



**AUTOMATIC GRAIN DRYER**  
**Continuous Flow / Automatic Batch**



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**Owners Operation Manual**  
**Sukup Manufacturing Company**  
**1555 - 255th Street P.O. Box 677**  
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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 USA or Distribution Centers - Arcola, Illinois; Aurora, Nebraska; Defiance, Ohio; Jonesboro, Arkansas; Cameron, 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.

**EXTENDED PORTABLE GRAIN DRYER WARRANTY** - Sukup warrants portable 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 should be mailed within two weeks of product delivery to certify warranty coverage.

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

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**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.

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**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:  
TRUCKER/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 judgment 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**

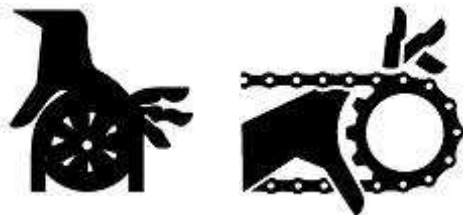
- Carefully review operators manual.
- Clean under unit, as fines may cause a bin fire.
- Check for gas leaks, (spray soapy solution on piping and joints.)
- Run fan at least a half minute before starting heater.
- NEVER start heater if you smell gas or hear a hissing sound.
- NEVER run heater with inspection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

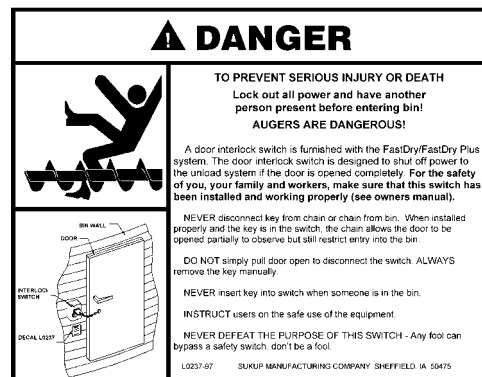
1. **WARNING-L0281**-To Avoid serious injury or death.



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 & secure parking stands before unhitching unit.



9. **DANGER - L0301**  
Rotating augers are dangerous!



**10. CAUTION - L0520**

Failure to keep unit clean may cause fire and serious injury or death.



**11. WARNING - L0164**

Metal is slippery when wet; Never carry items when climbing; Have another person present; Use safety harness & safety line; etc

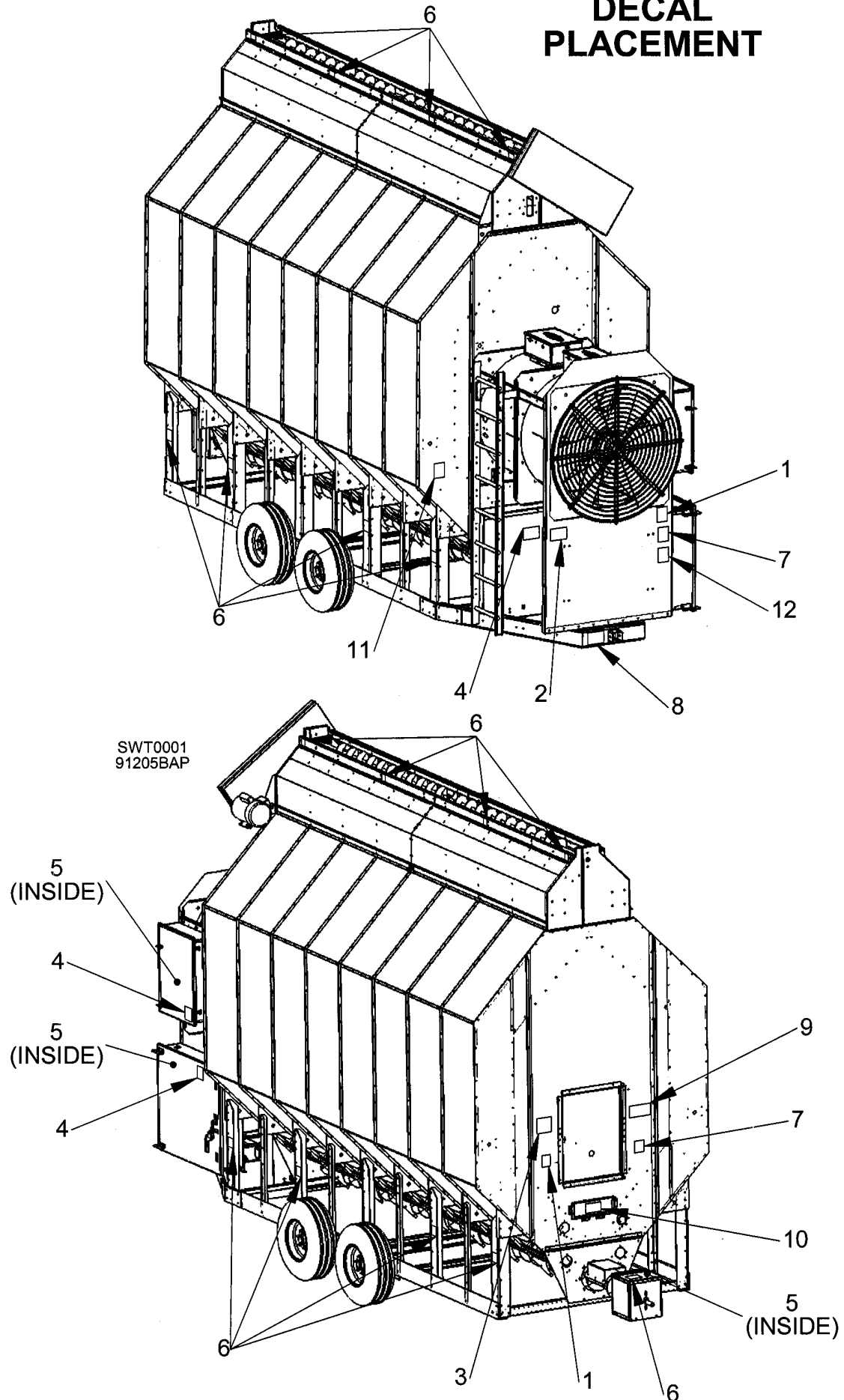


**12. WARNING - L0512**

Use safety chain when towing unit to eliminate detachment hazard.



## DECAL PLACEMENT



## 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.

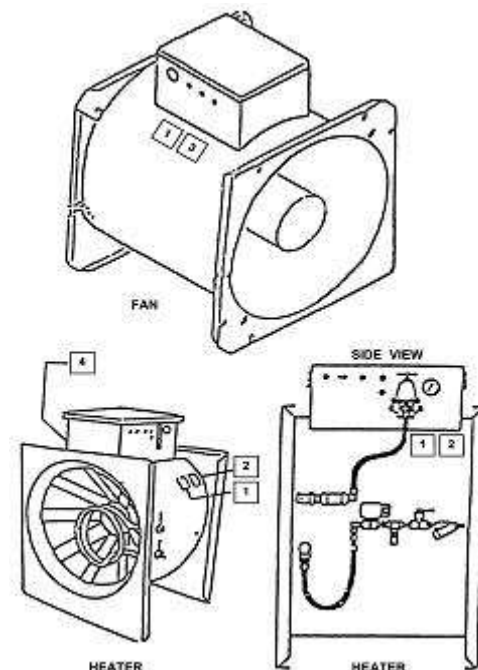


### 4. DANGER - L0204

Close service door.



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



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## Emergency Shutdown Locations

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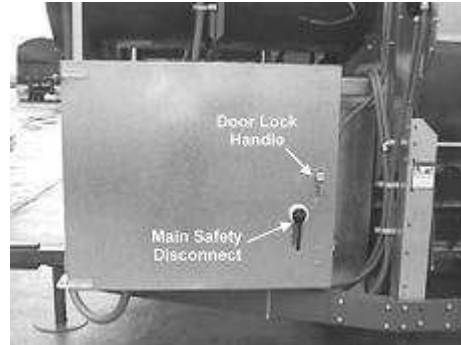
### Emergency Shutdown Locations

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**



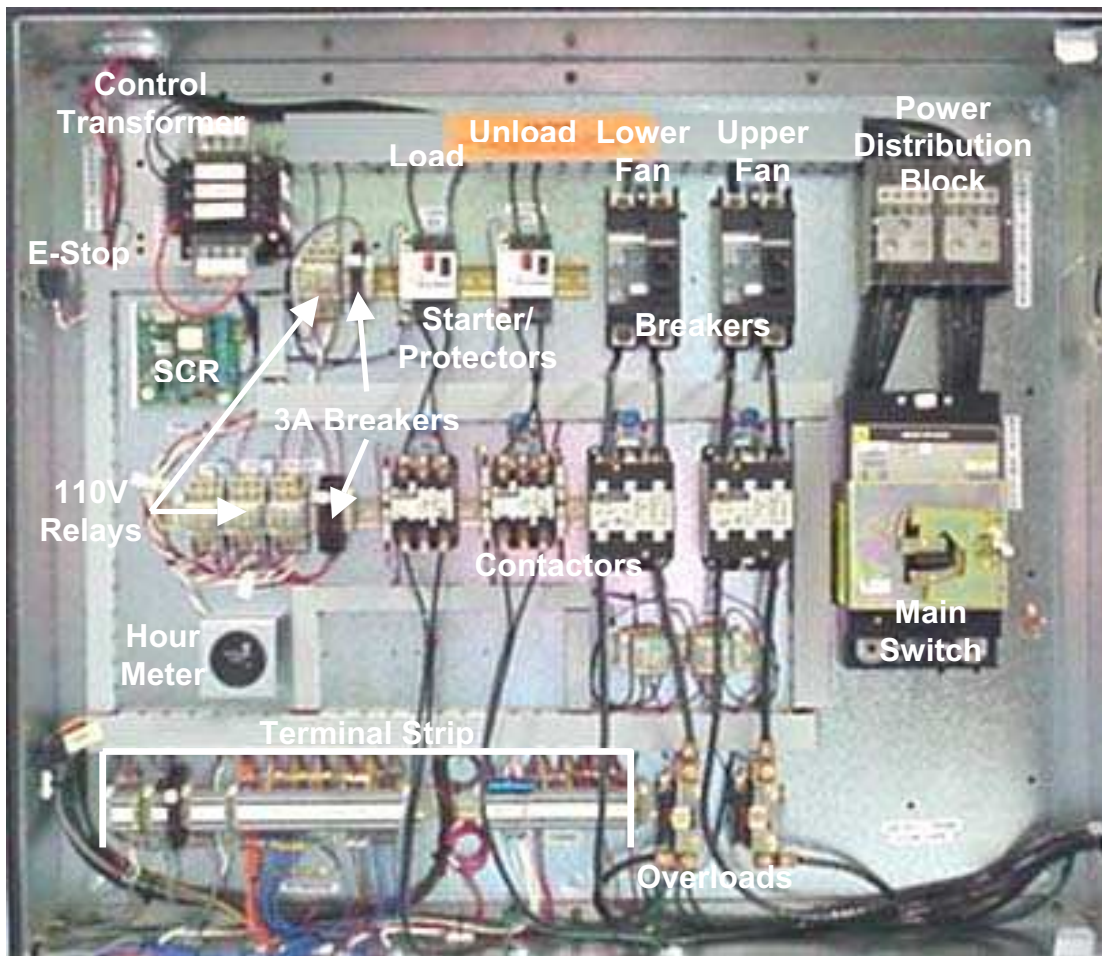
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## Power Box Component Location

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### Power Box Component Location

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



**\***

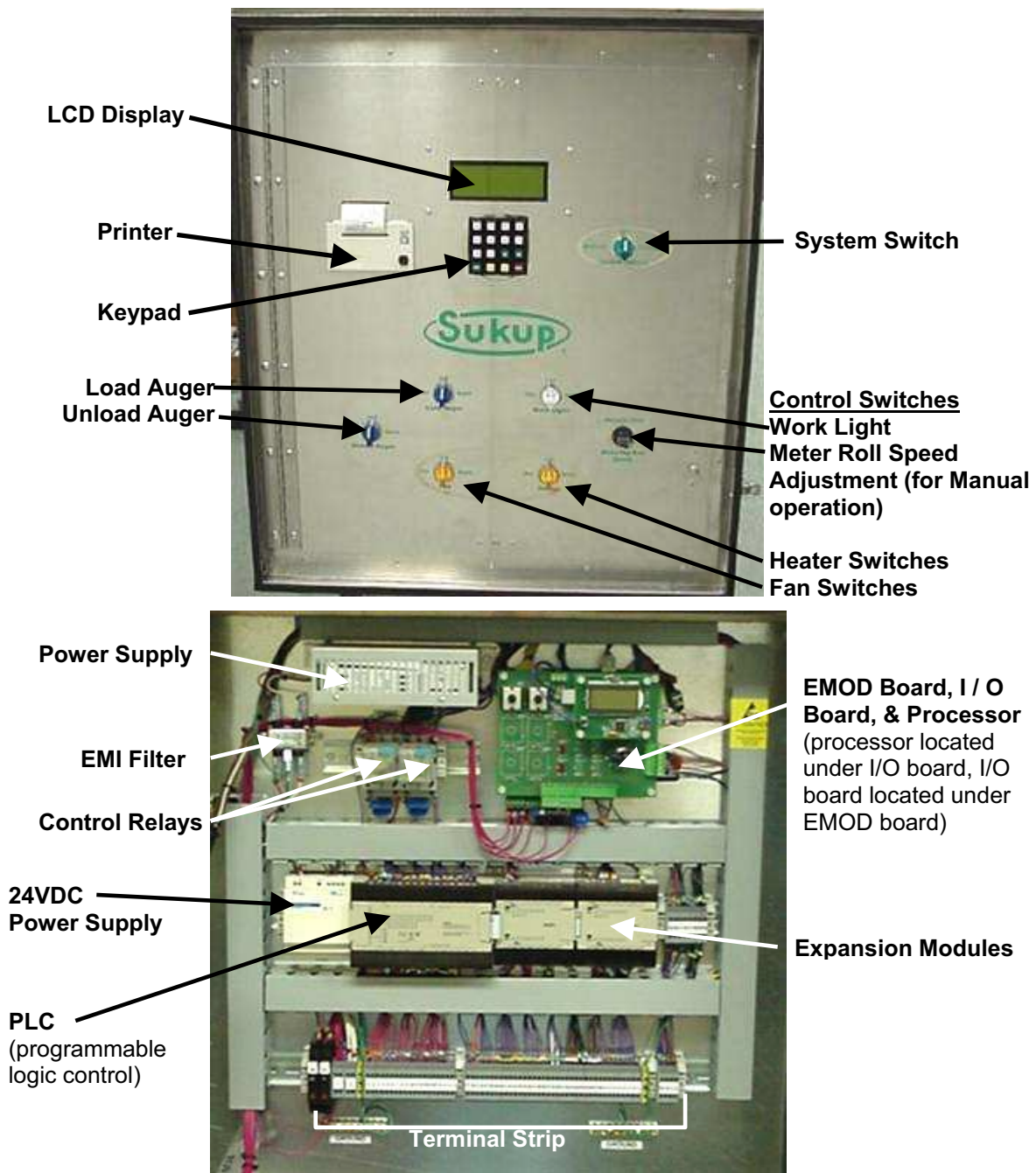
**Important Note:** During initial setup or after relocation of the dryer, it is highly recommended that ALL of the main power wiring connections be inspected for security and tight connections. The wires are tightened at the factory; however the connections should be checked after transport.

Note

All power boxes are wired to prevent EMC conditions. Varistor and Snubber networks are provided for extra protection against electromagnetic charges. When installing and running the dryer, do not remove any EMC protection.

## Control Box Components Location

### Control Box Components Location



#### Note

All control boxes are wired to prevent EMC conditions. Varistor and Snubber networks are provided for extra protection against electromagnetic charges. When installing and running the dryer, do not remove any EMC protection.

**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 vapor solenoids are opened and a 10-second ignition attempt occurs. ([See picture on page 21](#)).

**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.

### Plenum Temperature Adjustment Liquid Propane systems

To adjust the plenum temperature, refer to the Dryer Operation section of the Operators Manual

### 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 right.



### 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 heat from the burner. A vapor high limit fault will shut the dryer down if the vapor fault exceeds 120 °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.**

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**Heater**

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**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 (see chart below).

**Caution**

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

**Heater Orifice and Port Cup Configurations**

| <b>Liquid Propane (LP)</b>   | <b>44" 40HP</b>    | <b>44" 30HP</b>   | <b>44" 15HP</b>   | <b>38" 10,15,20HP</b> | <b>28" 15HP</b>   | <b>28" 20HP</b>   |
|------------------------------|--------------------|-------------------|-------------------|-----------------------|-------------------|-------------------|
| <b>High-Temp Orifice</b>     | D71125<br>(25/64") | D7113<br>(23/64") | D7112<br>(19/64") | D7112<br>(19/64")     | D7110<br>(13/64") | D7106<br>(17/64") |
| <b>High-Temp Port Cup</b>    | D4044<br>(3/4")    | D4044<br>(3/4")   | D4044<br>(3/4")   | D4044<br>(3/4")       | D4027<br>(9/16")  | D4027<br>(9/16")  |
| <b>Flame Deflector</b>       | Yes                | Yes               | Yes               | Yes                   | No                | No                |
| <b>Intermediate Orifice</b>  | D71125<br>(25/64") | D7113<br>(23/64") | D7112<br>(19/64") | D7112<br>(19/64")     | N/A               | N/A               |
| <b>Intermediate Port Cup</b> | D40443<br>(9/16")  | D40443<br>(9/16") | D40443<br>(9/16") | D40443<br>(9/16")     | N/A               | N/A               |
| <b>Flame Deflector</b>       | Yes of No          | Yes of No         | Yes of No         | Yes of No             | N/A               | N/A               |
| <b>Low-Temp Orifice</b>      | D7112<br>(19/64")  | D7112<br>(19/64") | D7110<br>(13/64") | D7110<br>(13/64")     | D7125<br>(11/64") | D7125<br>(11/64") |
| <b>Low-Temp Port Cup</b>     | D4041<br>(3/8")    | D4041<br>(3/8")   | D4041<br>(3/8")   | D4041<br>(3/8")       | D4025<br>(3/8")   | D4025<br>(3/8")   |
| <b>Flame Deflector</b>       | No                 | No                | No                | No                    | No                | No                |

| <b>Natural Gas (NG)</b>      | <b>44" 40HP</b>   | <b>44" 30HP</b>   | <b>44" 15HP</b>    | <b>38" 10,15,20HP</b> | <b>28" 15HP</b>    | <b>28" 20HP</b>    |
|------------------------------|-------------------|-------------------|--------------------|-----------------------|--------------------|--------------------|
| <b>High-Temp Orifice</b>     | D71128<br>(5/8")  | D71127<br>(9/16") | D71124<br>(1/2")   | D71124<br>(1/2")      | D71125<br>(25/64") | D71125<br>(25/64") |
| <b>High-Temp Port Cup</b>    | D4044<br>(3/4")   | D4044<br>(3/4")   | D4044<br>(3/4")    | D4044<br>(3/4")       | D4027<br>(9/16")   | D4027<br>(9/16")   |
| <b>Flame Deflector</b>       | No                | No                | No                 | No                    | No                 | No                 |
| <b>Intermediate Orifice</b>  | D71128<br>(5/8")  | D71127<br>(9/16") | D71124<br>(1/2")   | D71124<br>(1/2")      | N/A                | N/A                |
| <b>Intermediate Port Cup</b> | D40443<br>(9/16") | D40443<br>(9/16") | D40443<br>(9/16")  | D40443<br>(9/16")     | N/A                | N/A                |
| <b>Flame Deflector</b>       | No                | No                | No                 | No                    | N/A                | N/A                |
| <b>Low-Temp Orifice</b>      | D71129<br>(7/16") | D71129<br>(7/16") | D71131<br>(23/64") | D71131<br>(23/64")    | D7112<br>(19/64")  | D7112<br>(19/64")  |
| <b>Low-Temp Port Cup</b>     | D4041<br>(3/8")   | D4041<br>(3/8")   | D4041<br>(3/8")    | D4041<br>(3/8")       | D4025<br>(3/8")    | D4025<br>(3/8")    |
| <b>Flame Deflector</b>       | No                | No                | No                 | No                    | No                 | No                 |

**High-Temp** = Approx. 80-180°F Rise Above Ambient Air Temp

**Intermediate** = Approx. 60-160°F Rise Above Ambient Air Temp

**Low-Temp** = Approx. 40-80°F Rise Above Ambient Air Temp

### 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.

|                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------|
| <p><b>DRY FIRE OPTIONS</b><br/><b>1 = FAN 2 = FAN + HEAT</b><br/><b>3 = ROLLER RAMP TEST</b><br/><b>9=ROLLER/SCR ADJUST</b></p> |
|---------------------------------------------------------------------------------------------------------------------------------|

### 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 fan and/or heater 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.



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



4. Work Light Test
  - a. 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.
  - b. 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.

### Important

See Standard Dryer Parts Assemblies Manual for part numbers.

### 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

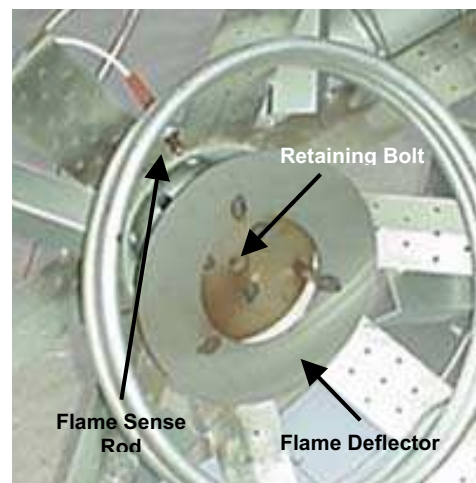
1. Remove fan inlet screen. Check for foreign material on fan blade. Check that the fan rotates freely and that all blade tip clearances are the same.
2. Check ventilation openings in motor for any blockage. Pay close attention to inside of fan hub. Reinstall fan inlet screen.



### Warning

**NEVER run fan without screen guard securely attached to fan housing!**

3. 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.
4. Examine the flame sense rod (J5747) for cracked porcelain insulation.
5. Examine spark plug (J5739) 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.



6. 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 Flame Deflector).

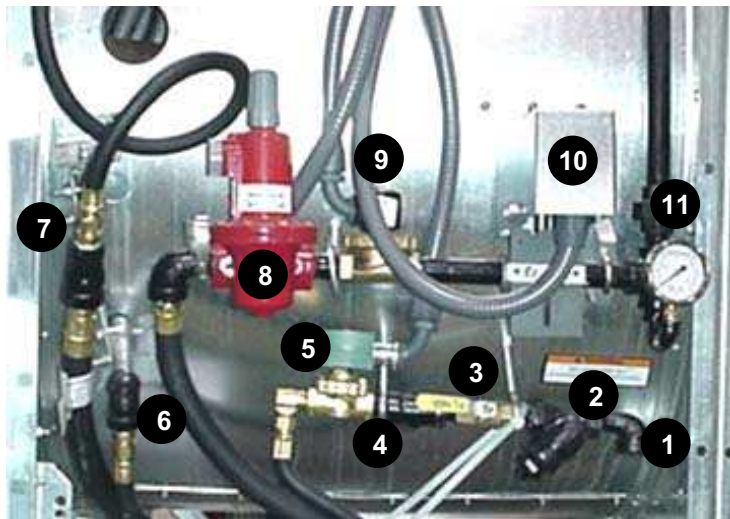
Inspect Vaporizer, Diffuser, and Flame deflector for damage and physical integrity.

### 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.**

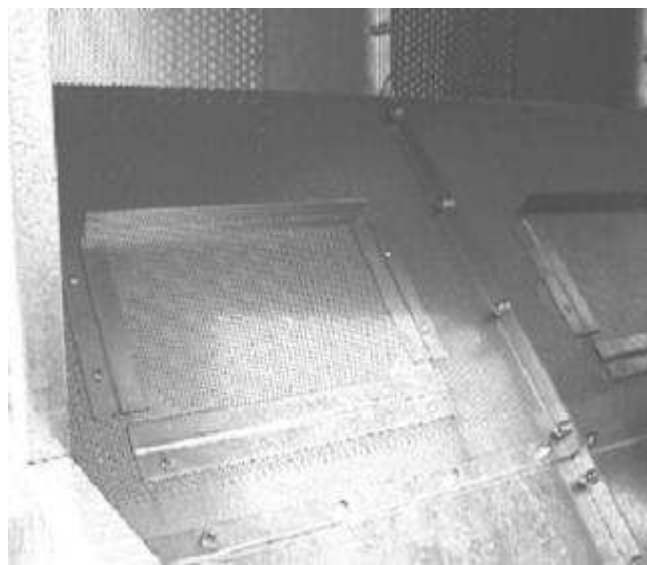
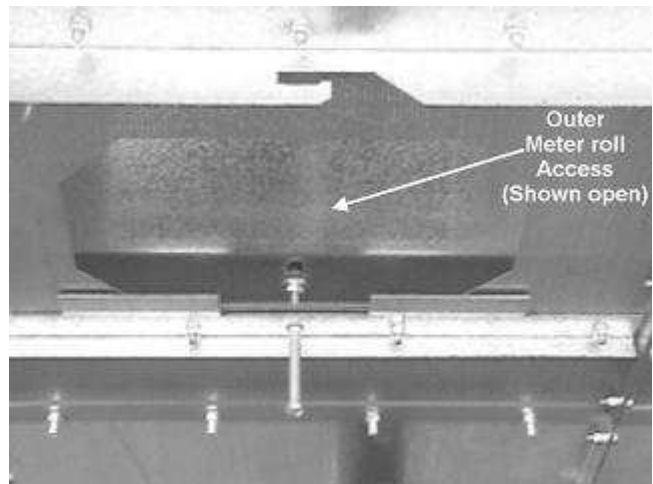
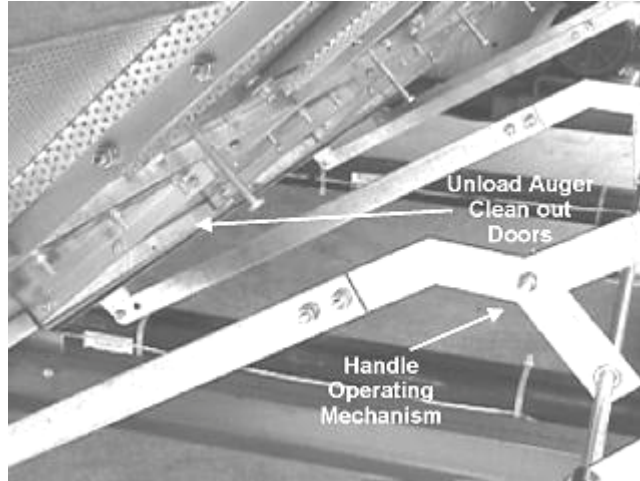
7. Remove and clean the gas strainer.
8. Inspect all valve train components for physical integrity.
9. Inspect all valve train connections for tightness.

### Liquid Propane



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. Pressure Regulator
9. Vapor Solenoid
10. Electronic Modulating Valve
11. Vapor Pressure Gauge

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



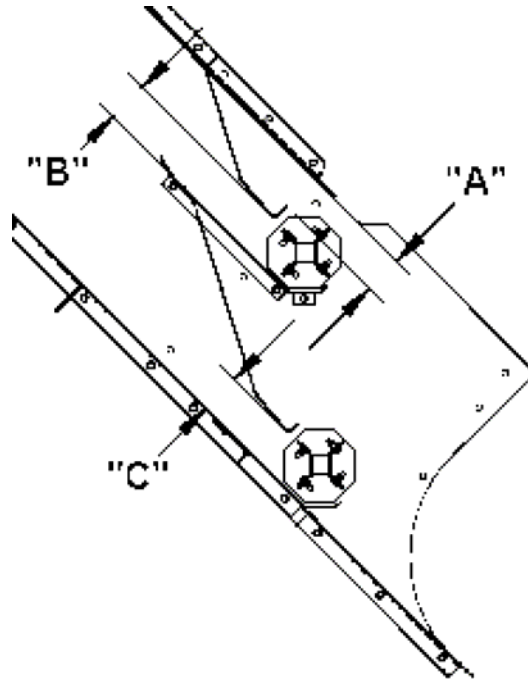


12. Remove any accumulation of fines, dirt or foreign material from the bottom auger trough area, meter rolls and lower column.
13. Inspect unload auger, 1 ¼" auger end flange bearings and wooden hanger bearing and flighting for damage and security.
14. Inspect meter rolls for damage and security.
15. 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 THE ADJUSTMENTS. SUKUP MFG. COMPANY WILL NOT BE RESPONSIBLE FOR ANY CIRCUMSTANCE THAT MAY ARISE AS A RESULT OF THESE ADJUSTMENTS.



| Dryer Length | Dimension (Column) | A      | C      |
|--------------|--------------------|--------|--------|
| 8'           | Front 3            | 2"     | 1 3/4" |
|              | Rear 1             | 1 3/4" | 2"     |
| 10'          | Front 4            | 2"     | 1 3/4" |
|              | Rear 1             | 1 3/4" | 2"     |
| 12'          | Front 4            | 2"     | 1 3/4" |
|              | Rear 2             | 1 3/4" | 2"     |
| 16'          | Front 6            | 2"     | 1 3/4" |
|              | Rear 2             | 1 3/4" | 2"     |
| 20'          | Front 7            | 2"     | 1 3/4" |
|              | Rear 3             | 1 3/4" | 2"     |
| 24'          | Front 9            | 2"     | 1 3/4" |
|              | Rear 3             | 1 3/4" | 2"     |
| 28'          | Front 11           | 2"     | 1 3/4" |
|              | Rear 3             | 1 3/4" | 2"     |

**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**

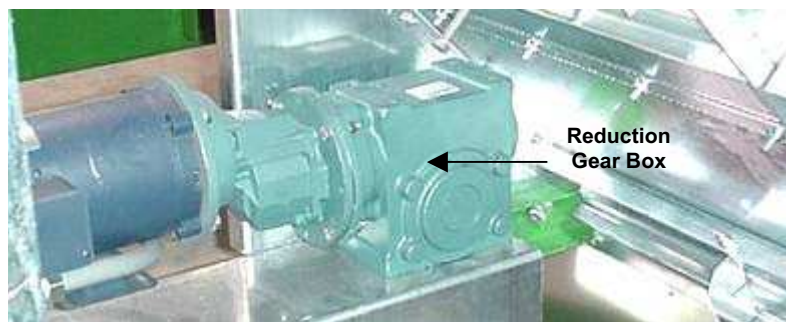
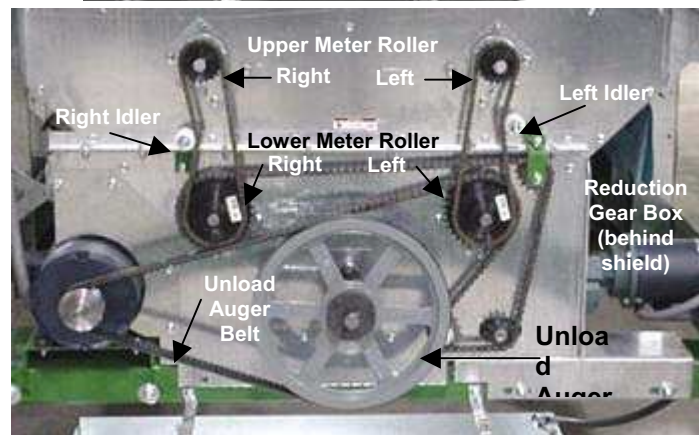
When inner flow gate adjustment bolt adjustment reaches 3 1/4" or outer flow gate bolt adjustment reaches 3 1/8" a free flow condition may occur. This is when the grain is able to flow freely over metering rolls.

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

**Warning**

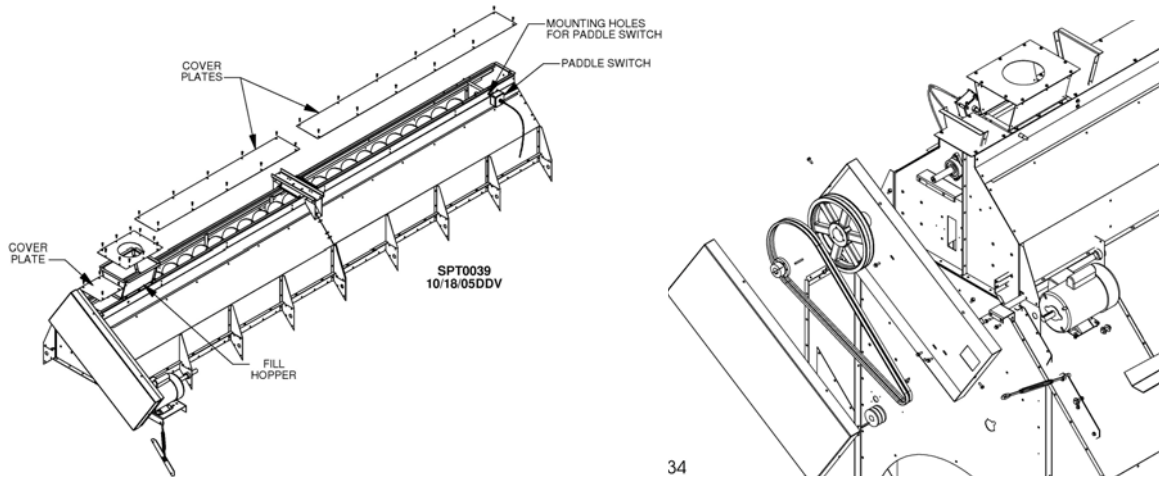
**Ensure electrical power is locked out**

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



28. Inspect load auger drive pulleys for damage and security
29. 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.
30. Inspect load auger end flange bearings and mid wood hanger bearing for wear or damage.
31. Inspect flighting for wear or damage.

### Note

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

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

### Operational Check

34. 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 sampling mode. During this operation, the dryer adjusts the meter roll speed for variances seen in the average 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. See Grain Transfer section on [page 52](#).

### 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 the 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. See Manual Control section on [page 42](#).

### Grain Dryer Control System Menus

#### Quick Reference Guide V4.3A

[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**

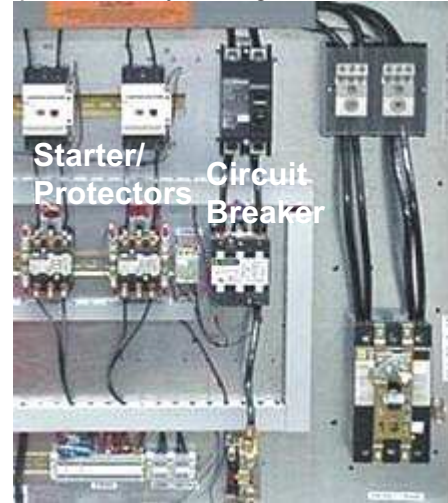
- 1 – Perform Electronic Mod Valve Diagnostics (if applicable)
- 2 – Perform Dryer Dry Fire Diagnostics
- 4 – Monitor Sensors
- 5 – Select Moisture Sensor
- 6 – Select Processor PCB Version
- 7 – Select Temperature Units (F or C)

### Before Loading or Starting the Dryer

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

### 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 (see below).
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 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 \(p. 32\)](#)
- [Automatic Batch p. 47](#)
- [Manual p. 42](#)
- [Grain Transfer p. 52](#)

**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/<br>Stabilization | Restart w/<br>Stabilization | Restart |
|-----------------------------------------------------------------|---------------------------------|-----------------------------|---------|
| All wet grain, No gradient established                          | Yes                             | No                          | No      |
| Shutdown greater than 1 Hours, gradient established, grain cool | 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.

|                             |                |
|-----------------------------|----------------|
| <b>** SYSTEM READY **</b>   |                |
| <b>SET SWITCHES TO AUTO</b> |                |
| <b>THEN PRESS START</b>     |                |
| <b>8/22/05</b>              | <b>12:45PM</b> |

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

|                     |          |
|---------------------|----------|
| <b>CONT. FLOW</b>   | <b>1</b> |
| <b>AUTOBATCH</b>    | <b>2</b> |
| <b>GRAIN TRANS.</b> | <b>3</b> |
| <b>FINAL DRY</b>    | <b>4</b> |

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

|                           |              |
|---------------------------|--------------|
| <b>OPERATION</b>          | <b>PRESS</b> |
| <b>INITIAL DRY</b>        | <b>1</b>     |
| <b>STAB &amp; RESTART</b> | <b>2</b>     |
| <b>RESTART</b>            | <b>3</b>     |

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 in Troubleshooting 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 within 15 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. Often, 100 seconds is not sufficient to stabilize the plenum. The plenum temperature is indicated on the LCD display located on the control box.

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

The mod valve will now adjust to reach a plenum temperature of 160° F for each plenum. 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<br>Removed | Plenum<br>160 | Plenum<br>170 | Plenum<br>180 | Plenum<br>190 | Plenum<br>200 | Plenum<br>210 | Plenum<br>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 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 15 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 plenum temperature, current moisture, grain 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.

## General Dryer Operation

### Print-out Information

Once the dryer is running, discharged grain temperature, current moisture, 3-minute moisture average as well as the current roll order and plenum temperature 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. Initial Dry, Restart, or Restart with Stabilization

Moisture setting

Maximum meter roll setting

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 and can be adjusted to not print or to print every 10 minutes.

#### SUKUP AUTO DRYER \*\* VERSION 4.3A \*\*

SINGLE FAN DRYER  
CONTINUOUS FLOW OPERATION  
INITIAL DRY

DATE: 2/01/06 TIME: 2:15PM

INPUT MOISTURE = 22.5%

OUTPUT MOISTURE SETPOINT= 16.5%

MAXIMUM ROLL = 50%

MINIMUM ROLL = 10%

MOISTURE CAL ADJ = 0.0%

TEMP. CAL ADJUST = 0

-----  
2:15PM INITIAL LOAD STARTED

2:15 INITIAL LOAD COMPLETED

2:17PM INITIAL DRY STARTED – 30.0 MIN.

2:47PM INITIAL DRY COMPLETED

PLENUM TEMPERATURE = 220F

CALCULATED INIT. ROLL = 26%

2:48PM STABILIZATION STARTED-54.7 MIN.

3:43PM STABILIZATION COMPLETED

#### SAMPLING 10 MIN PRINTOUT

| TIME | OUT TEMP | OUT MOIST | ROLL SPEED | COL TEMP | PLEN TEMP |
|------|----------|-----------|------------|----------|-----------|
|------|----------|-----------|------------|----------|-----------|

|      |      |       |     |      |      |
|------|------|-------|-----|------|------|
| 3:43 | 125F | 16.4% | 39% | 190F | 220F |
|------|------|-------|-----|------|------|

|      |      |       |     |      |      |
|------|------|-------|-----|------|------|
| 3:53 | 125F | 16.5% | 39% | 191F | 220F |
|------|------|-------|-----|------|------|

|      |      |       |     |      |      |
|------|------|-------|-----|------|------|
| 4:03 | 125F | 16.6% | 39% | 190F | 220F |
|------|------|-------|-----|------|------|

4:05PM USER SHUTDOWN

Program version number

Operation selected  
Continuous Flow, Automatic  
Batch, or Grain Transfer

User entered incoming  
moisture content

Minimum meter roll setting

Moisture sensor calibration  
adjustment indicator

Computer calculated time for  
stabilization

Prints time, output  
temperature, output  
moisture, roll speed, column  
temperature, and plenum  
temperature.

Whenever 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**

After the heater adjusts, 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 with all other switches to off. If the computer is operational, the following screen will appear:



The dryer is now ready for manual operation.

**\*\* SYSTEM READY \*\***  
**\*\* MANUAL CONTROL \*\***  
**START TO MONITOR**  
**8/22/05 12:45PM**

#### Step 1. Load Dryer

Load the dryer, by turning the load auger switch to "ON". At this time the dryer will load. 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:

**\*\* MANUAL CONTROL \*\***  
**NO AUTO CONTROL OR**  
**SENSE OF METER ROLLS**  
**START TO CONTINUE**

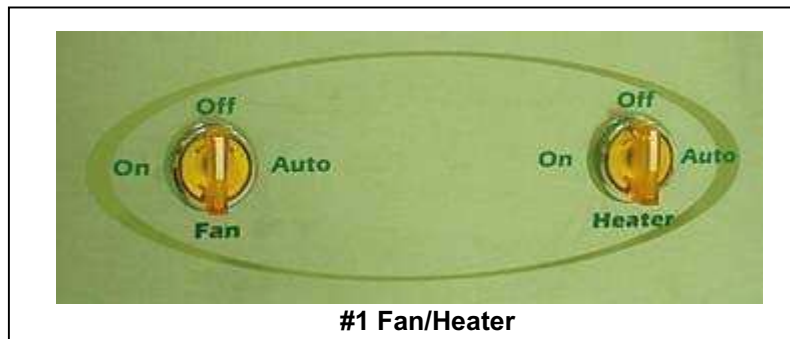
Press any key on keypad to continue to the monitoring function.

### 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 on the LCD by pressing [SET] + [2].

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 by pressing [SET] + [2] for the plenum temperature adjust.

### 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 a starting point, adjust as necessary for each dry. (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 999, 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 (Approximate)

| 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.

| <b>Deviation Above Set Point</b> | <b>Decrease Meter Roll Setting</b> |
|----------------------------------|------------------------------------|
| 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**

| <b>Deviation Below Set Point</b> | <b>Increase Meter Roll Setting</b> |
|----------------------------------|------------------------------------|
| 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.

| <b>Start/Restart scenario</b>                                   | <b>Initial Dry w/<br/>Stabilization</b> | <b>Restart w/<br/>Stabilization</b> | <b>Restart</b> |
|-----------------------------------------------------------------|-----------------------------------------|-------------------------------------|----------------|
| All wet grain, No gradient established                          | Yes                                     | No                                  | No             |
| Shutdown greater than 1 Hours, gradient established, grain cool | 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 plenums at the same temperature.**

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

Begin automatic batch by pressing 2.

|                       |          |
|-----------------------|----------|
| <b>CONT. FLOW</b>     | <b>1</b> |
| <b>AUTOBATCH</b>      | <b>2</b> |
| <b>GRAIN TRANSFER</b> | <b>3</b> |
| <b>FINAL DRY</b>      | <b>4</b> |

#### 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 15 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**

## General Dryer Operation

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<br>Possibly lower dry time (Check printer tape). | Yes               |
| Shutdown 1 to 6 Hours, grain warm            | Yes<br>Possibly lower dry time (Check printer tape). | Yes               |
| Change of plenum temperature more than 20°F. | No<br>(Check moisture of next batch)                 | No                |
| Shutdown less than 1 Hour                    | Yes<br>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.

|                     |          |
|---------------------|----------|
| <b>CONT. FLOW</b>   | <b>1</b> |
| <b>AUTOBATCH</b>    | <b>2</b> |
| <b>GRAIN TRANS.</b> | <b>3</b> |
| <b>FINAL DRY</b>    | <b>4</b> |

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

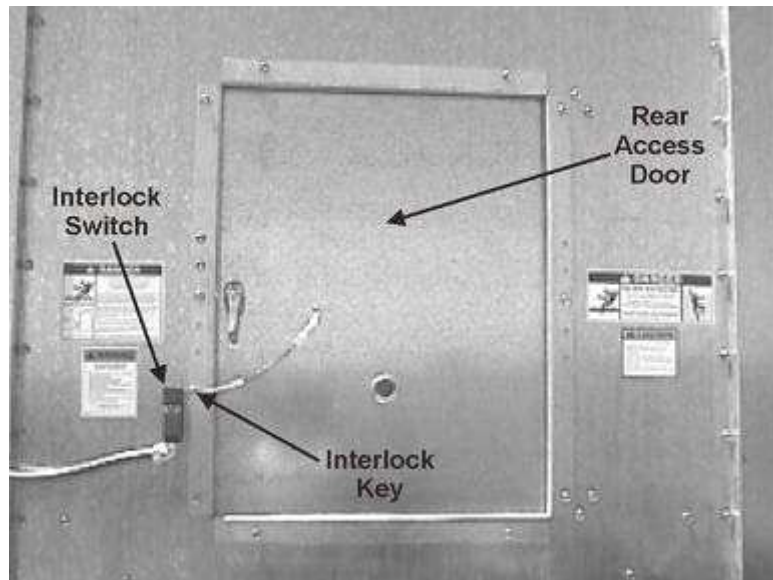
#### Start of Drying Season requirements

At the start of every drying season, the Trantorque screw on each fan(s) must be checked for proper torque. See Appendix A in the Installation-Service part of the manual for more information.

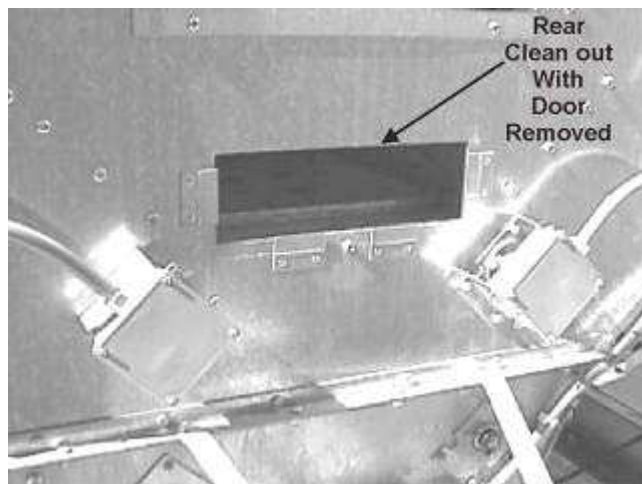
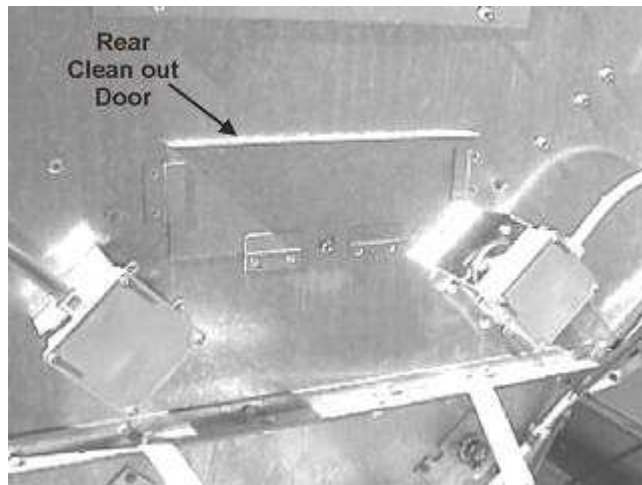
#### Daily Maintenance requirements

This assumes 24-hour day operation during harvest.

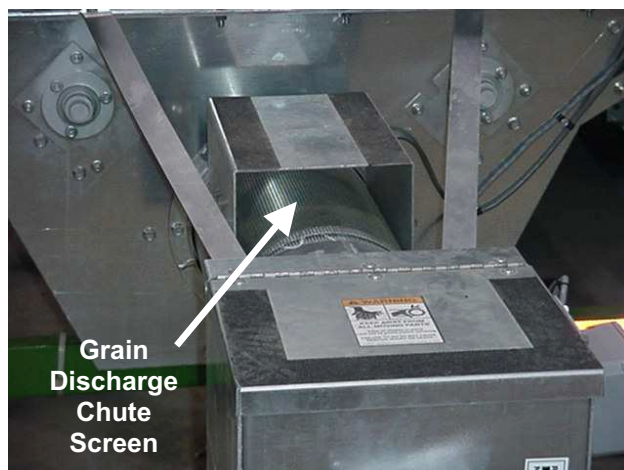
1. Clean foreign material from fan air inlet screen.
2. Sweep off top of exhaust slope where fines may have accumulated on the outer perforated skins.
3. Visually inspect for an even grain movement along all perforated panels of the lower outer grain column slope. If grain in one section is not moving, 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.



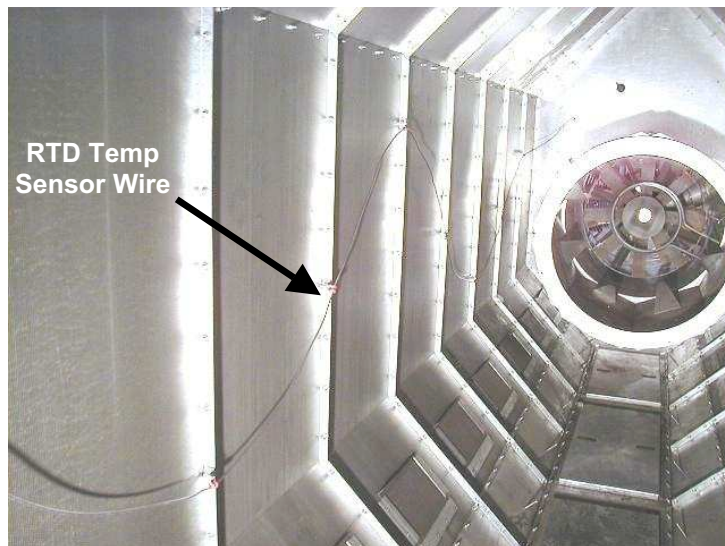
## Functional Maintenance Requirements

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



Reinstall moisture sensor.

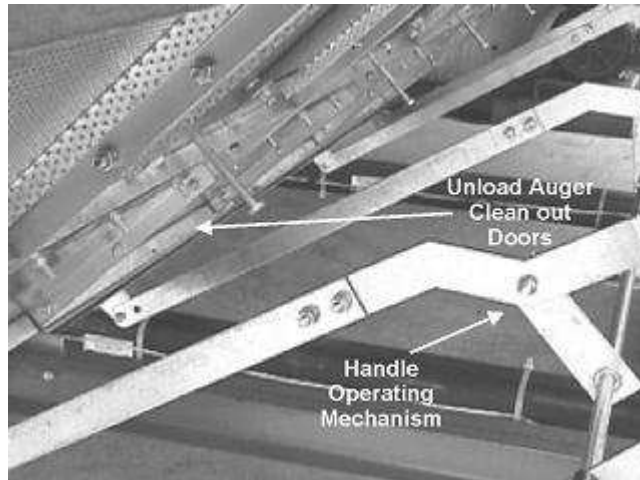
11. Inspect temperature sensor wire (RTD). Clean if necessary.



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.

---

## Functional Maintenance Requirements

---

### 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).

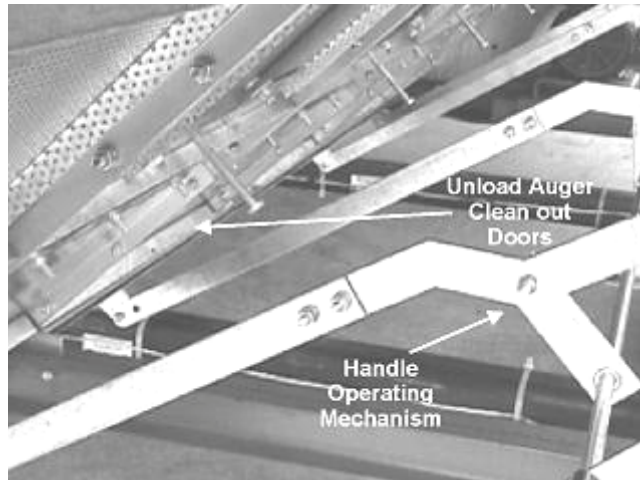
### End of Season Maintenance requirements

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.

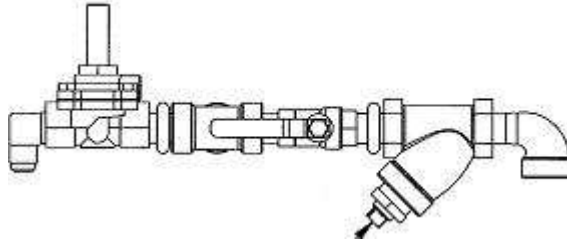
2. Perform all steps listed in prior to season maintenance inspection.
3. Reinstall all access panels and doors with one exception. **Leave the Unload Auger clean out doors open for water drainage.**



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. Remove discharge moisture sensor from grain discharge chute and put into sensor holder (sensor could be covered in standing water if left inside tube).

### Pre-Season Maintenance requirements

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 16](#)). 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.
4. Remove Wye strainer on the Liquid pipe train (see picture below) and clean out all fines. Replace strainer.



## 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. <b>(Grain may over dry)</b><br>✓ Ensure that take-away system is operating properly.<br>✓ 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.<br>✓ 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      |

## Shutdown Faults

### Housing High Temperature Alarm

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

| Possible Problems                      | Possible Solutions                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Housing temperature has exceeded 200°F | <ul style="list-style-type: none"><li>✓ Manually reset switch in heater box of proper heater after temperature has gone down. Refer to heater operation section.</li><li>✓ Check condition of fan blade and for proper rotation.</li><li>✓ Check for plugged fan grill.</li><li>✓ Check for defective MOD valve.</li></ul> |

### Vaporizer High Temperature Alarm

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

| Possible Problems         | Possible Solutions                                                                                                                                                                                                                  |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vapor coil exceeded 120°F | <ul style="list-style-type: none"><li>✓ Supply tank may be low. Fill tank</li><li>✓ Vaporizer misadjusted, readjust, and refer to the heater operation section.</li><li>✓ Fan airflow obstructed. Check for obstructions.</li></ul> |

### Plenum High Temperature Alarm

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

| Possible Problems                        | Possible Solutions                                                                                                                                                                                                                    |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature exceeded 325°F for capillary | <ul style="list-style-type: none"><li>✓ Check plenum by placing back of hand near rear door, checking for heat. If ok, remove interlock key and assess problem.</li><li>✓ Plenum temperature set too high (adjust setting).</li></ul> |

### Grain Column High Temperature Alarms

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

| Possible Problems                | Possible Solutions                                                                                                                                                                                                                                                |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Column temperature exceeds 210°F | <ul style="list-style-type: none"><li>✓ Check for stagnant column that has overheated. Unplug if necessary.</li><li>✓ Lower plenum temperature if no columns are plugged.</li><li>✓ Unload dryer and check for restrictions, plugging, or slow columns.</li></ul> |

## 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. | <ul style="list-style-type: none"><li>✓ 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.</li></ul> |

### 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. | <ul style="list-style-type: none"><li>✓ Check sensor calibration adjustments (MODE + 4)</li><li>✓ Perform calibration procedure as described on Pg 40 or enter calibration offsets from start screen "SET" menu.</li><li>✓ Check if motor is rotating.</li><li>✓ Check if sensor is placed in operating position.</li></ul> |

### 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 | <ul style="list-style-type: none"><li>✓ Check for obstruction in meter rolls.</li><li>✓ Check chain linkage for broken chain.</li><li>✓ Check proximity switch adjustment.</li></ul> |

### 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. | <ul style="list-style-type: none"><li>✓ Dryer is not filling. Check load auger for proper operation.</li></ul>                                                          |
| Internal plenum pressure was lost during operation.          | <ul style="list-style-type: none"><li>✓ Wet bin has run out of grain and allowed inner plenum to release air pressure before out of wet grain timeout occurs.</li></ul> |
| Air switch out of calibration                                | <ul style="list-style-type: none"><li>✓ Contact your Sukup Dealer to adjust air switch.</li></ul>                                                                       |

## Shutdown Faults

### 10 Minute 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                                                                 |
|-------------------------------------------------|------------------------------------------------------------------------------------|
| Paddle switch not satisfied in under 10 minutes | ✓ Supply more grain to dryer.                                                      |
| 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

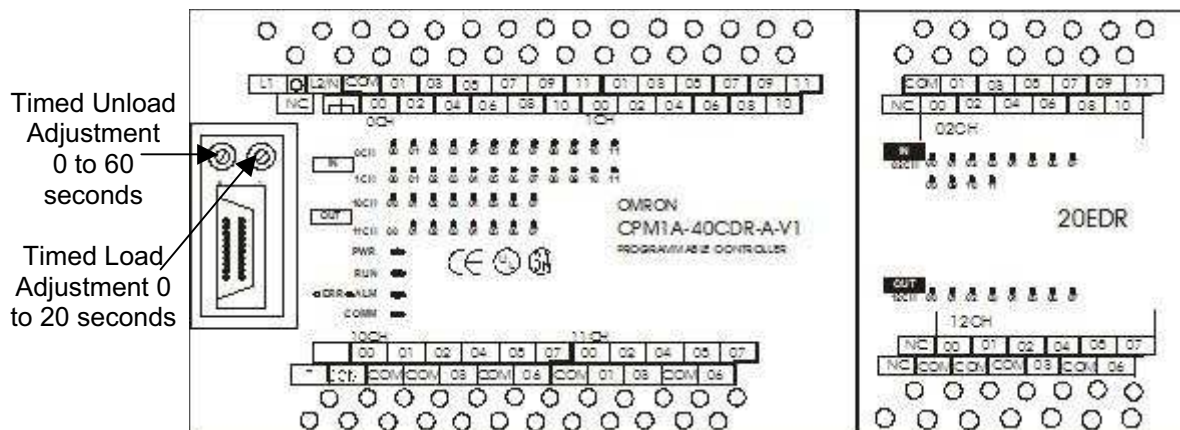
If you desire to have your unload system have a timed delay off function, (To clear augers so as not to heavily load them on restart), this is provided. This feature is adjustable from 0 to 60 seconds of "Off Delay".

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 | <ul style="list-style-type: none"> <li>✓ Unload Auger is turned off</li> <li>✓ Broken unload or meter roll</li> </ul> |

**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 | <ul style="list-style-type: none"> <li>✓ Heat set too low (Increase heat)</li> <li>✓ Temperature set point too high (Decrease temperature)</li> <li>✓ Contact Dealer if problem continues</li> </ul> |

**Defaults Set**

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

| Possible Problems                 | Possible Solutions                                                                                                                                                     |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Battery backed data has corrupted | <ul style="list-style-type: none"> <li>✓ If displayed multiple times when starting the dryer, contact your Dealer for battery backed data part replacement.</li> </ul> |

---

## Shutdown Faults

---

### Air Timeout

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

**LOWER AIR TIMEOUT  
(PLC) CHECK LOWER  
FAN AND AIR SWITCH  
PRESS ANY KEY**

### Heater Fault

This will occur on upper heater start if flame is not sensed within 15 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 62](#). 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.

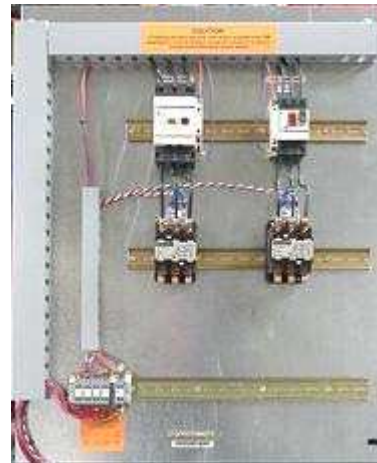
**Caution**

**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.

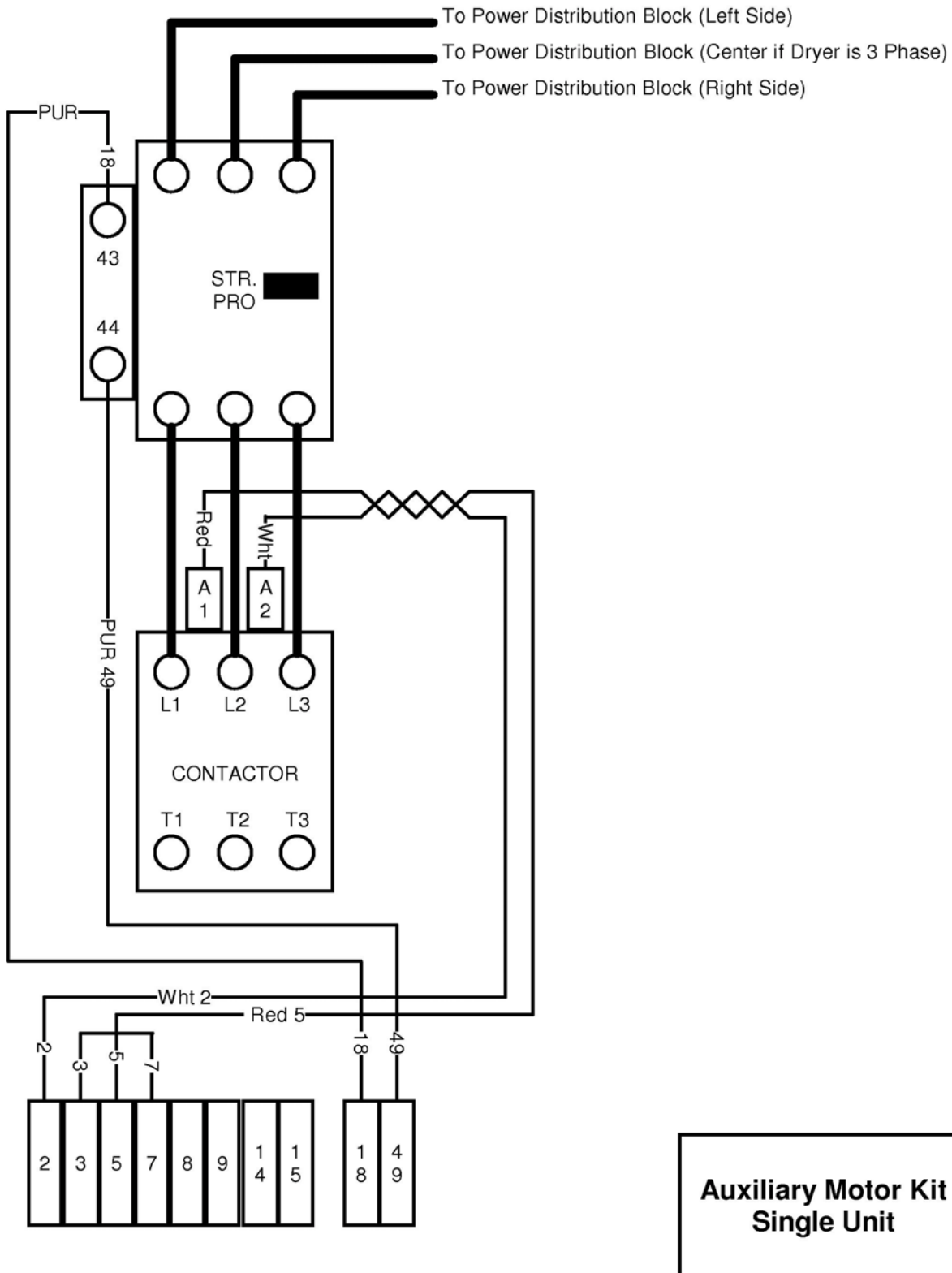
**Wiring the components**

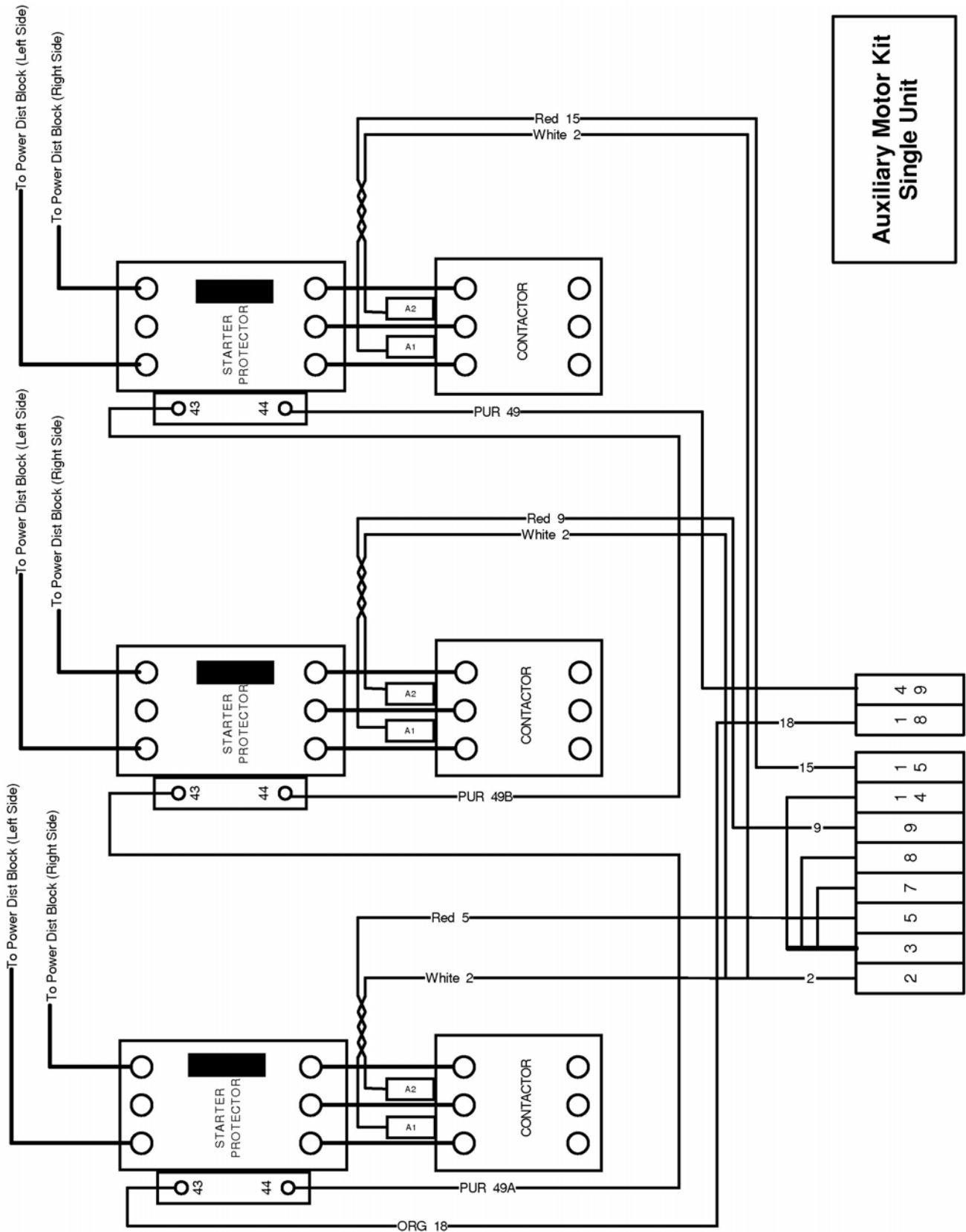
Three sets of wires must be installed for the auxiliaries:

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.**





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**Appendix B**

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

| <b>Dryer</b>    | <b>12 Foot<br/>1 Module</b> | <b>16 Foot<br/>1 Module</b> | <b>20 Foot<br/>1 Module</b> | <b>24 Foot<br/>1 Module</b> | <b>16 Foot<br/>2 Module</b> | <b>20 Foot<br/>2 Module</b> | <b>24 Foot<br/>2 Module</b> | <b>20 Foot<br/>3 Module</b> | <b>24 Foot<br/>3 Module</b> |
|-----------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 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 C – 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 is 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.

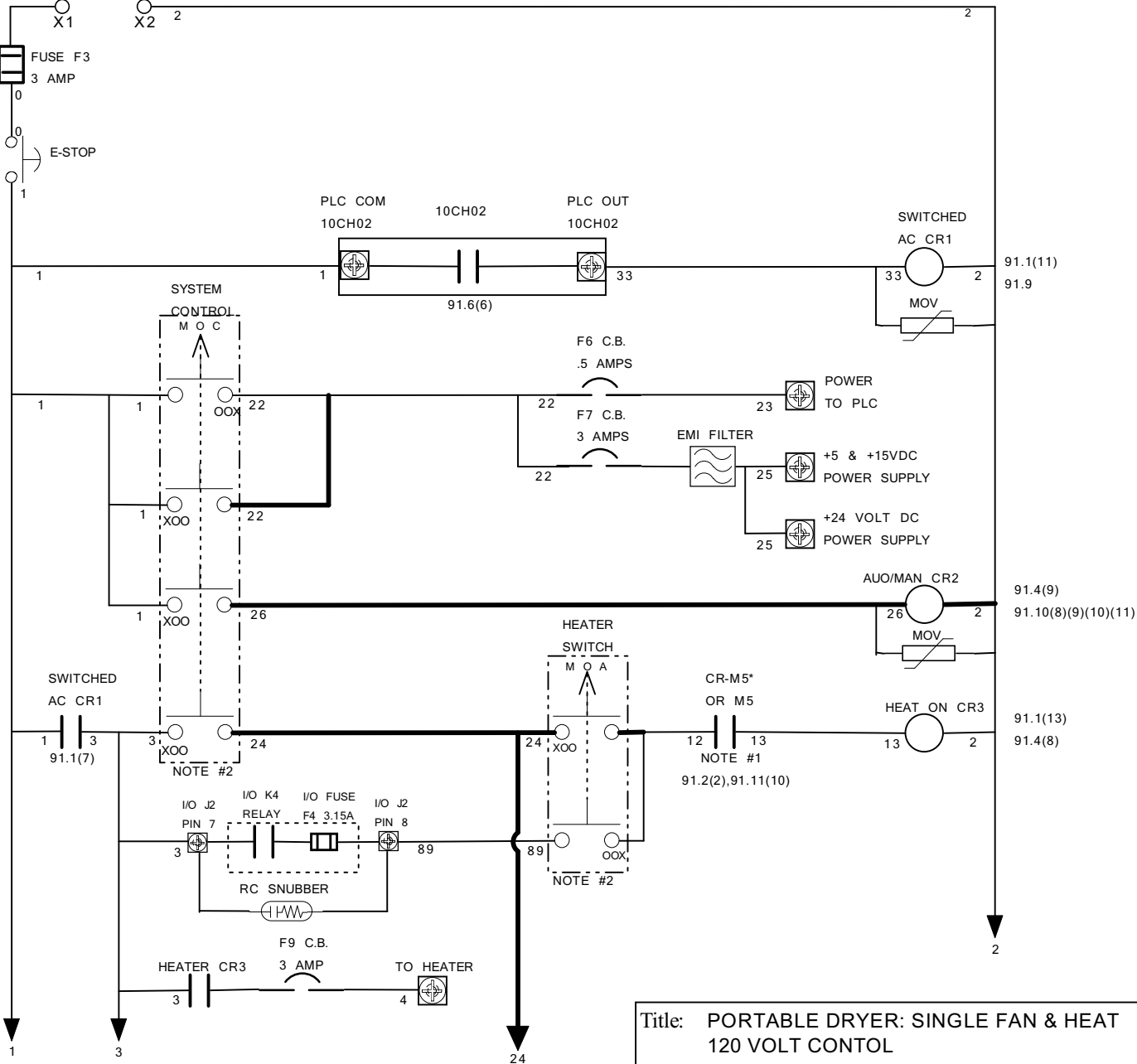
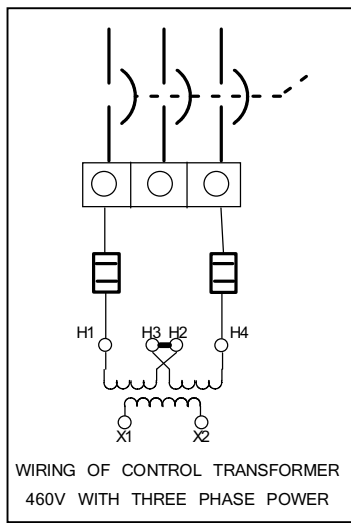
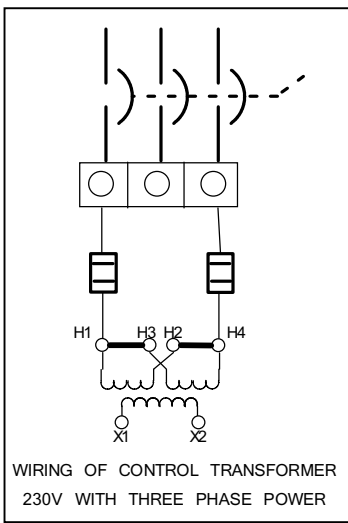
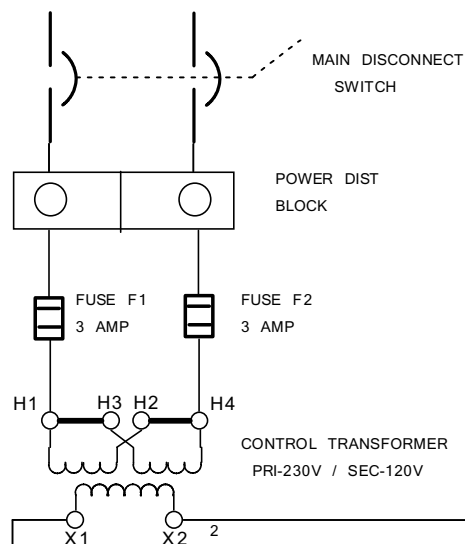
**For Grain Transfer**

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

**Appendix D**

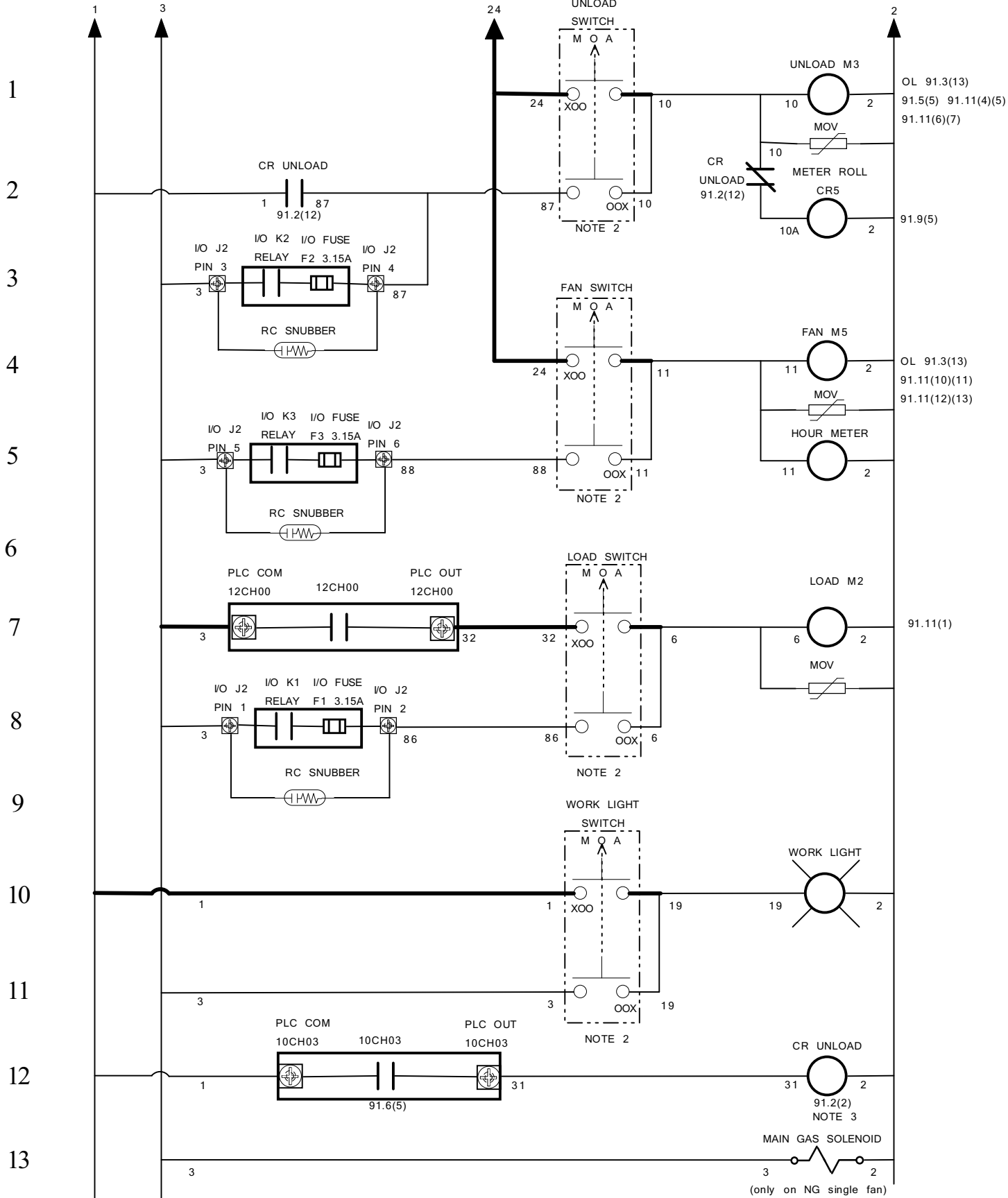
**Single Fan Ladder Diagrams**

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13



|                                                              |             |
|--------------------------------------------------------------|-------------|
| Title: PORTABLE DRYER: SINGLE FAN & HEAT<br>120 VOLT CONTROL |             |
| Author: KWC                                                  |             |
| Date: 01/01                                                  | Sheet: 91.1 |
| Revision: 1/08                                               |             |

— MANUAL CONTROL — AUTO/COMPUTER CONTROL



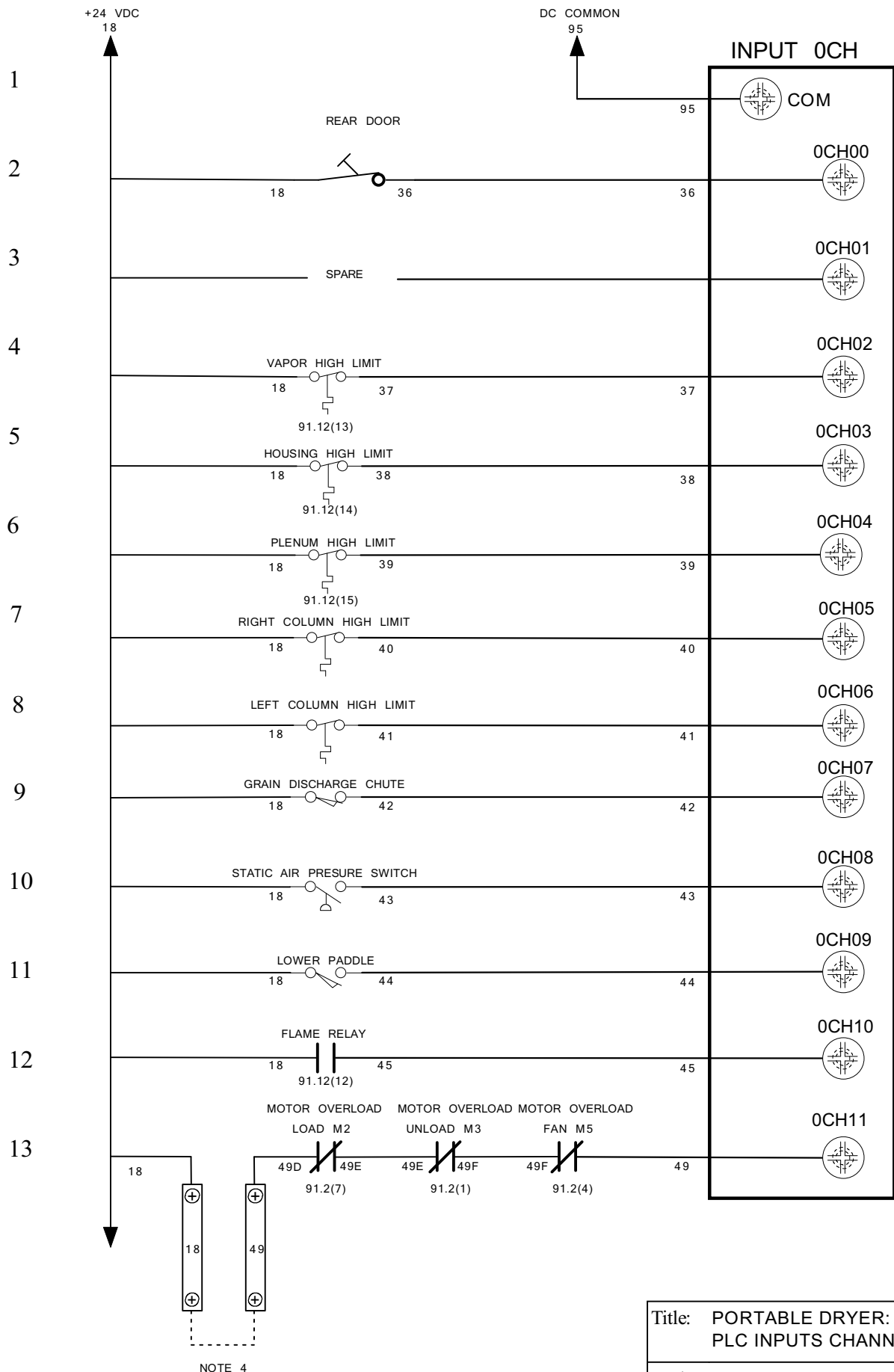
Title: PORTABLE DRYER: SINGLE FAN & HEAT  
120 VOLT CONTROL cont.

Author: KWC

Date: 01/01

Sheet: 91.2

Revision: 1/08



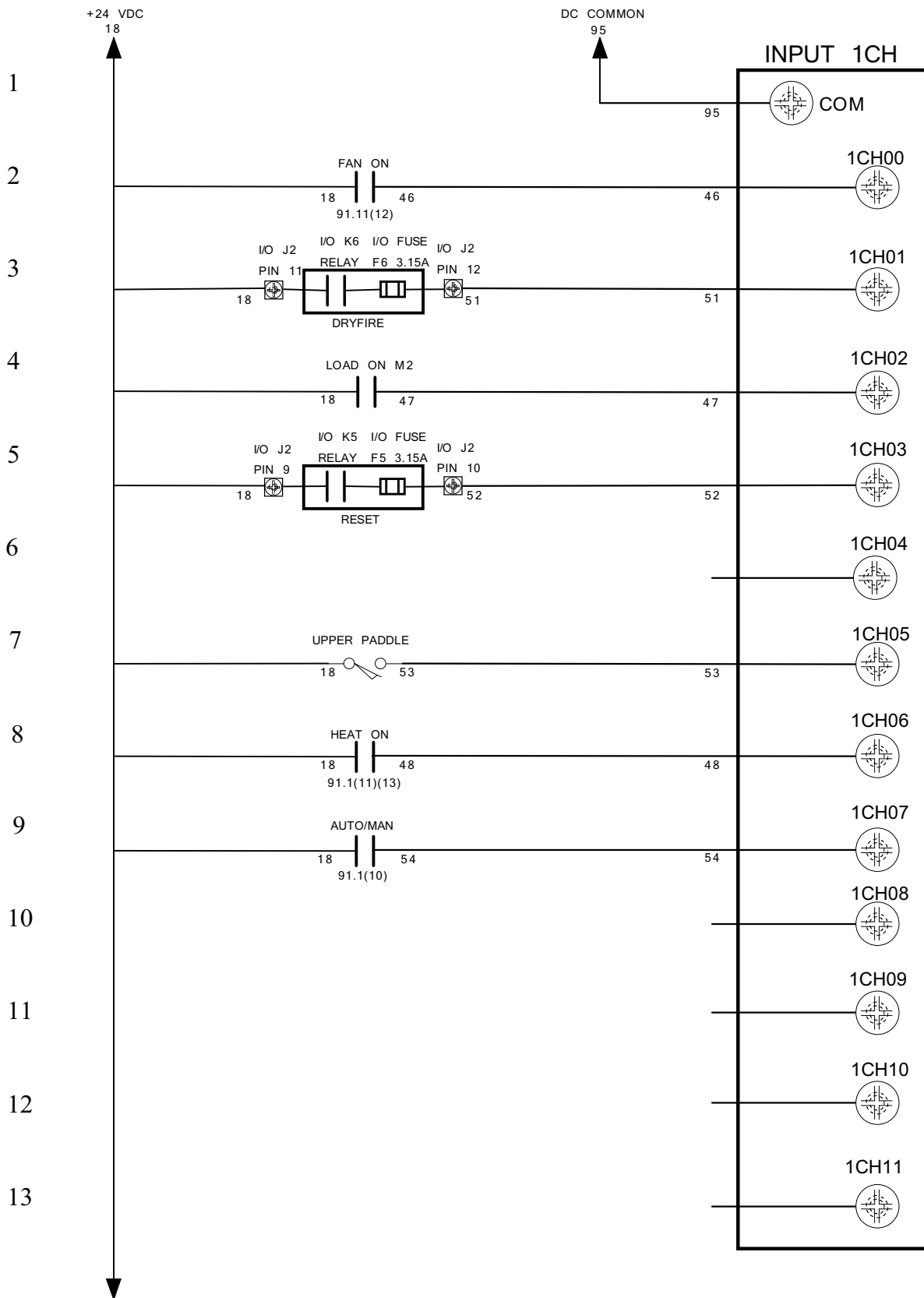
Title: PORTABLE DRYER: SINGLE FAN & HEAT  
PLC INPUTS CHANNEL 0

Author: KWC

Date: 01/01

Sheet: 91.3

Revision: 01/08



|                                                                  |             |
|------------------------------------------------------------------|-------------|
| Title: PORTABLE DRYER: SINGLE FAN & HEAT<br>PLC INPUTS CHANNEL 1 |             |
| Author: KWC                                                      |             |
| Date: 01/01                                                      | Sheet: 91.4 |
| Revision: 01/04,01/07                                            |             |

DC COMMON  
95

+24 VDC  
18

## INPUT 2CH



COM

2CH00



2CH01



2CH02



2CH03



2CH04



2CH05



2CH06



2CH07



2CH08



2CH09



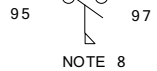
2CH10



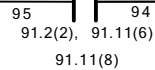
2CH11



DIFFERENTIAL AIR  
FLOW SWITCH

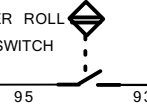


UNLOAD ON M3

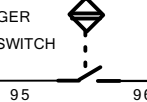


JUMPER FOR METER ROLL INPUT WAS  
THE LEFT PROX SWITCH. (REMOVED 1/08)

RIGHT METER ROLL  
PROXIMITY SWITCH



UNLOAD AUGER  
PROXIMITY SWITCH

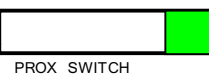
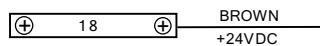


SEE NOTE 9

LOAD SWITCH

UNLOAD SWITCH

FAN SWITCH



PROX SWITCH

TO PLC  
INPUT

BLACK  
SIGNAL

Title: PORTABLE DRYER: SINGLE FAN & HEAT  
PLC INPUTS CHANNEL 2

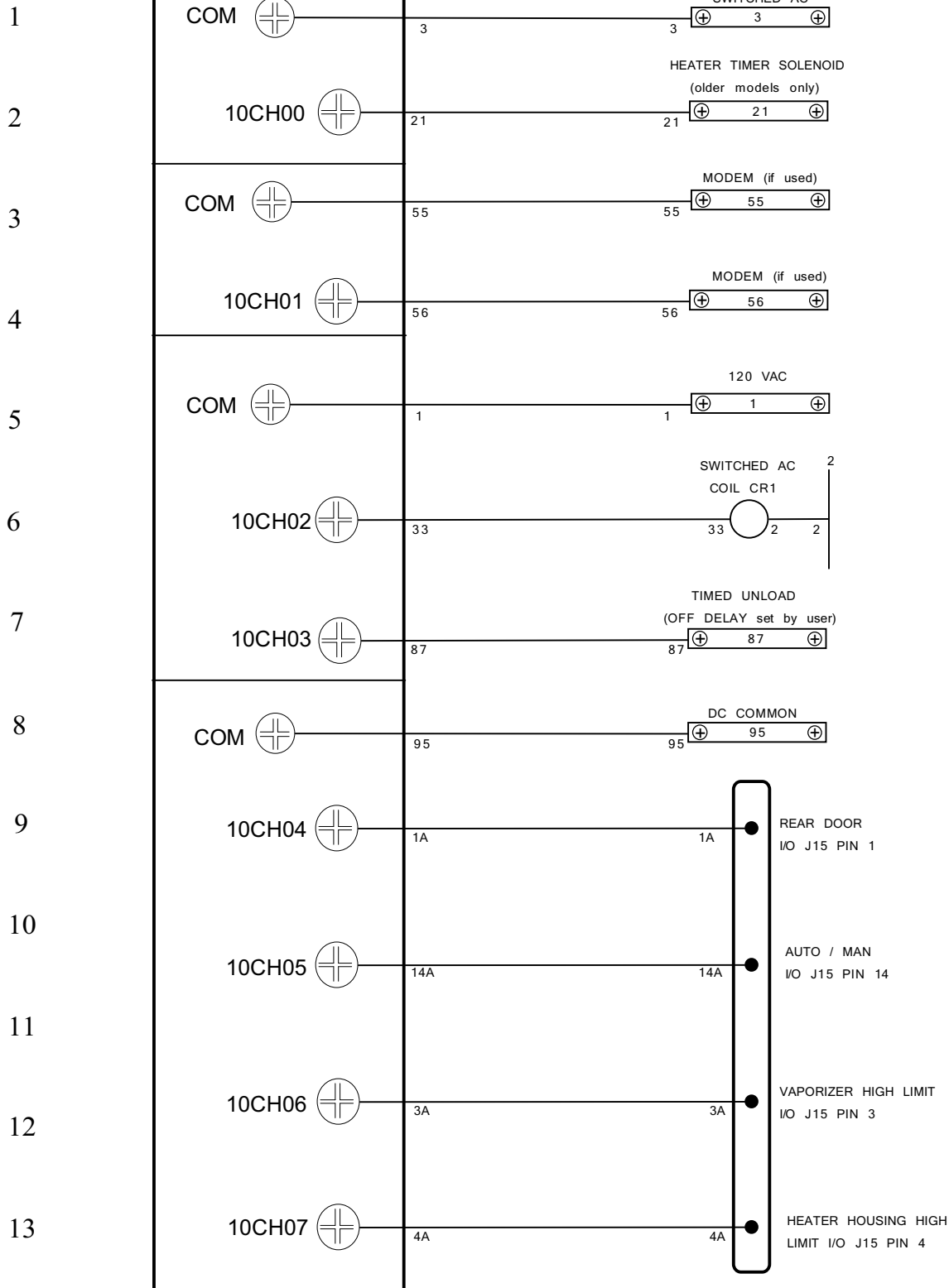
Author: KWC

Date: 01/01

Sheet: 91.5

Revision: 1/08

# OUTPUT 10CH



Title: PORTABLE DRYER: SINGLE FAN & HEAT  
PLC OUTPUTS CHANNEL 10

Author: KWC

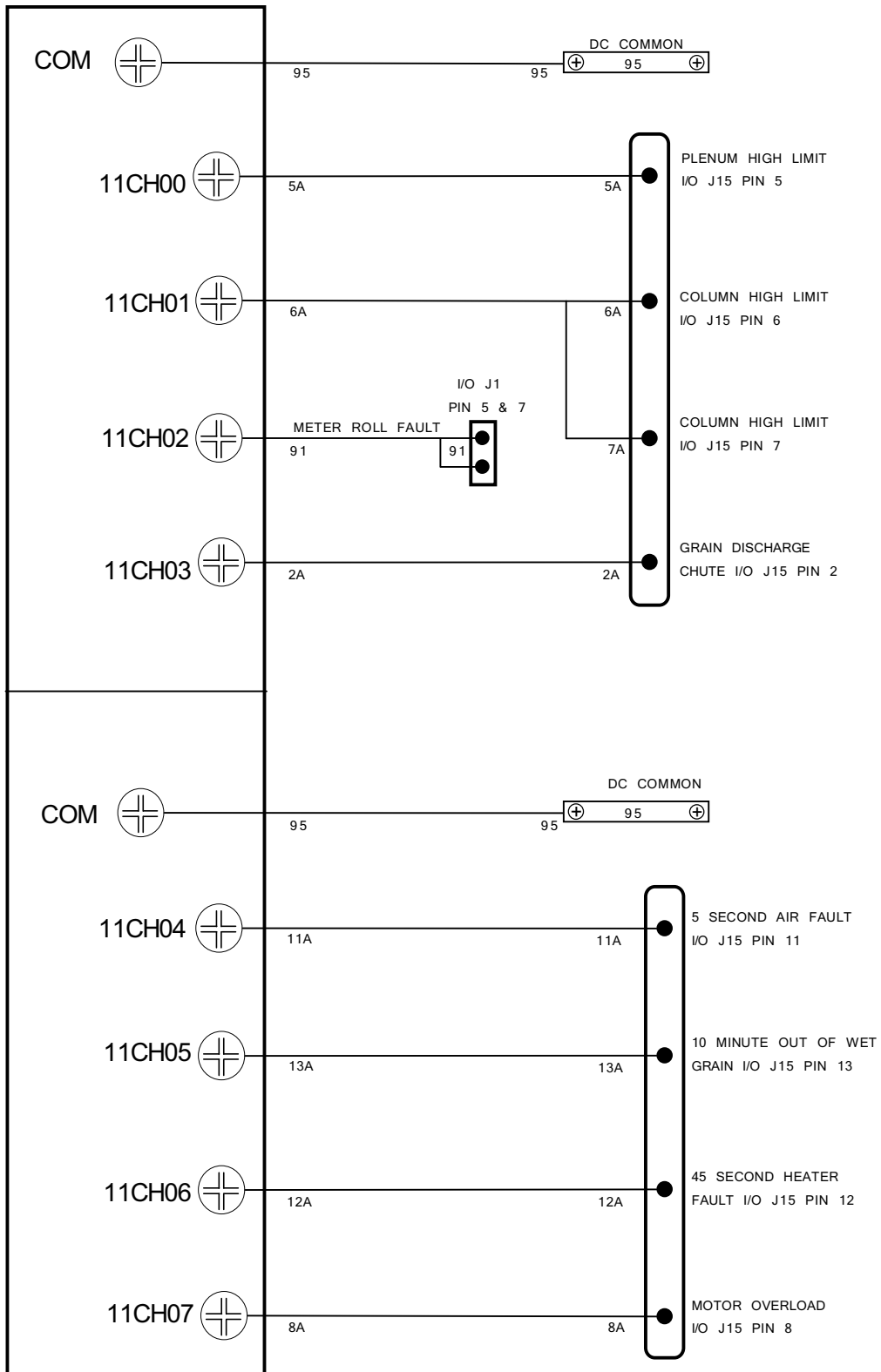
Date: 01/01

Sheet: 91.6

Revision: 01/04, 01/07

# OUTPUT 11CH

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Title: PORTABLE DRYER: SINGLE FAN & HEAT  
PLC OUTPUT CHANNEL 11

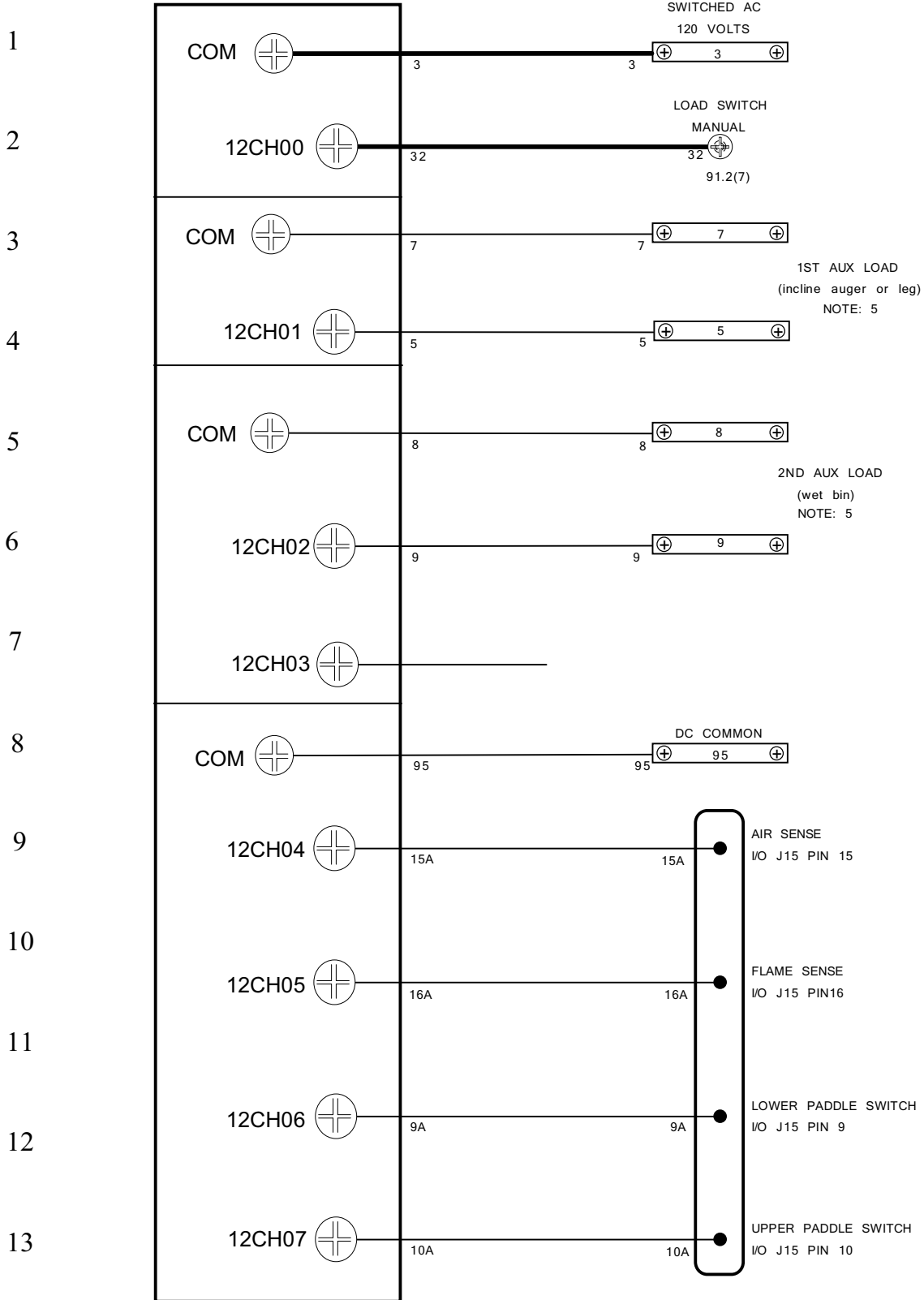
Author: KWC

Date: 01/01

Sheet: 91.7

Revision: 01/04 , 01/07

# OUTPUT 12CH



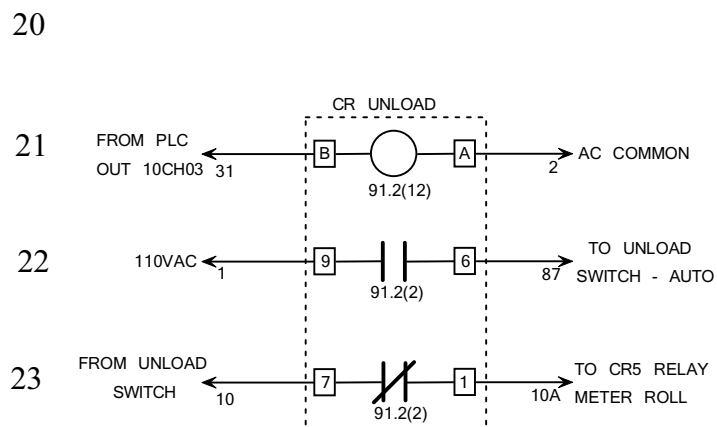
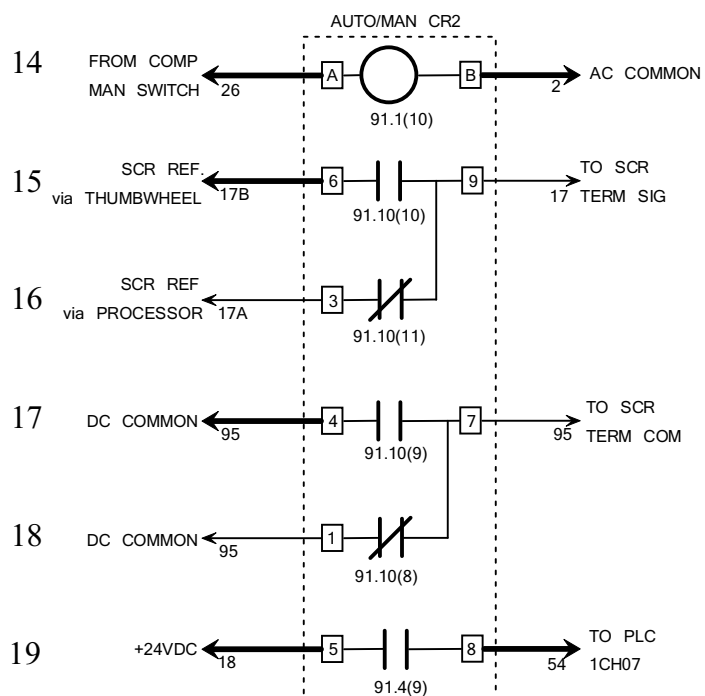
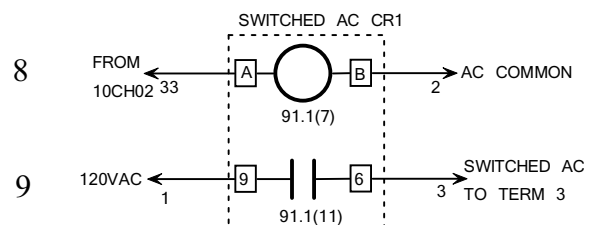
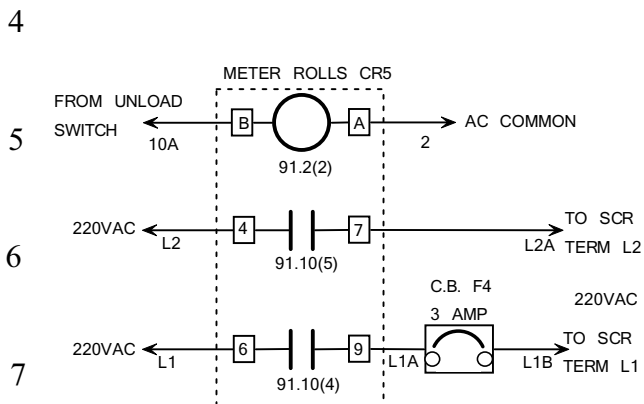
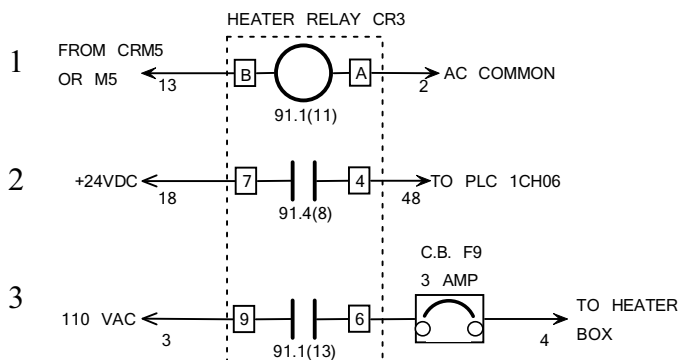
Title: PORTABLE DRYER: SINGLE FAN & HEAT  
PLC OUTPUT CHANNEL 12

Author: KWC

Date: 01/01

Sheet: 91.8

Revision: 11/07



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MANUAL CONTROL

Title: PORTABLE DRYER : SINGLE FAN & HEAT RELAY CONTACT WIRING

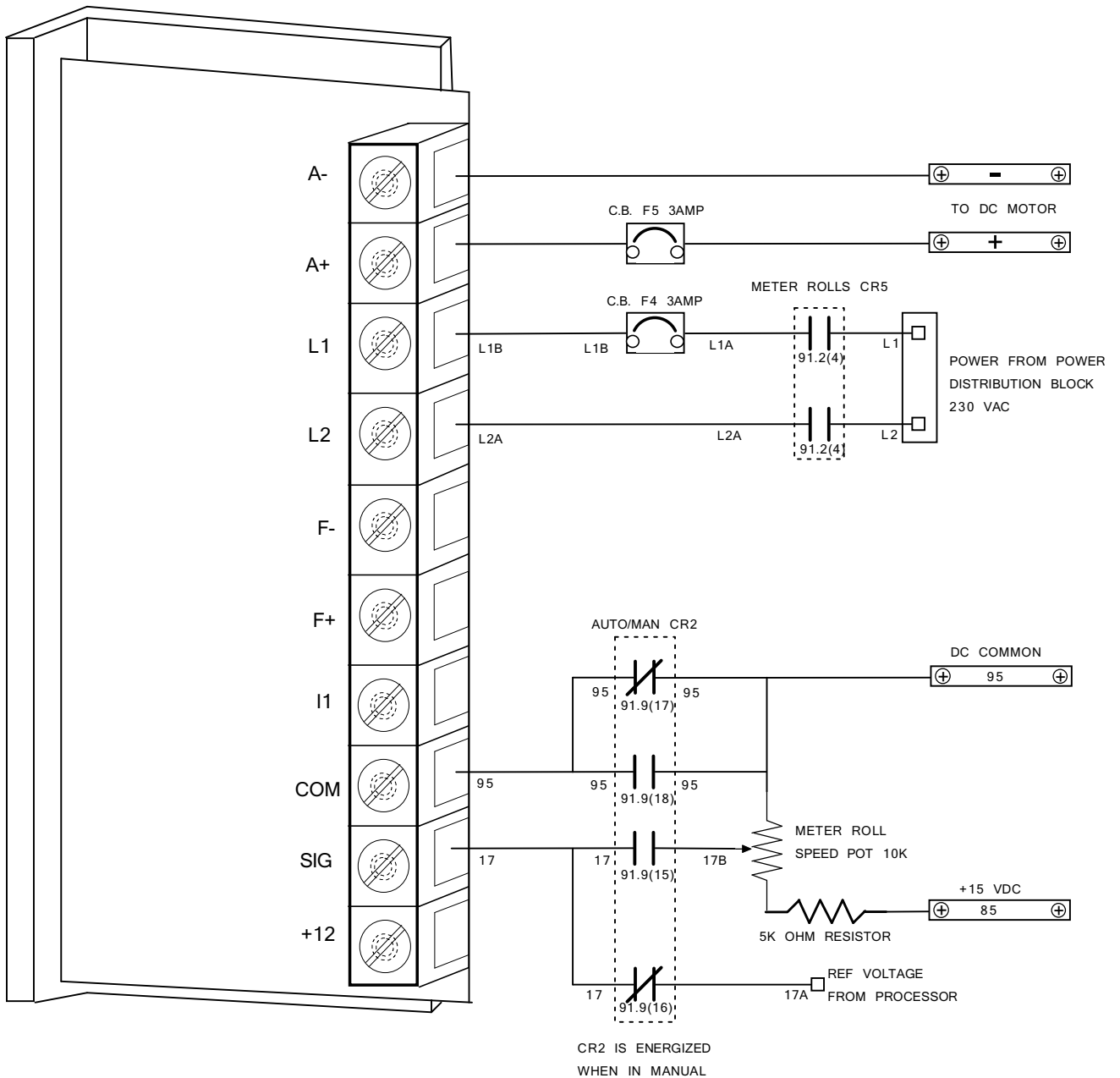
Author: KWC

Date: 12/07

Sheet: 91.9

Revision:

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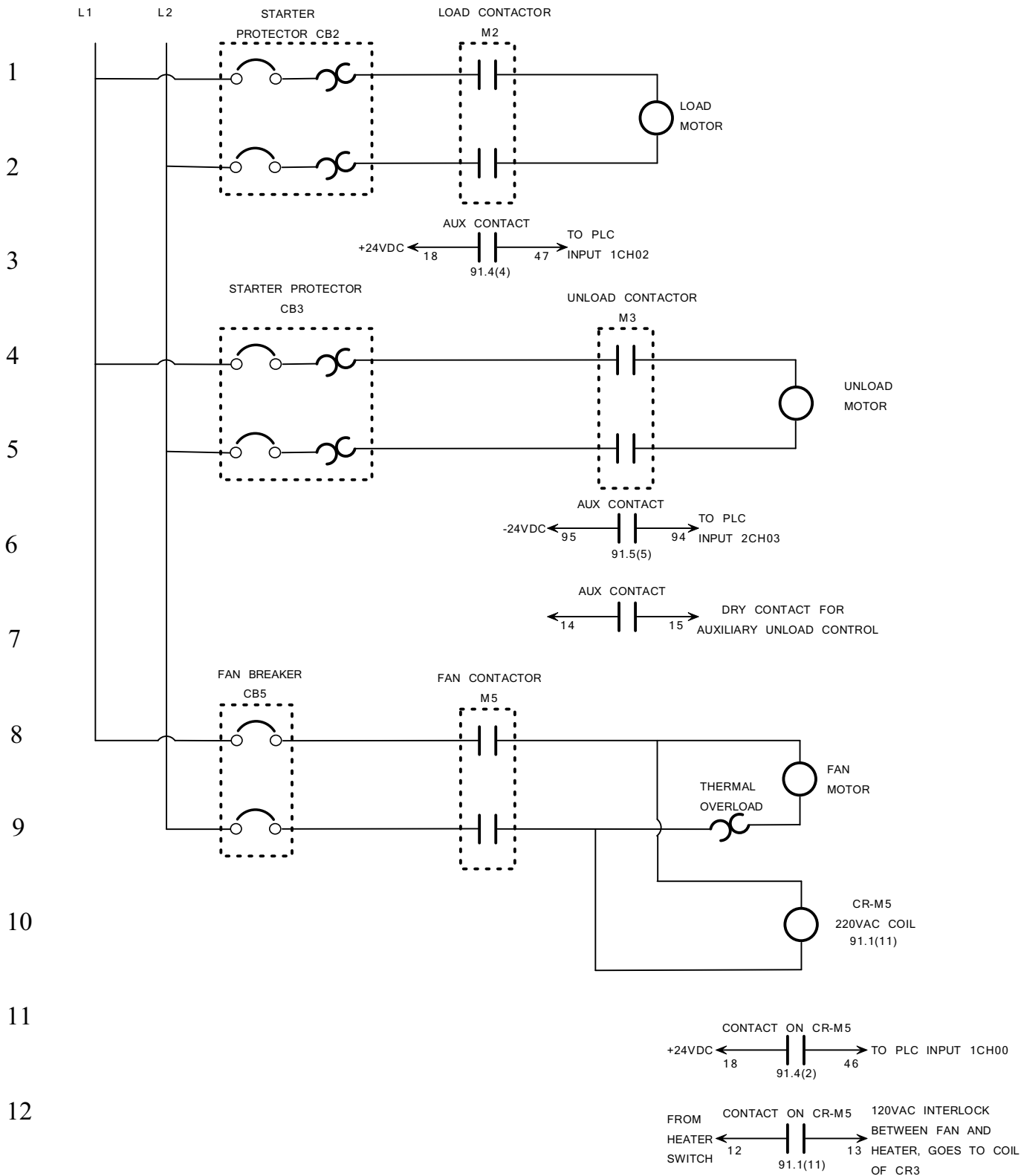


Title: PORTABLE DRYER: SINGLE FAN & HEAT  
SCR BOARD WIRING

Author: KWC

Date: 01/01 Sheet: 91.10

Revision: 01/04 , 01/07



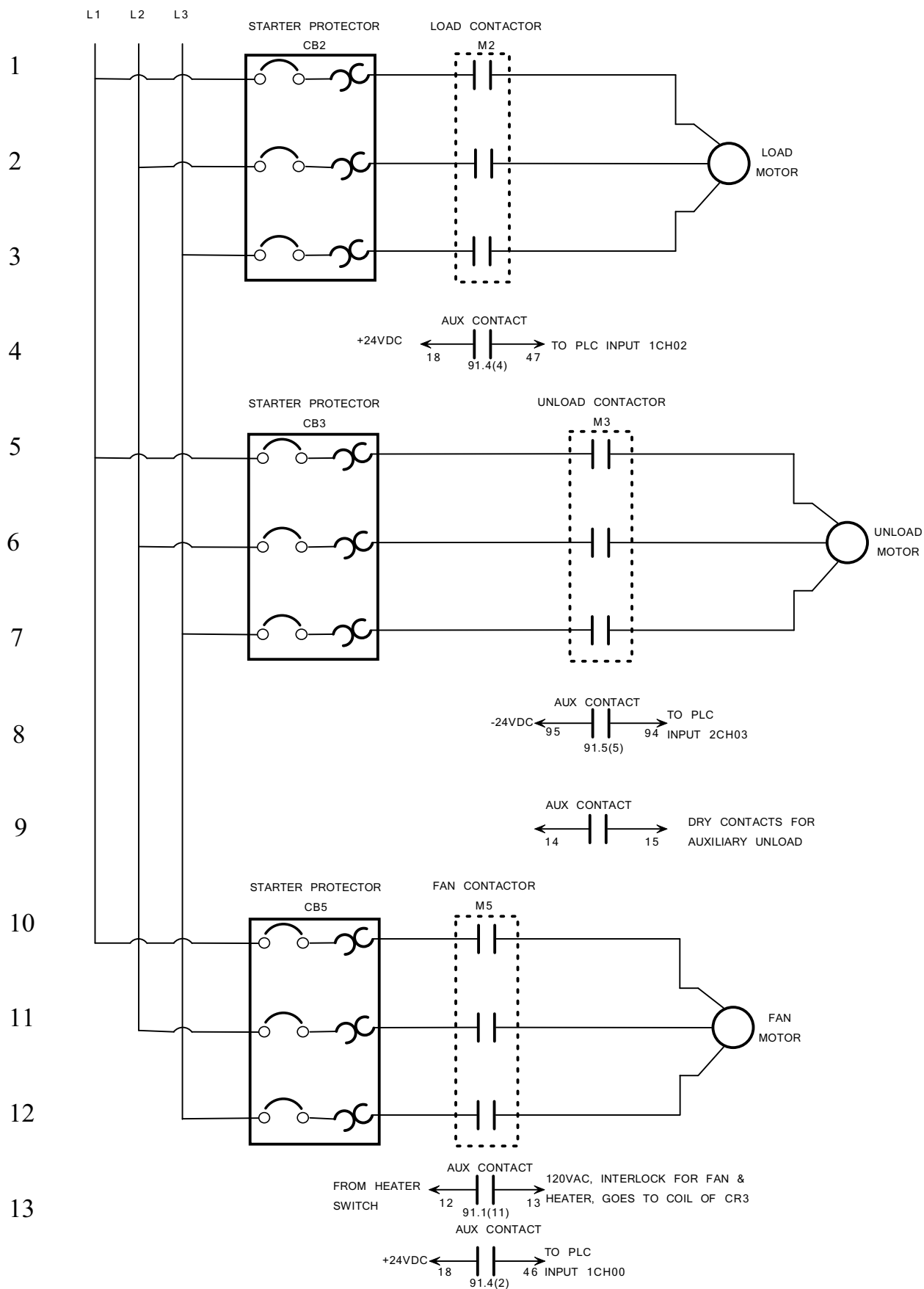
Title: PORTABLE DRYER: SINGLE FAN & HEAT 1PH POWER WIRING

Author: CSP

Date: 01/04

Sheet: 91.11

Revision: 01/07



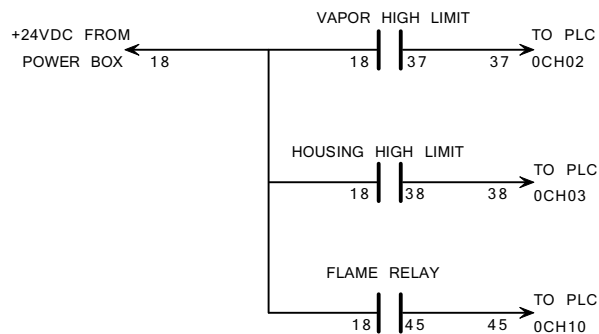
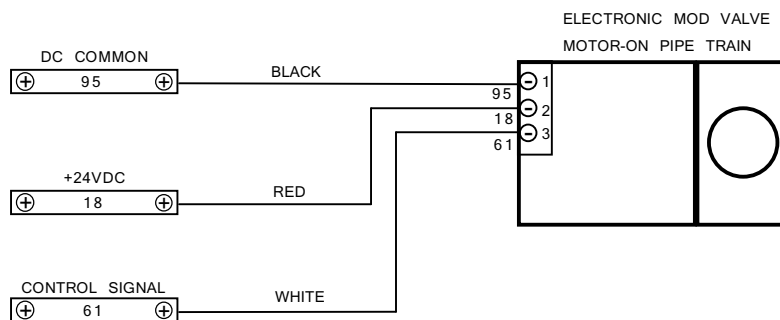
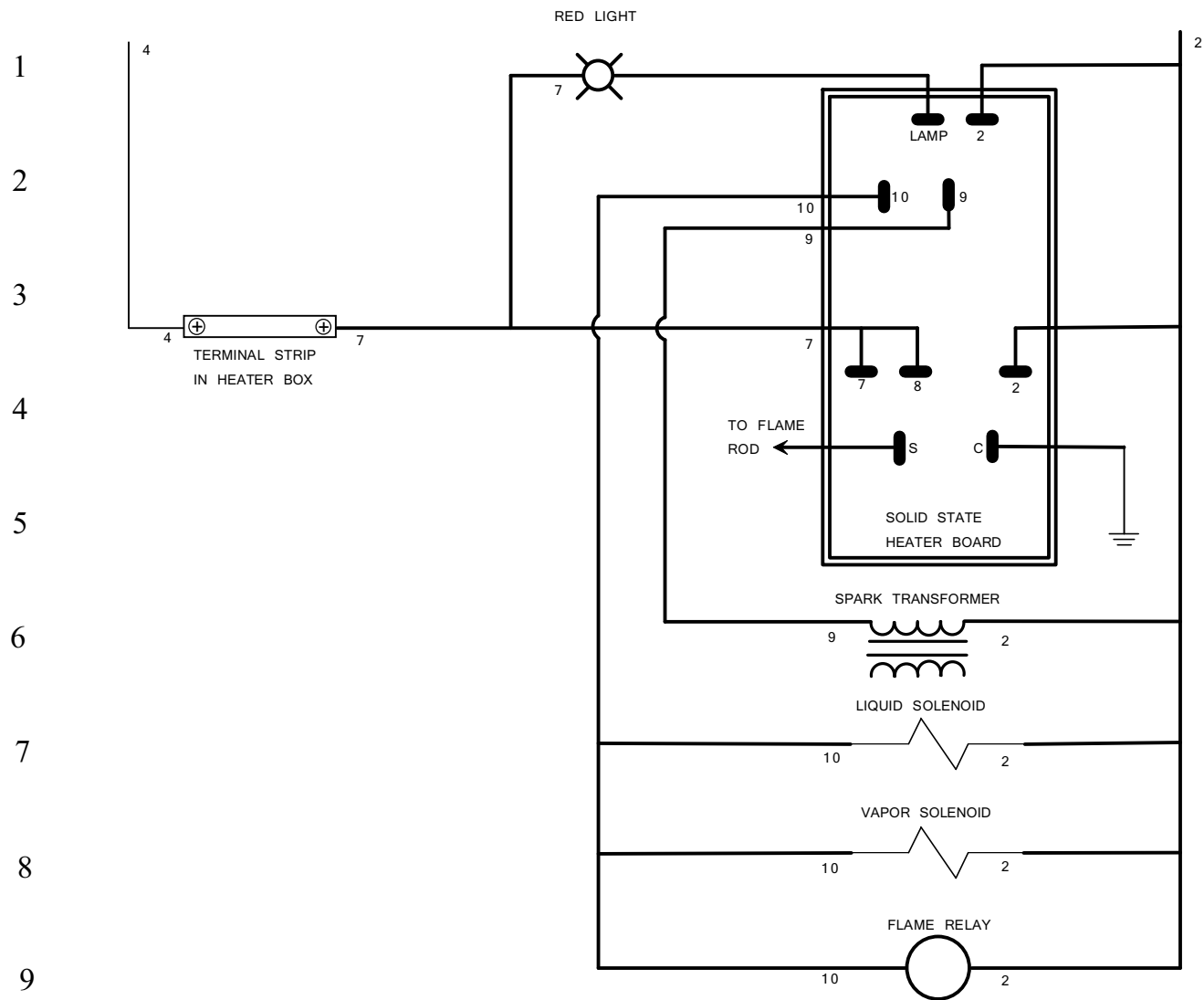
Title: PORTABLE DRYER: SINGLE FAN & HEAT  
3 PH POWER WIRING

Author: CSP

Date: 01/04

Sheet: 91.11\_3ph

Revision: 01/07



Title: PORTABLE DRYER: SINGLE FAN & HEAT  
HEATER CONTROL & FAULT WIRING

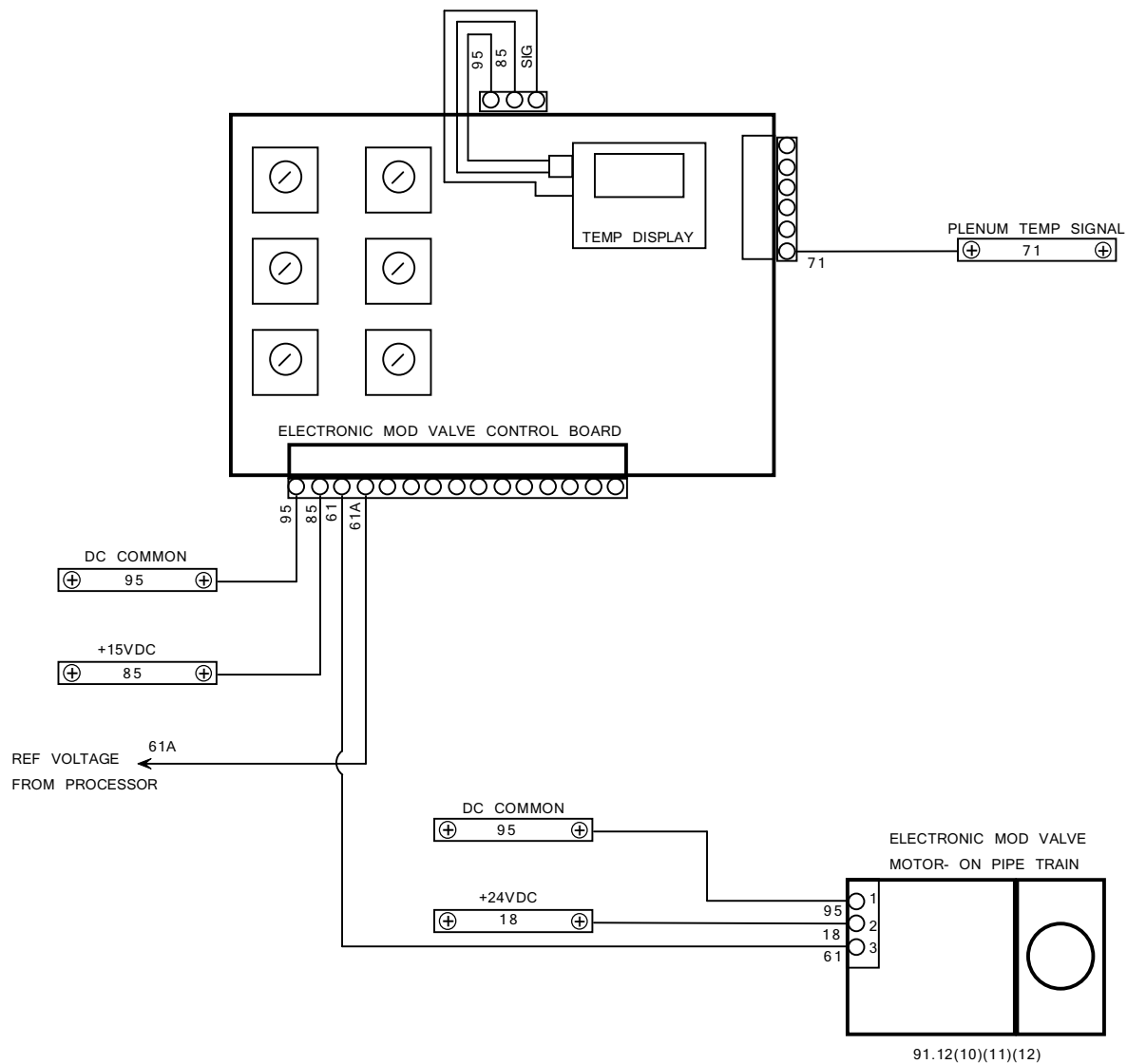
Author: CSP

Date: 01/04

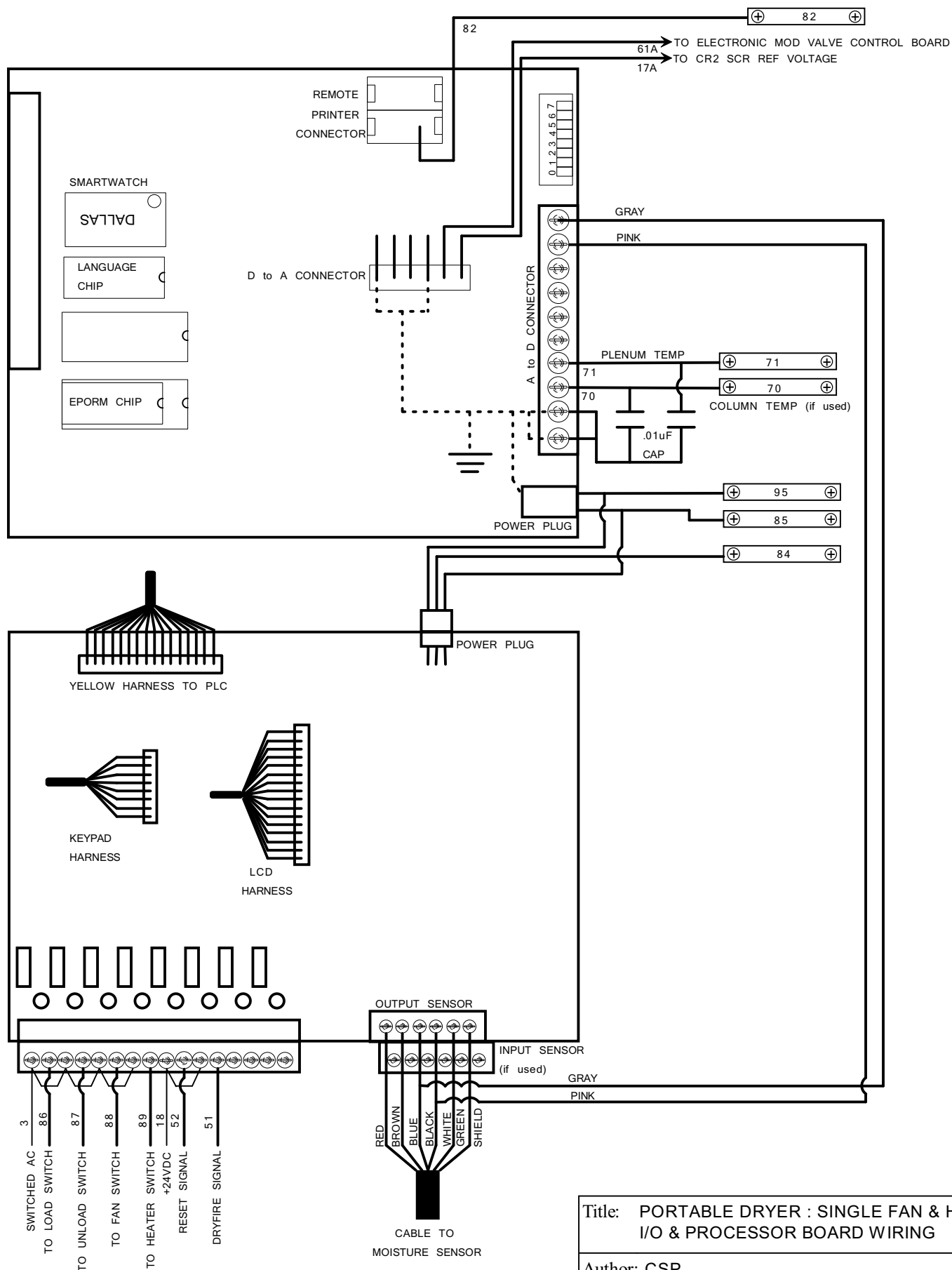
Sheet: 91.12

Revision: 01/07

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|--------------------------------------------------------------------------|--------------|
| Title: PORTABLE DRYER: SINGLE FAN & HEAT<br>ELECTRONIC MOD VALVE CONTROL |              |
| Author: CSP                                                              |              |
| Date: 01/06                                                              | Sheet: 91.13 |
| Revision: 01/07                                                          |              |



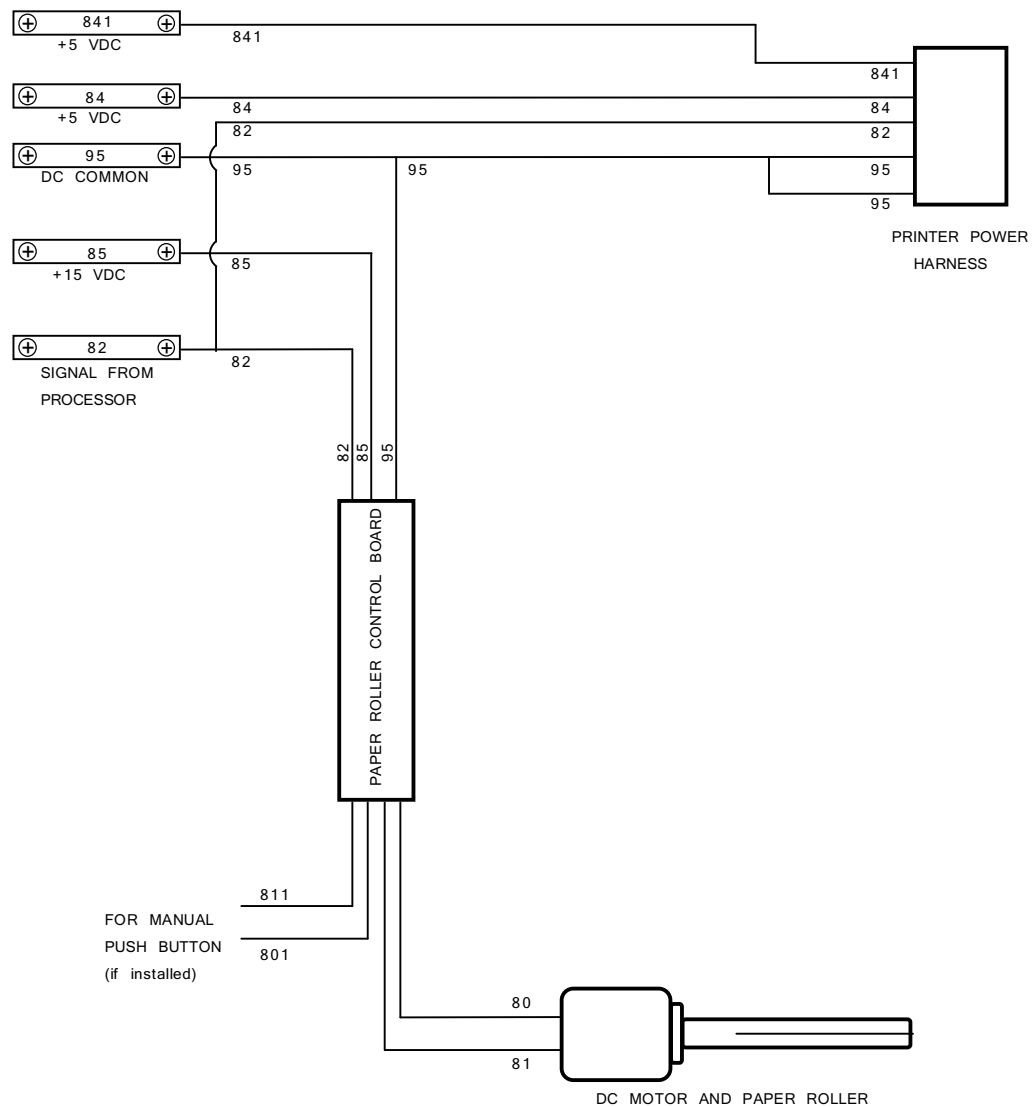
Title: PORTABLE DRYER : SINGLE FAN & HEAT  
I/O & PROCESSOR BOARD WIRING

Author: CSP

Date: 01/07

Sheet: 91.14

Revision:



Title: PORTABLE DRYER : SINGLE FAN & HEAT  
PRINTER AND PAPER ROLLER WIRING

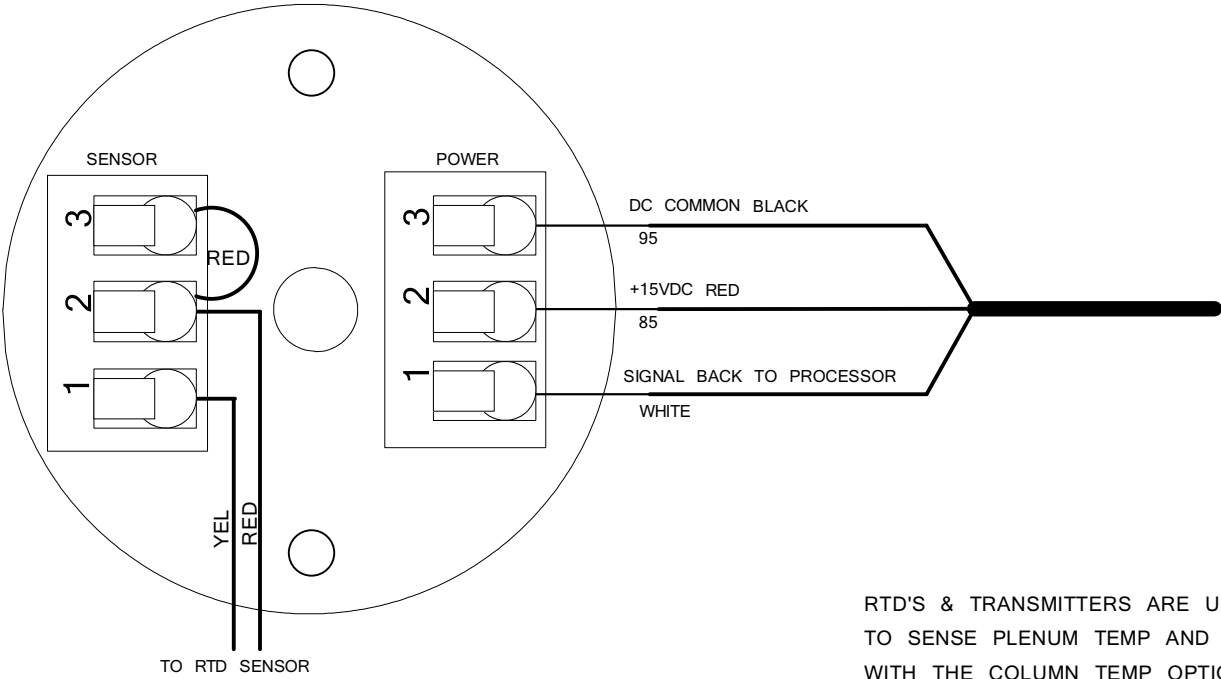
Author: CSP

Date: 01/07

Sheet: 91.15

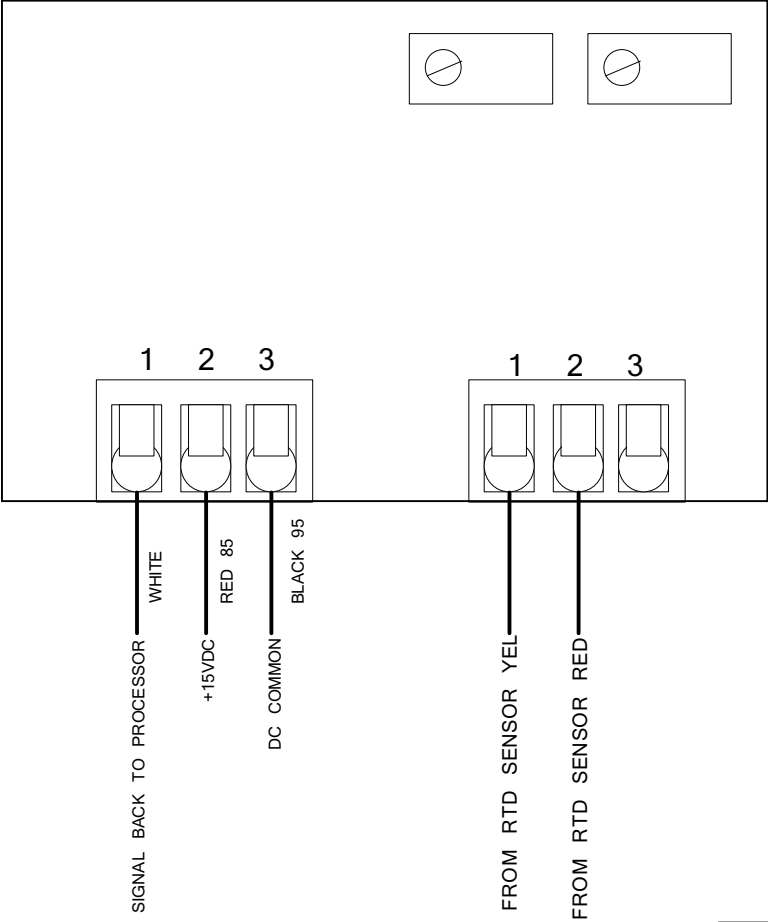
Revision:

MINCO TRANSMITTER (DISCONTINUED IN 2007 - REPLACE WITH T17028)



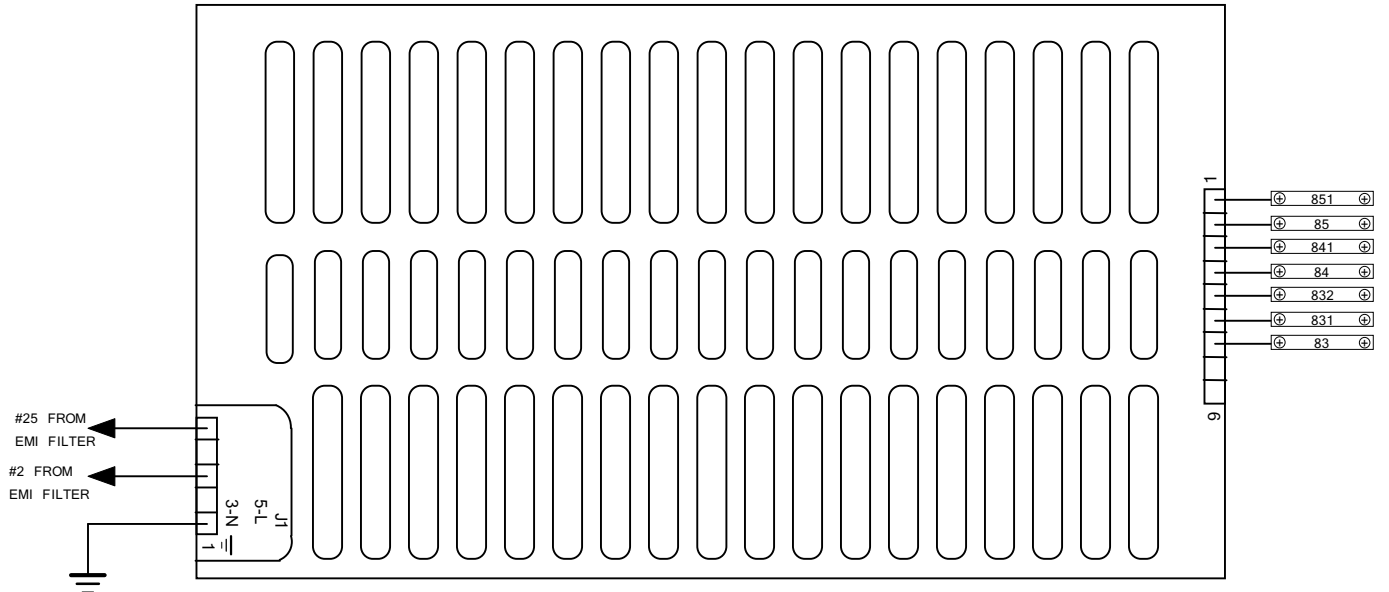
RTD'S & TRANSMITTERS ARE USED TO SENSE PLENUM TEMP AND ALSO WITH THE COLUMN TEMP OPTION.

T17028 NEW AS OF 2007



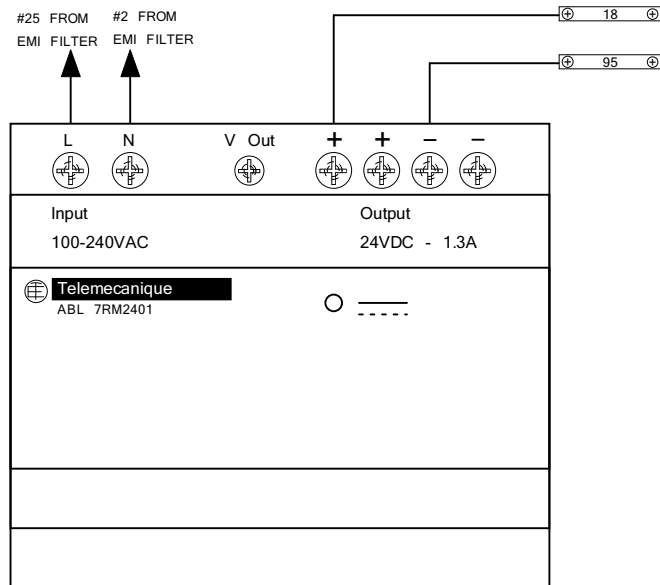
|                                                                  |              |
|------------------------------------------------------------------|--------------|
| Title: PORTABLE DRYER : SINGLE FAN & HEAT RTD TRANSMITTER WIRING |              |
| Author: CSP                                                      |              |
| Date: 01/07                                                      | Sheet: 91.16 |
| Revision:                                                        |              |

# 5 AND 15 VOLT DC POWER SUPPLY



INPUT: J1  
100-240 VAC 1.7A  
50/60 Hz  
~ L PIN 5  
~ N PIN 3  
⏏ PIN 1

OUTPUTS: J2  
+15VDC 3A PIN 1,2  
5A PK  
+5VDC 6A PIN 3,4  
-15VDC 1A PIN 8  
-5VDC 1A PIN 9  
COMMON PIN 5,6,7



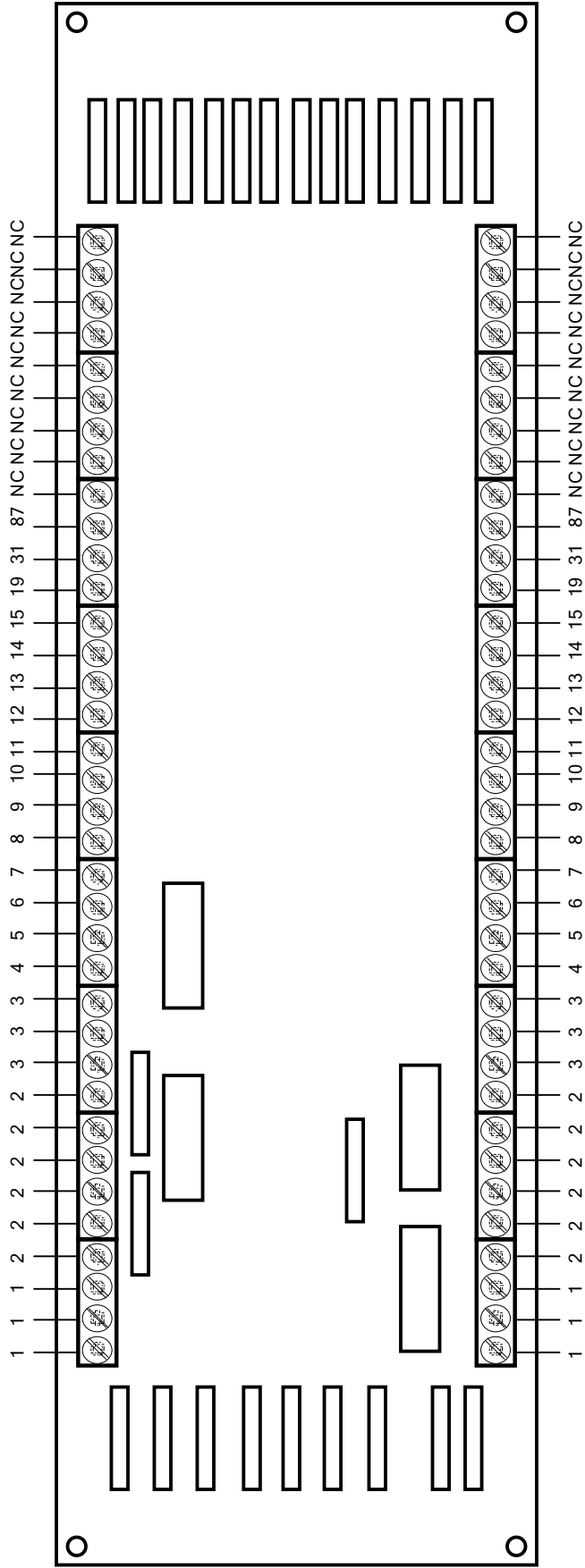
Title: PORTABLE DRYER: SINGLE FAN & HEAT  
POWER SUPPLY CONNECTIONS

Author: CSP

Date: 11/07

Sheet: 91.17

Revision:



|                                                                   |              |
|-------------------------------------------------------------------|--------------|
| Title: PORTABLE DRYER: SINGLE FAN & HEAT:<br>AC SUPPRESSION BOARD |              |
| Author: CSP                                                       |              |
| Date: 11/07                                                       | Sheet: 91.18 |
| Revision:                                                         |              |

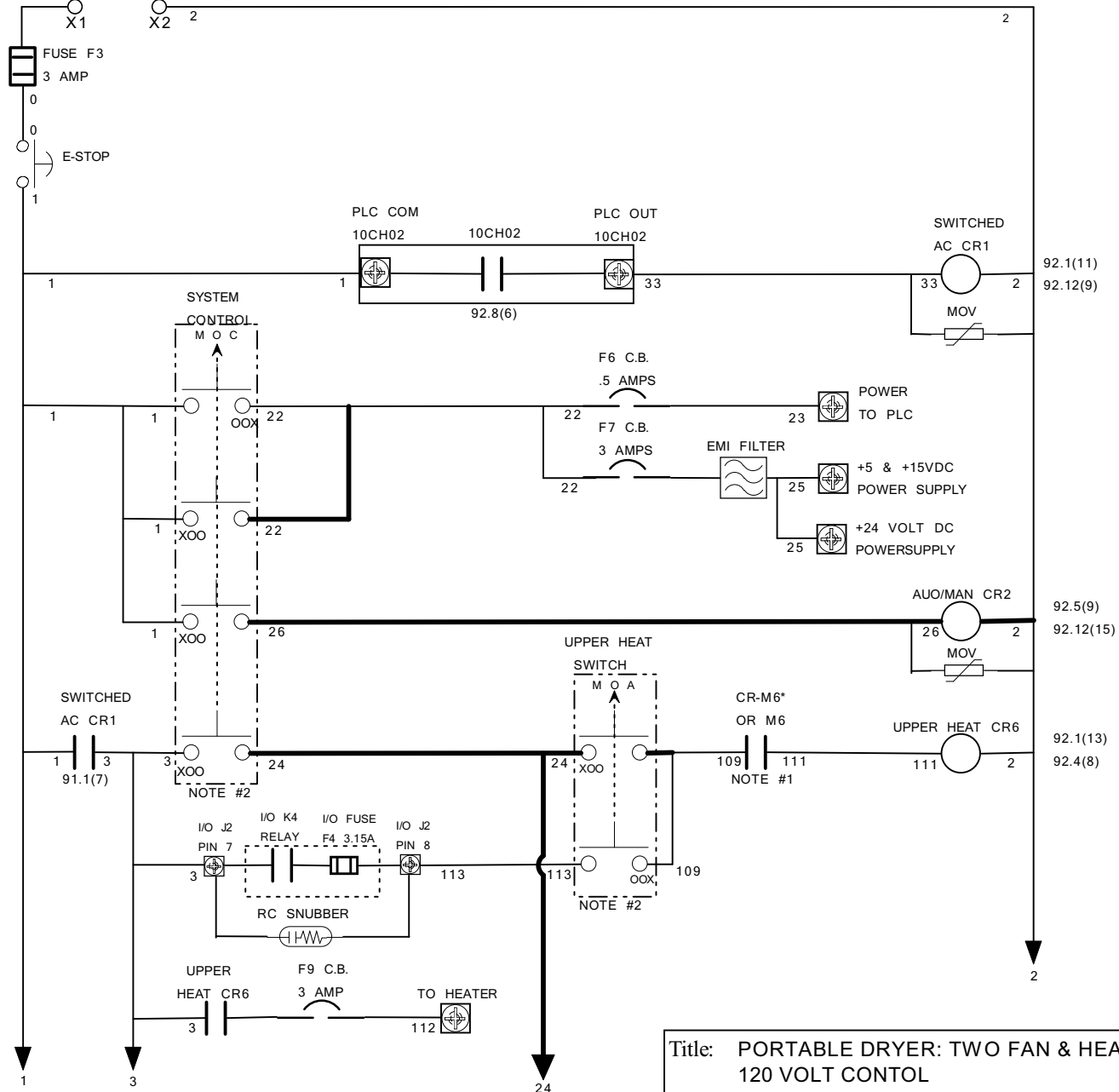
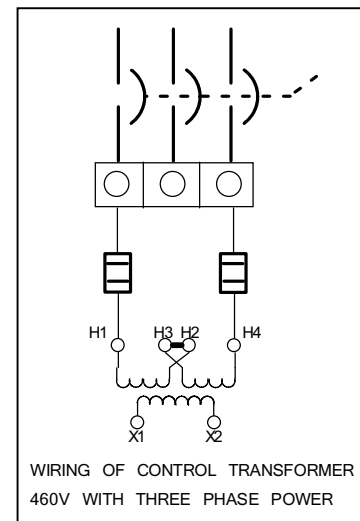
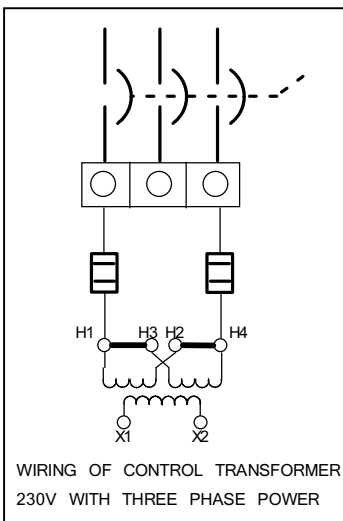
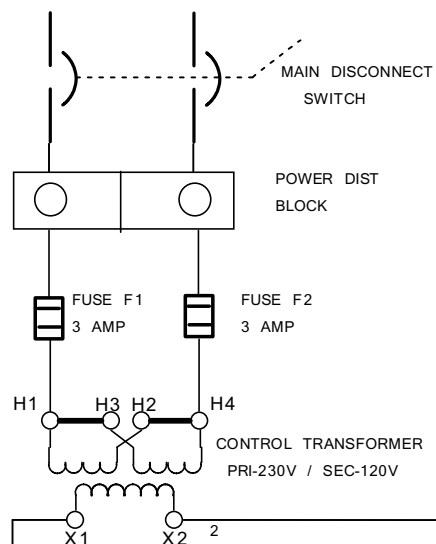
## SINGLE FAN ELECTRICAL DRAWING NOTES

- NOTE 1: On single phase, the control voltage comes from CR - M5. On 3 phase dryers the control voltage comes from an Auxiliary contact on M5 starter.
- NOTE 2: On all switches XOO indicates that the switch is in the Manual or ON position. OOX indicates that the switch is in the Computer or AUTO position.
- NOTE 3: CR Unload is a timed off delay, so that the unload will clean out when a fault occurs.
- NOTE 4: Terminals found in the Auxiliary box. If no auxiliary controls are installed, place a jumper between terminal 18 and terminal 49.
- NOTE 5: For Auxiliary wiring of 12CH01 and 12CH02, Refer to Appendix 1 in the Dryer Manual.
- NOTE 6: Drawing 91.12 covers both LP & NG heaters. If the heater is NG, then the vapor high limit and the liquid solenoid valve are not used.
- NOTE 7:  - indicates the screw terminal on the relay socket that the wire is attached to, found in drawing 91.9.
- NOTE 8: Differential Air Flow switch is only used on CE and CSA dryers. It is not used on the domestic dryers.
- NOTE 9: Change being made during 2008 production run. Left meter roll proximity switch removed, a jumper may be found between the meter roll PLC input (2CH04 & 2CH05).
- NOTE: There are different types of electrical noise protection that are installed throughout the dryer, that might not be shown in these drawings.

## **Appendix D**

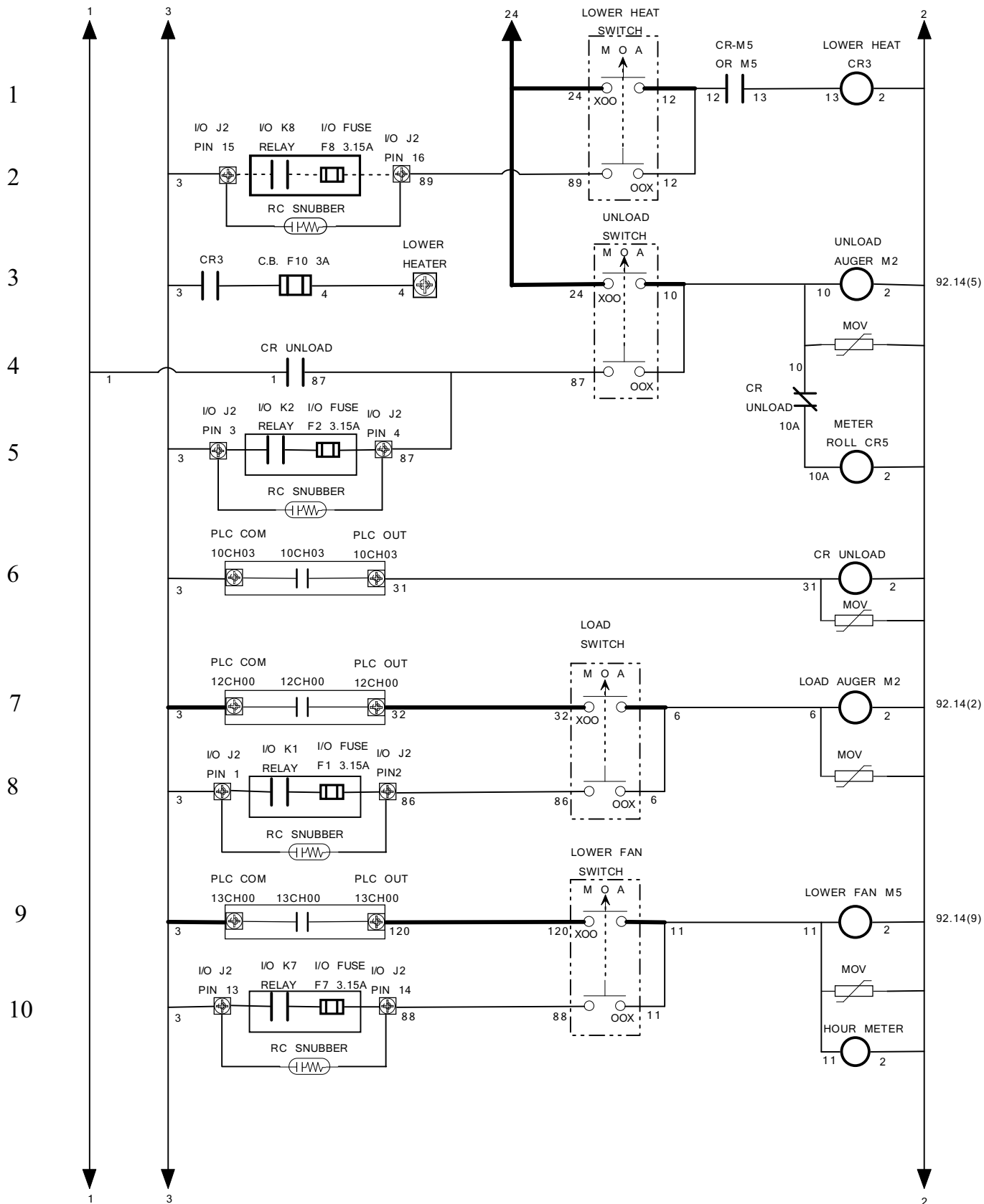
### **Two Fan Ladder Diagrams**

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|-----------------------------------------------------------|-------------|
| Title: PORTABLE DRYER: TWO FAN & HEAT<br>120 VOLT CONTROL |             |
| Author: KWC                                               |             |
| Date: 01/01                                               | Sheet: 92.1 |
| Revision: 1/08                                            |             |

MANUAL CONTROL AUTO/COMPUTER CONTROL



Title: PORTABLE DRYER: TWO FAN & HEAT  
120 VAC CONTROL cont.

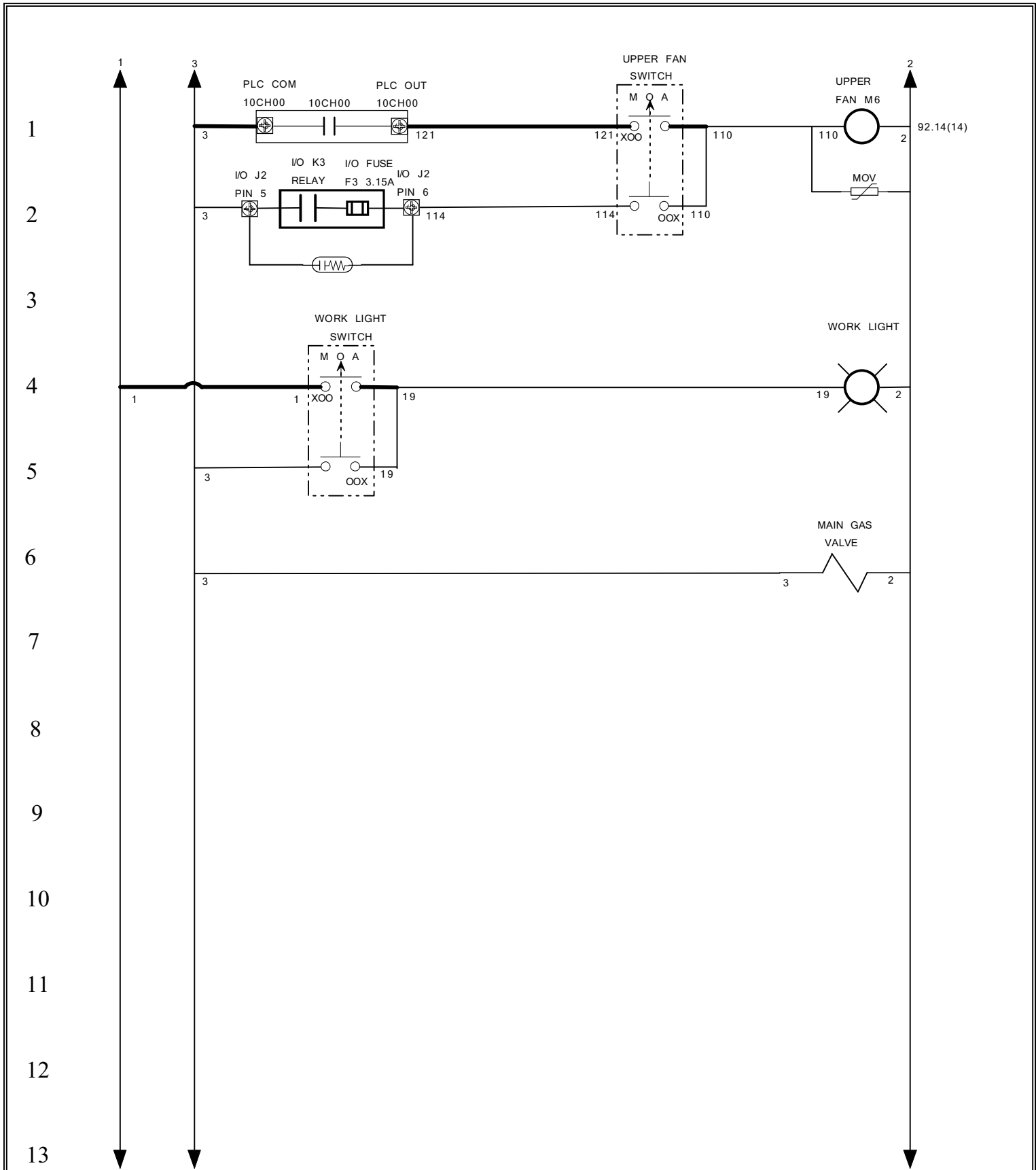
Author: KWC

Date: 01/01

Sheet: 92.2

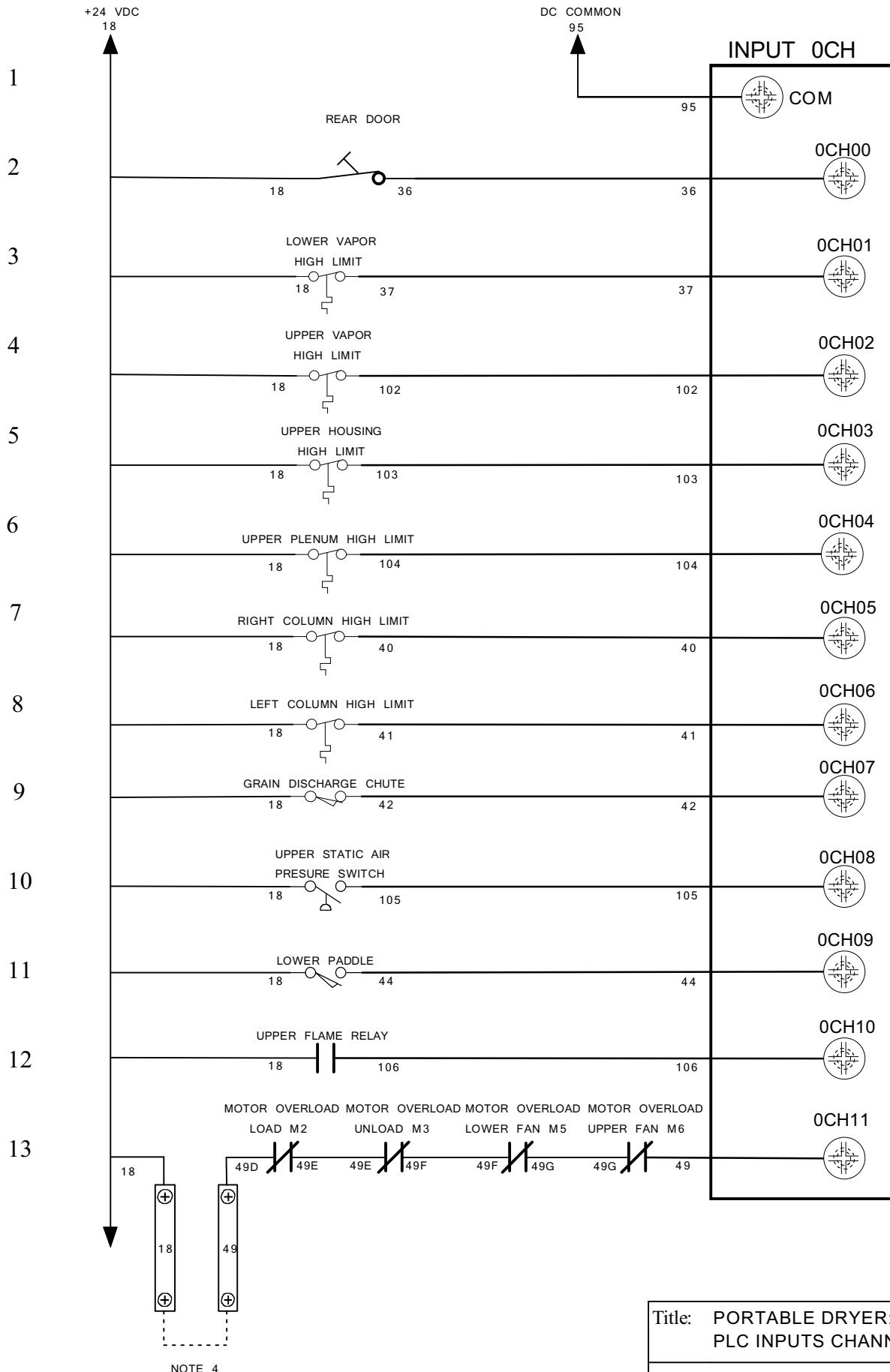
Revision: 1/08

— MANUAL CONTROL — AUTO/COMPUTER CONTROL



|                                                                 |             |
|-----------------------------------------------------------------|-------------|
| Title: PORTABLE DRYER: TWO FAN & HEAT<br>120 VOLT CONTROL cont. |             |
| Author: KWC                                                     |             |
| Date: 01/01                                                     | Sheet: 92.3 |
| Revision: 1/08                                                  |             |

MANUAL CONTROL
  AUTO/COMPUTER CONTROL



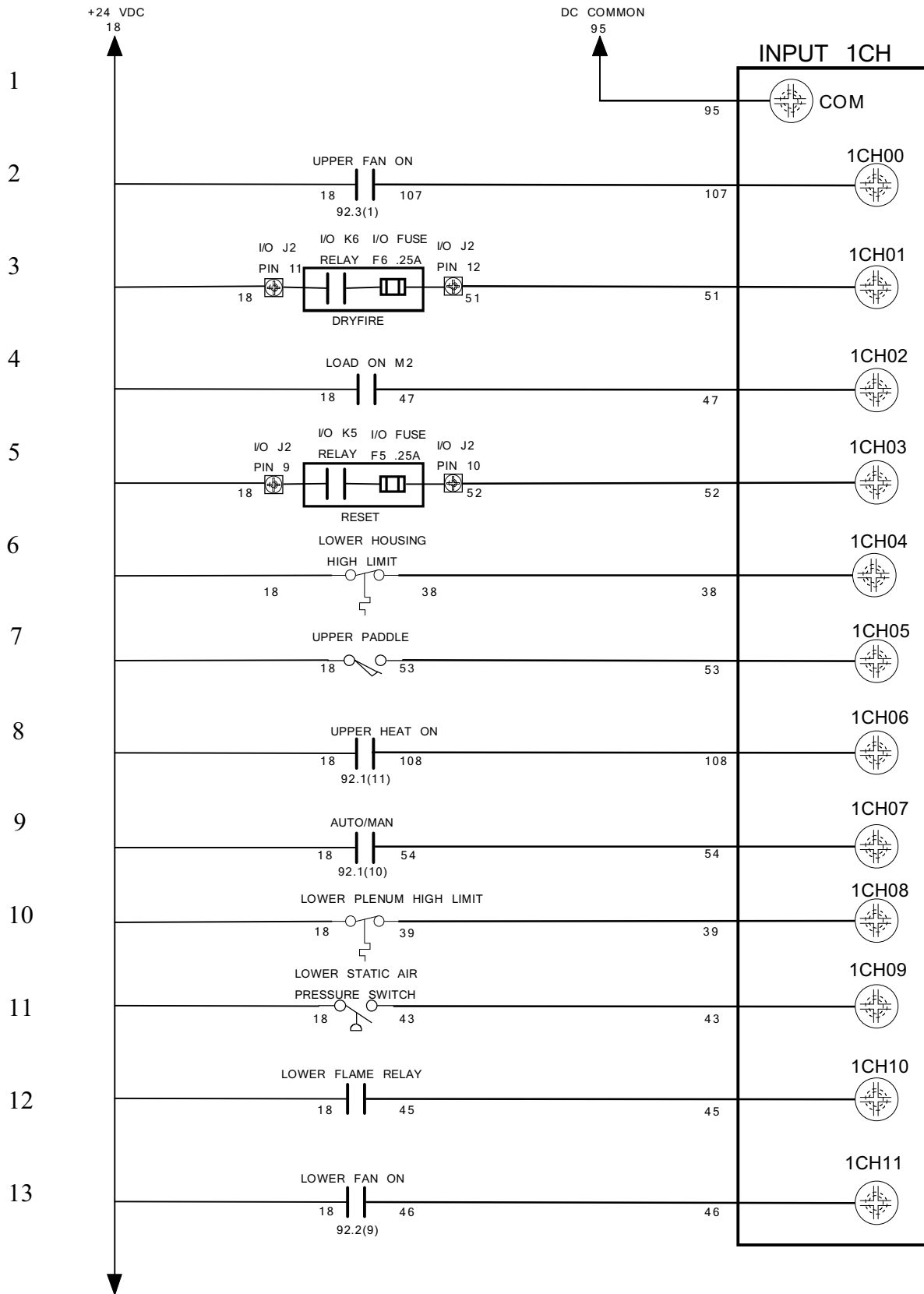
Title: PORTABLE DRYER: TWO FAN & HEAT  
PLC INPUTS CHANNEL 0

Author: KWC

Date: 01/01

Sheet: 92.4

Revision: 01/04,01/07



Title: PORTABLE DRYER: TWO FAN & HEAT  
PLC INPUTS CHANNEL 1

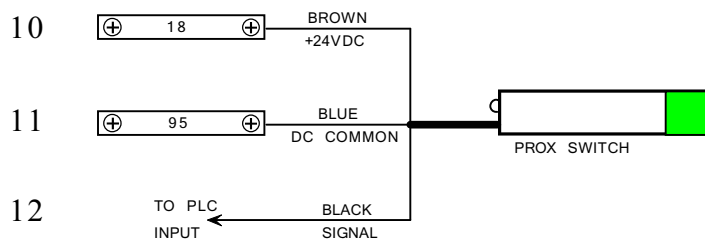
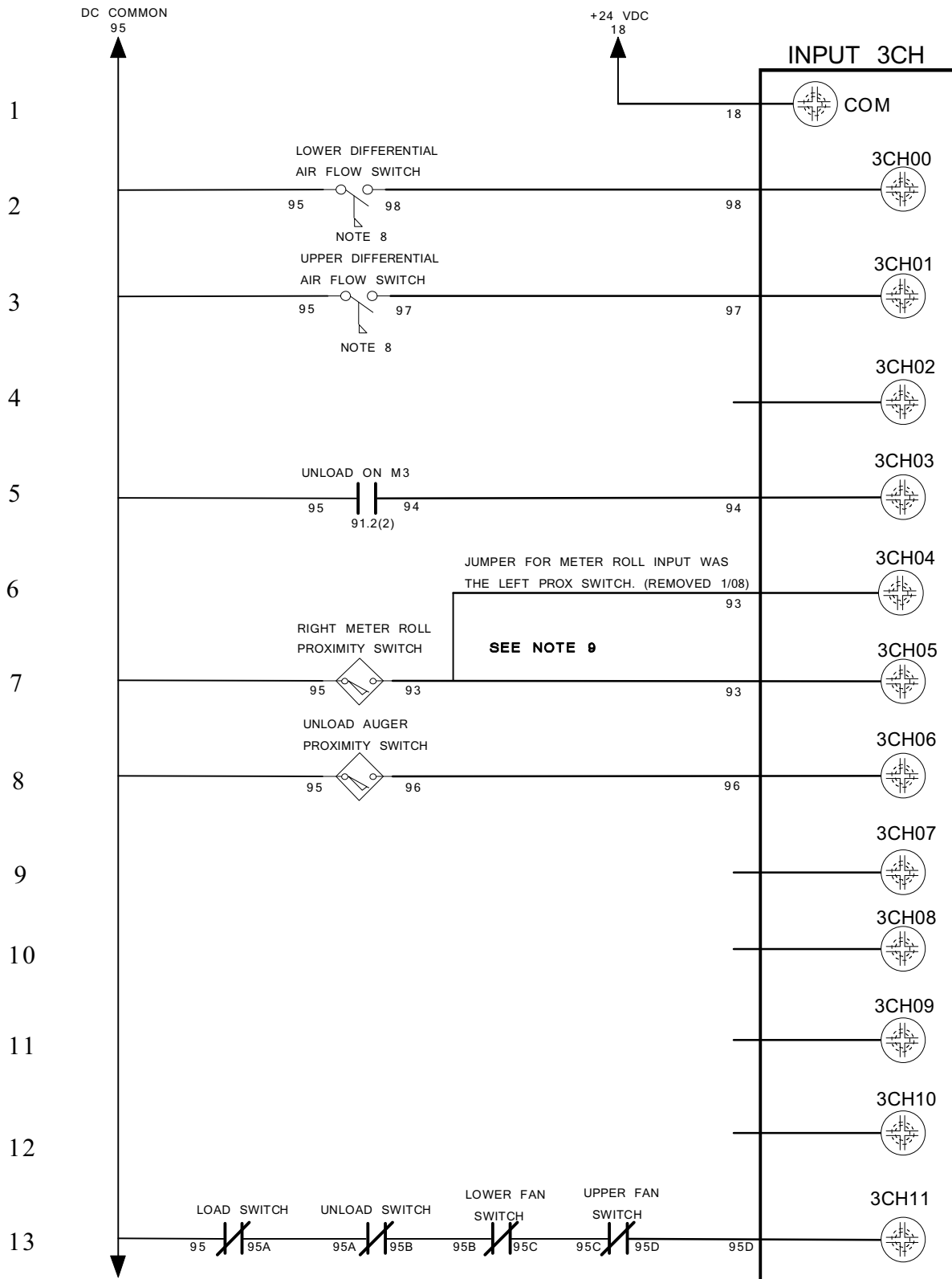
Author: KWC

Date: 01/01

Sheet: 92.5

Revision: 01/04,01/07

Revision: 01/04,01/07



Title: PORTABLE DRYER: TWO FAN & HEAT  
PLC INPUTS CHANNEL 3

Author: KWC

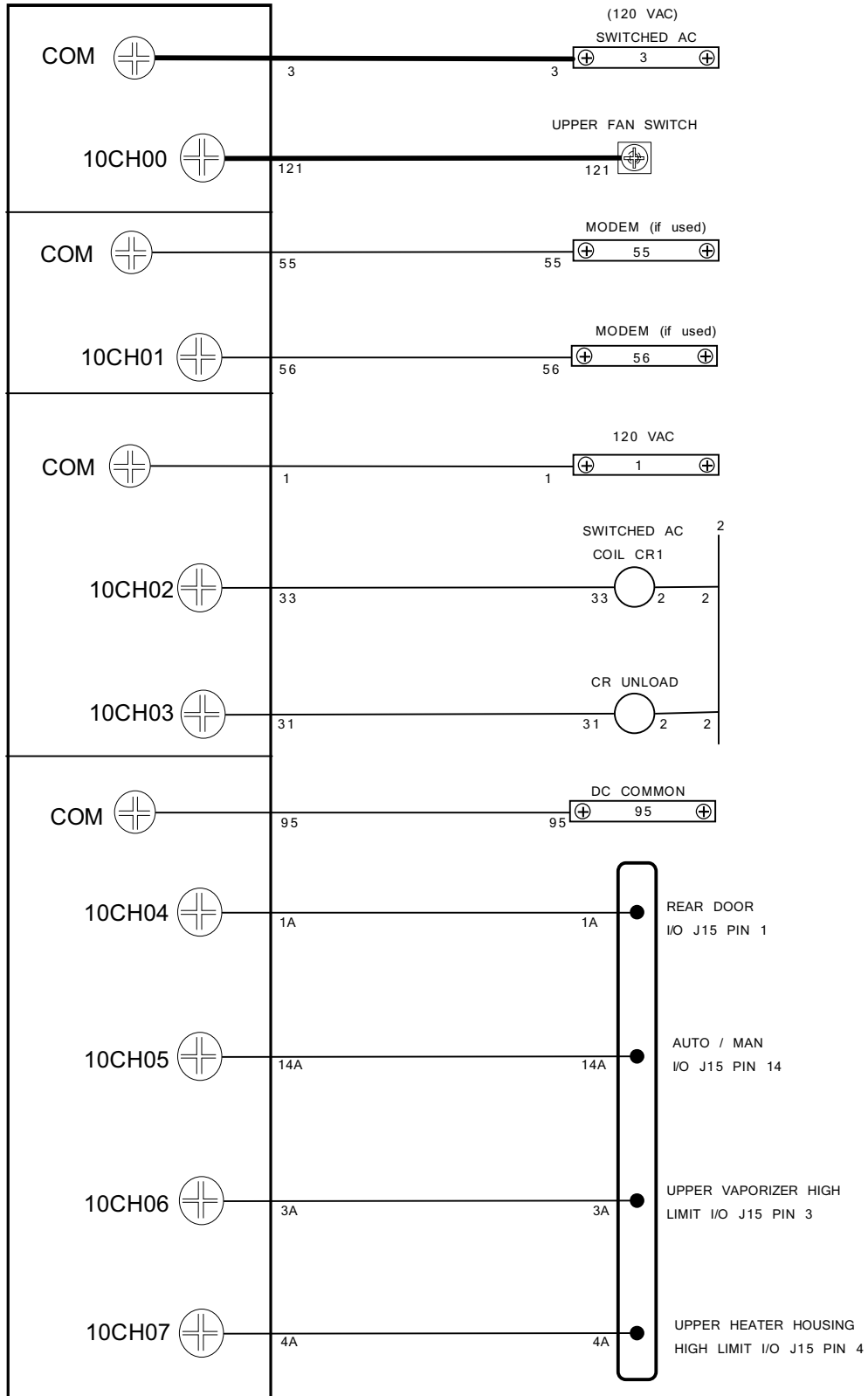
Date: 01/01

Sheet: 92.7

Revision: 01/04,01/07,1/08

# OUTPUT 10CH

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Title: PORTABLE DRYER: TWO FAN & HEAT  
PLC OUTPUTS CHANNEL 10

Author: KWC

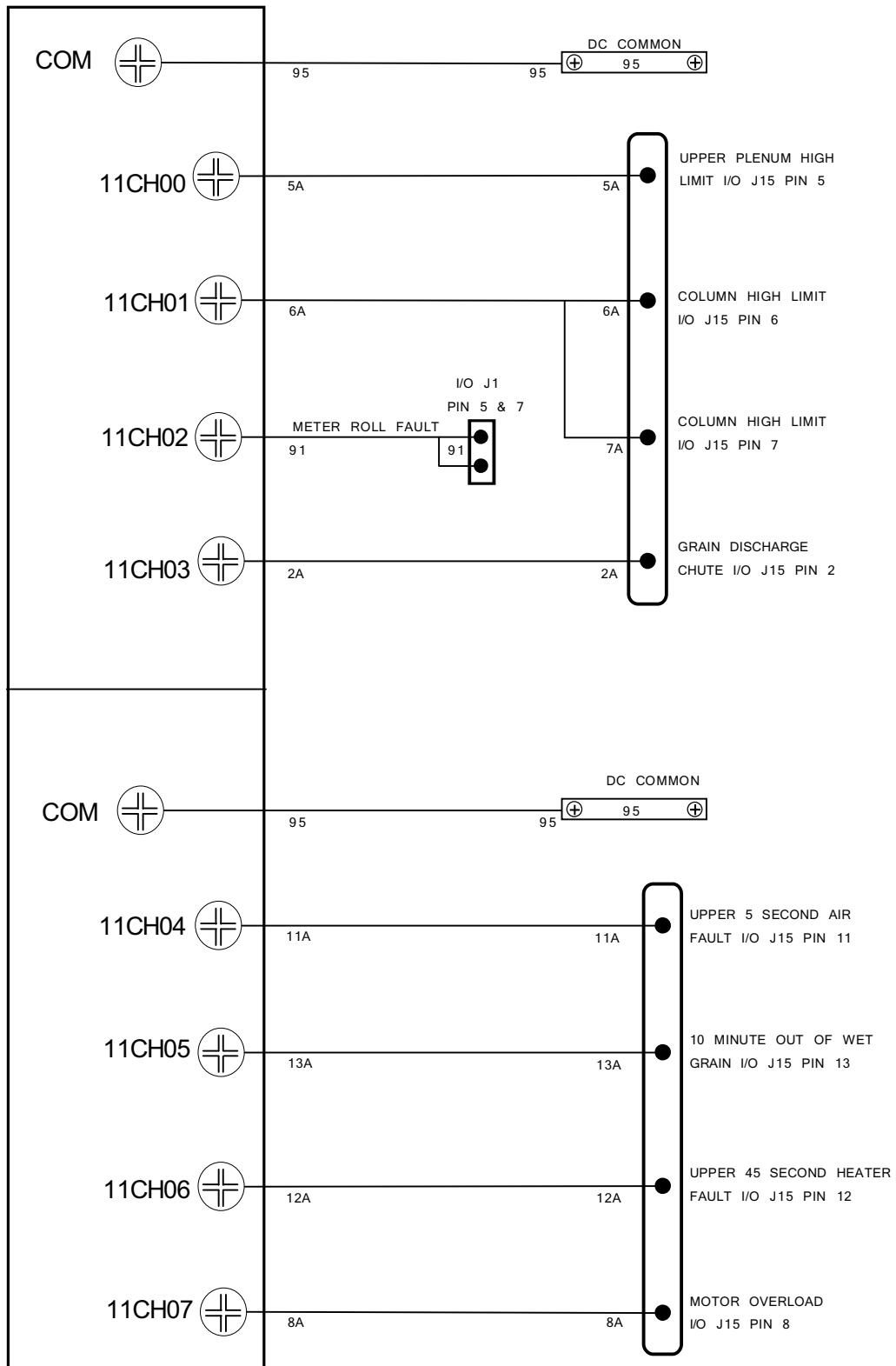
Date: 01/01

Sheet: 92.8

Revision: 11/07

# OUTPUT 11CH

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Title: PORTABLE DRYER: TWO FAN & HEAT  
PLC OUTPUT CHANNEL 11

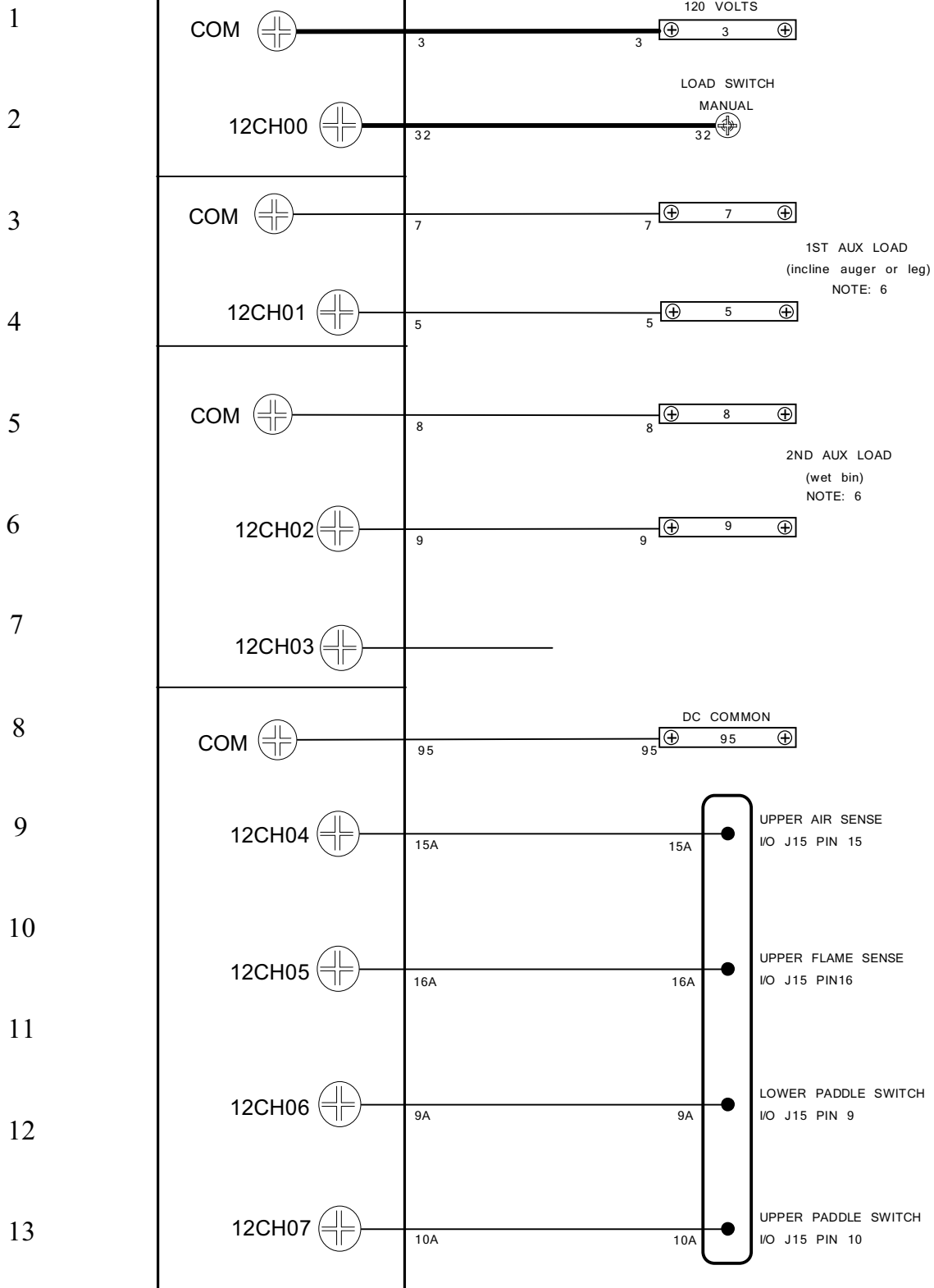
Author: KWC

Date: 01/01

Sheet: 92.9

Revision: 01/04 , 01/07

# OUTPUT 12



Title: PORTABLE DRYER: TWO FAN & HEAT  
PLC OUTPUT CHANNEL 12

Author: KWC

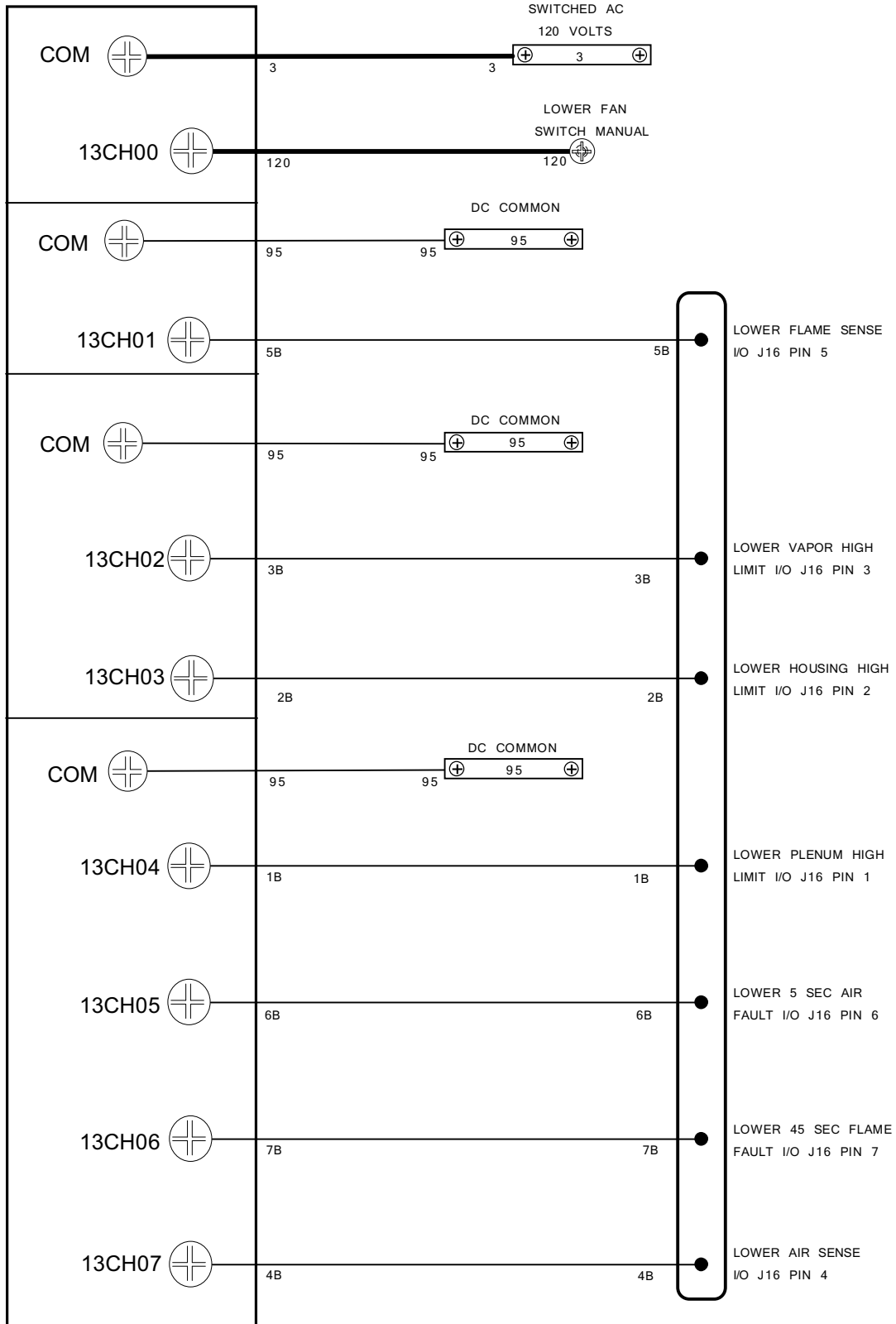
Date: 01/01

Sheet: 92.10

Revision: 11/07

# OUTPUT 13CH

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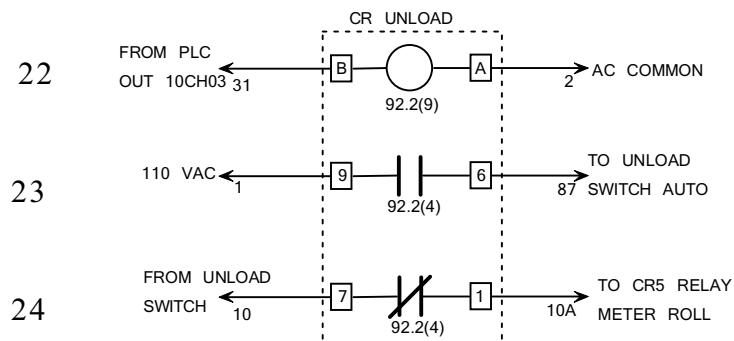
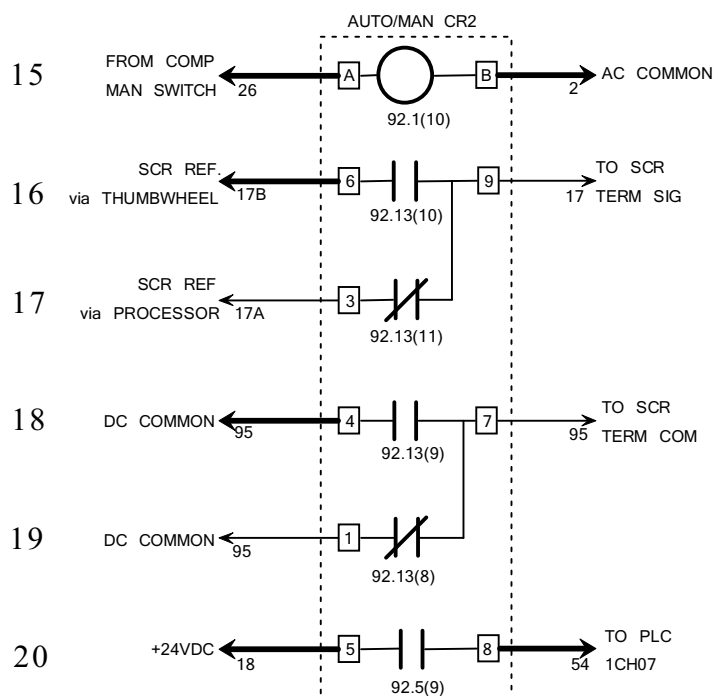
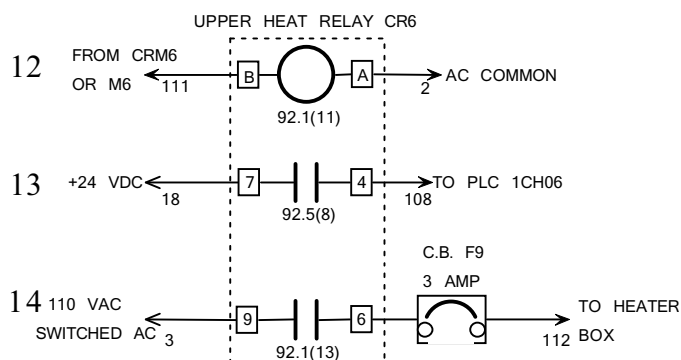
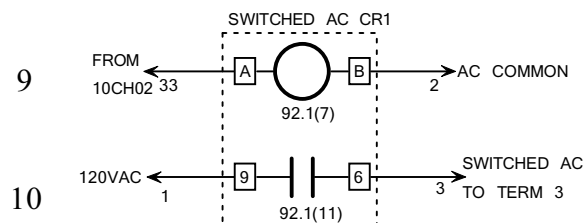
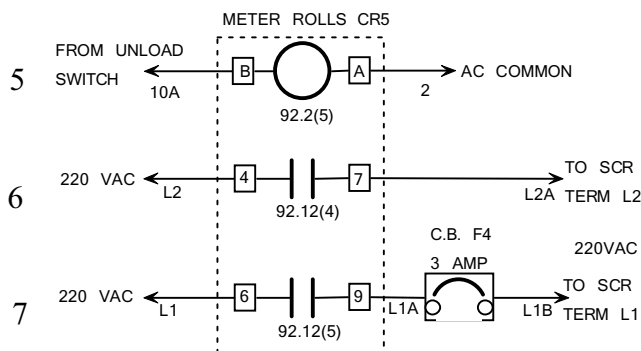
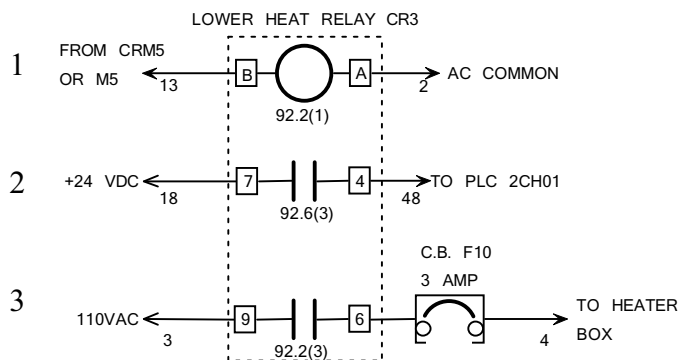
Title: PORTABLE DRYER: TWO FAN & HEAT  
PLC OUTPUT CHANNEL 13

Author: KWC

Date: 01/01

Sheet: 92.11

Revision: 11/07



MANUAL CONTROL

Title: PORTABLE DRYER : TWO FAN & HEAT RELAY CONTACT WIRING

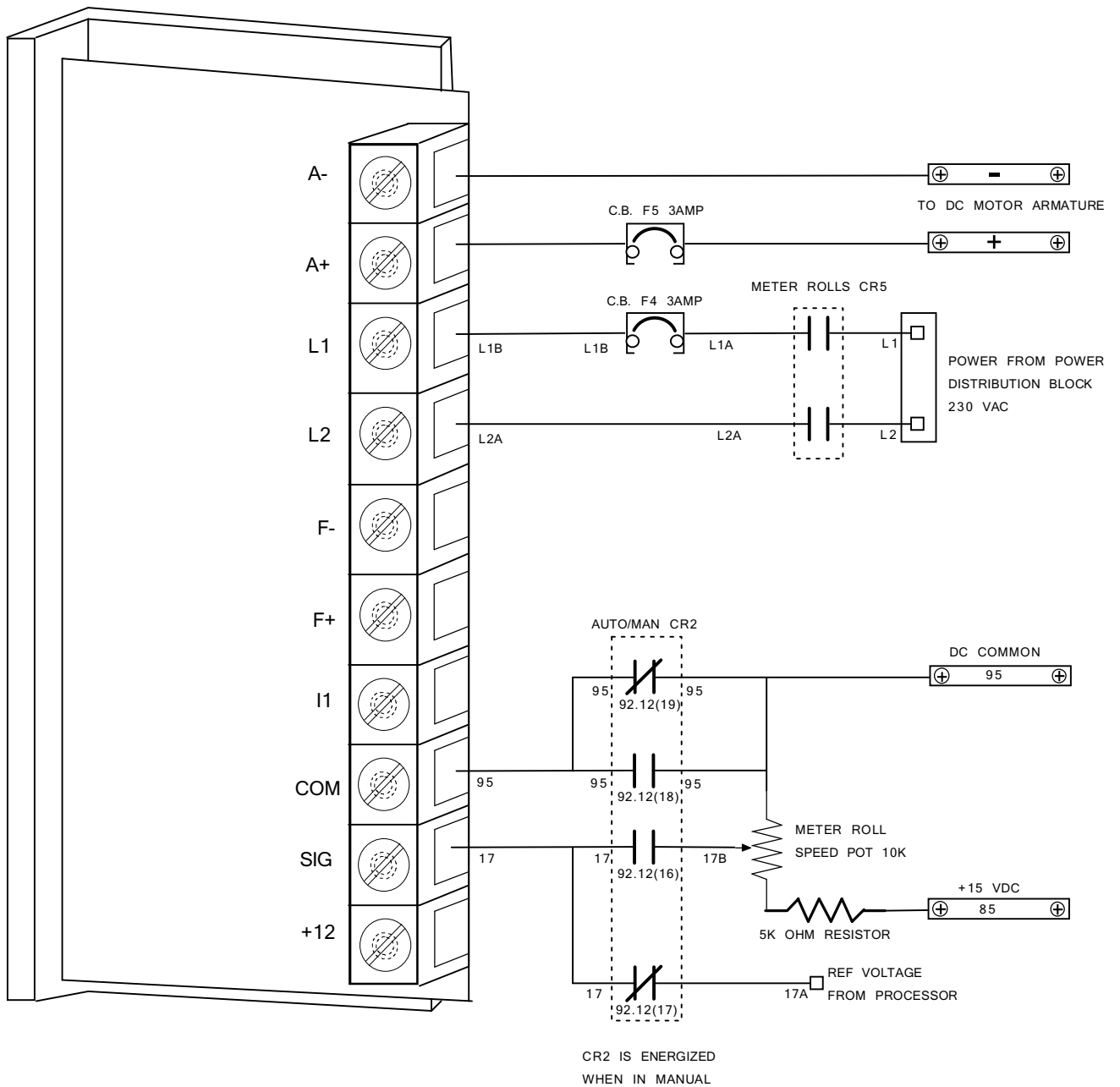
Author: KWC

Date: 01/01

Sheet: 92.12

Revision: 11/07

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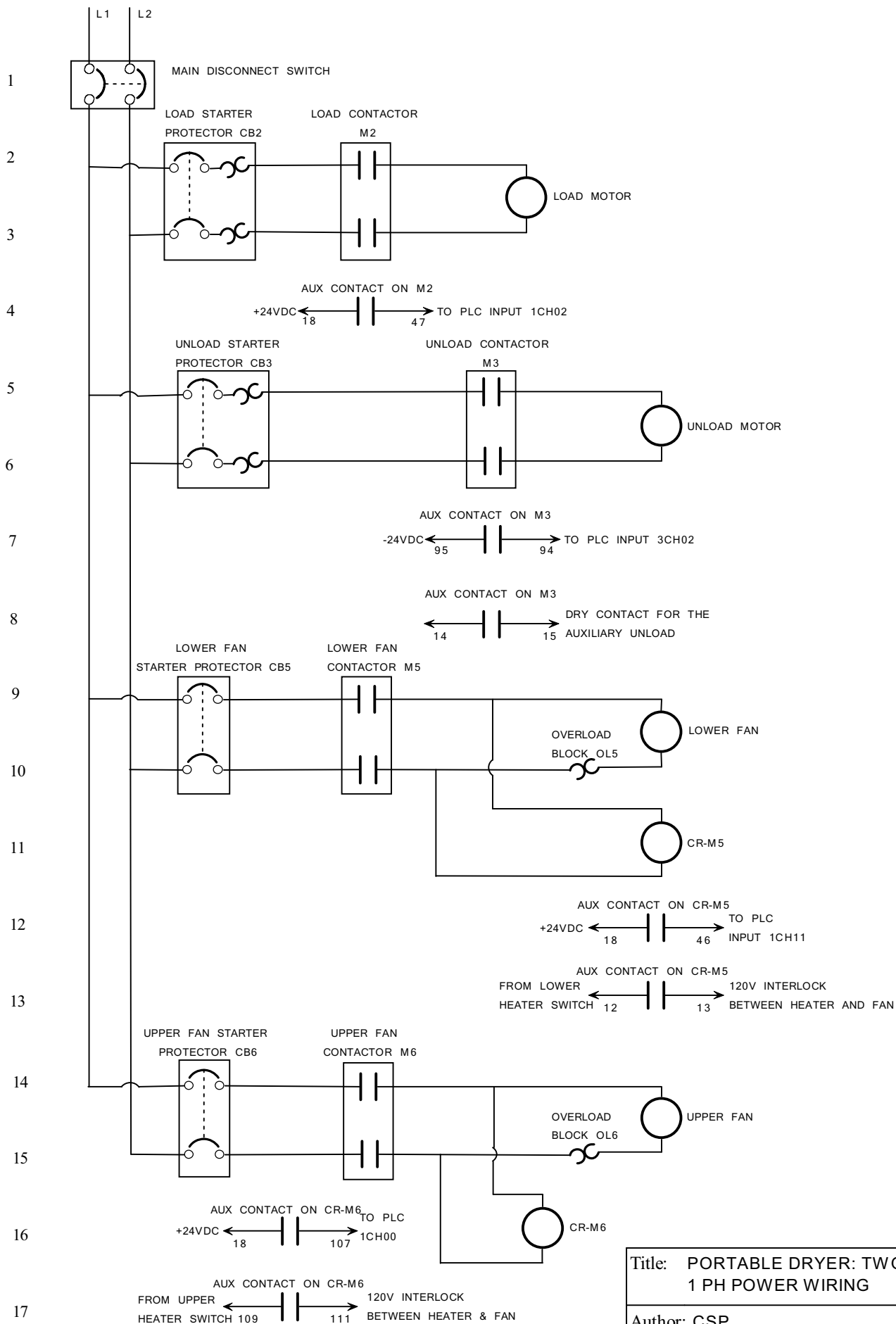
Title: PORTABLE DRYER: TWO FAN & HEAT  
SCR BOARD WIRING

Author: KWC

Date: 01/01

Sheet: 92.13

Revision: 01/04 , 01/07



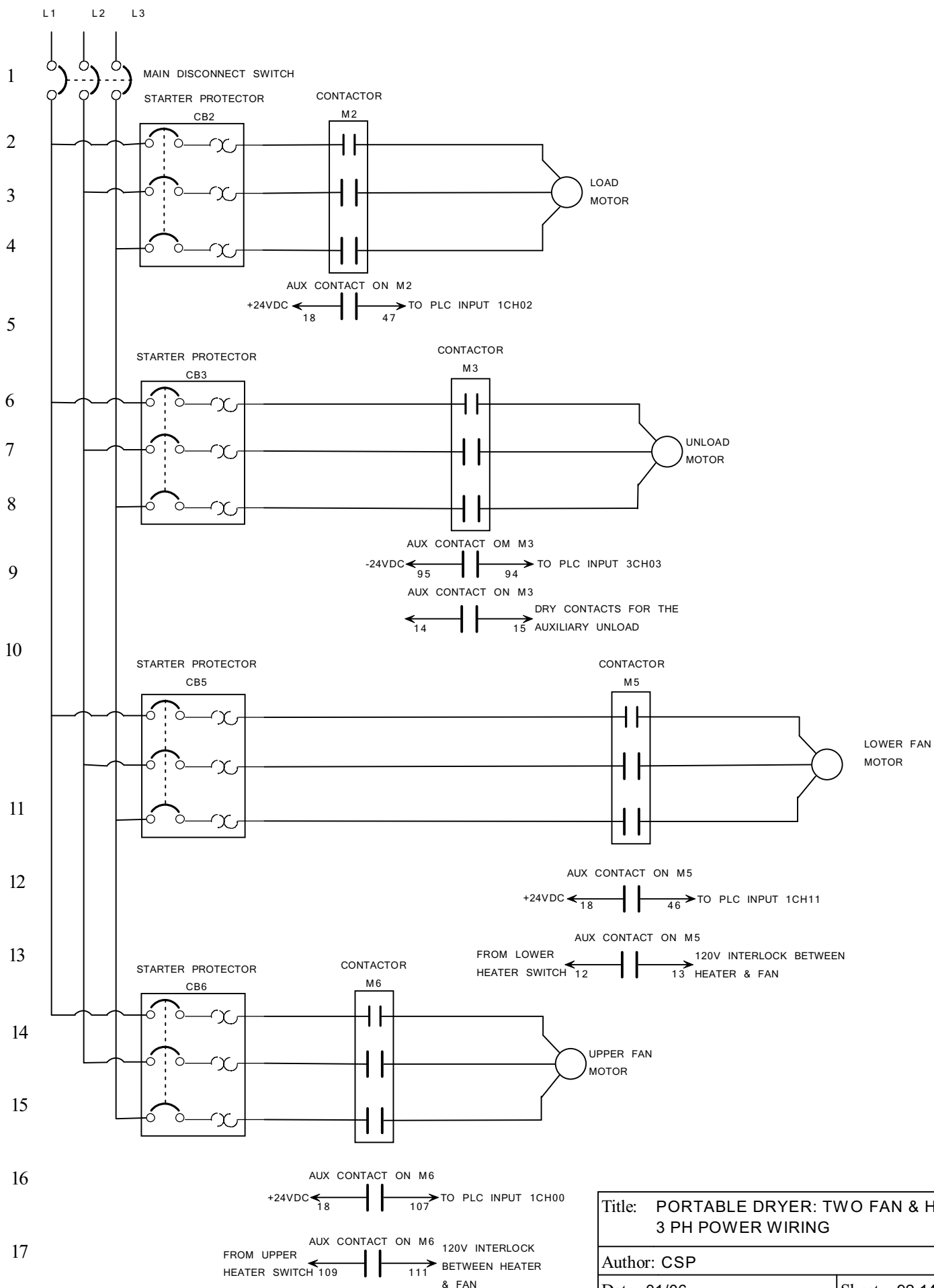
Title: PORTABLE DRYER: TWO FAN & HEAT  
1 PH POWER WIRING

Author: CSP

Date: 01/06

Sheet: 92.14

Revision: 11/07



Title: PORTABLE DRYER: TWO FAN & HEAT  
3 PH POWER WIRING

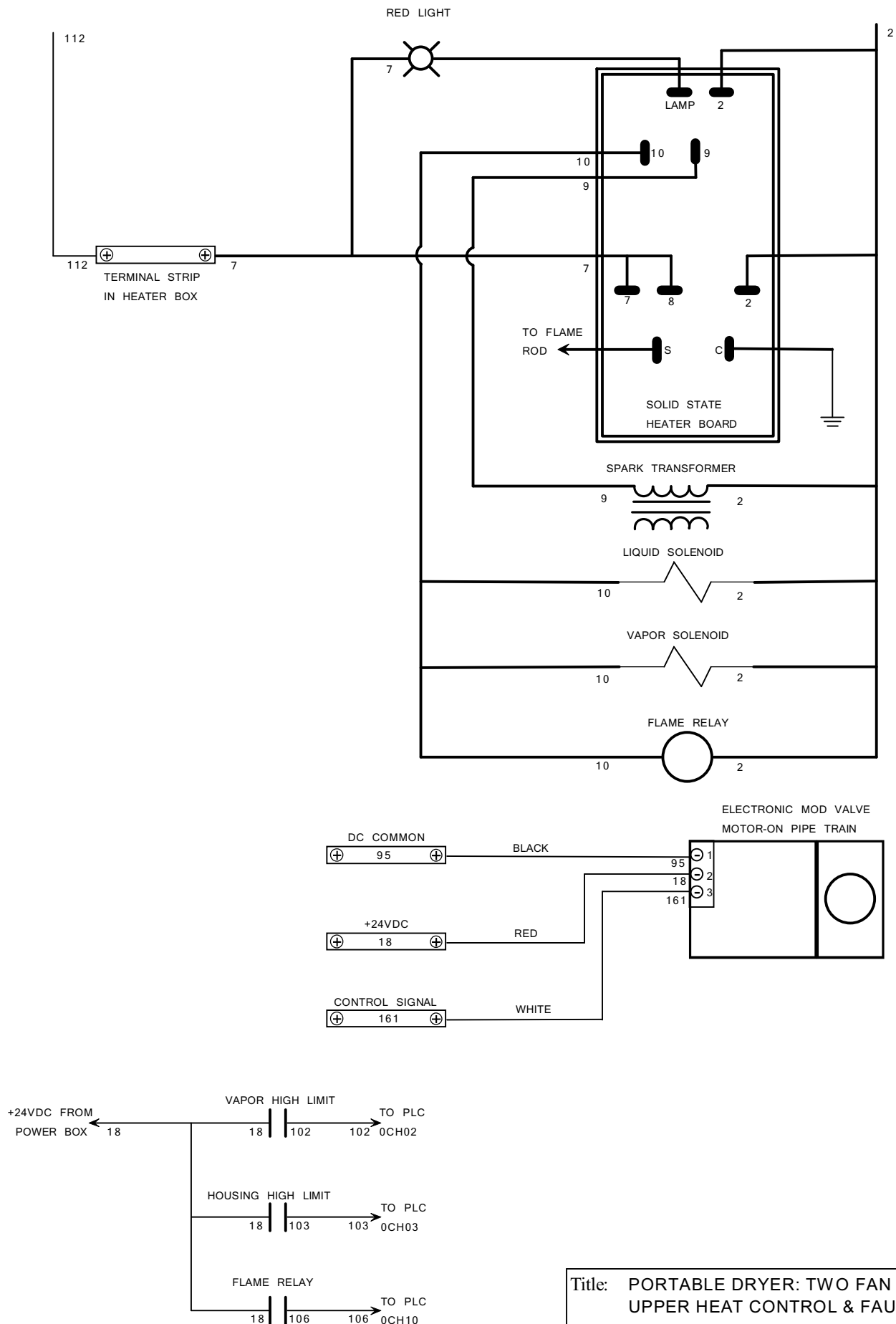
Author: CSP

Date: 01/06

Sheet: 92.14

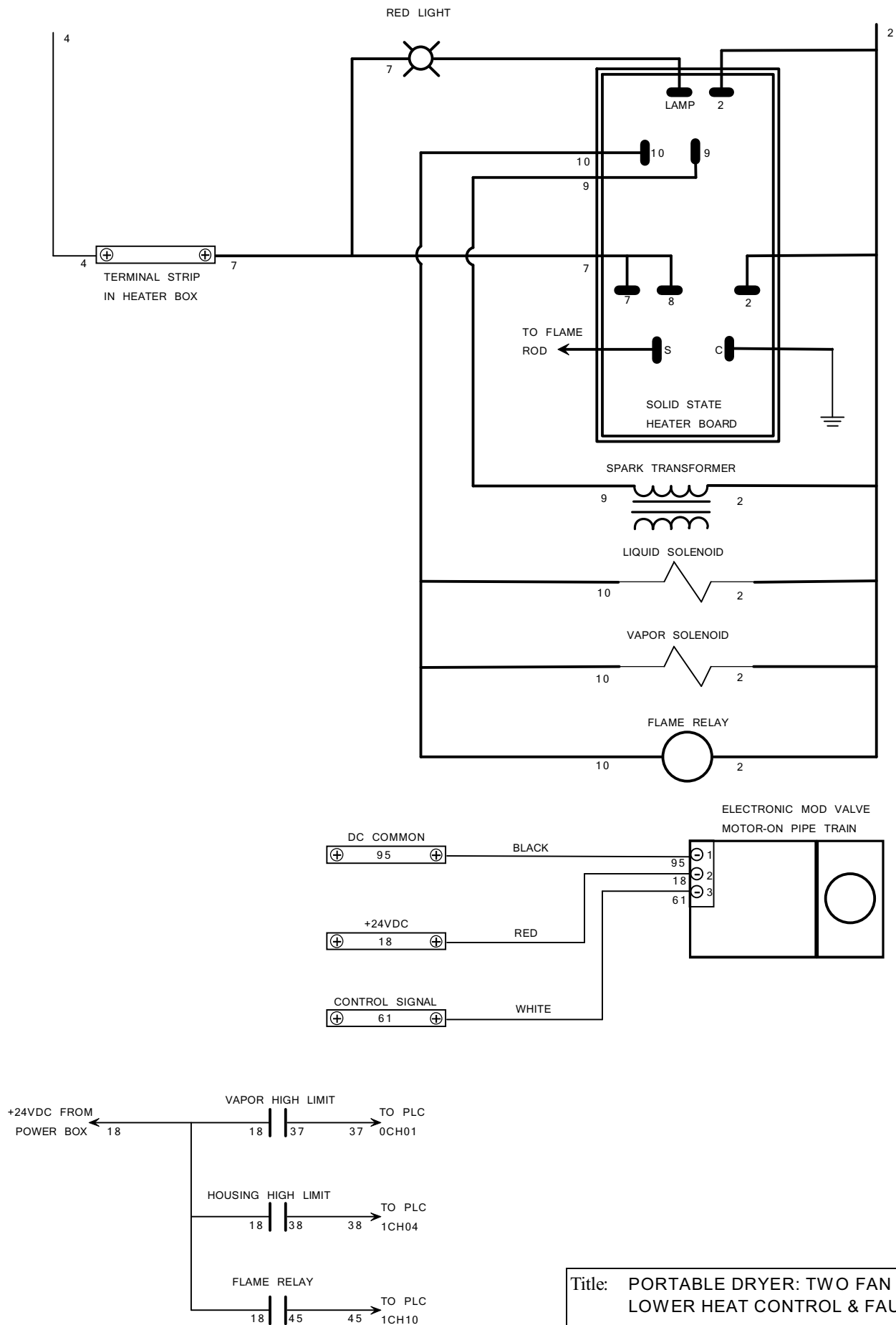
Revision: 01/07

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|----------------------------------------------------------------------------|--------------|
| Title: PORTABLE DRYER: TWO FAN & HEAT<br>UPPER HEAT CONTROL & FAULT WIRING |              |
| Author: CSP                                                                |              |
| Date: 01/04                                                                | Sheet: 92.15 |
| Revision: 11/07                                                            |              |

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Title: PORTABLE DRYER: TWO FAN & HEAT  
LOWER HEAT CONTROL & FAULT WIRING

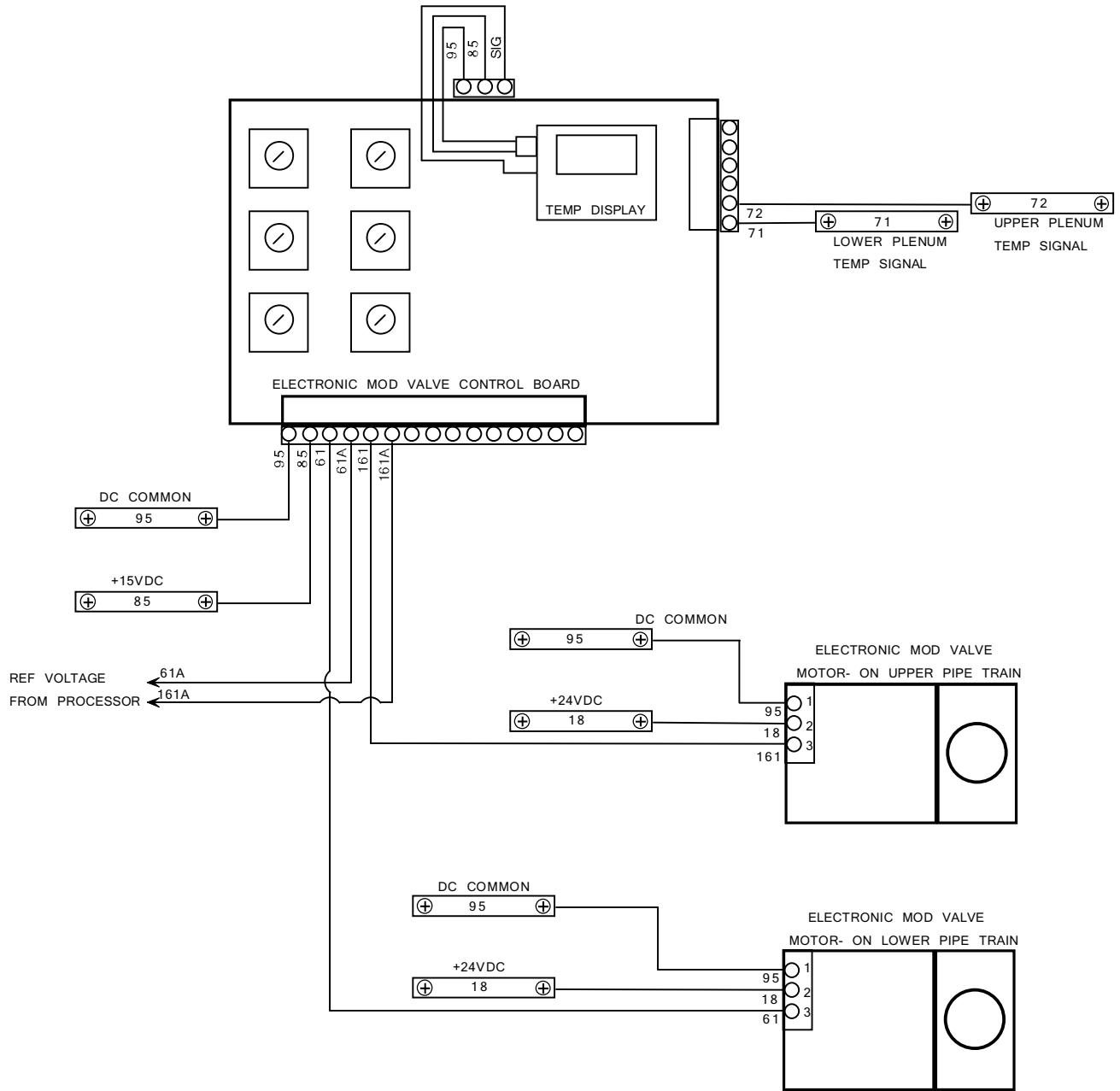
Author: CSP

Date: 01/04

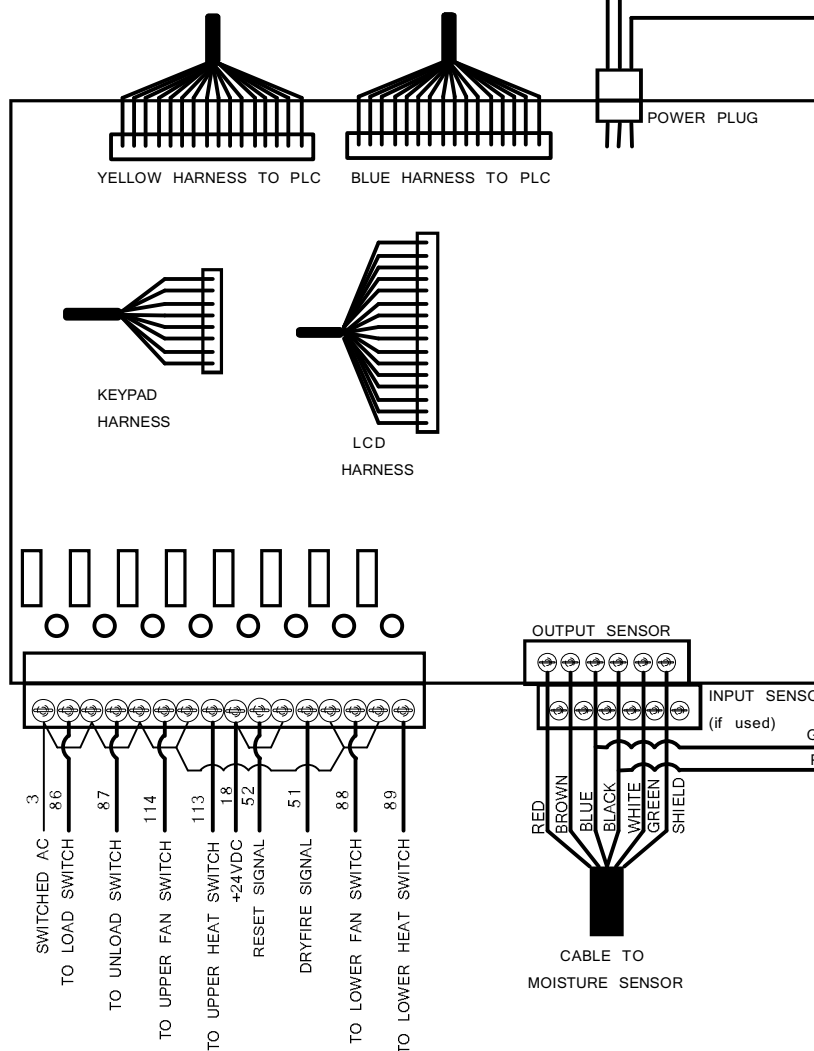
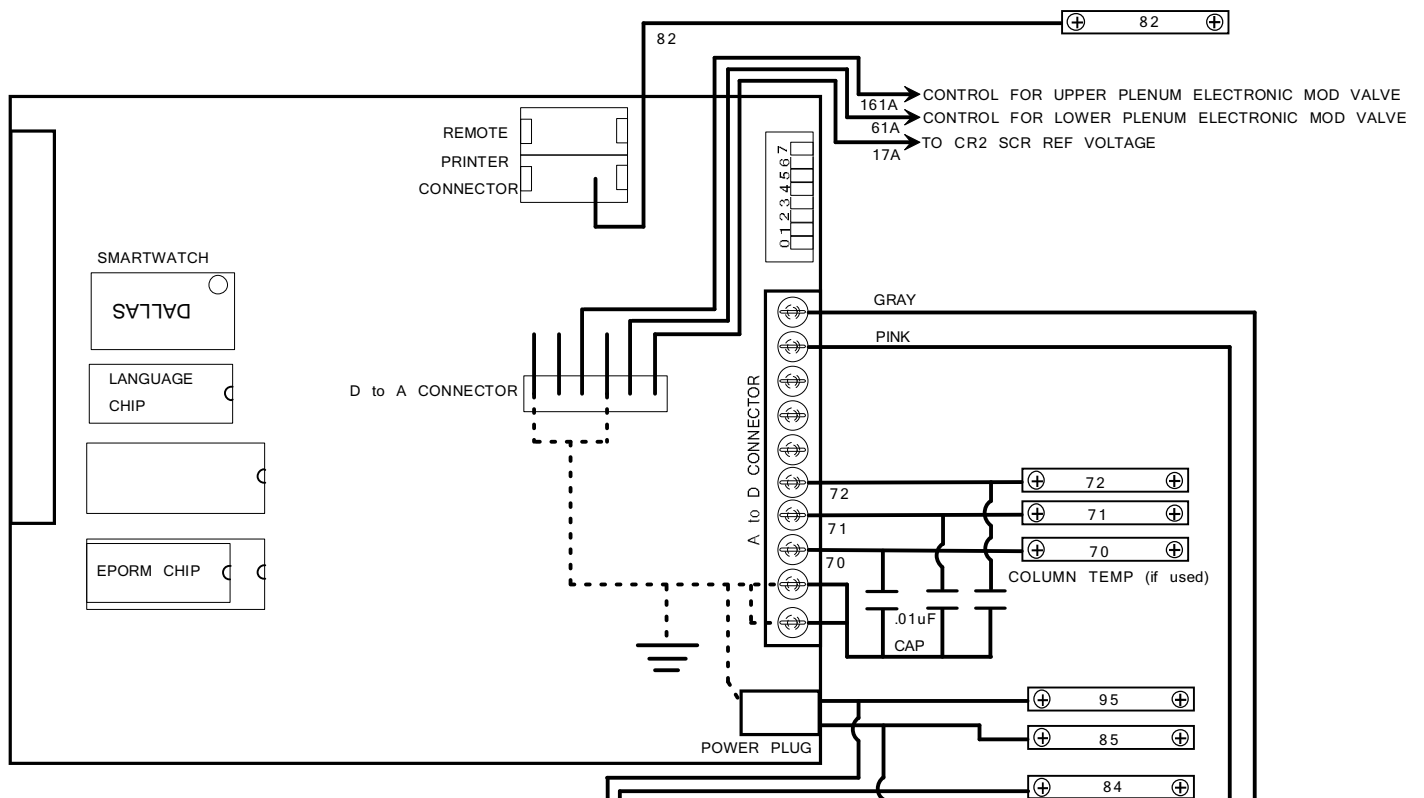
Sheet: 92.16

Revision: 01/07

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|-----------------------------------------------------------------------|--------------|
| Title: PORTABLE DRYER: TWO FAN & HEAT<br>ELECTRONIC MOD VALVE CONTROL |              |
| Author: CSP                                                           |              |
| Date: 01/06                                                           | Sheet: 92.17 |
| Revision: 01/07                                                       |              |



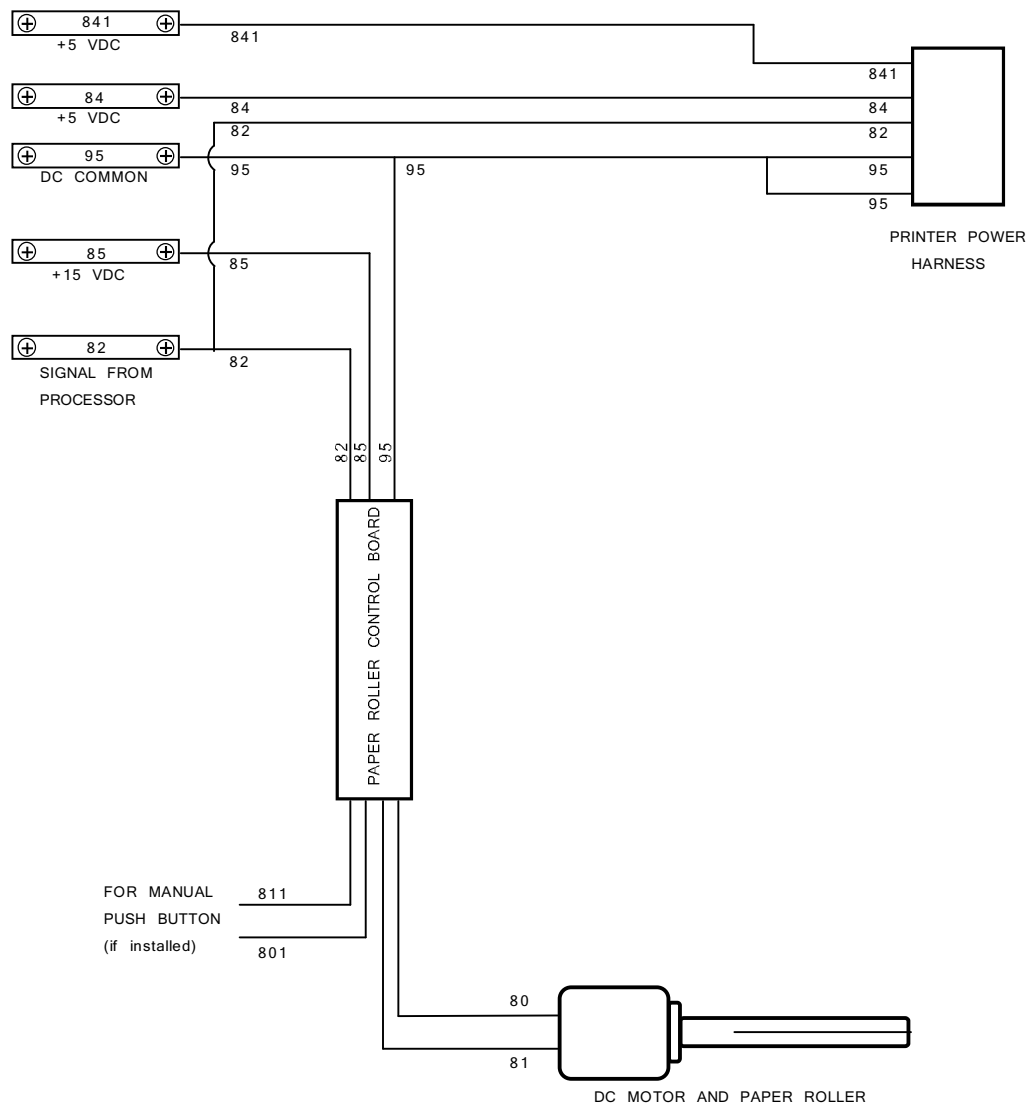
Title: PORTABLE DRYER : TWO FAN & HEAT  
I/O & PROCESSOR BOARD WIRING

Author: CSP

Date: 01/07

Sheet: 92.18

Revision:



Title: PORTABLE DRYER : TWO FAN & HEAT  
PRINTER AND PAPER ROLLER WIRING

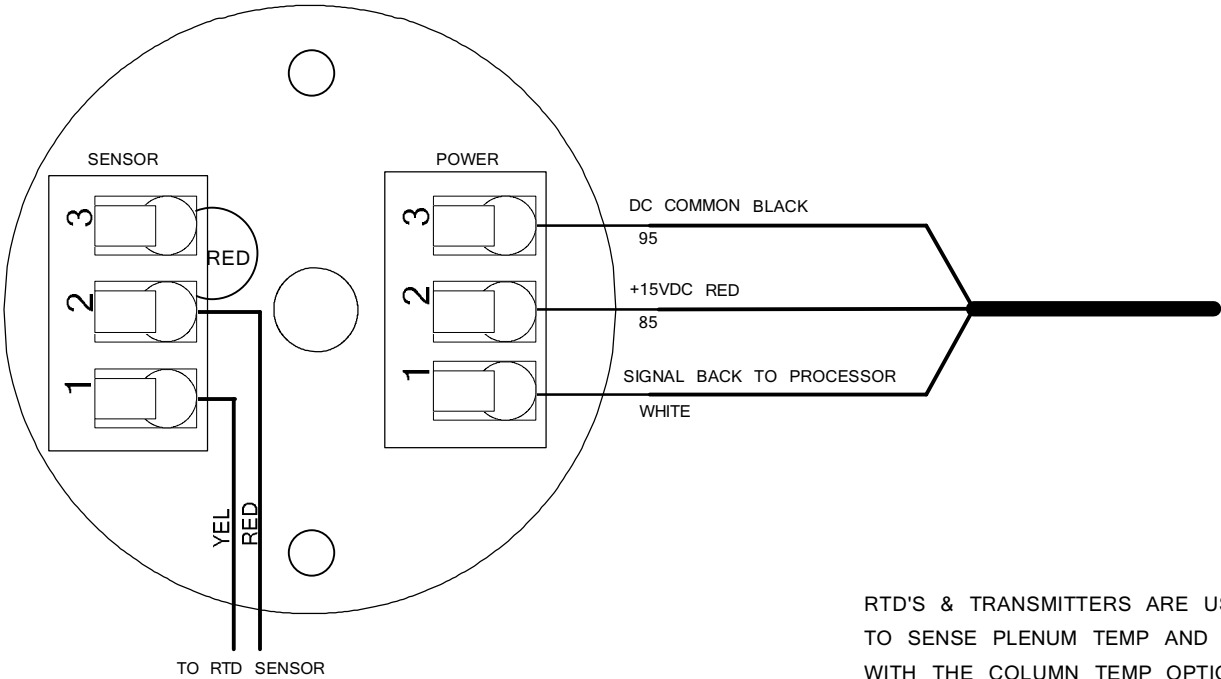
Author: CSP

Date: 01/07

Sheet: 92.19

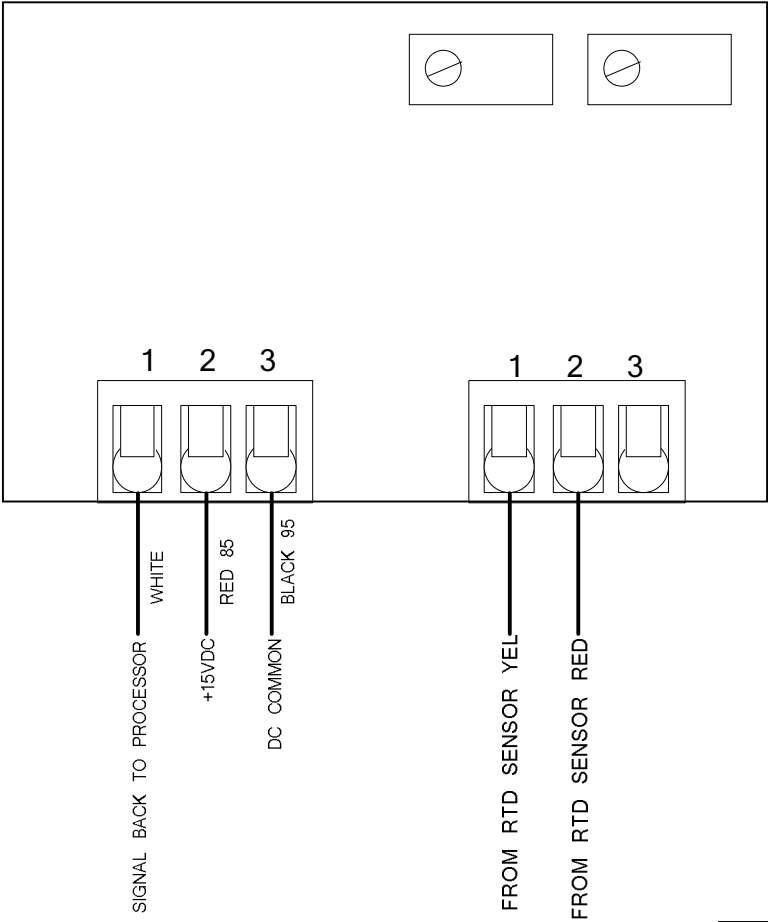
Revision:

MINCO TRANSMITTER (DISCONTINUED IN 2007 - REPLACE WITH T17028)



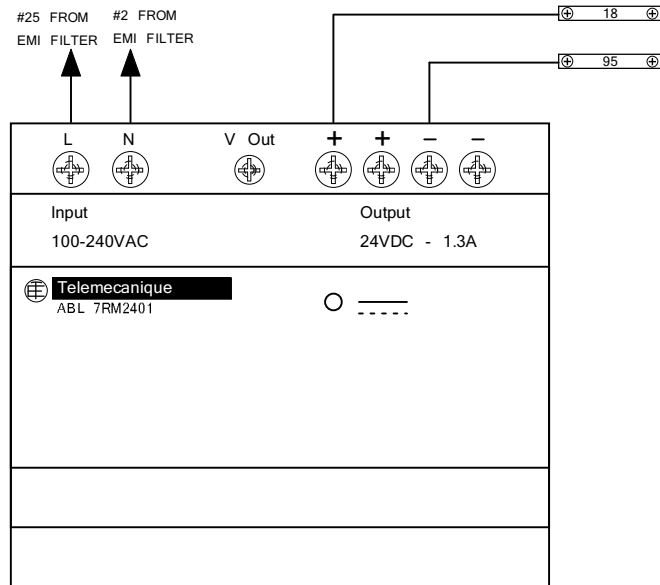
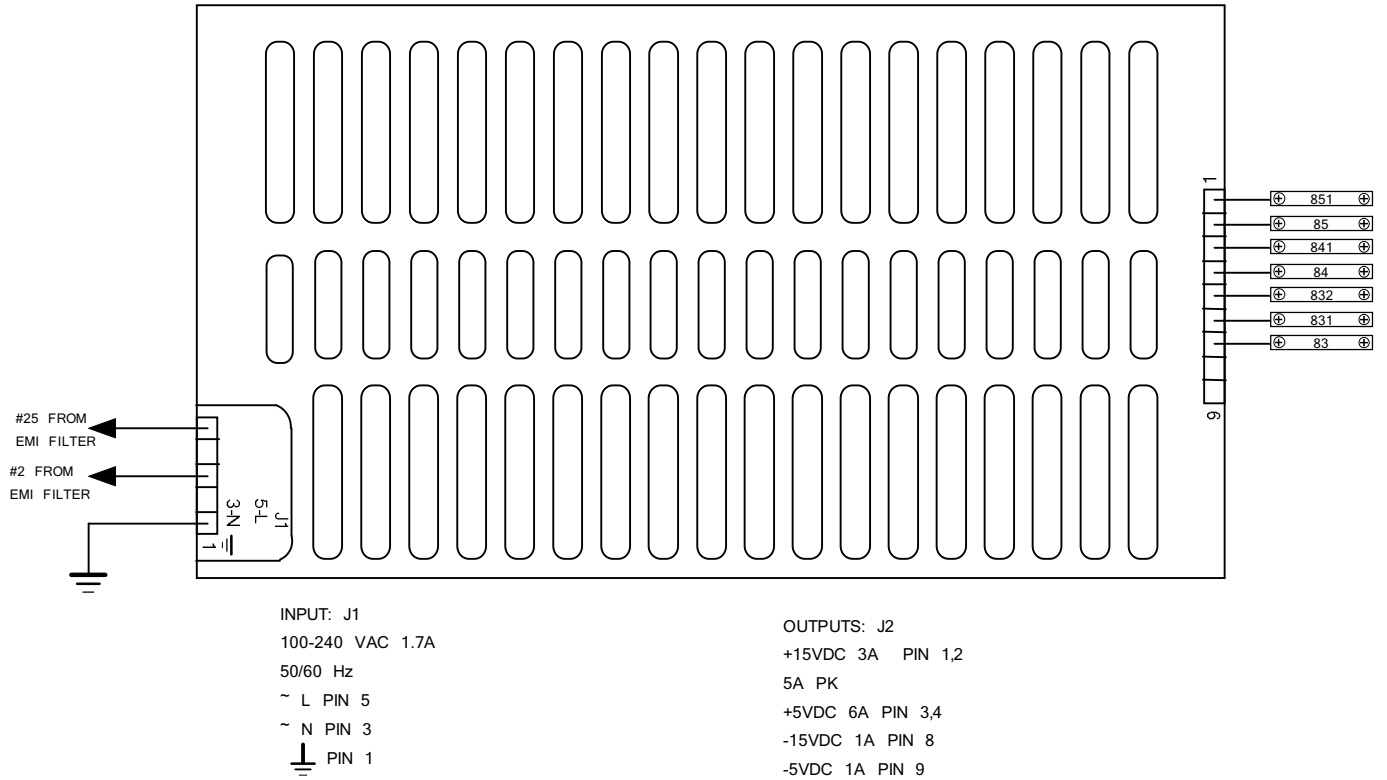
RTD'S & TRANSMITTERS ARE USED TO SENSE PLENUM TEMP AND ALSO WITH THE COLUMN TEMP OPTION.

T17028 NEW AS OF 2007



|                                                                  |              |
|------------------------------------------------------------------|--------------|
| Title: PORTABLE DRYER : TWO FAN & HEAT<br>RTD TRANSMITTER WIRING |              |
| Author: CSP                                                      |              |
| Date: 01/07                                                      | Sheet: 92.20 |
| Revision:                                                        |              |

# 5 AND 15 VOLT DC POWER SUPPLY



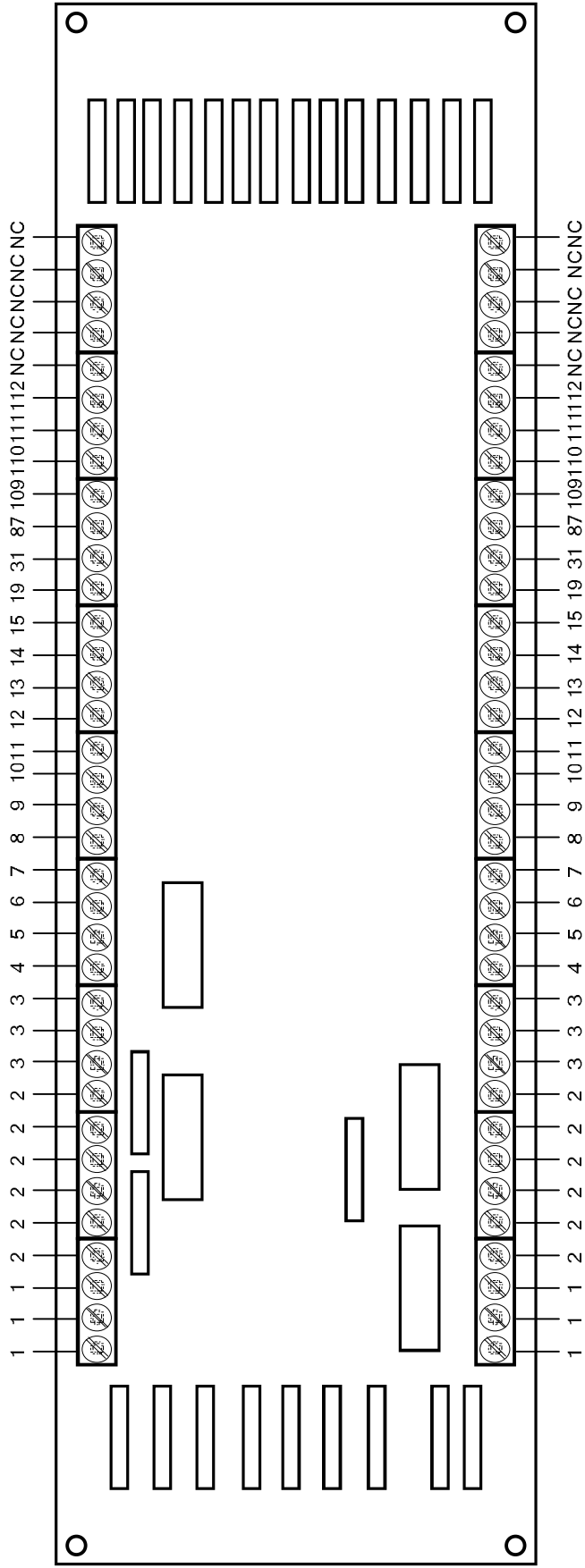
Title: PORTABLE DRYER: TWO FAN & HEAT  
 POWER SUPPLY CONNECTIONS

Author: CSP

Date: 11/07

Sheet: 92.21

Revision:



|                                                                        |              |
|------------------------------------------------------------------------|--------------|
| Title: PORTABLE DRYER: TWO FAN & HEAT:<br>AC SUPPRESSION BOARD: J67831 |              |
| Author: CSP                                                            |              |
| Date: 11/07                                                            | Sheet: 91.18 |
| Revision:                                                              |              |

## TWO FAN ELECTRICAL DRAWING NOTES

NOTE 1: On single phase, the control voltage comes from CR - M5 & CR - M6. On 3 phase dryers the control voltage comes from an Auxiliary contact on M5 & M6 starter.

NOTE 2: On all switches XOO indicates that the switch is in the Manual or ON position. OOX indicates that the switch is in the Computer or AUTO position.

NOTE 3: CR Unload is a timed off delay, so that the unload will clean out when a fault occurs.

NOTE 4: Terminals found in the Auxiliary box. If no auxiliary controls are installed, place a jumper between terminal 18 and terminal 49.

NOTE 5: For Auxiliary wiring of 12CH01 and 12CH02, Refer to Appendix 1 in the Dryer Manual.

NOTE 6: Drawing 91.12 covers both LP & NG heaters. If the heater is NG, then the vapor high limit and the liquid solenoid valve are not used.

NOTE 7:  - indicates the screw terminal on the relay socket that the wire is attached to, found in drawing 91.9.

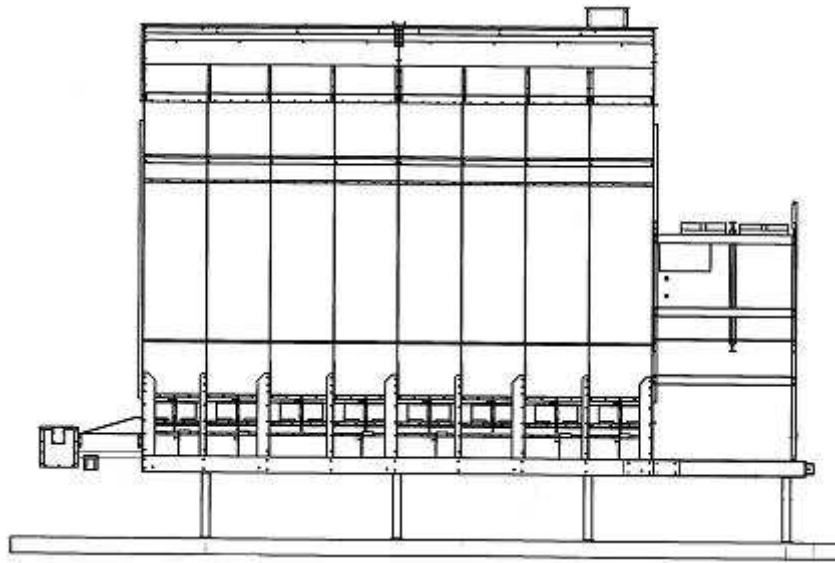
NOTE 8: Differential Air Flow switch is only used on CE and CSA dryers. It is not used on the domestic dryers.

NOTE 9: Change being made during 2008 production run. Left meter roll proximity switch removed and installed a jumper between the meter roll inputs on PLC (3CH04 & 3CH05).

NOTE: There are different types of electrical noise protection that are installed throughout the dryer, that might not be shown in these drawings.



**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.

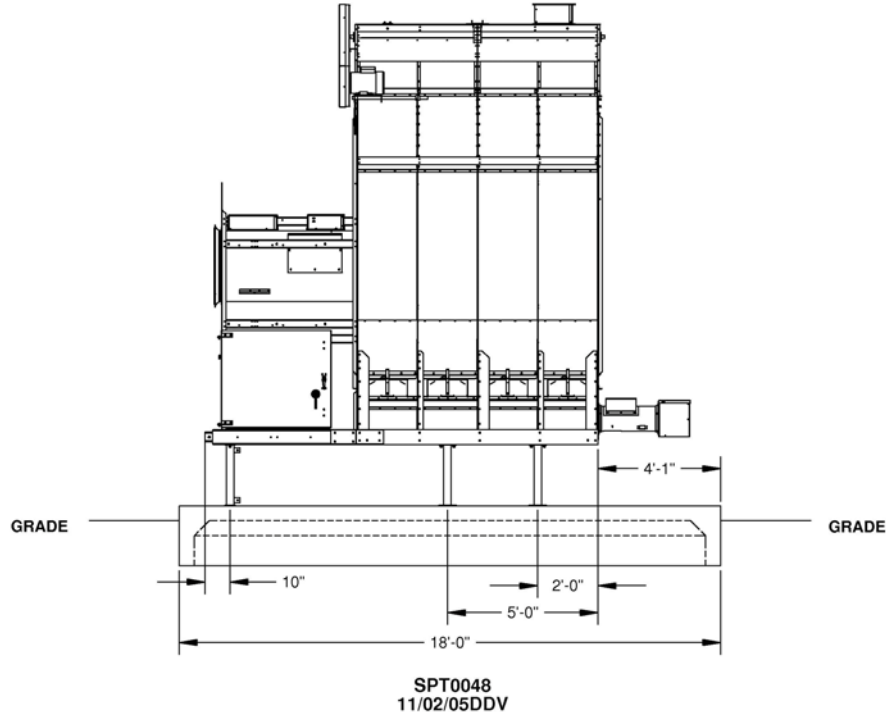
The dryer must be mounted a minimum of 16 inches above the surface to allow for clean out.

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).

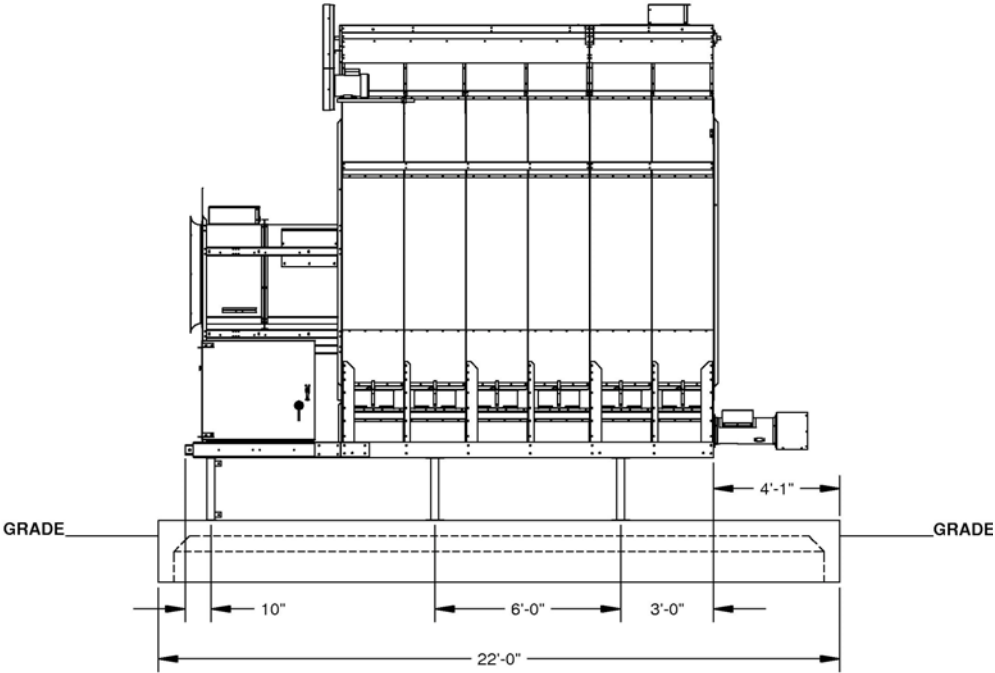
Ladder extensions are included with the 3 & 4 foot leg extension kit. The same length of ladder extension is supplied with the 4 foot kit as the 3 foot kit.

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

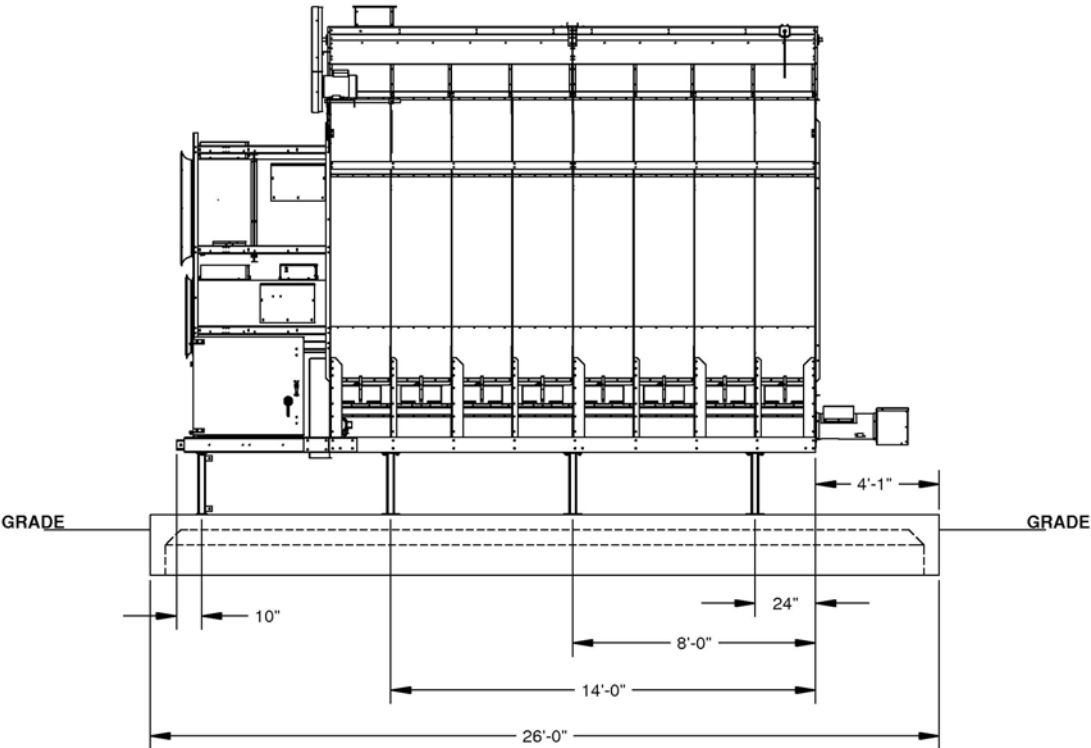
The following five drawings show proper support leg locations for 8, 12, 16, 20, 24 and 28 foot dryers.



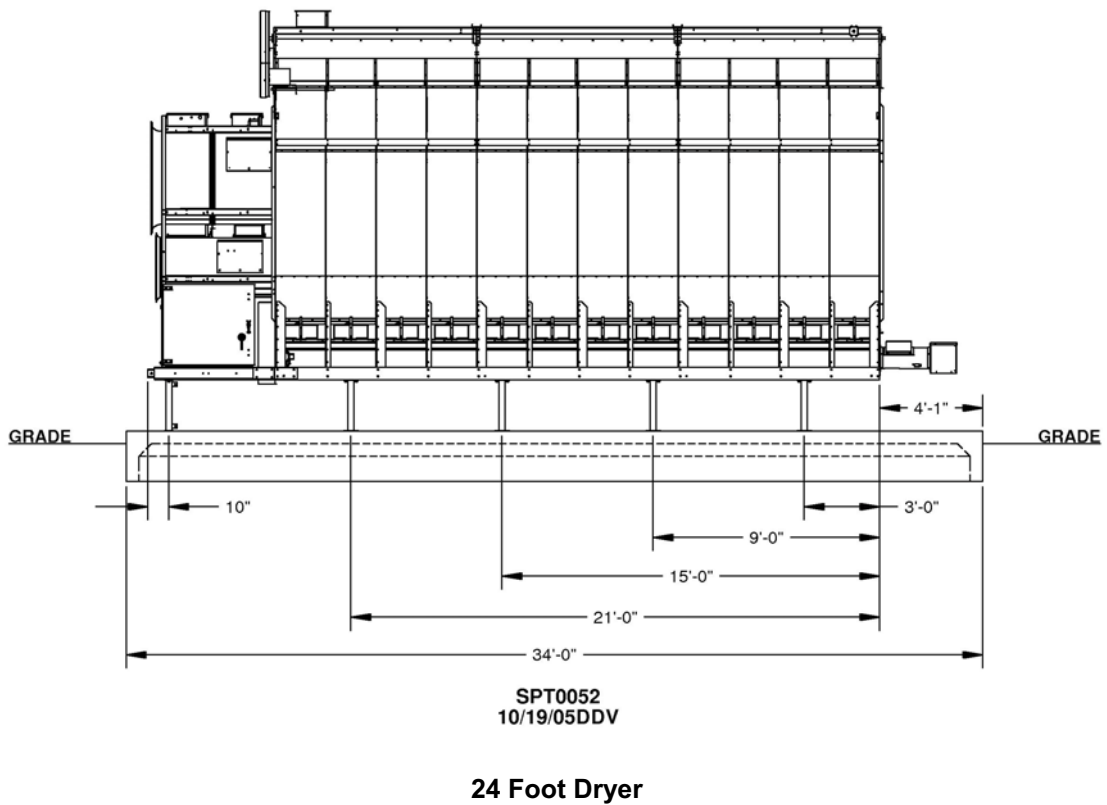
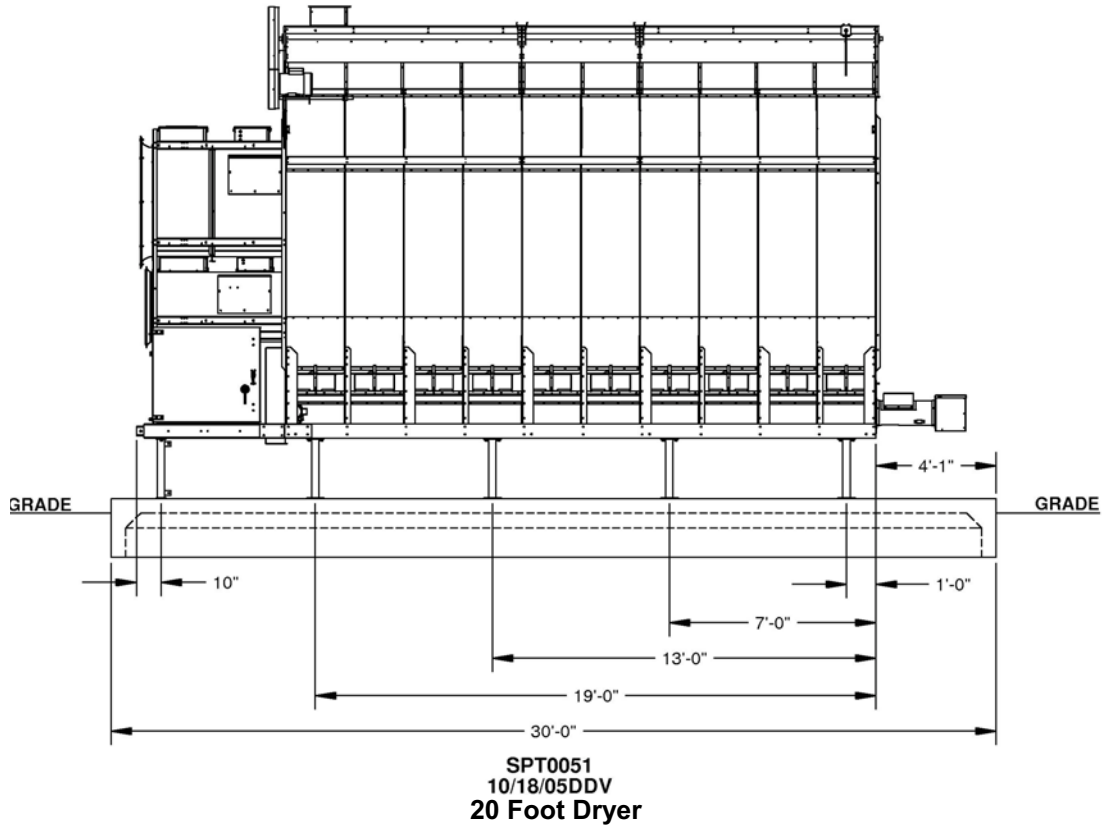
**8 Foot Dryer**

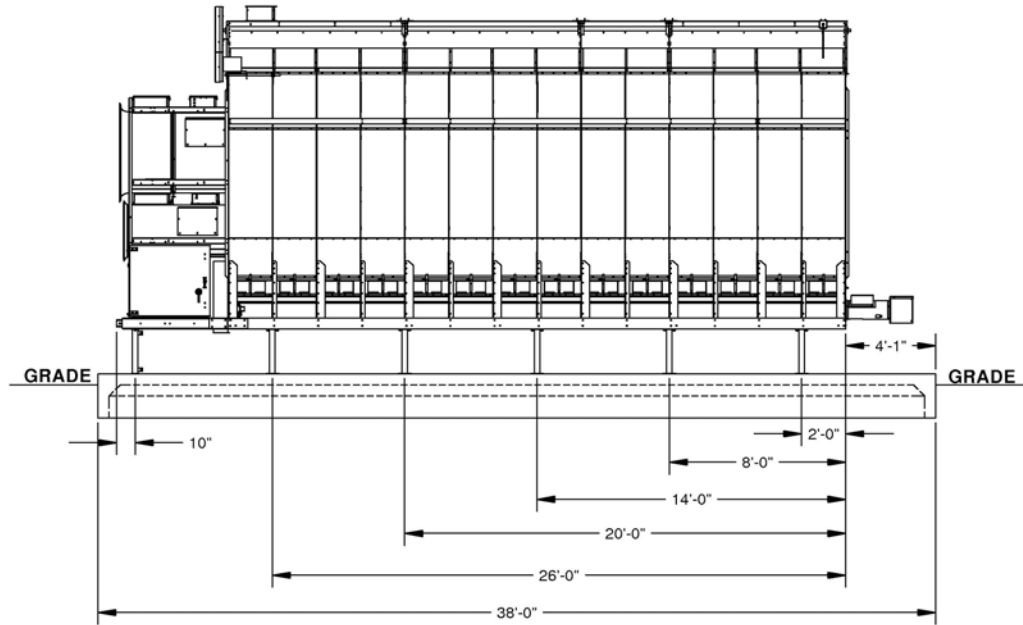


SPT0049  
10/18/05DDV  
**12 Foot Dryer**

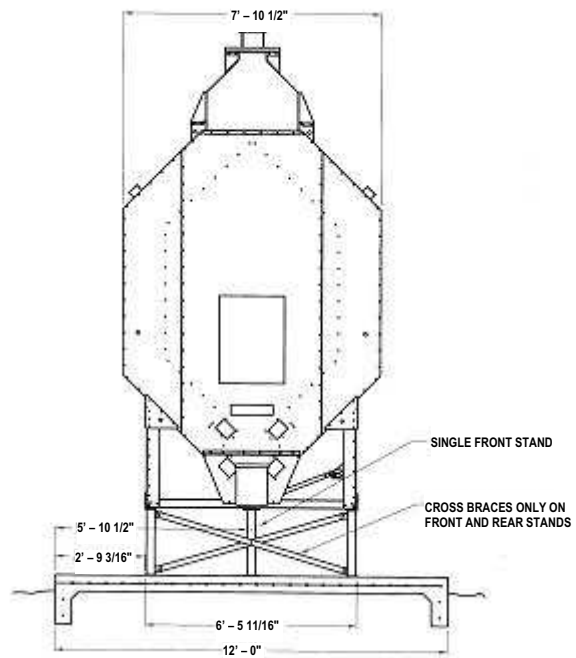


SPT0050  
10/18/05DDV  
**16 Foot Dryer**





SPT0053  
10/27/05DDV  
**28 Foot Dryer**

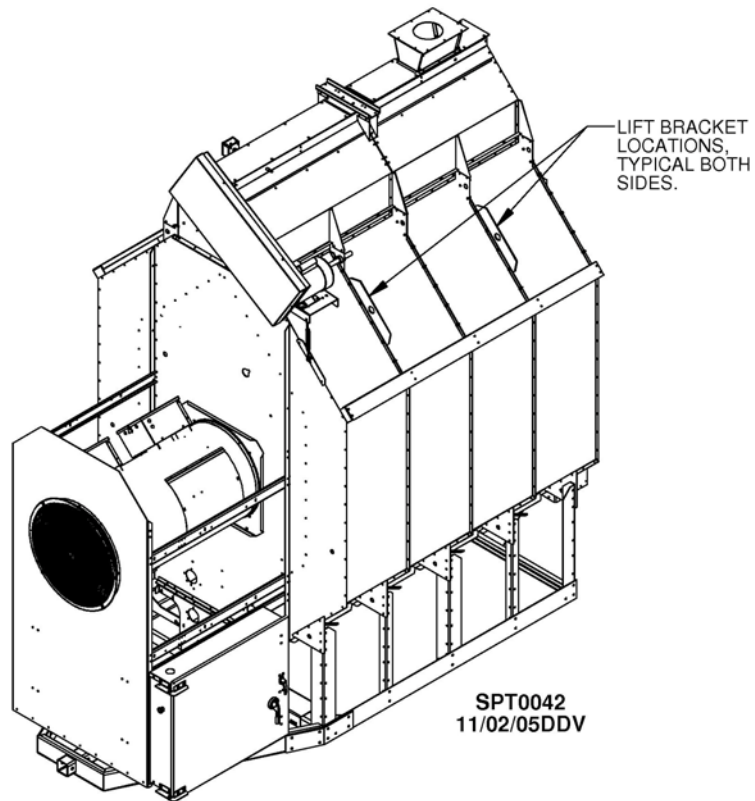


**Cross support braces and Front stand**

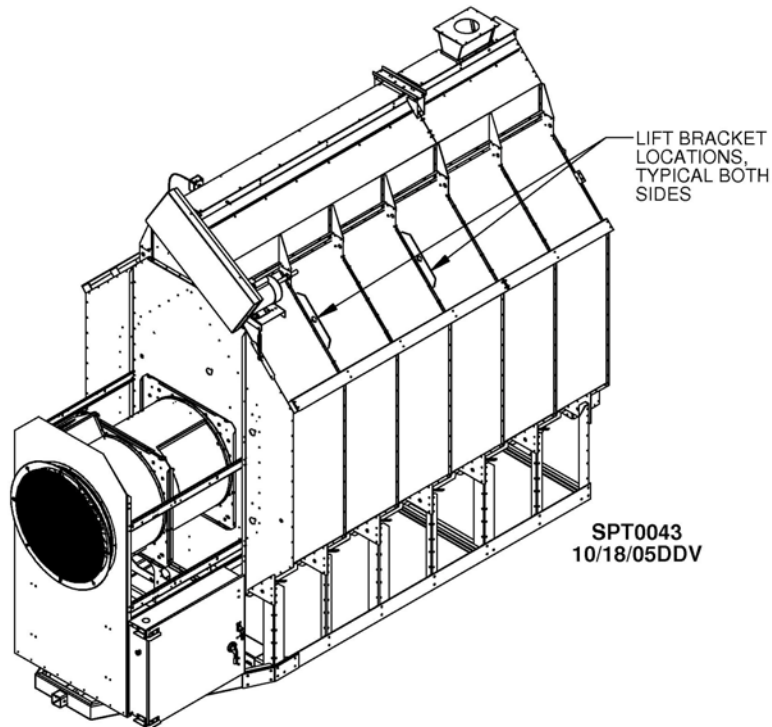
If the dryer is not mounted using Sukup Mfg supports, the following guidelines must be followed:

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

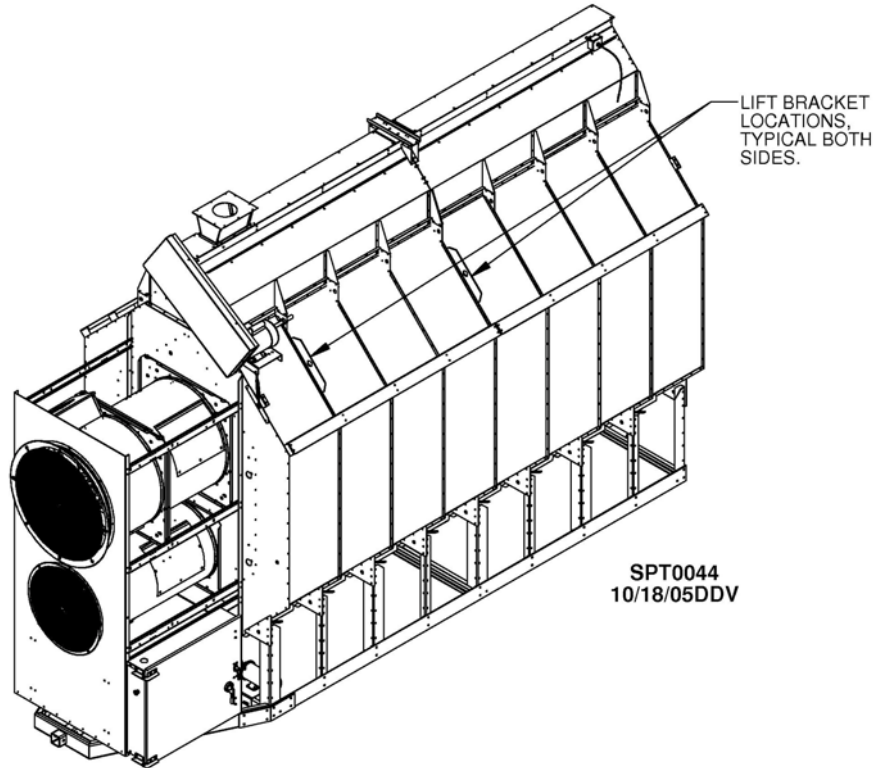
Lift Bracket Locations



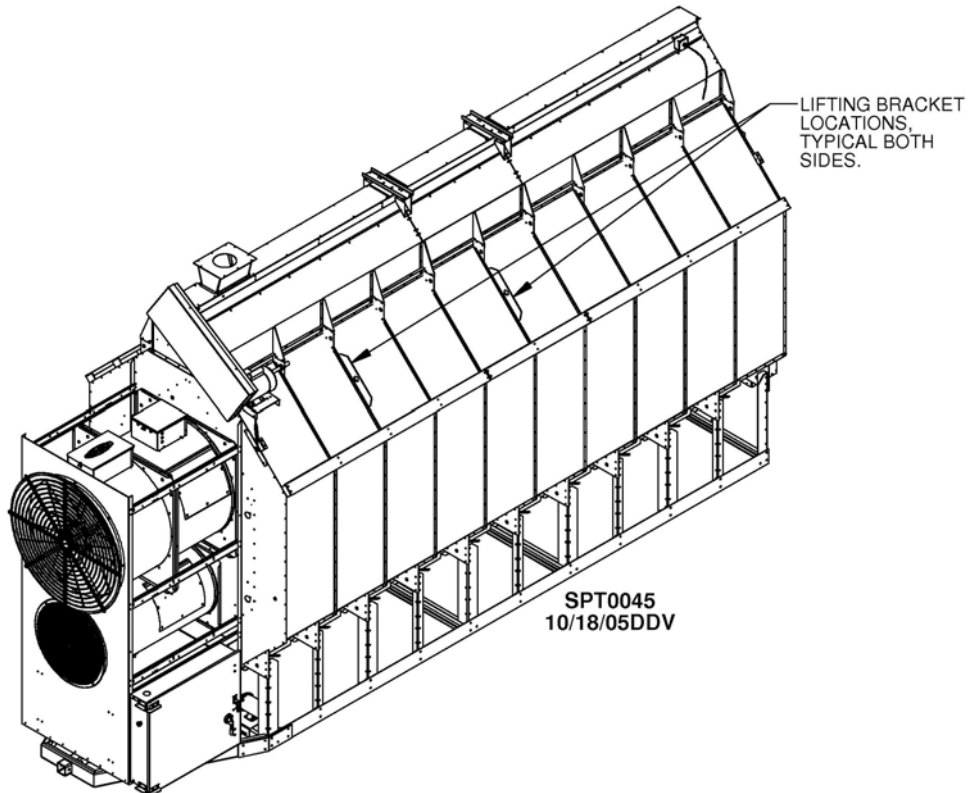
8 Foot Dryer Lift Points



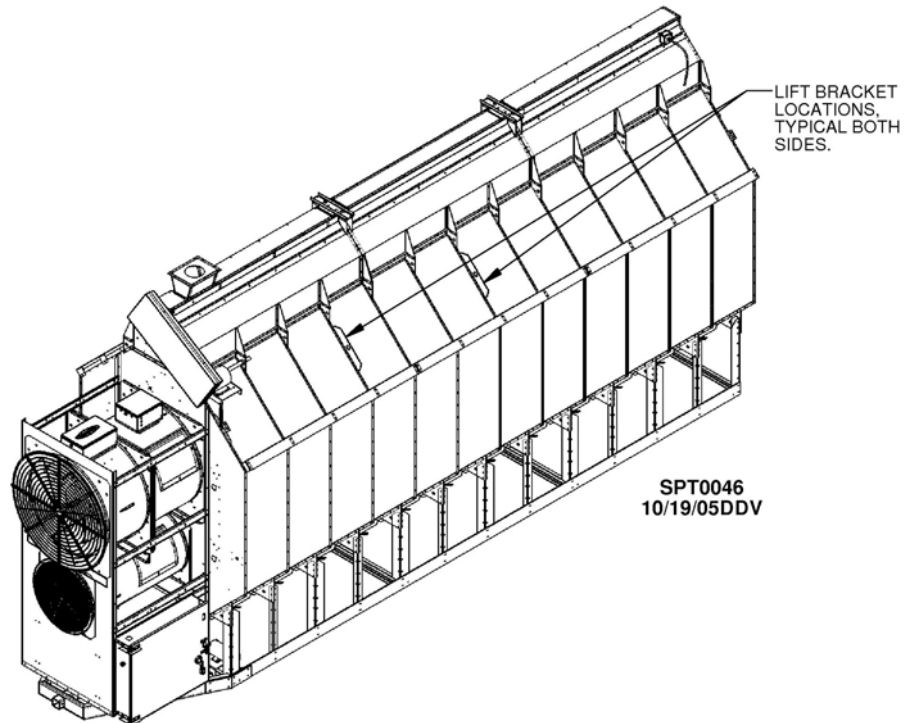
12 Foot Dryer Lift Points



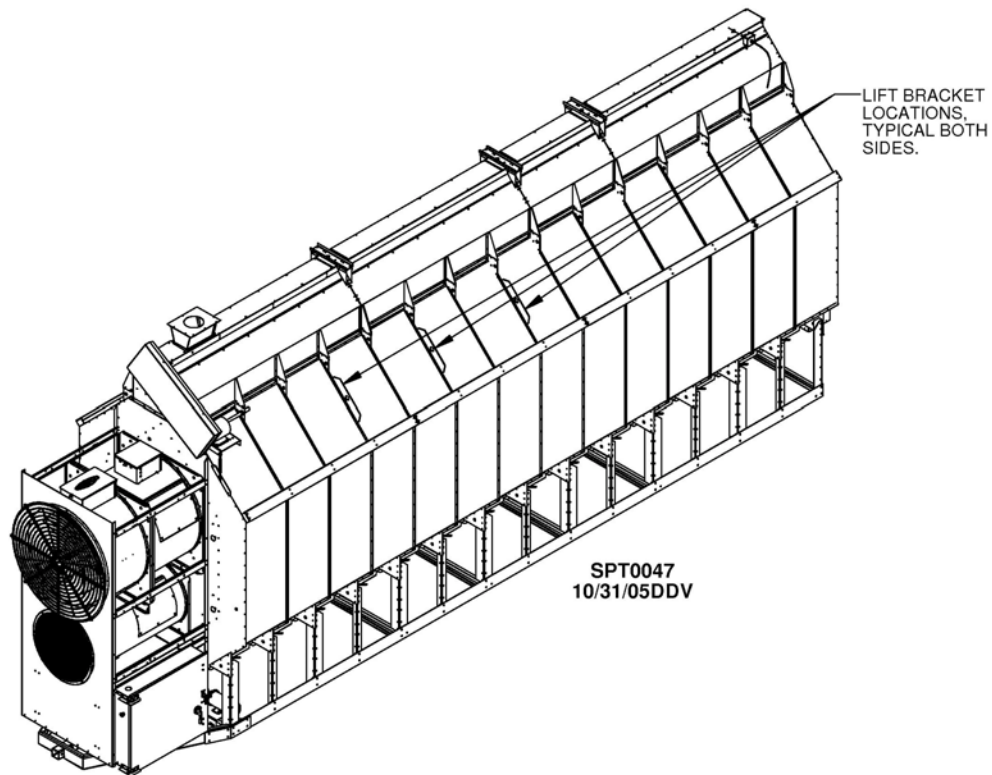
**16 Foot Dryer Lift Points**



**20 Foot Dryer Lift Points**



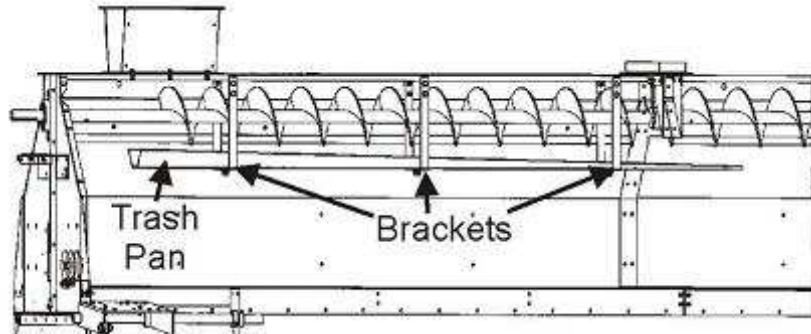
**24 Foot Dryer Lift Points**



**28 Foot Dryer Lift Points**

### 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.



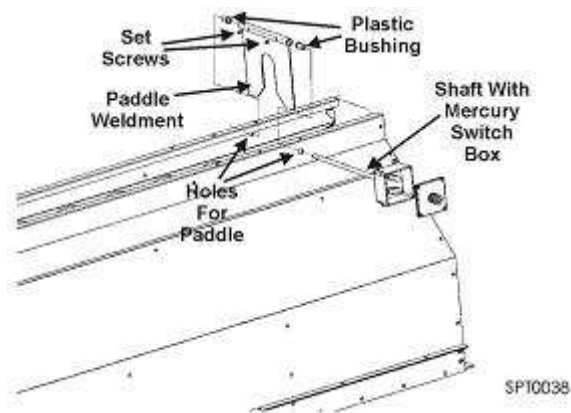
**Figure SPT0036**

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 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 setscrews 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 Folding Kits (T17699) are available to aid in lifting the wet bin.

### 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 for Front fill and Figure SPT0041 for Rear fill dryers.

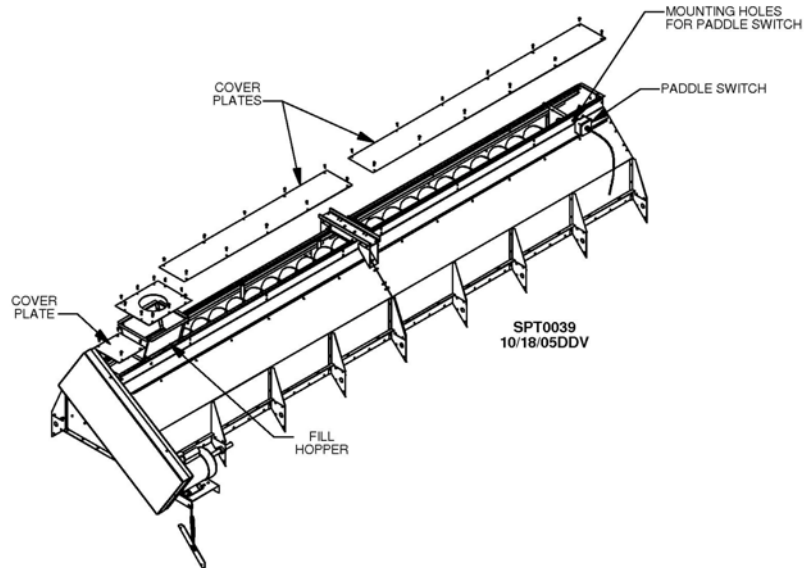


Figure SPT0039

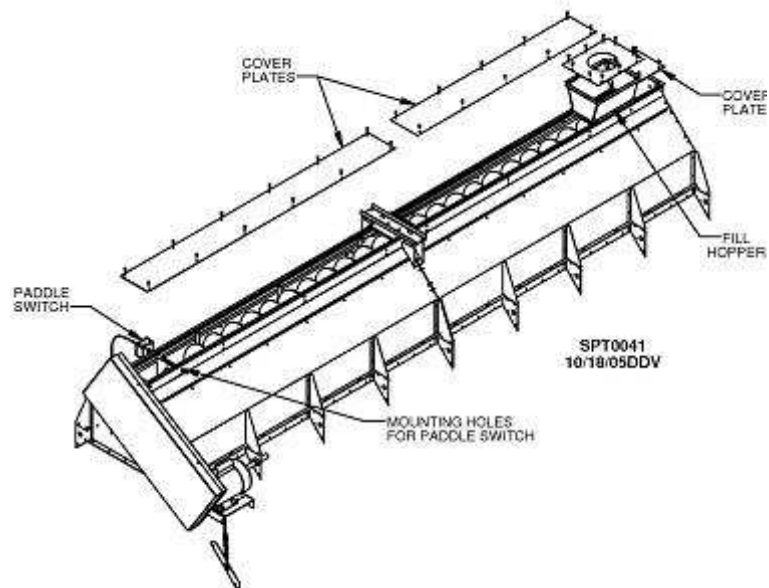
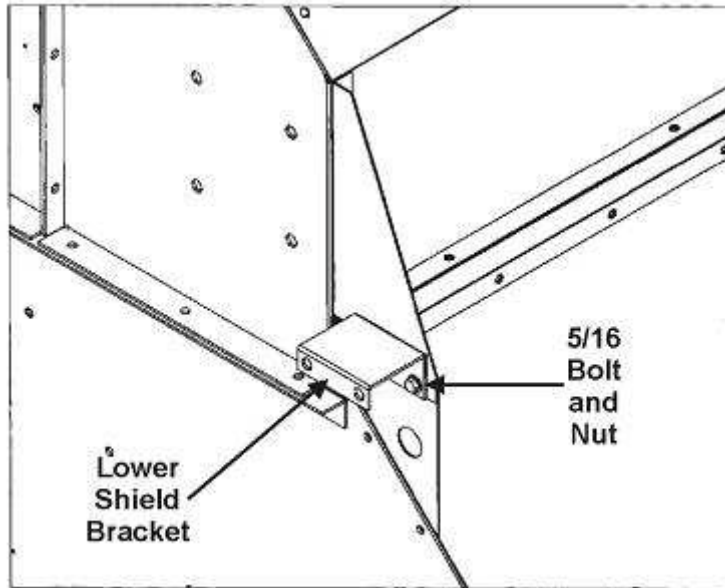


Figure SPT0041

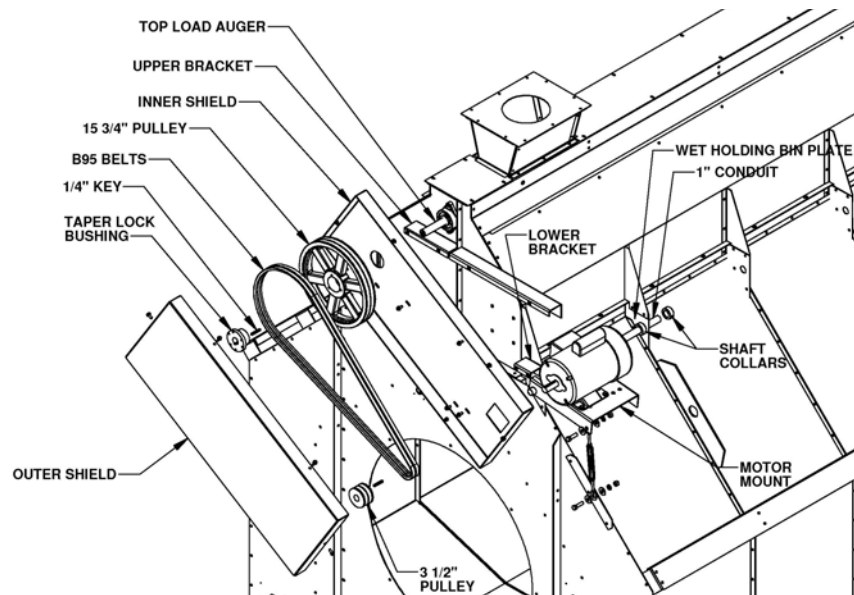
### Top Load Auger Motor and Shields

1. Bolt the lower shield bracket to the end of the dryer, using 5/16 x 1" bolts and 5/16 nuts. Refer to Figure SPT0031.



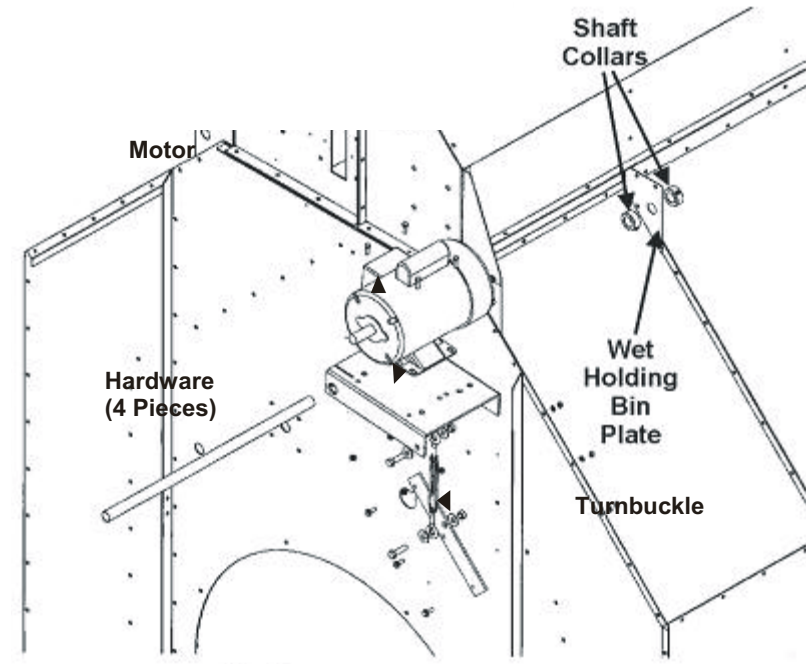
**Figure SPT0031**

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.



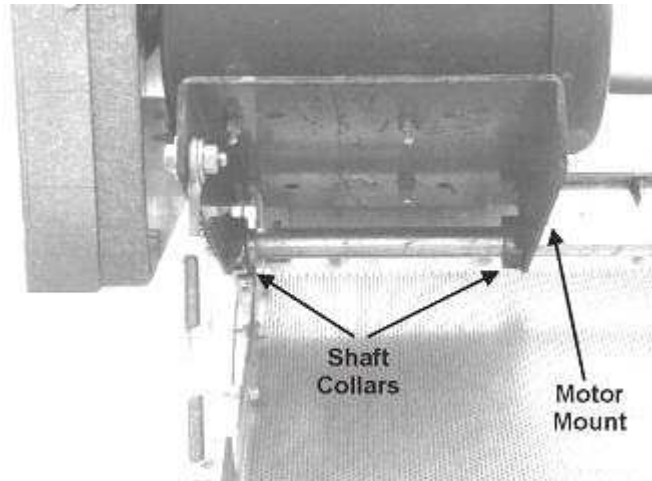
**Figure SPT0034**

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



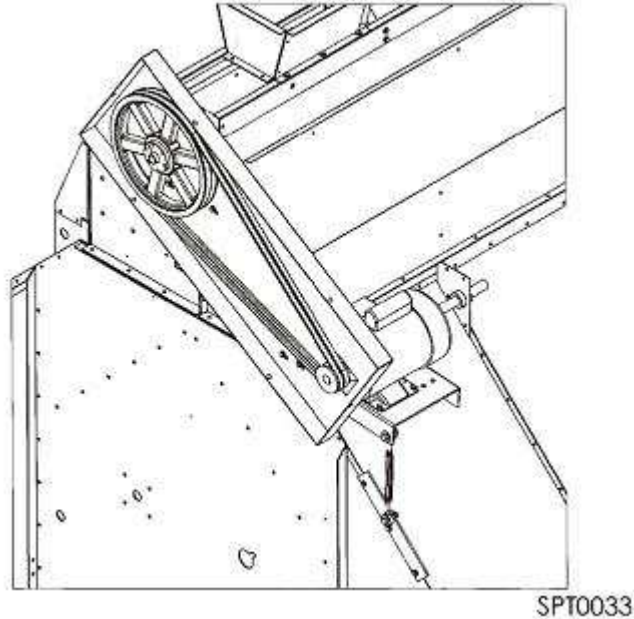
**Figure SPT0035**

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.
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.
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.

8. Bolt the inner shield to the upper and lower brackets using 5/16 bolts, washers, and nuts. Refer to Figure SPT0034.
9. Attach a 10.8 cm O.D. pulley to the motor shaft with a key and attach the 40 cm 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.
10. The Final assembly should appear as below.



**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.

### Safety shields / Access doors and covers

#### Warning

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

#### 1. Safety Shields

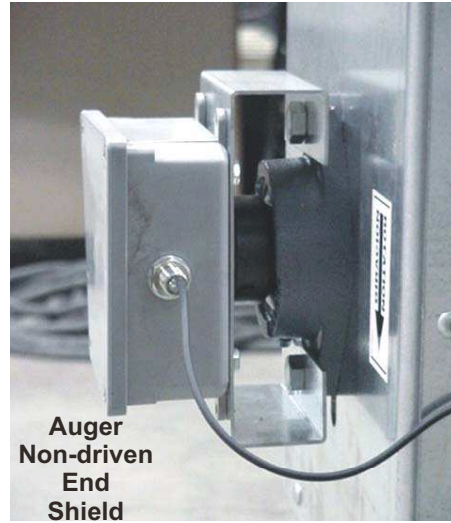


The load auger safety shield is located on the top of the Dryer and it functions to cover the load auger drive pulleys, motor, and belts.

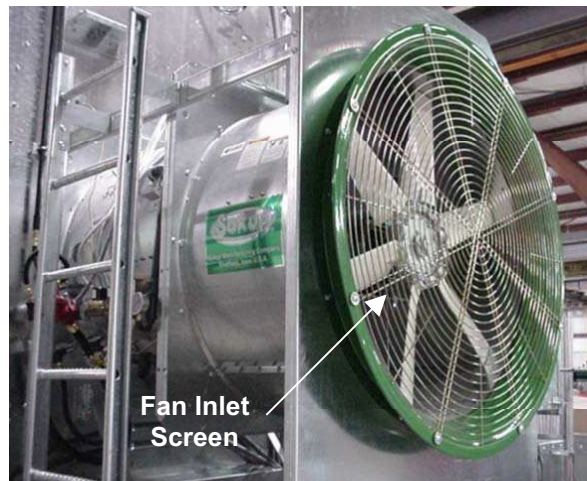


The unload auger and meter roll drive safety shield is located on the front of the dryer and functions to cover the unload auger motor, pulleys and belts. It also covers the meter roll sprockets and drive chains.

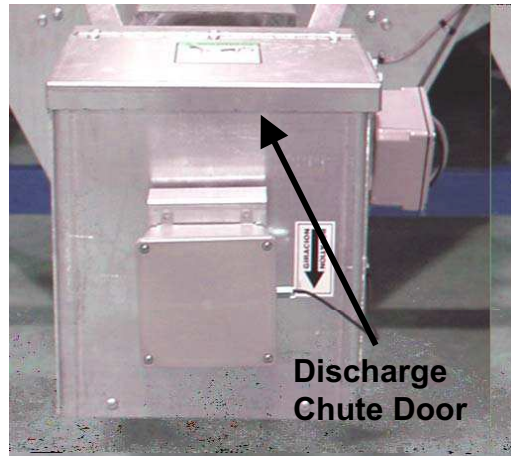
The non-driven end of the load auger has a safety shield and is located at the rear of the dryer. The shield also serves as a mount for the unload proximity junction box.



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.

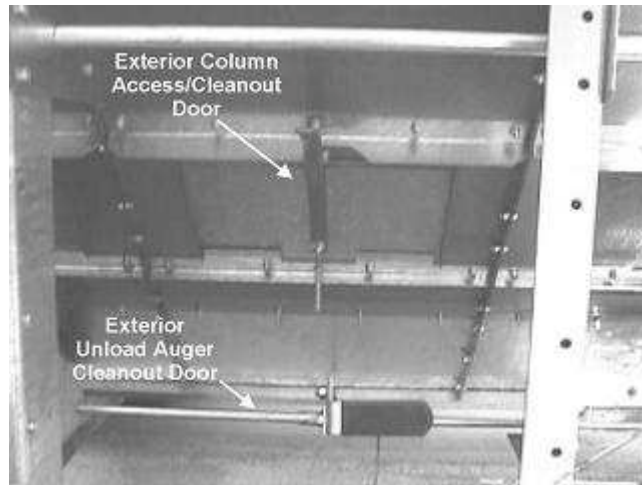


### 2. Access doors/covers

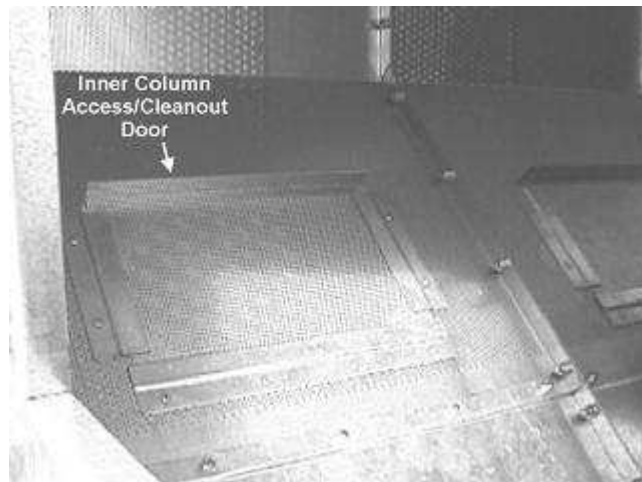
The heater access panel is located on the upper left side of the heater and allows access to the inside of the heater barrel.



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.



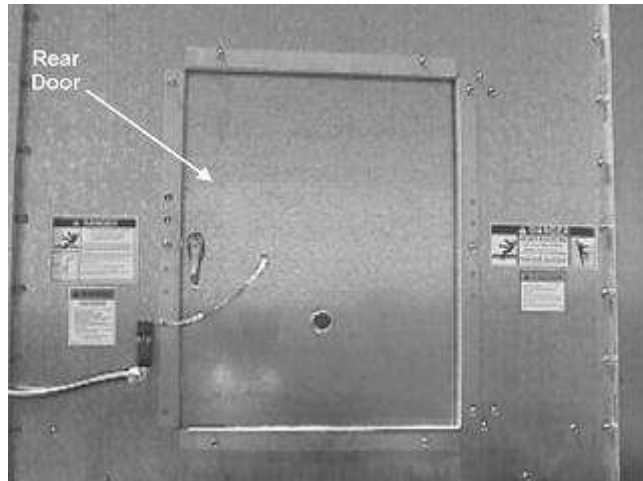
The inner grain column access doors are located in the plenum area on each column, both sides.



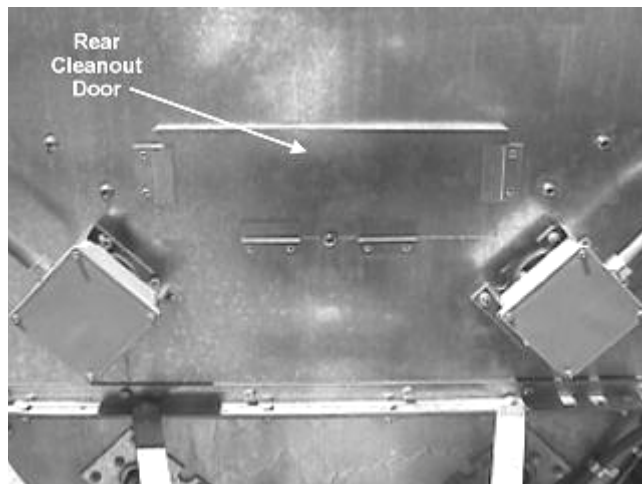
The unload auger inner access panels are located in the plenum, on the floor.



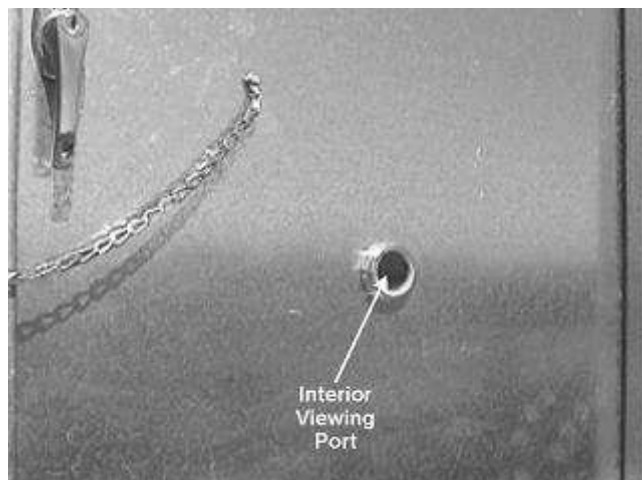
The plenum access door is located at the rear of the dryer.



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.



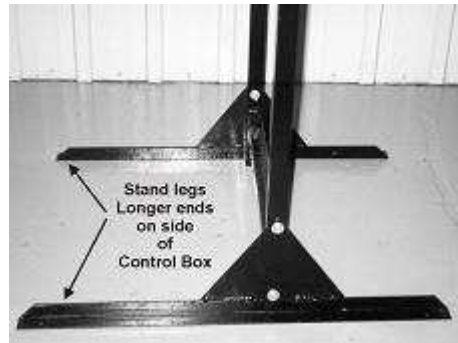
The rear viewing port is located in the plenum access door and is used to view the interior of the dryer during operation.



### Control Box Stand Assembly

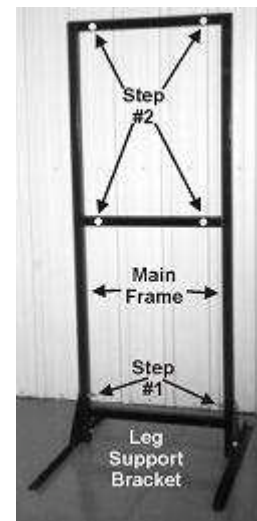
The optional control box stand will come disassembled and packaged in the rear of the Dryer. Remove the stand components, which include the following:

- 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.



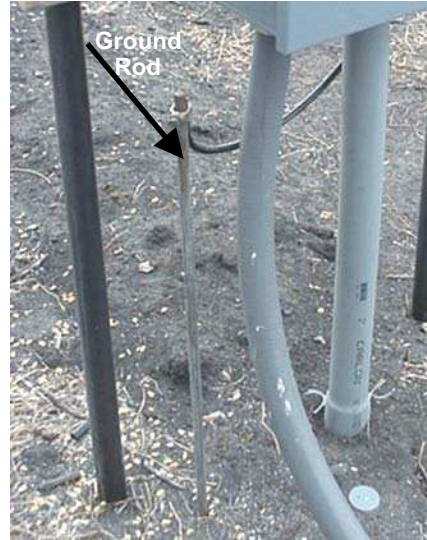
#### Caution

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 (J5722) 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 or lightening strike.
4. **MUST** be installed to validate the dryer warranty!

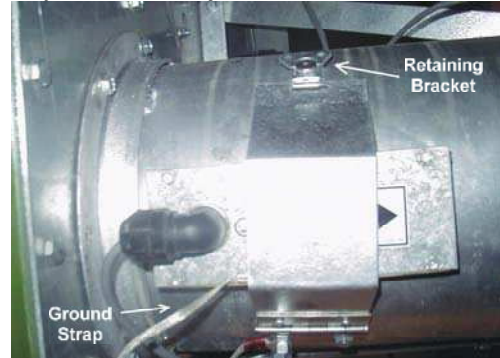


**Service Manual****Sensor Installation and Removal Instructions****A. Discharge Moisture Sensor (F60337)**

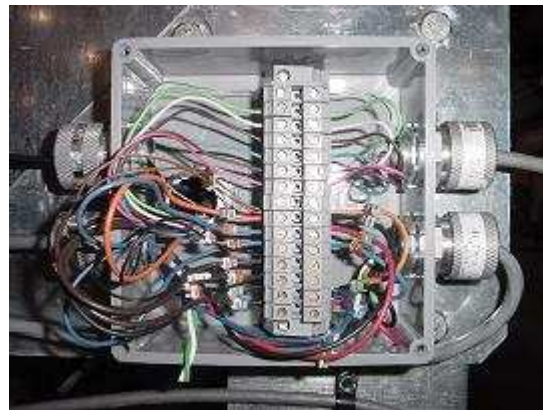
This sensor is used to monitor the grain's moisture as it exits the dryer.

**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 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.
6. Tighten strain relief.



**B. Grain Discharge Chute Sensor (J4440)**

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 (J4440)**

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 (J4483)**

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 (approximately the width of a nickel).
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 (J5900)

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

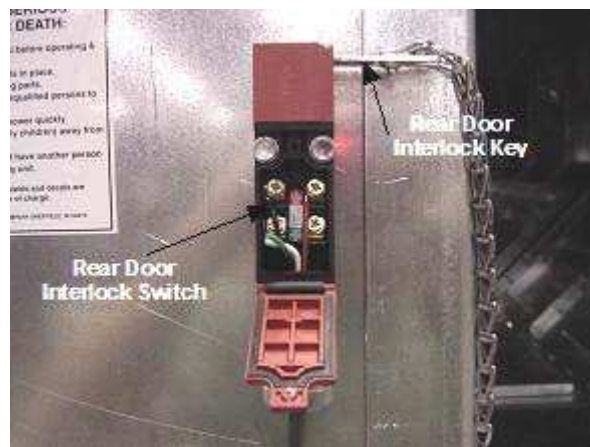
1. Obtain a new over-temperature switch and position the new switch in the same position as the old switch and secure by tightening the worm clamp. Be careful not to over tighten!
2. Route the new switch wiring to the heater control box.
3. Attach the red #18 wire to the housing high-temperature switch where #18 blue connects.
4. Attach the red #37 wire to the blue #37 wire.

**F. Rear Door Interlock Switch (J4487&F6991)**

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 by turning it 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 (T17289 – 16', T17290 – 24', T17288 – 28')

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:

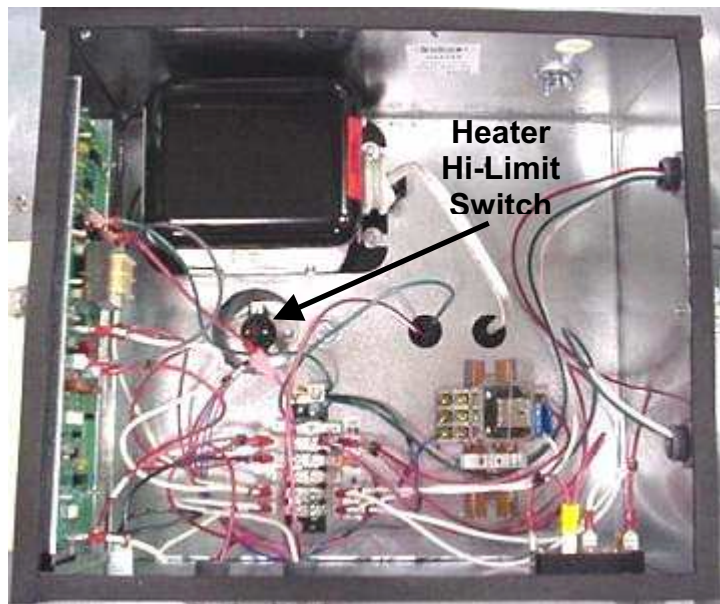
1. Install the new sensor by carefully uncoiling the small copper tube into the conduit inside the junction box. Be very careful not to kink the copper tube.
2. Using extreme care not to bend the copper tube. Attach the switch to the back of the junction box using the 5/16" nuts.
3. Reconnect the wires. 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 (J5772)**

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. Disconnect power to dryer.
2. Open the heater box cover by flipping the J clip on each side of the box.
3. Locate the housing high limit switch.
4. Remove the wires from the switch by pulling on the crimped connectors.
5. Remove the two hold down screws.
6. 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.

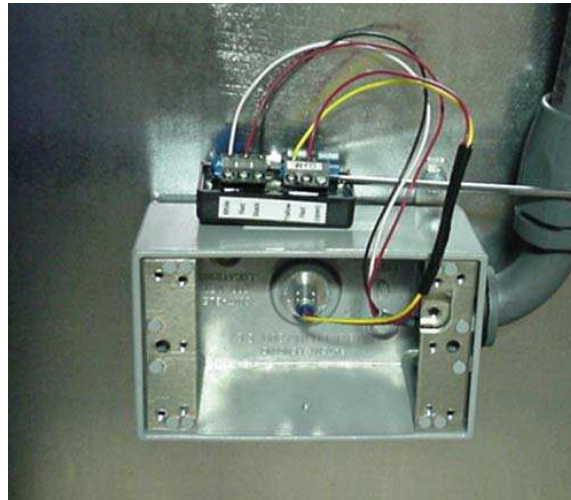
**I. Plenum Temperature Sensor (RTD)**

**(J5645 – 12', J5642 – 16', J5646 – 20', J5643 – 24', J5648 – 28')**

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. Turn control switch on control box to OFF.
2. Locate the sensor junction box mounted to the front of the plenum area on the front of the dryer.
3. Open the junction box and disconnect the wires from the transmitter (T17028).
4. Remove the two self-tapping screws on the two tabs holding the junction box to the dryer.
5. Remove the conduit fittings from the ends of the junction box.
6. Remove the clips holding the sensor tube to the inside wall of the plenum area. Gently set aside the plenum over temperature capillary.
7. 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 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 (T17028) to the wires from the conduits and install the junction box cover. Make sure to cut off braided shield wires.

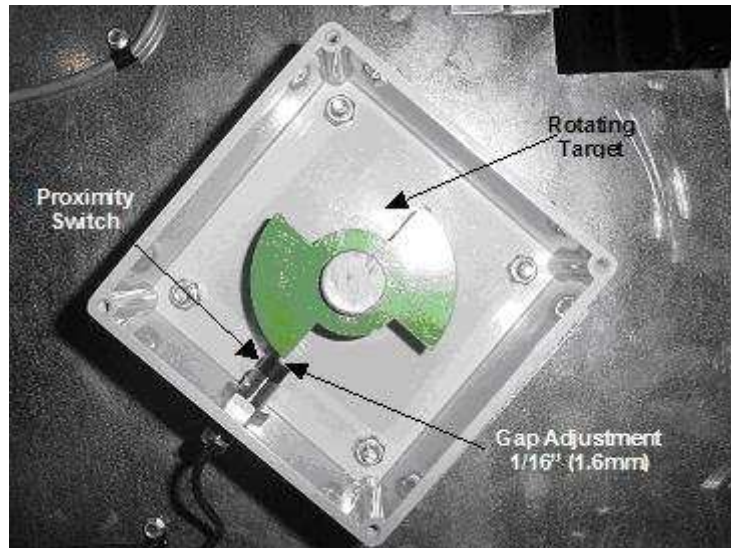


**J. Metering roll proximity switches (J4483)**

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:**

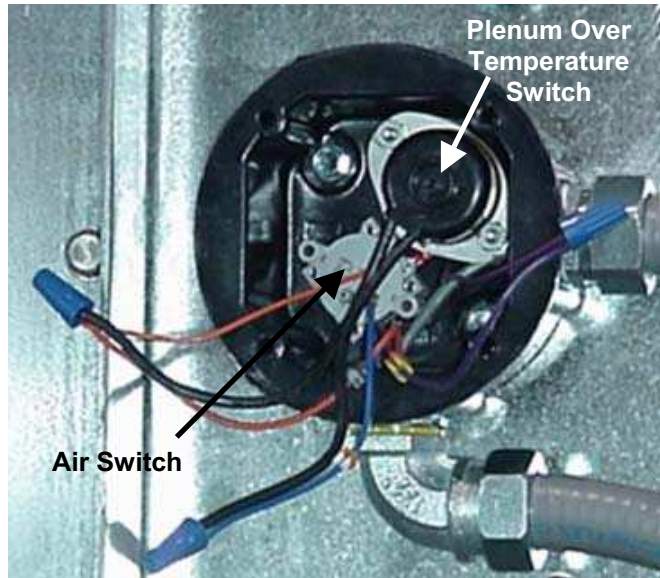
1. Installation of the new proximity switch is opposite to that of removal.
2. **Caution:** Adjustment of the proximity switch is critical. See Proximity Switch Calibration in the Component Calibration section to calibrate. The gap from the tip of the switch to the rotating target **MUST** be 1/16 inch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

**K. Static Air Pressure Sensor (J5862) & J6019)**

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 (6019) from the backside of the switch (J5862) from inside the plenum area of the dryer.
4. Remove the air switch.

**Installation:**

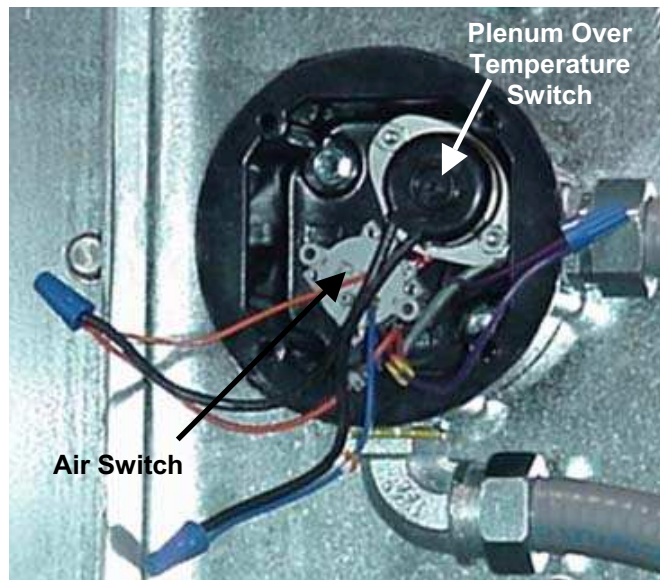
1. Reinstallation of the switch is opposite of assembly.
2. New switches should be pre-calibrated and ready for installation.
3. After switch installation, reinstall wires, screen filter, and the junction box cover.

**L. Plenum Over Temperature Sensor (J6795 – 16', J6796 – 24', & J67961 – 28')**

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:**

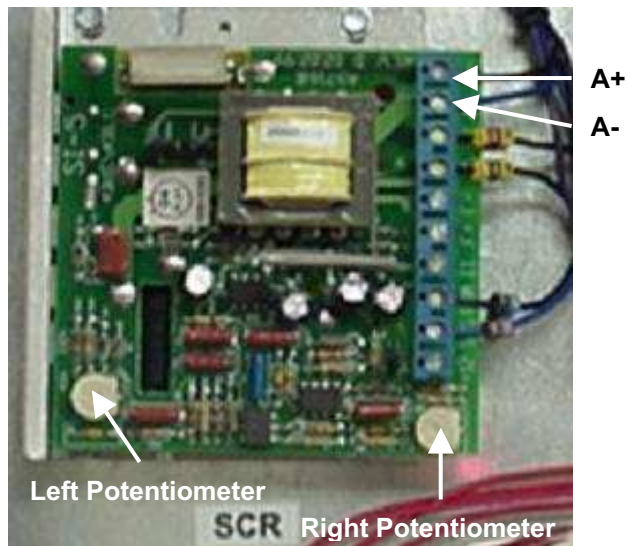
1. Locate the sensor junction box mounted to the front of the plenum area on the front of the dryer.
2. Open the junction box and disconnect the blue and orange wires from the sensor.
3. Remove the clips holding the sensor capillary to the inside wall of the plenum area. Gently set aside the plenum temperature 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

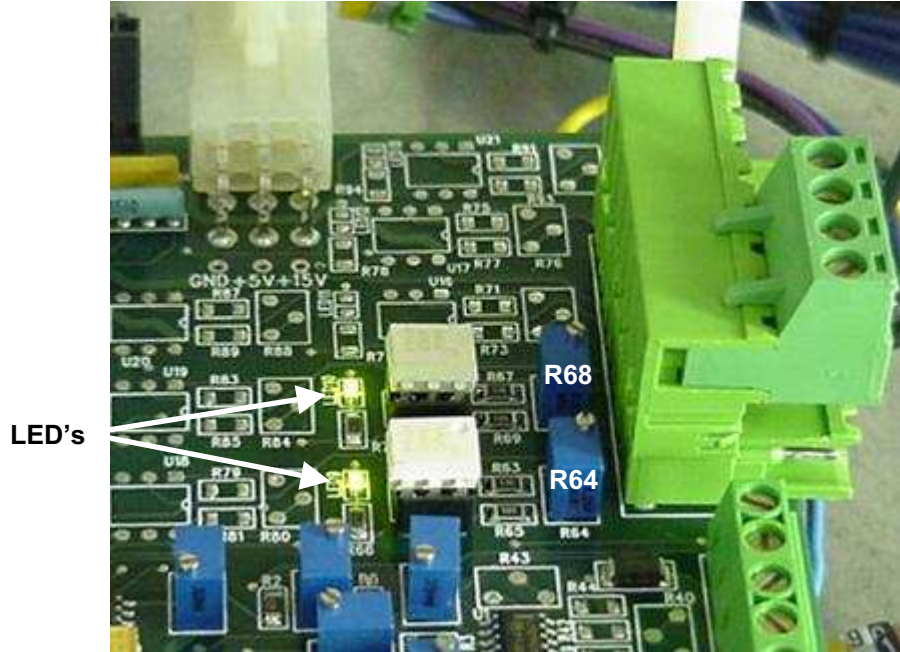
#### 1. SCR Calibration Adjust (J6794)



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 (J46501)



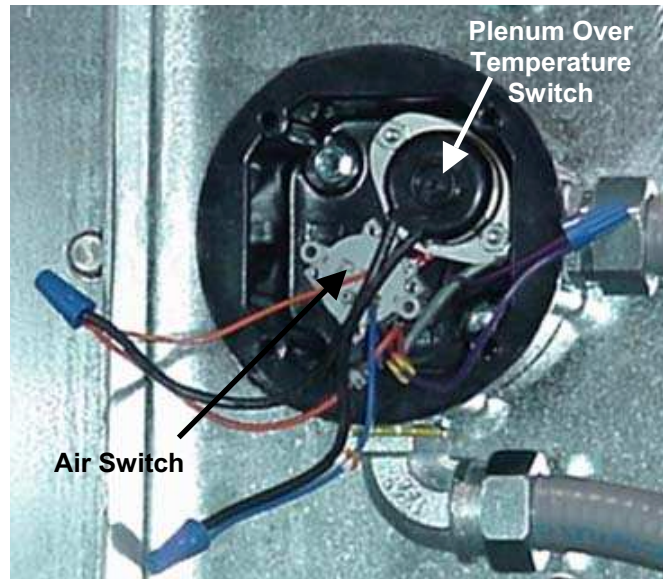
To change the meter roll adjustment, do the following:

- 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

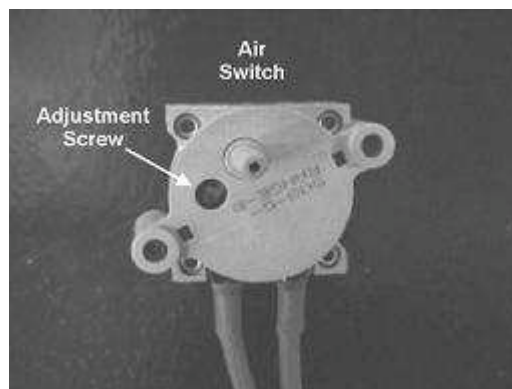
See Output Calibration Procedure During Continuous Flow Section in the Continuous Flow section in the Operators Manual

#### 4. Air Switch Adjustment Calibration (J5862 & J6019)



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).



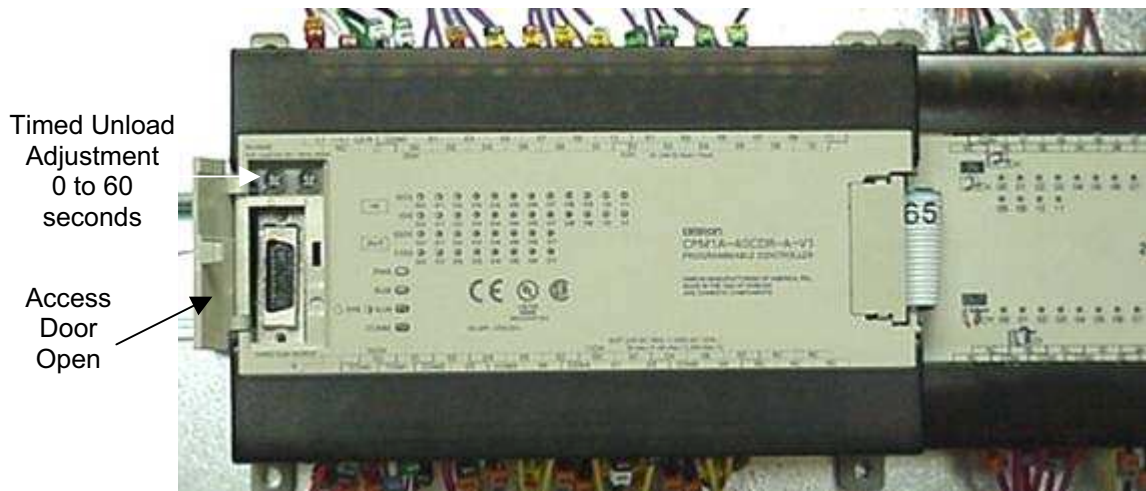
J5862 – Air Switch

### 5. Contrast Adjustment Calibration (J46501)



- 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.

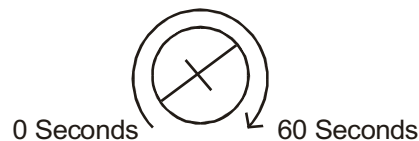
### 6. Unload Auger Time Delay Off Adjustment



The Unload Auger Time Delay Off Adjustment option is used only in manual. This option shuts down the unload auger after the selected amount of time and only after **some** faults. It will **not** delay on a user shutdown.

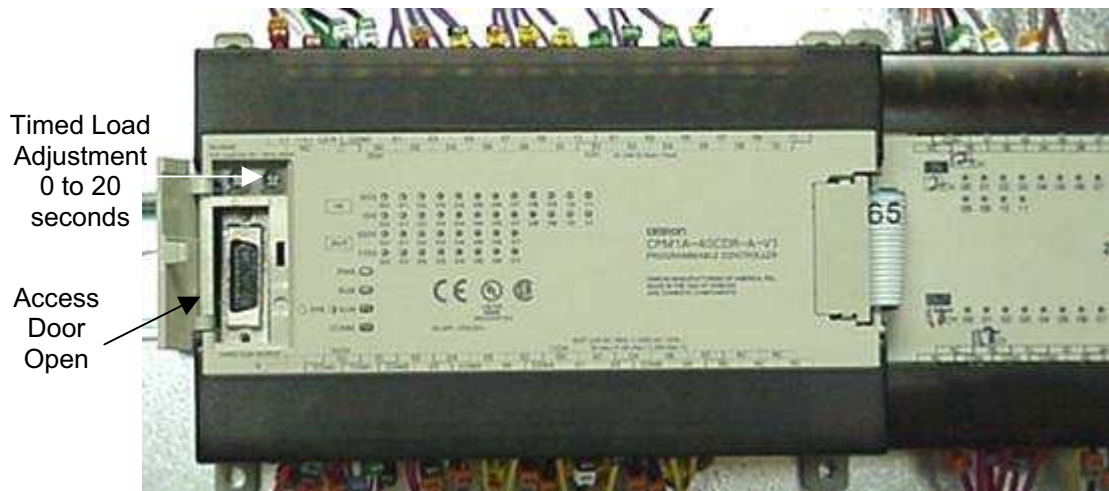
To add a timed delay (up to 60 seconds) to the auxiliary unload, follow these steps:

- Gain access to the inside of the control box by opening the inner panel.
- Locate the Programmable Logic Controller (PLC) (J6726), 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



The Secondary Fill Adjustment Calibration is provided to clean out the incline auger from the wet bin to the dryer.

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) (J6726), 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.

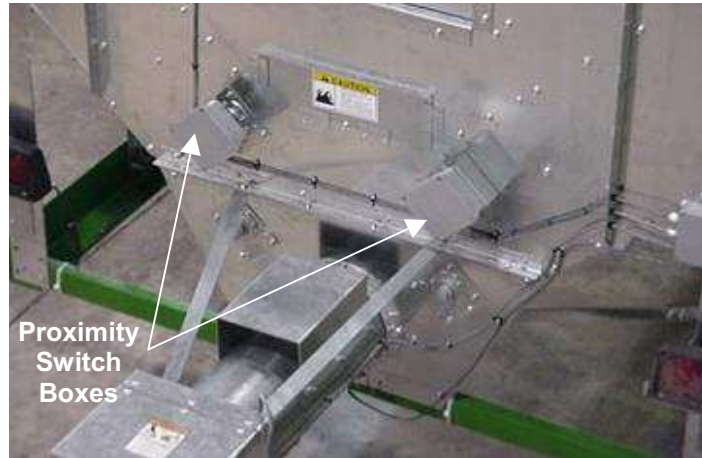


- Close the access door on the PLC and close the Control box inner panel.

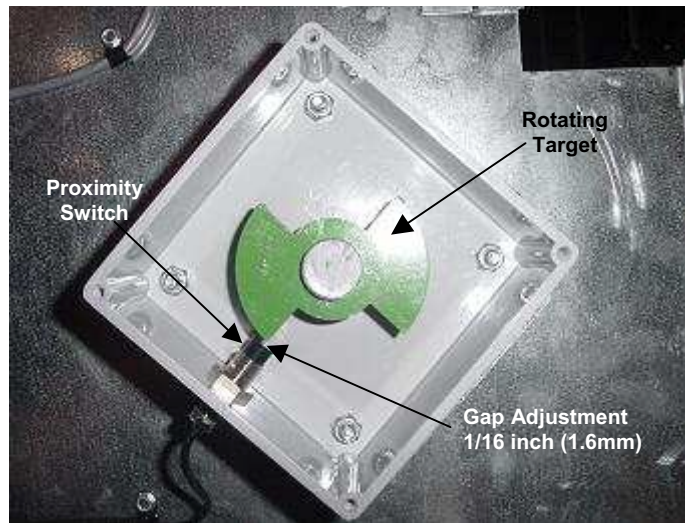
### 8. Proximity Switch Calibration

When calibrating the proximity switch (J4483), 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.

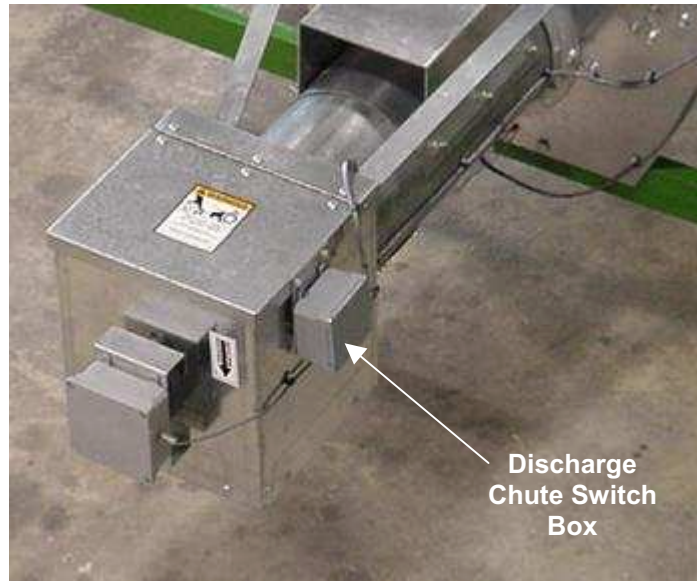


- d. Using a tape measure, shift the switch so that it is 1/16 of an inch (1.6mm) from target (approximately the thickness of a nickel). This measurement is very important for accuracy. The switch must be this distance so that it can read the target as it turns.
- e. Once the switch is in place, tighten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

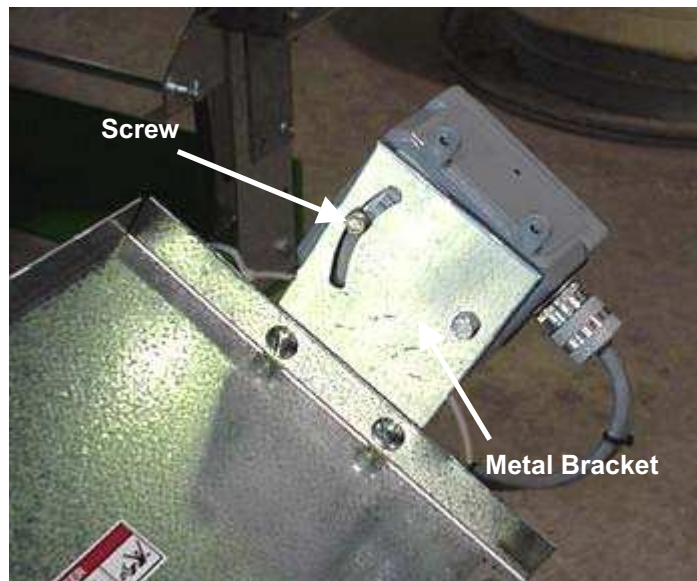
### 9. Rear Discharge Chute Switch Adjustment

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.

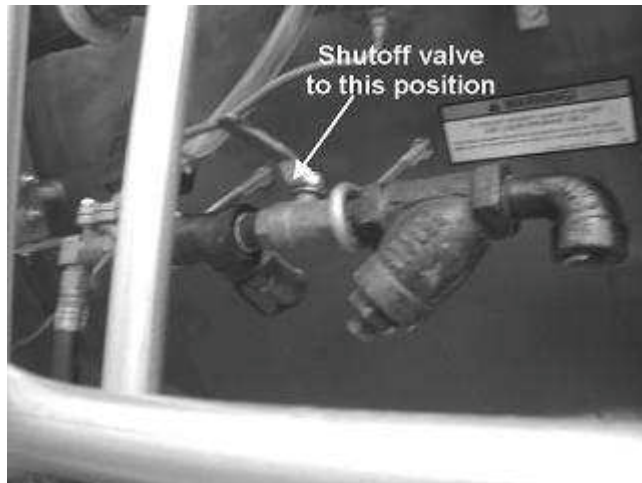
### Caution

**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).

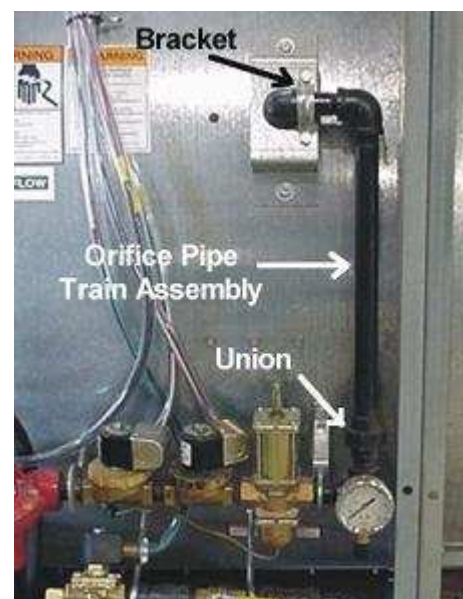
Step 2. Lock out all electrical power and gas lines



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

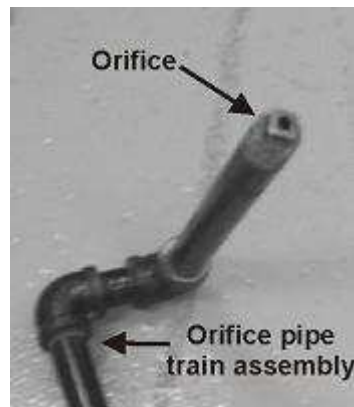
Step 4. Loosen the union located at the bottom of the orifice pipe train assembly (refer to picture at right)

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.

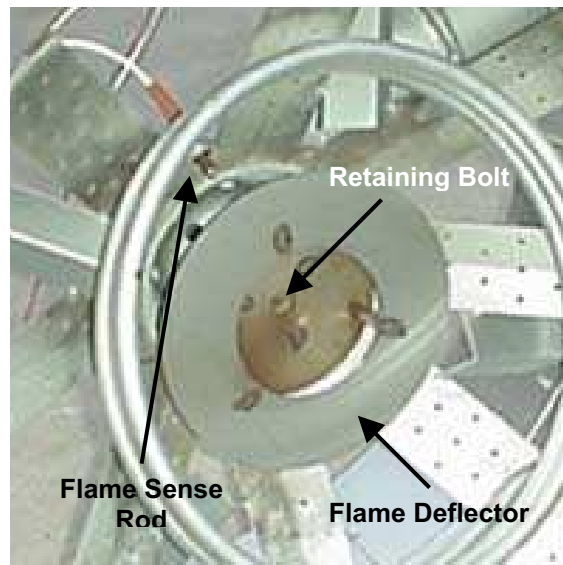
Step 11. Re-install orifice pipe train assembly into heater housing by reversing steps 4 through 6 above.

**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 flame deflector by removing the bolt located in the center of the deflector.

(Refer to picture below)



Step 13. Mounting position of flame sense rod (for re-installation). Remove flame sense rod from the mounting bracket. Then, remove the two port cup retention bolts. Remove port cup. (refer to picture above)

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" 40 HP   | 3 / 4" D4044               | 5 / 8" D71128                     |
| 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                      |

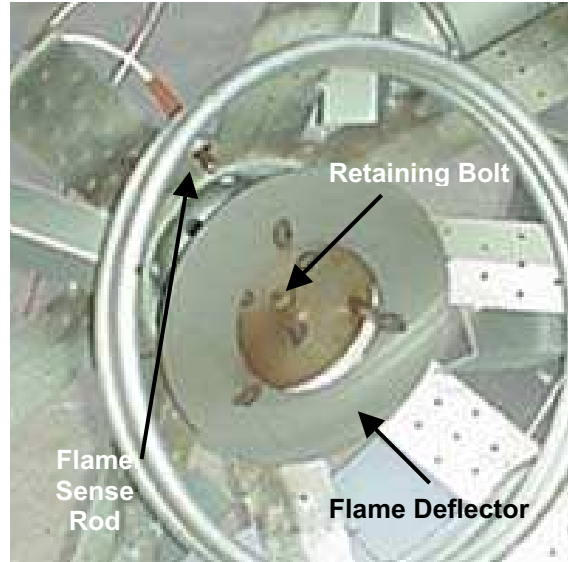
Step 15. Install new port cup by reversing the items in Step 11.

**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 flame deflector 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.

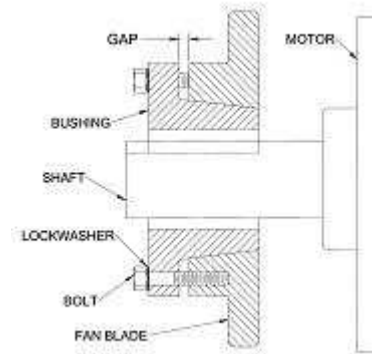
Dryer can now be restored to service.

**Appendix A – Fan Blade Replacement****Fan torque specifications (For Trantorque specifications, see next page)**

Follow these instructions when replacing the blade on the fan of the dryer and maintaining the blade at the start of the drying season.

**Failure to properly tighten blade may cause serious injury or death:**

- **USE TORQUE WRENCH** with settings capable of attaining the correct torque specifications.
- There **MUST** be a gap between the bushing and the blade to insure a tight fit.
- **DO NOT** over-tighten. May cause hub to crack and threads to strip.
- **NEVER** run fan without screen guard installed.
- **DO NOT** stand in front of fan when running.

**Procedure to Install Axial Fan Blade with Taper-lock Bushing:**

1. Put blade on motor shaft.
2. Position bushing on motor shaft and tighten setscrew (if applicable).
3. Insert bolts with lockwashers through the unthreaded holes in the bushing into the threaded holes on the blade.
4. Tighten bolts evenly to draw the fan blade onto the bushing. Using a torque wrench, tighten bolts to  $\frac{3}{4}$  of the recommended torque, then continue to alternately tighten them until they remain at their full torque rating specified below.
5. Install screen guard and run for a minute. **DO NOT STAND IN FRONT OF FAN.**
6. Recheck bolt torque. Continue this process until bolts maintain specified torque after fan has been run.

**Fan Torque Specifications – Prior to 2006**

| PART # | FAN SIZE | HP | BUSHING | BORE SIZE | BUSHING BOLT | TORQUE FT-LBS |
|--------|----------|----|---------|-----------|--------------|---------------|
| J0426  | 28"      | 15 | P1      | 1.125     | 5/16"        | 13            |
| J04265 | 28"      | 20 | SDS     | 1.375     | 1/4"         | 9             |
| J0424  | 38"      | 10 | P1      | 1.375     | 5/16"        | 13            |
| J04286 | 44"      | 15 | SK      | 1.625     | 5/16"        | 15            |
| J04285 | 44"      | 30 | SD      | 1.875     | 1/4"         | 9             |
| J0432  | 44"      | 40 | SK      | 2.125     | 5/16"        | 15            |

### Trantorque GT Bushing specifications

A Trantorque GT Keyless Bushing offers flexible and easy installation while providing exceptional holding power. To ensure a Trantorque GT unit performs as specified, it must be installed properly.

**! WARNING: Do not lubricate the Trantorque GT bushing or shaft. The use of any lubricant on the contact surfaces could result in bushing failure and will void all warranties.**

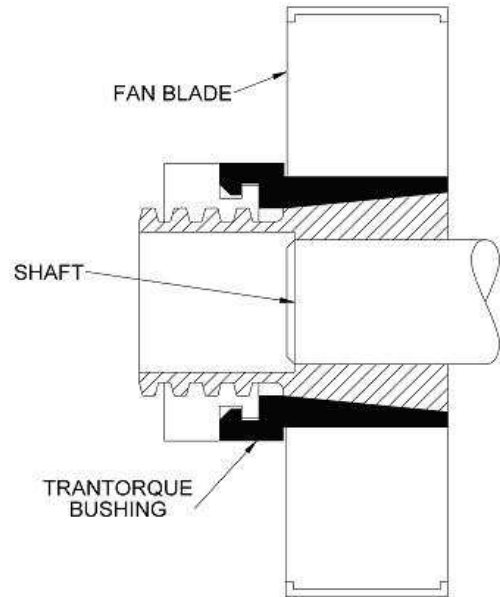
1. Insert the Trantorque GT unit into the component to be mounted, making sure the mating hub is flush against the shoulder at the hex flats.

2. Position the assembly at the desired location on the shaft and hand-tighten the nut (clockwise), until the assembly becomes snug on the shaft.

**! WARNING: Do not hammer or use any type of impact to force the Trantorque GT assembly along the shaft.**

**! WARNING: The shaft must fully engage the shaft gripping area of the Trantorque GT unit.**

3. Using a torque wrench, tighten the nut to the proper installation torque. The hex flats on the outer ring are provided for counter-torque, eliminating the need to hold the component or shaft, while applying installation torque.



NOTE: At full installation torque, the assembly will have moved approximately 1/16" axially along the shaft away from the nut. If axial position is critical, it may be necessary to loosen the nut and reposition the assembly.

**! WARNING: Over-tightening the nut could damage the Trantorque GT unit and/or the mounted component.**

**Trantorque Bushings**

| PART # | FAN SIZE | HP | BUSHING    | BORE SIZE | NUT SIZE | TORQUE     |
|--------|----------|----|------------|-----------|----------|------------|
| J0436  | 28"      | 15 | TRANTORQUE | 1.125     | 1.75"    | 165 FT-LBS |
| J0437  | 28"      | 20 | TRANTORQUE | 1.375     | 2"       | 190 FT-LBS |
| J0437  | 38"      | 10 | TRANTORQUE | 1.375     | 2"       | 190 FT-LBS |
| J0435  | 38"      | 15 | TRANTORQUE | 1.625     | 2.25"    | 230 FT-LBS |
| J0435  | 38"      | 20 | TRANTORQUE | 1.625     | 2.25"    | 230 FT-LBS |
| J0435  | 44"      | 15 | TRANTORQUE | 1.625     | 2.25"    | 230 FT-LBS |
| J04371 | 44"      | 30 | TRANTORQUE | 1.875     | 2.5"     | 400 FT-LBS |
| J04372 | 44"      | 40 | TRANTORQUE | 2.125     | 2.75"    | 440 FT-LBS |



Instructional Decal located on Fan



## **AUTOMATIC GRAIN DRYER**

Continuous Flow / Automatic Batch  
Portable and Stack Dryers



---

**Dryer Software 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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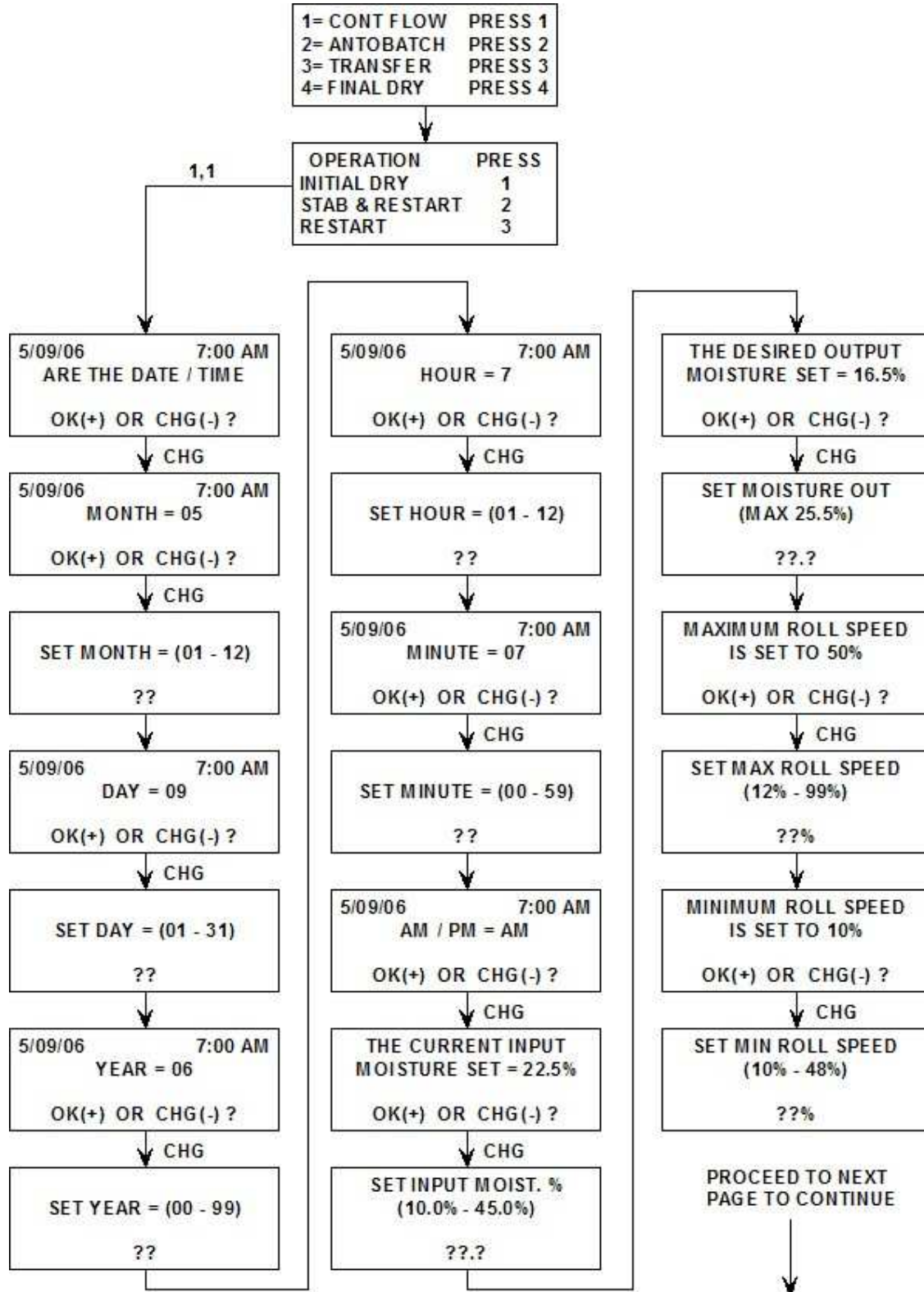
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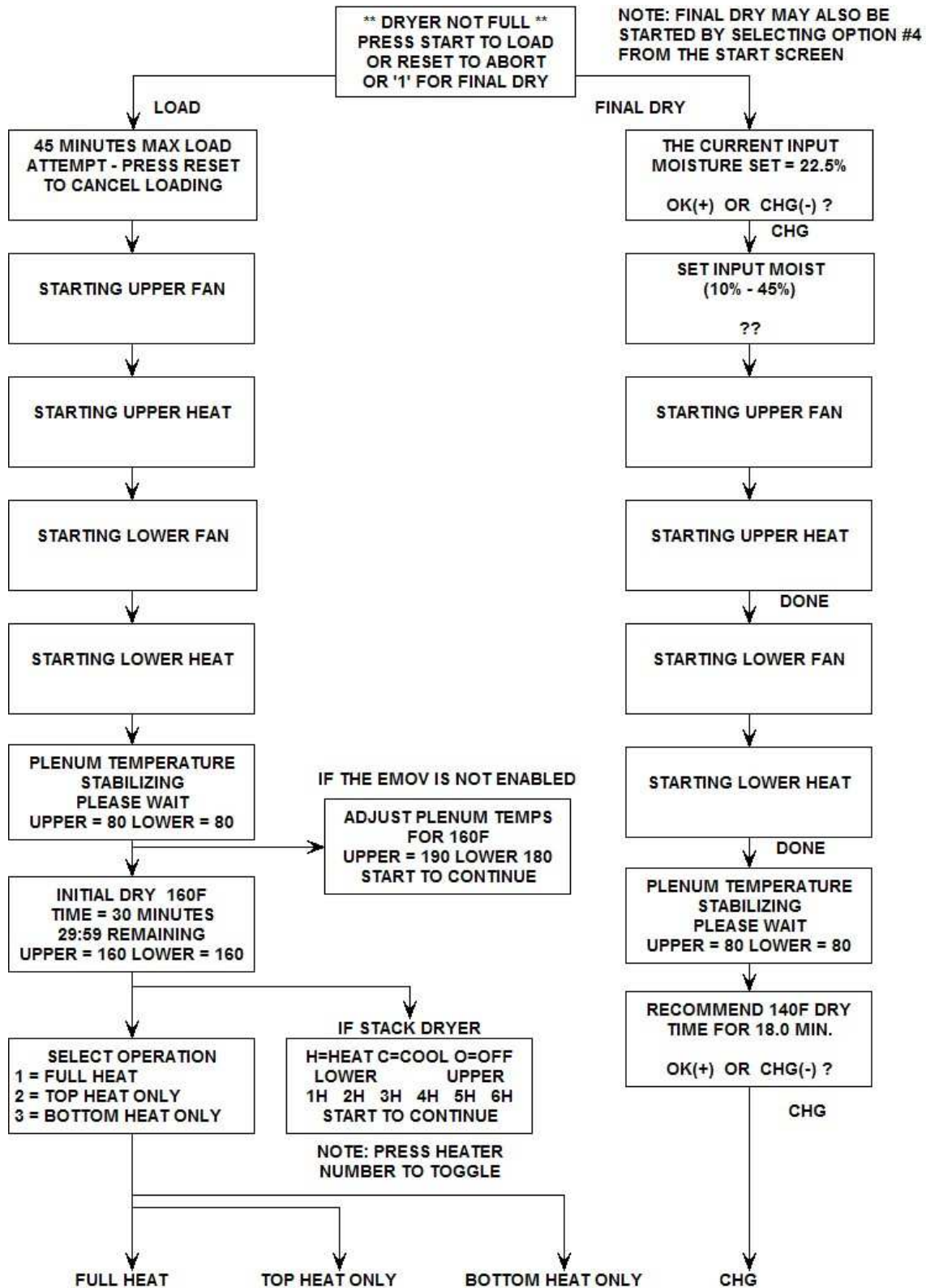
# 1. Continuous Flow

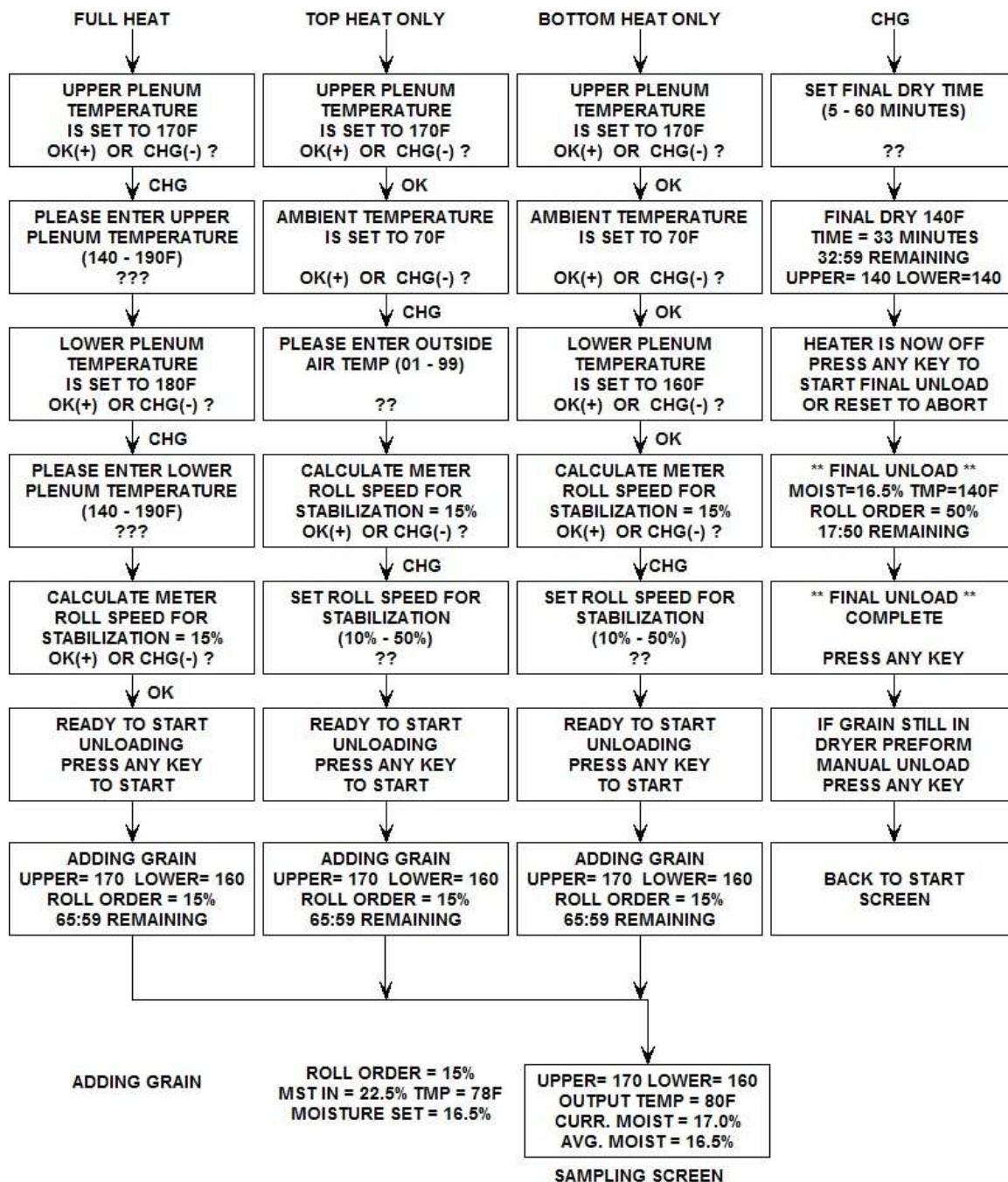
## A. Initial Dry

Press START then 1 on Keypad



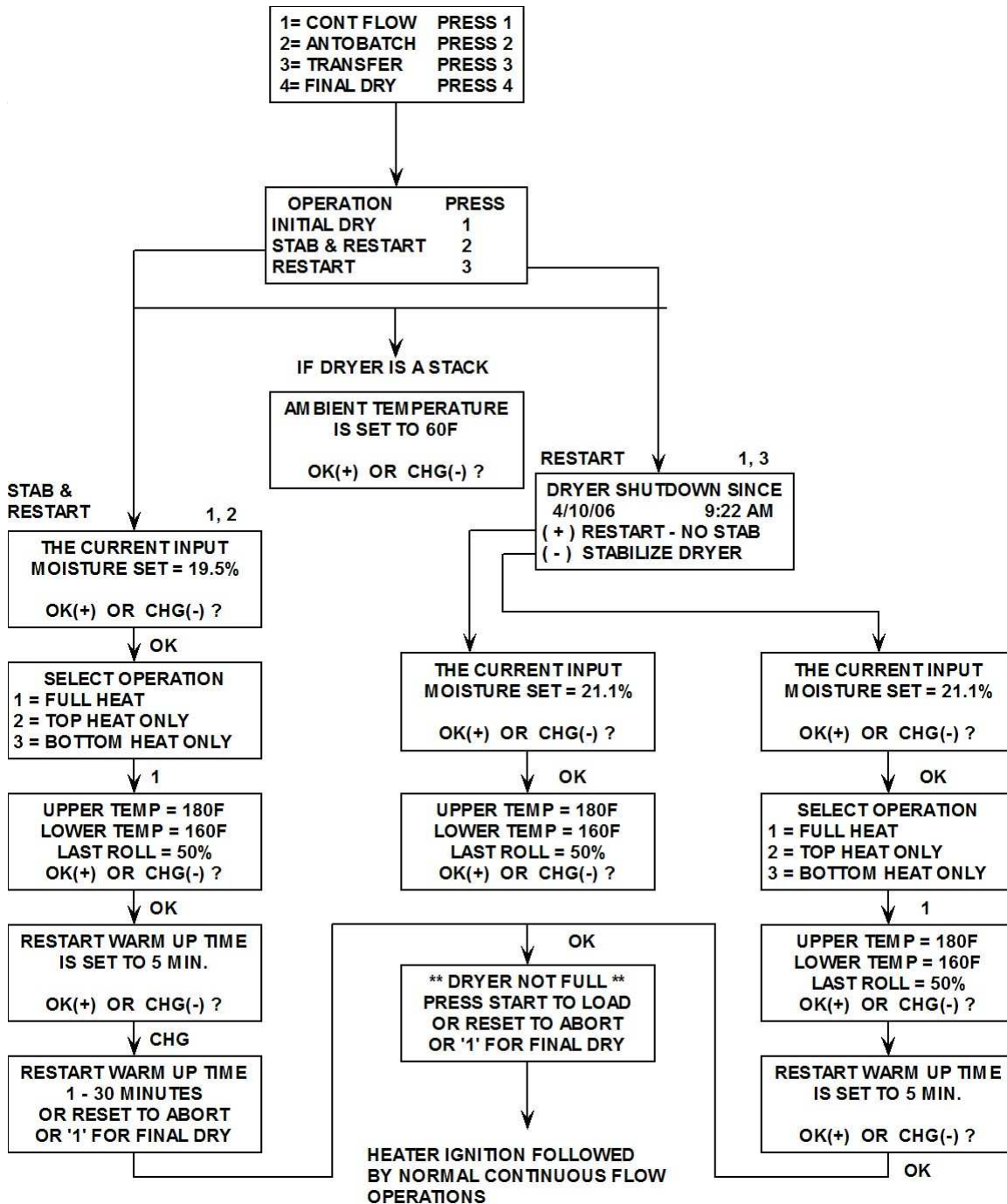
Initial Dry continues from previous page (#3)





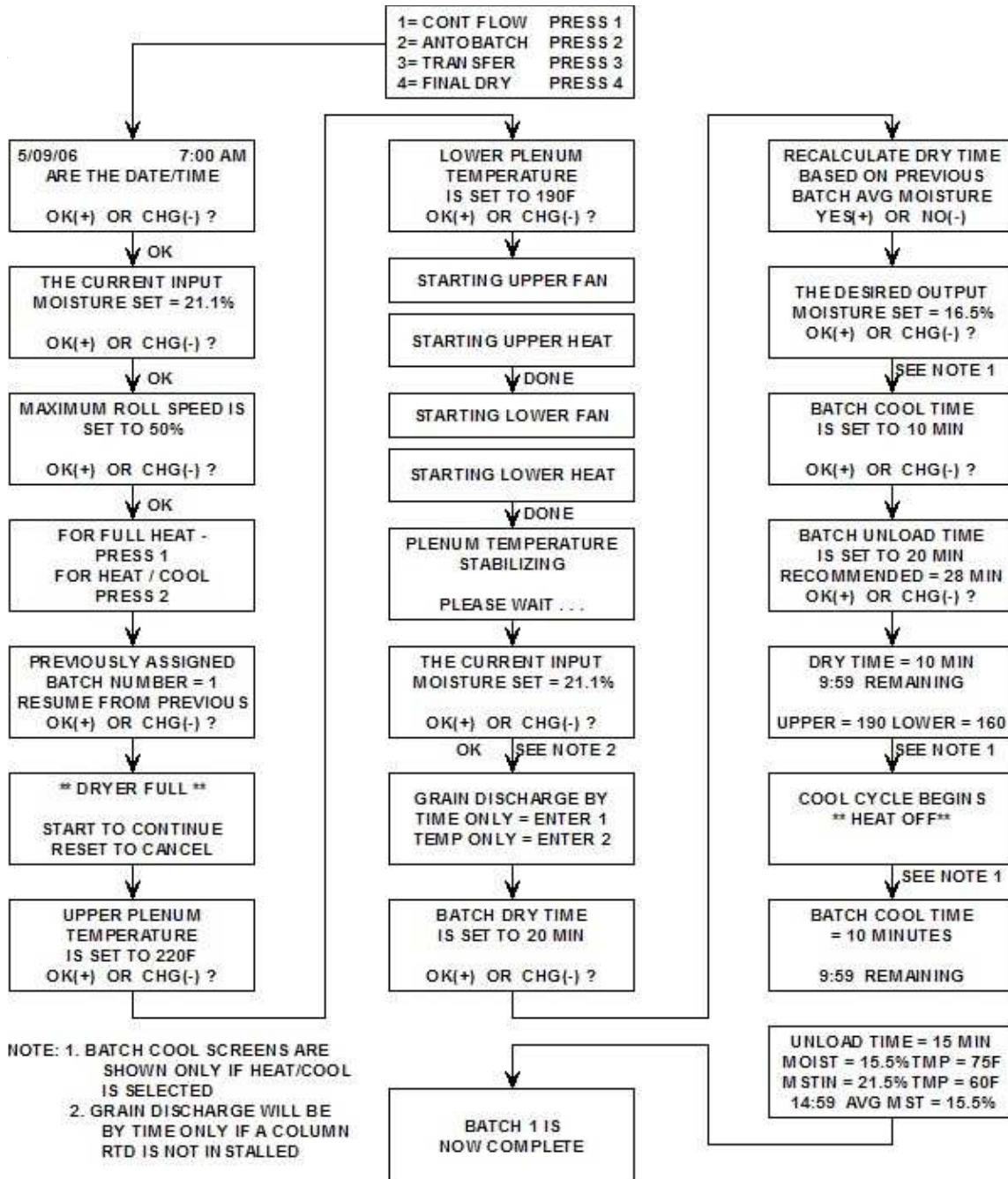
NOTE: THE DISPLAY ALTERNATES INFORMATION DISPLAYED ON THE SAMPLING SCREEN, SO THE OPERATOR HAS UP TO DATE INFORMATION

## B. Stabilization and Restart / Restart Only



## 2. AutoBatch

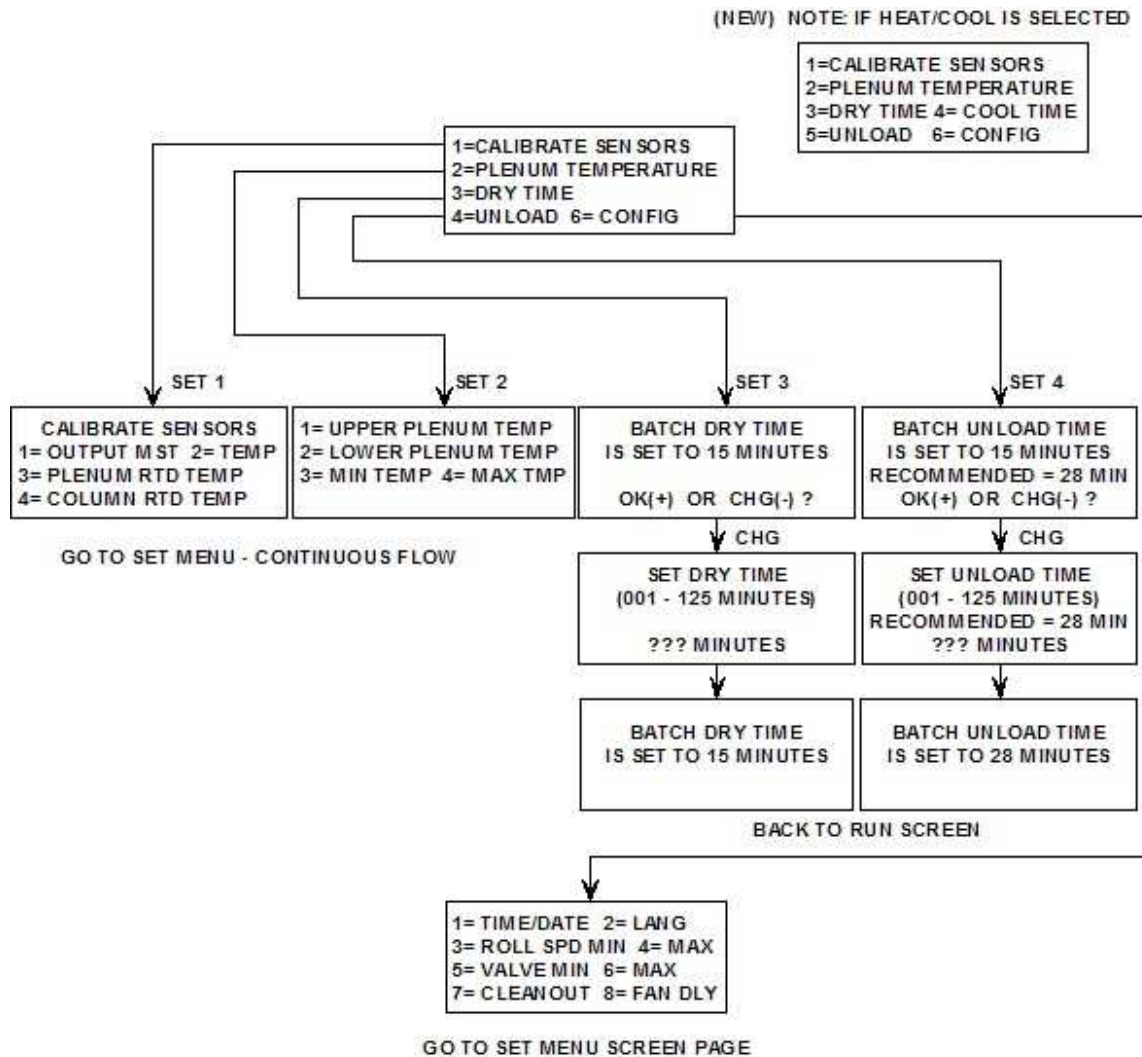
Press **START** then **2** on Keypad



### 3. Autobatch Set Menu

Press [SET] On The Keypad

**Note: Must be in the autobatch mode to access this menu**

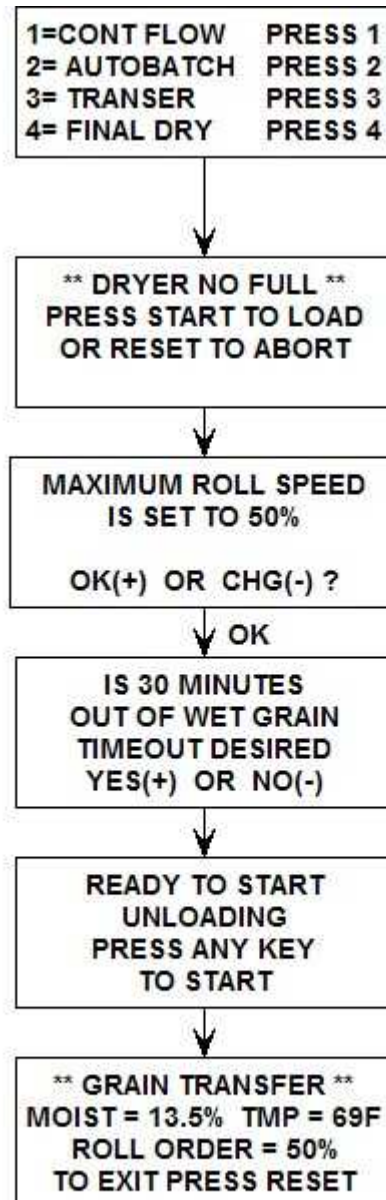


NOTE: Beginning with V4.2, at 160 F, an adjustment of 5 minutes per point is applied if the Auto Adjustment is enabled. The adjustment will vary 1 minute per point for every 20 degrees F.

Example: If drying at a temperature of 220 F, an adjustment of 2 minutes per point will be used (a loss of 1 point/minute/20 F for 60 F = 3 points subtracted).

## 4. Grain Transfer

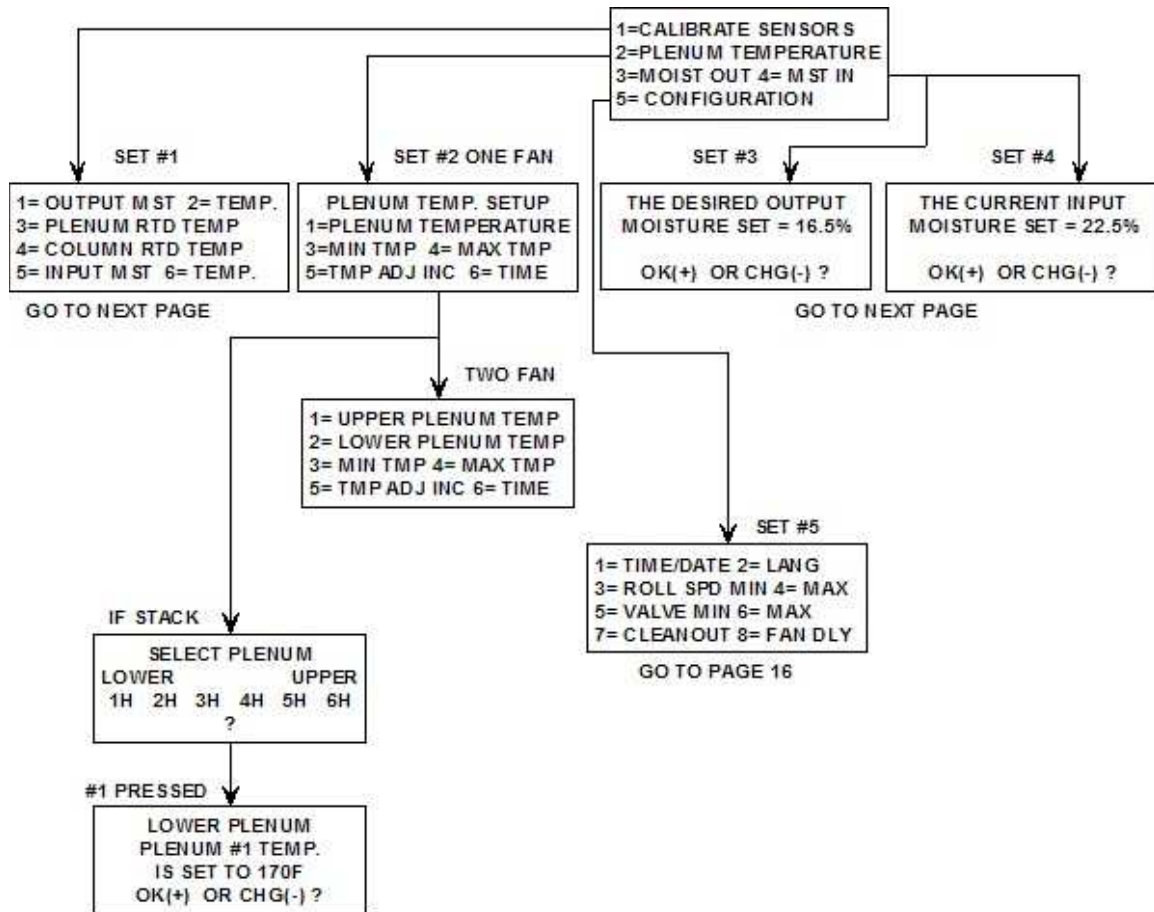
Press Start Then 3 On The Keypad



NOTE: PRESSING RESET WILL STOP THE GRAIN TRANSFER, TURN OFF AUGERS AND RETURN TO THE START SCREEN.

## 6. Set Menu

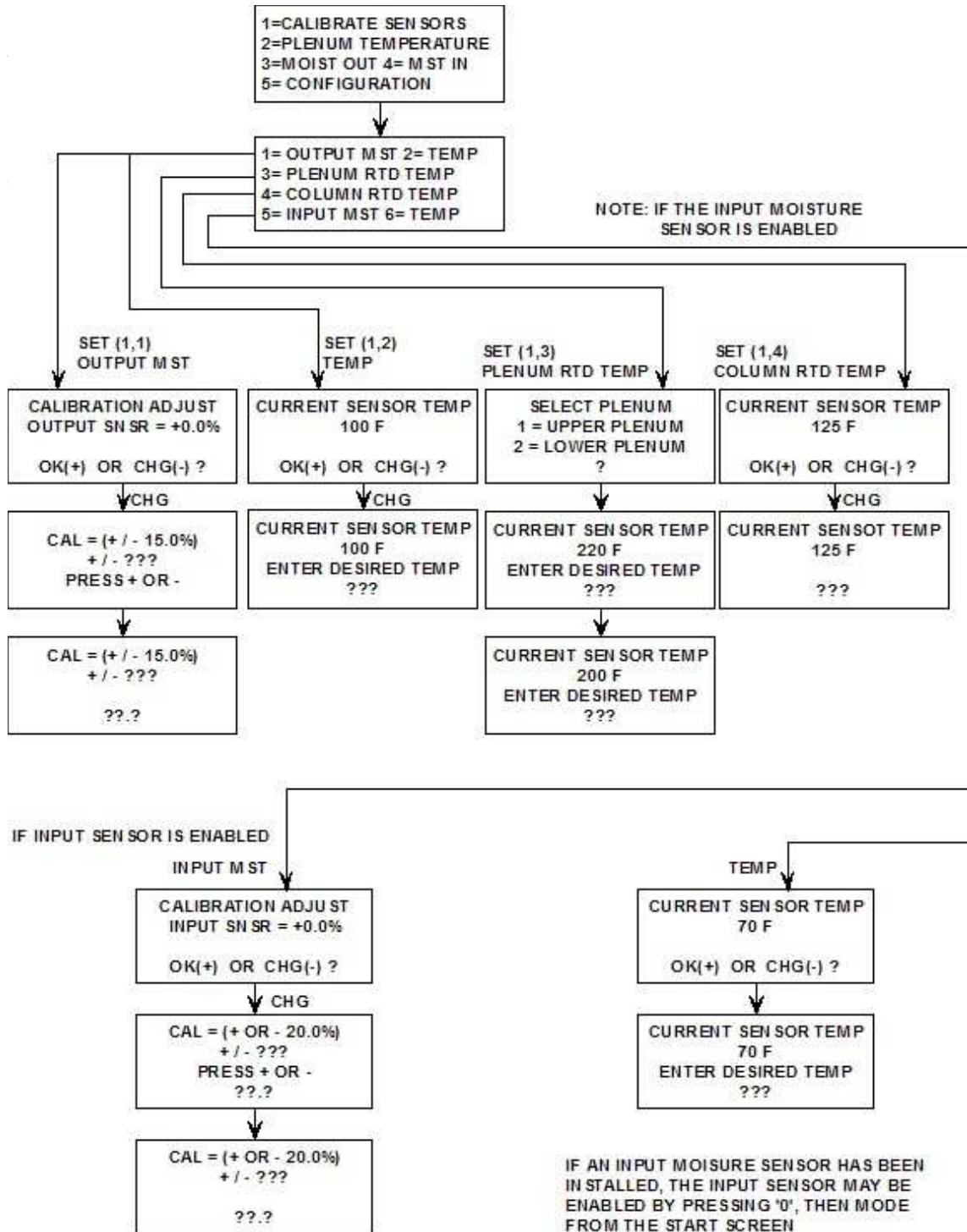
Press [SET] On Keypad



NOTE: SELECT THE NUMBER OF THE HEATER TEMPERATURE TO BE CHANGED ON THE KEYPAD.

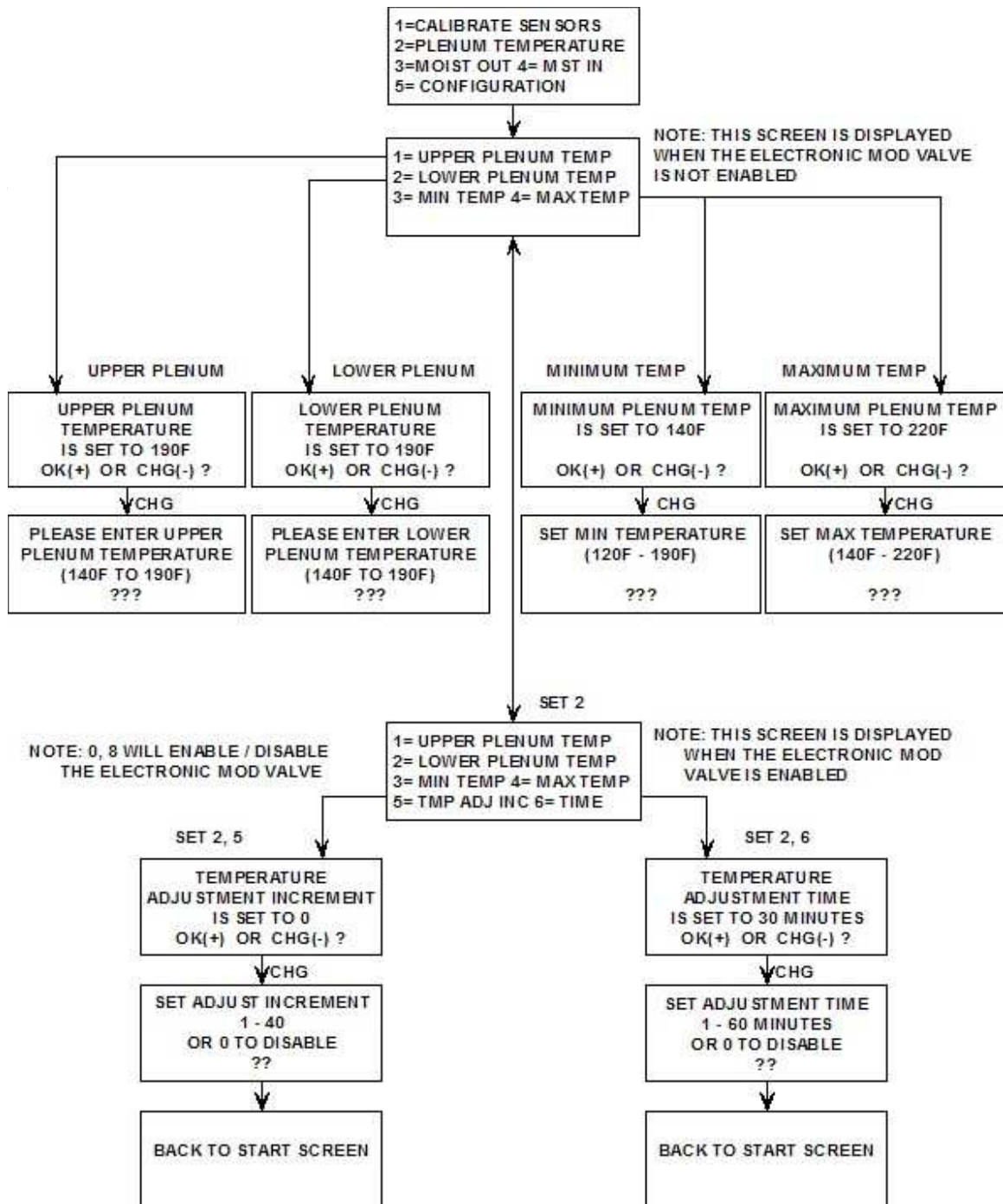
## Set Menu – Continuous Flow

Press [SET] On Keypad and then [1] on Keypad



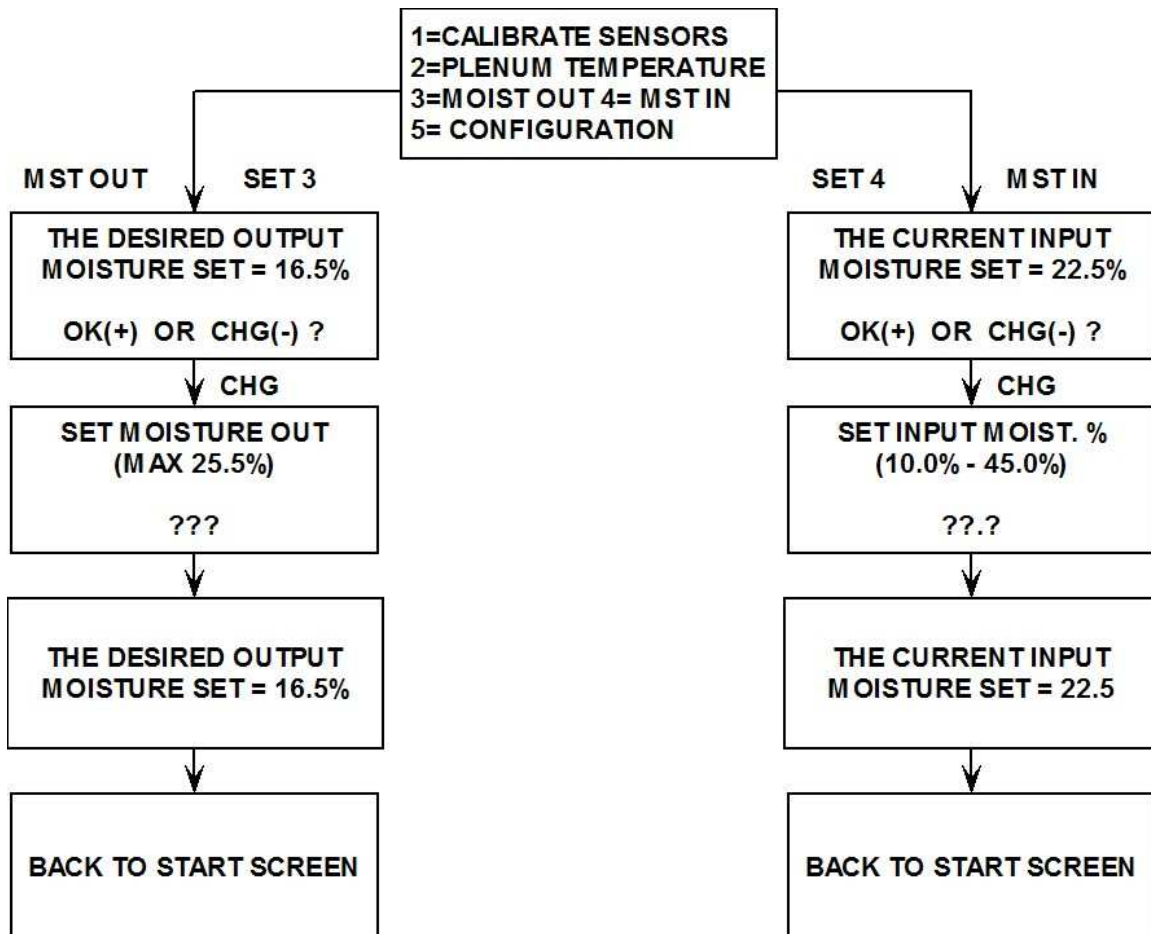
## Set Menu

Press [SET] And Then [2] On Keypad

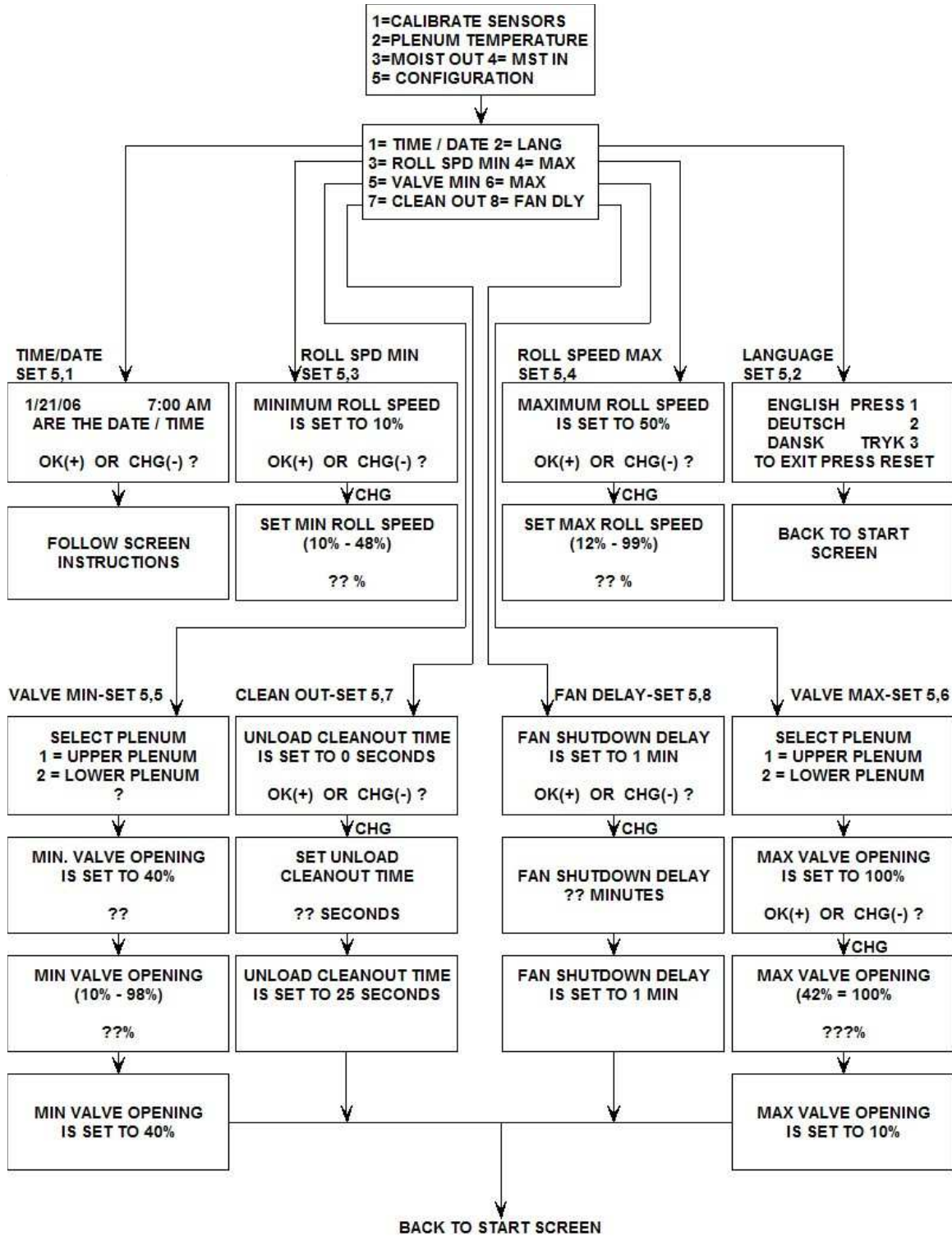


NOTE: MIN/MAX temperature sets the range of allowable plenum temperatures. Also, if the MAX temperature is lowered from 160 F, the initial dry time is calculated using the new temperature.

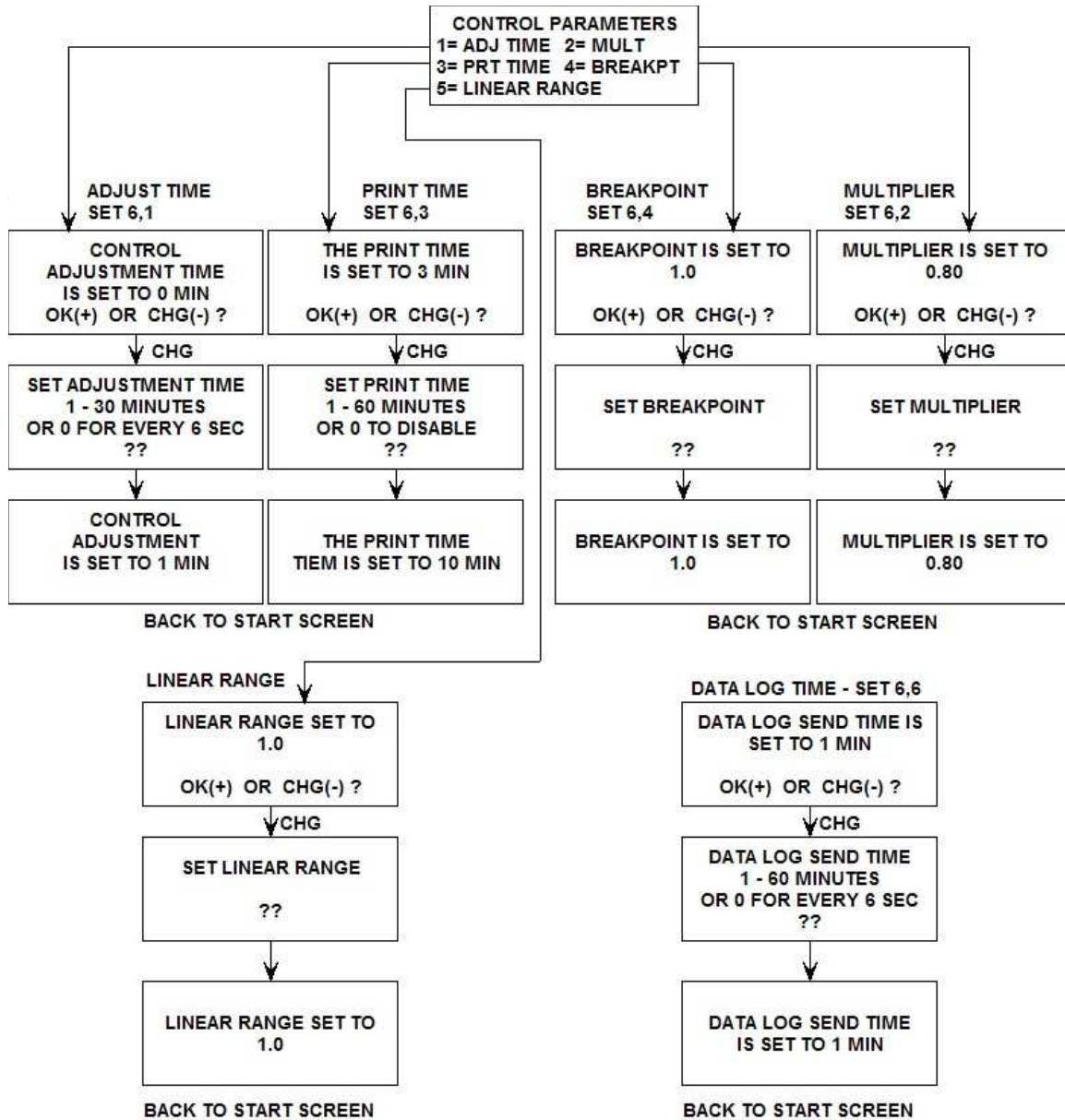
**Set Menu**  
**Press [SET] And Then [3] Or [4] On Keypad**



## Set Menu – Press [SET and then [5] On Keypad

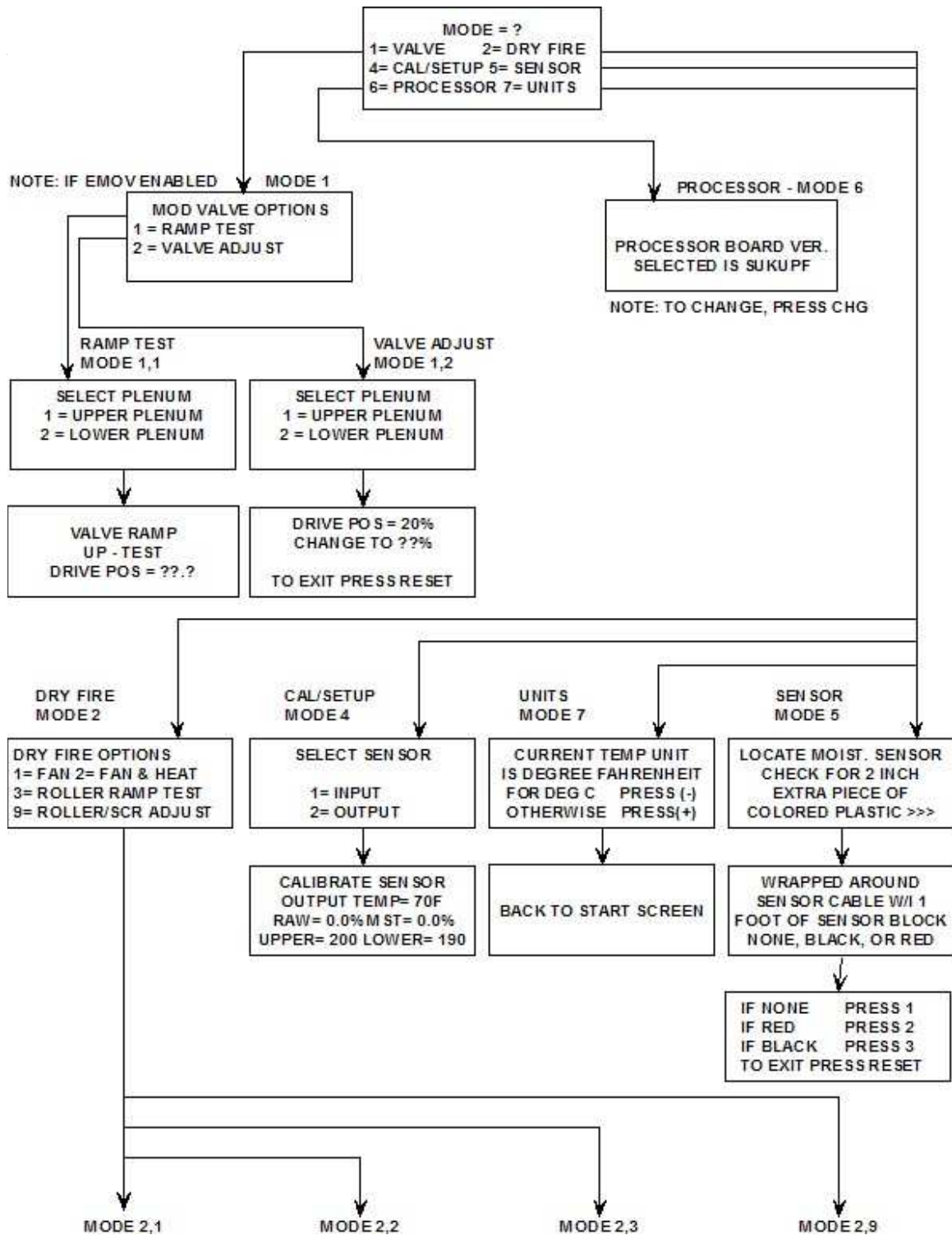


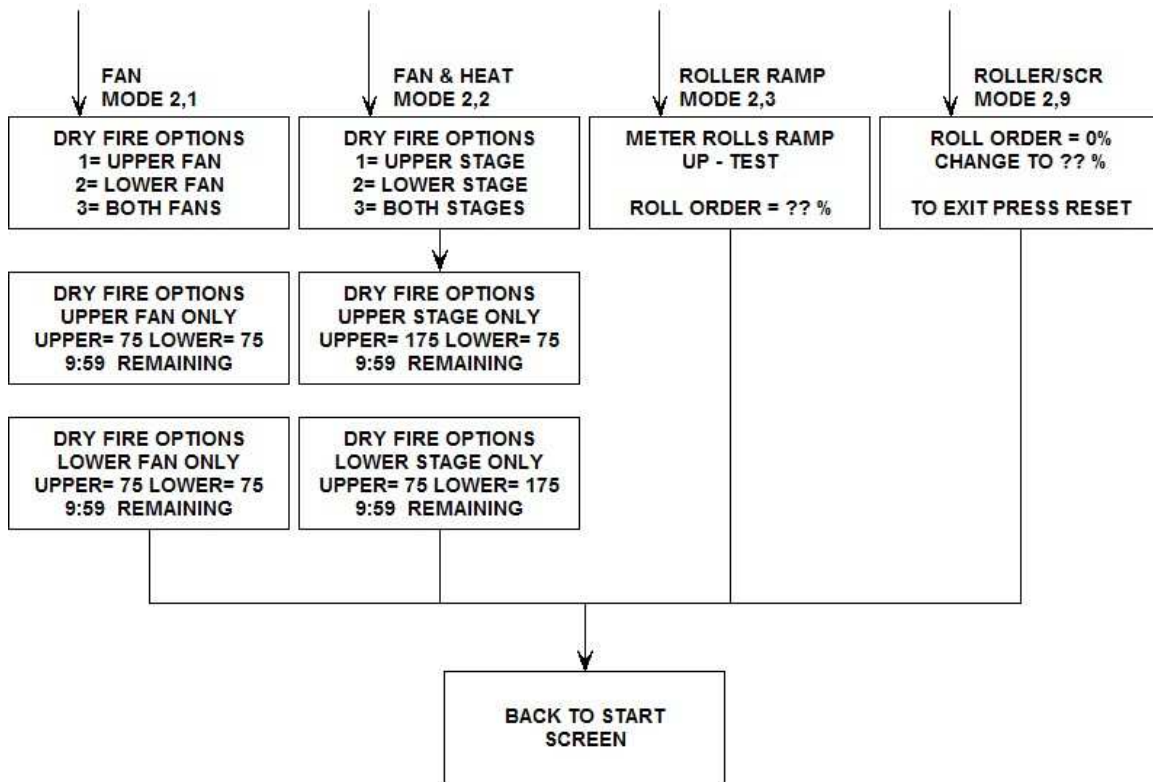
## Control Algorithm – Meter Rolls – Hidden Menu Set 6 - Press [SET] and then [6] On Keypad



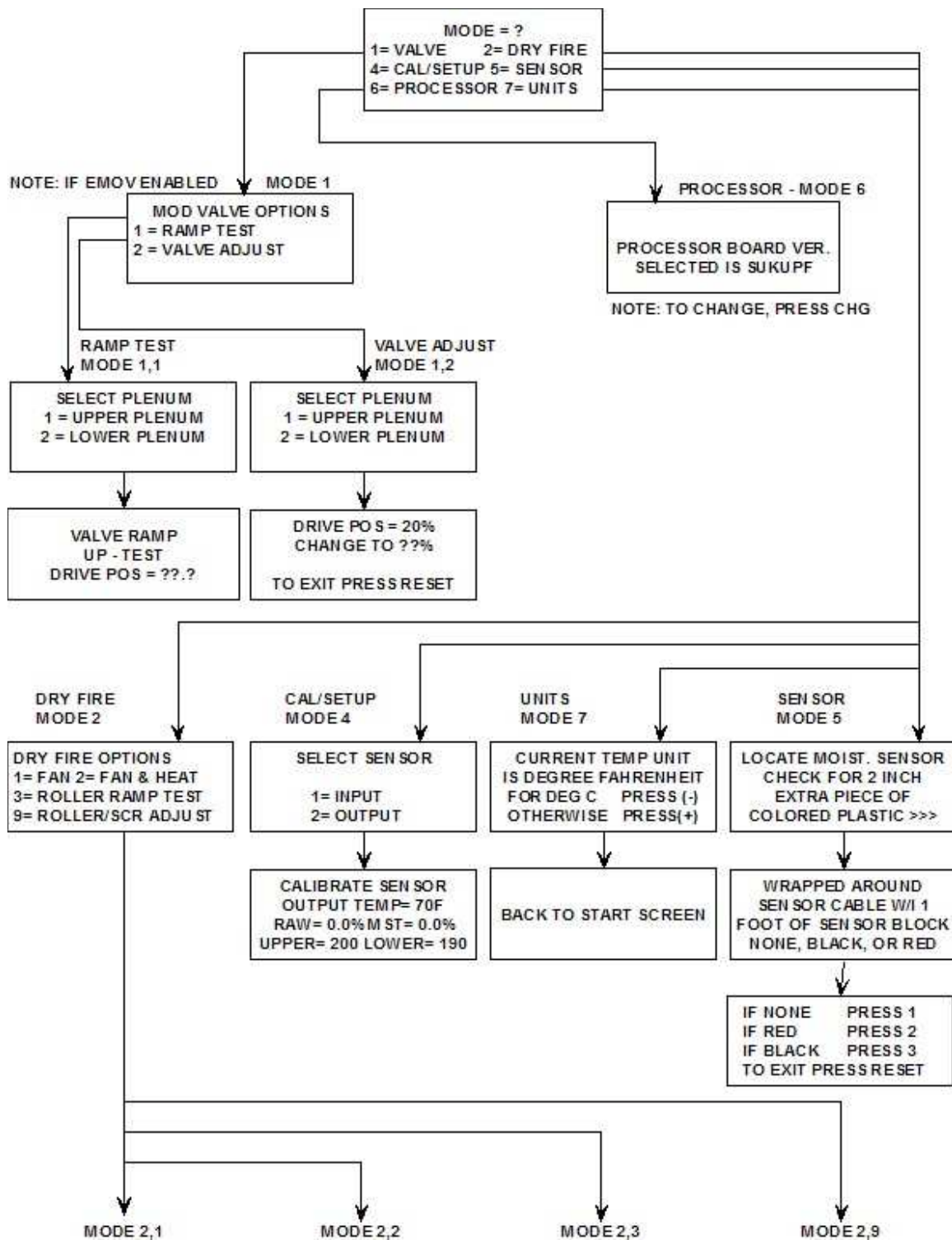
## 7. Mode

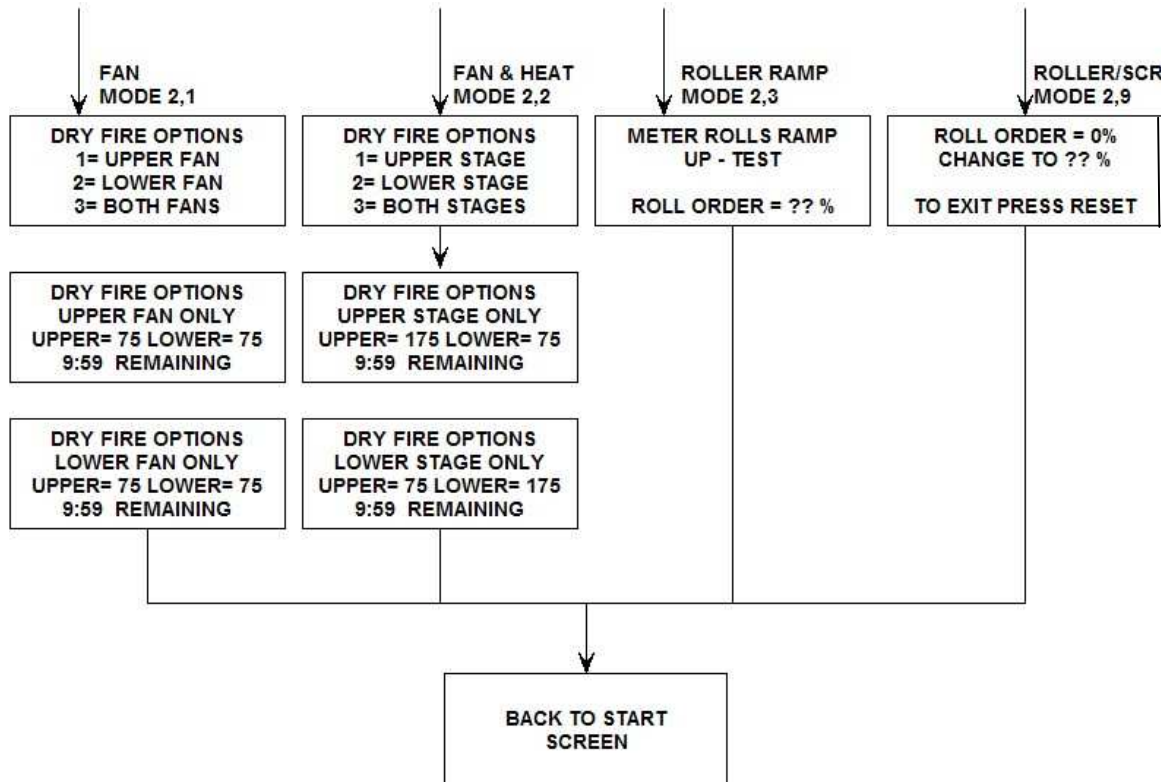
Press [MODE] On Keypad



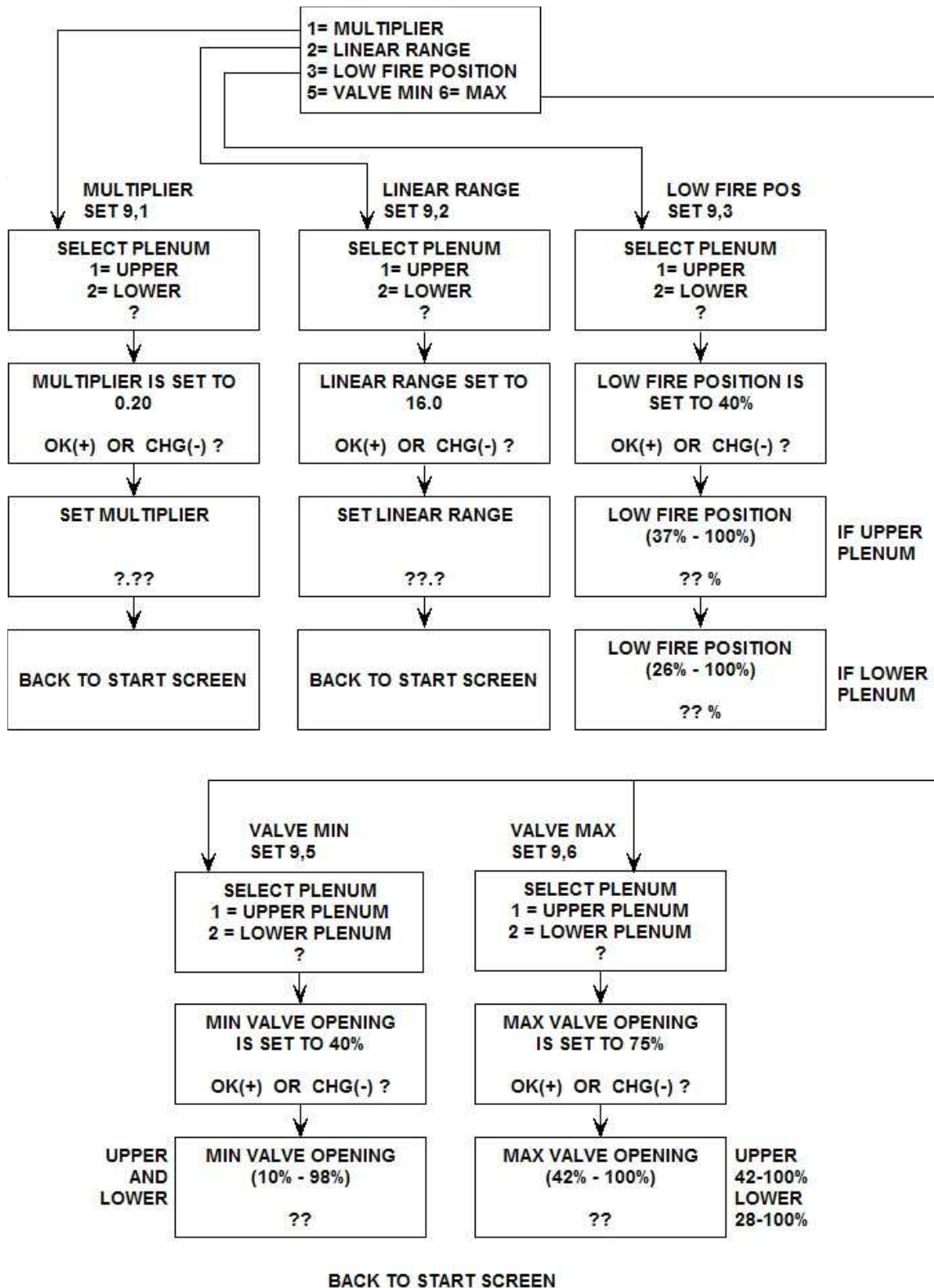


## MODE – Press [MODE] On Keypad

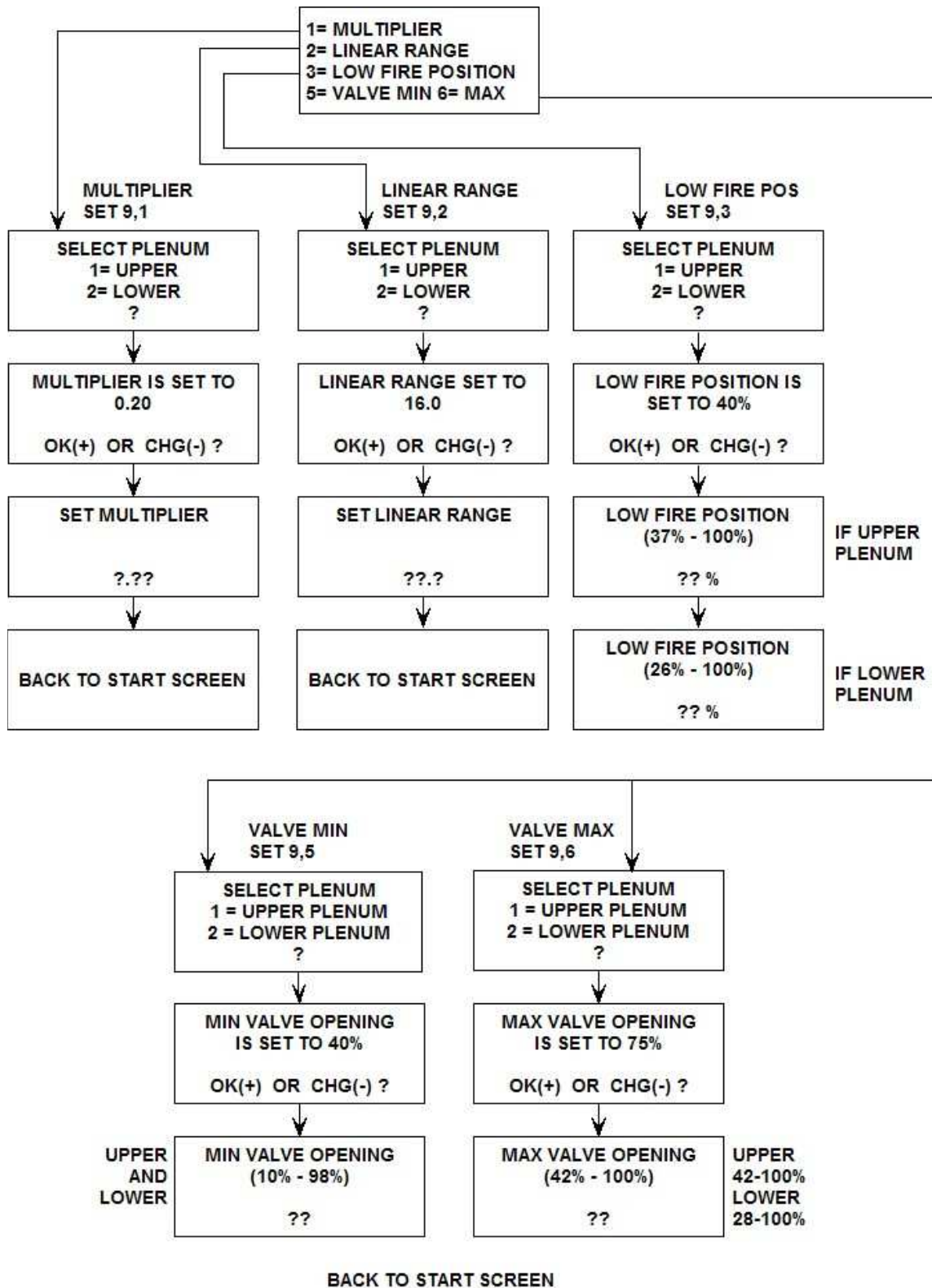




# **Control Algorithm – Electronic MOD Valve – Hidden Menu** **Set 9 – Press [SET] the [9] On Keypad**



**Control Algorithm (continued) – Electronic MOD Valve – Hidden Menu  
Set 9 – Press [SET] the [9] On Keypad**



## 8. Bushels Per Hour

### Press [9] On Keypad (see #1)

#### A. How to Turn On and Set Up

1. Note: To access the BPH (Bushels Per Hour) screen, the dryer must be in the continuous flow operation, unloading grain
2. While unloading, select [9] on the keypad. The following screen should be displayed:

**CALIBRATE BUSHEL/HR**  
**ENTER CURR. BPH    1**  
**TIME SAMPLE        2 ?**  
**TO EXIT PRESS RESET**

3. Key [1] is selected if the BPH is known or calculated from the dryer size. For example, if a 12 ft. dryer is unloading at 25%, multiply 1200 BPH x 0.25. The answer is 300 BPH. Enter the 300 BPH as the Current BPH by selecting [1] on the keypad. When this is done, the following screens will be displayed. Once the BPH has been entered, the BPH will be displayed on the screen.

**BUSHEL PER HOUR IS**  
**????**

4. Number 2 is selected if the actual BPH coming from the dryer is to be measured. By pressing Key [2], the following screen will be displayed:

**BPH TIMER STARTED**  
**PRESS 9 TO STOP TMR**

5. Once key [2] has been pressed, a timer is started and the roll ordered will be averaged and retained in memory until the timer is stopped.

6. Once a "sample" has been unloaded, whether it be a truckload or enough grain to be accurately weighed, press [9] again to stop the timer. The following screen will be displayed:

**BPH TIMER STOPPED**  
**PRESS 9 TO CALIBRATE**

7. The computer retains the time and average roll order until the operator selects key [9] again, to enter the bushels unloaded.

**SAMPLING UNLOAD**  
**TIME = 10.0 MINUTES**  
**BUSHEL UNLOADED**  
**????**

8. In the case of a shutdown, the timer is paused until it is either stopped or unloading is resumed. Note: the larger the sample, the more accurate the readout will be. Once calibrated, the BPH will be displayed whenever the roll order is displayed.

#### B. How to Turn Off

9. To turn off the BPH display, press key [9] then key [1] during dryer operation and enter 0000 for the BPH.

## 9. Temperature Based Control

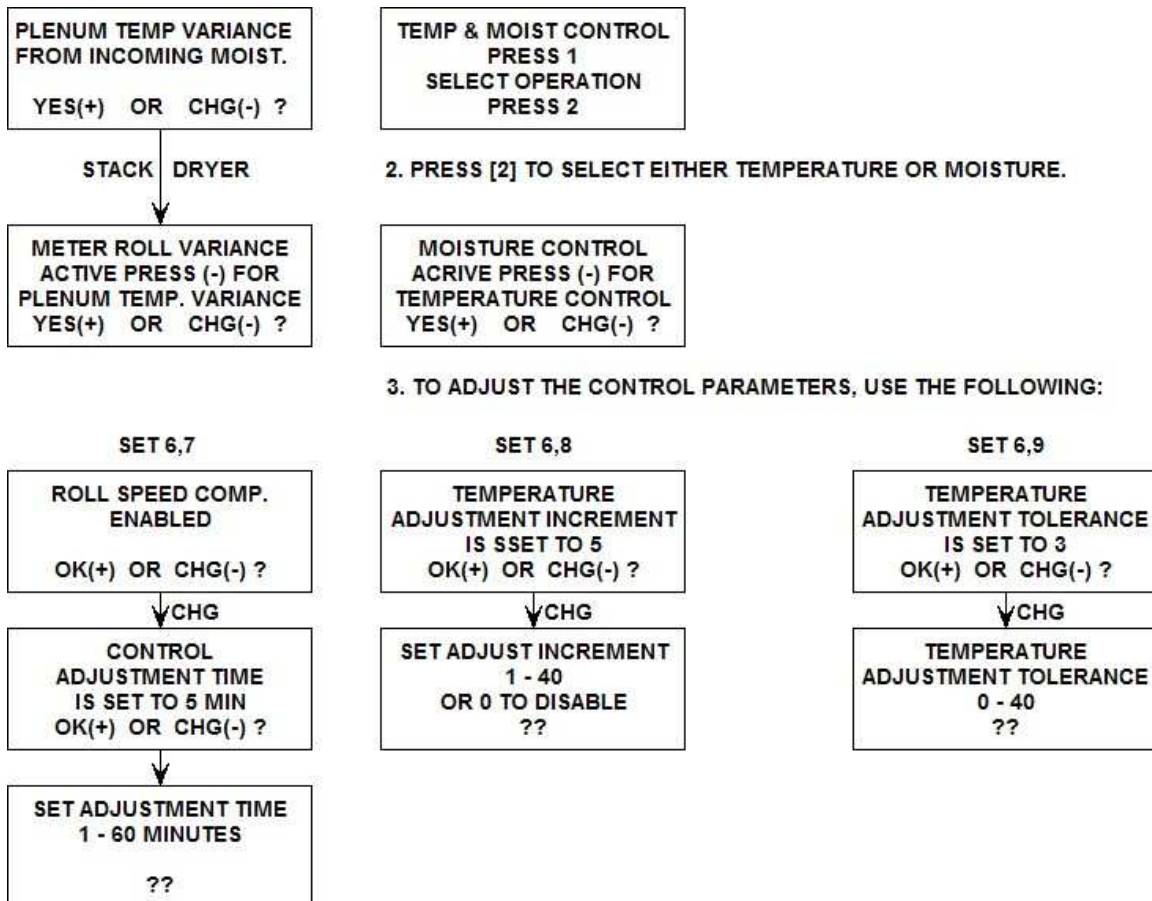
Press [SET] the [8] On Keypad

### A. Switching To

If a grain column RTD sensor has been installed, the metering rolls can be controlled using grain temperature as the controlling factor.

**Note:** The following screens will not appear if RTD sensor has not been installed.

1. To switch from moisture based control to grain temperature control, press [SET] then [8]. The following screen should be displayed: Press [1] to change to temperature based control.



How it works?

The meter rolls are being controlled internally by the software using temperature-based control from the column RTD sensor. The initial temperature control setpoint is set to the column temperature.

After stabilization has completed. This temperature setpoint will automatically vary in order to maintain the desired output moisture.

Control parameters defined:

1. **Tolerance** – The column temperature must be at the setpoint or within the set +/- tolerance before the software automatically makes an adjustment to the control temperature. If the RTD indicates an overdrying/underdrying condition and the moisture sensor indicates the opposite, a change will take place regardless of tolerance. Default is 3.

2. **Control Adjustment Time** – The minimum amount of time required between adjustments. Note that tolerance must be met before the timer is started. Default is set to 5 minutes.
3. **Roll Speed Compensation** – The present meter roll speed can be used to compensate the control adjustment time. For instance, if the control adjustment time is 5 minutes and the meter roll speed is 33%, the roll speed compensation will then require a 15 minute time between adjustments. Default is ON. (The higher the roll speed, the longer the time between adjustments).
4. **Temperature Adjustment Increment** – The control temperature is adjusted by this increment for every 1.0% variation from accrual moisture vs. desired moisture. For example, if the desired moisture is 15.0%, actual moisture is 16.5%, and the temperature adjustment increment is 5, then 7 degrees will be added to the control temperature. Default is 5 (5 degrees for the temperature adjustment increment and an extra 2 degrees for being an additional 0.5% away from the desired set point).

#### **Recommendations for Adjustments:**

Caution should be taken when making adjustments and it is recommended that only one parameter be changed at a time. After an adjustment, carefully monitor the input moisture and note variations going through the dryer. If variations of the input grain are +/- 3.0% from one sample to the next and that trend continues, these variations will be seen at the output but will not cause any adjustments to be made to the meter roll speed (tolerance default is set to 3).

If moisture control seems too slow or sluggish, first try adjusting the temperature adjustment increment. A change from 5 to 7 may have a large impact. If control still seems sluggish, try adjusting the control adjustment time from 5 minutes to 4. Roll speed compensation is recommended.

If moisture control seems too fast and is causing oscillations, first try adjusting the temperature adjustment increment. A change from 5 to 3 will have a large impact. If control still seems too fast, try adjusting the control adjustment time from 5 to 6 minutes. Roll compensation is recommended.

The tolerance factor should need little or no adjustment.

## 10. General Information

### A. Dip Switch Settings

- DIP 1: Down is for 150:1 gear reduction, up is for 100:1 gear reduction.  
DIP 2: Down indicates a 50/50 dryer, up indicates 2/3-1/3 dryer.  
DIP 3: Down is for a 2-Fan dryer, up is for a single fan dryer.  
DIP 4: Down if the dryer has proximity switches on the meter rolls, up if encoders.  
DIP 5: Down if the meter roll fault needs to be bypassed, up if enabled.  
DIP 6: Down will reset all of the defaults back to factor settings, (same as pressing 0,0)  
Beginning with V4.2, indicates the dryer has electronic MOD valves.  
DIP 7: Down causes the program to use the internal clock timing on the board, up causes the real time clock (RTC) found in the smartwatch to be used.
1. When replacing a processor board, verify that the DIP switch settings are identical to the board being removed. If any DIP switch is changed, the system power needs to be recycled in order for the new setting to be recognized.
  2. Upon startup, the checksum of saved variables (such as min / max meter roll speed) is compared to the checksum saved upon the last change. Should they not match, the default values are reset. This will commonly occur if the software (PROM) has been upgraded, or if the Smartwatch IC is defective or not seated properly.
  3. Initial Dry is typically performed with a temperature of 160F. If this is not desired, the min / max plenum temperature can be adjusted accordingly through the [SET] - [ 2 ] menu. For instance, when drying wheat seed, 125F may be the maximum desired drying temperature. Assuming that the LOW TEMPERATURE KIT has been installed, a maximum temperature of 125F can be entered. The initial dry calculation will then be made using a drying temperature of 125F. The same applies for Final Dry, except that Final Dry generally uses a temperature setting of 140F.
  4. During stabilization, moisture and temperature information are hidden from the operator, as the information during this time might be off target. To view this information, press the [MODE] key. Calibration can be performed by pressing the [SET] key. [RESET] will take you out of stabilization and into the sampling mode.
  5. At various stages during operation, IF an input moisture sensor has been installed, the input moisture will be shown as the dryer is loading. If the dryer is not loading, the [MODE] key can be pressed to view the incoming moisture.
  6. During sampling, or continuous flow mode of operation, the moisture sensor must be functioning properly for accurate moisture control. If the output moisture falls below 8.0% (5% in V4.0 or higher), the message " NO GRAIN DETECTED " will be displayed and the dryer will shut down after 3 minutes of this condition. If the output moisture falls below 1.0 %, the message " MOISTURE SENSOR NOT FOUND " is displayed and the dryer will shut down after 30 seconds.
  7. While the system is pausing so that the displayed text can be read, pressing any key can advance the screen. During data entry, the [MODE] key can be used to back up one step, the [CHG] key will back up one digit, and the [OK] key accepts the current value. For instance, if a three digit number is requested (???), pressing [1] then [OK] accepts "1" for the value, similar to "001".

8. The System Status printout has been streamlined to only include pertinent information. Standard settings such as Black Moisture Sensor, Processor Version SukupF, etc., are no longer printed. Nonstandard settings will be printed during Initial Dry or Autobatch modes of operation.
9. Displayed moisture readings are a 5-sample average, with samples taken at least one second apart. A sample consists of 60 A / D readings that are averaged. Moisture is temperature compensated where every 20F above 80F constitutes a -1% offset, and every 20F below 80F constitutes a +1% offset. When in automatic, a small compensation factor is also included based on meter roll speed. No offset is Included for 10% speed, a +0.6% linear offset up to 40% and an additional +0.15% linear offset up to 100%.

## B. Reset Default Values

1. Pressing key [0] at the start screen will display the program version currently in use.
2. Pressing key [0] and then [SET] will display the following menu:

0= DEF 1= FILL 2= HISTR  
3= CLR HIST 4= DATA LG  
5= REMOT 6= BAUD 7= PRT  
8= VALV 9= PREC MD=INP

If any of the above information has been memorized, pressing [0] and then the number of the feature desired, will take the user directly to that function, bypassing the above screen.

Pressing [0] and then any of the following will take the user to that feature:

## C. Resets default values

Press [0]

DEFAULTS SET

## D. 15 minute fill timer shutdown enable / disable

Press [1]

15 MIN FILL TIMER  
ENABLED

## E. Print History

Press [2]

Prints the last 150 lines of information – stored in memory

NO INFORMATION DISPLAYED

## Clears the print history

Press [3]

NO INFORMATION DISPLAYED

## F. Enables / Disables data logging features

Press [4]

DATA LOGGING  
ENABLED

### G. Remote monitoring enable / disable

Press [5]

REMOTE MONITORING  
ENABLED

### Selects RS-232 remote baud rate

Press [6]

While this screen is displayed, each time the [CHG] key is pressed, a new baud rate is displayed.

(57600, 19200, 9600, 4800, 2400, 1200, 300) When the correct rate is displayed, press [OK] to accept.

SERIAL BAUD RATE IS  
57600

OK(+) OR CHG(-) ?

### H. Printer enable / disable

Press [7]

PRINTER  
ENABLED

### I. Electronic modulation valve control enable / disable

If enabled, press one of the following keys within 4 seconds to:

[1] = Will disable upper electronic mod valve

[2] = Will disable lower electronic mod valve

ELECTRONIC MOD VALVE  
ENABLED

While this screen is displayed, pressing [1] or [2] will disable the respective valve. A message will be displayed, indicating which valve was disabled.

### J. Precision print enable / disable

Press [9]

(Include the decimal point for the roll speed)

PRECISION PRINT  
ENABLED

### K. Input moisture sensor enable / disable

Press [MODE]

INPUT MOISTURE SENSOR  
ENABLED

### L. Load Start Delay (0 to 240 seconds)

Press [CHG]

LOAD START DLY TIME  
IS SET TO 0 SECONDS

OK(+) OR CHG(-)

LOAD START DLY TIME

??? SECONDS

## 11. Electronic Modulation Valve Control Parameters

To access the Control Parameters Menu, press [SET] then [9].

1= MULTIPLIER  
2= LINEAR RANGE  
3= LOW FIRE POSITION  
5= VALVE MIN 6= MAX

### A. Multiplier

The multiplier affects the size of the adjustment. A nonlinear scale is used to determine the amount of adjustment. As the moisture approaches the target setpoint, the amount of adjustment becomes significantly less. Increasing the multiplier will cause the control to adjust quicker, using bigger steps, but may cause oscillation (swinging) problems. Decreasing the multiplier will cause the control to adjust slower, which should be done to prevent oscillation problems.

|                             |              |
|-----------------------------|--------------|
| Default for 38 / 44" fans = | 0.20         |
| Default for 28" fans =      | 0.24         |
| Range =                     | 0.01 to 9.99 |

### B. Linear Control Range

Sets the point away from the target when the adjustment becomes linear. With a linear control of 16.0, once the temperature reaches  $\pm 16.0^\circ\text{F}$  of the target, a linear scale will be used to determine the amount of the adjustment.

|           |               |
|-----------|---------------|
| Default = | 16.0F         |
| Range =   | 0.0F to 25.5F |

### Low Fire Position

Sets the starting position of the valve. With a low fire position of 50 %, the processor will send a 5.0 VDC to the valve as soon as power is applied to the Control Box. Once ignited, the processor will open the valve farther, if necessary, and start to control. If the angle % on the valve is set to 60 %, a 10 VDC signal will open the butterfly valve to 60 % of 95 degrees or 57 degrees. Therefore, a 5.0 VDC signal will open the valve to  $(5.0 - 2) / (10 - 2) * 60 \% * 95 \text{ degrees} = 24.4$  degrees.

|                             |                        |
|-----------------------------|------------------------|
| Default for 38 / 44" fans = | 50 %                   |
| Default for 28" fans =      | 40 %                   |
| Range =                     | Valve Min to Valve Max |

### C. Valve Minimum

Sets the minimum position of the valve. With a valve minimum of 44%, the processor will not allow the control signal to fall below 4.4 VDC. Therefore, a 4.4 VDC signal will open the valve to:  $(4.4 - 2) / (10 - 2) * 60 \% * 95 \text{ degrees} = 17.1$  degrees.

|                             |                   |
|-----------------------------|-------------------|
| Default for 38 / 44" fans = | 44 %              |
| Default for 28" fans =      | 26 %              |
| Range =                     | 10 % to Max - 2 % |

### D. Valve Maximum

Sets the maximum position of the valve. Typically, this is always set to 100 % to allow the processor to reach the maximum output if needed, but this can be lowered to limit the maximum output voltage being sent to the valve, by the processor. This may be desired if the plenum RTD temperature were to fail, the valve would be limited as to how far it would open, keeping the maximum temperature from climbing.

## E. Adjustment Recommendations

Verify that capacitors have been installed on the inputs to the processor board. Without them, electrical noise can impact the signal causing false readings, which will impact control.

Adjust the low fire (minimum) valve position as needed to achieve the proper pressure upon startup. Ideally, there should be 2 – 3 PSI as the flame is lit.

Upon starting the heater for the first time, press the number of the plenum on the keypad to observe control. An increase in temperature of approximately 1 degree each 1 – 2 seconds will be observed. If the control overshoots the target by 8 degrees, try lowering the multiplier. If the overshoot is less than 8 degrees, try lowering the linear range. If control is sluggish as the temperature approaches the set point, try raising the multiplier. If the control is sluggish once the temperature is within 8 – 10 degrees, try increasing the linear range.

Once the control point has been established, upon restarting the heaters, control will immediately go to the last temperature entered, and will remain at that point until the 100-second stabilization period has ended, unless the temperature overshoots. A change in plenum temperature changes the control point.

Try to avoid changing multiple parameters at the same time, and making dramatic changes. The default parameters are optimized for our control system and should require only slight refinements, if any, to tune in the control.

To access the Plenum Temperature Setup Menu, press [SET] and then option [2]. The following menu will be displayed:

See page 14 for screen progression.

|                               |
|-------------------------------|
| <b>1= UPPER PLENUM TEMP</b>   |
| <b>2= LOWER PLENUM TEMP</b>   |
| <b>3= MIN TMP 4= MAX TMP</b>  |
| <b>5= TMP ADJ INC 6= TIME</b> |

Note, when the electronic mod valve is installed, options [5] and [6] allow for the plenum temperature to be adjusted automatically when the meter roll speeds have reached a minimum or maximum meter roll speed limitation. (Indicated by an asterisk ( \* ) beside the roll order display) Setting the Temperature Adjustment Increment to 5 and the Temperature Adjustment Time to 30 minutes would cause the Plenum Temperature to be increased 5 degrees after 30 minutes of running at the minimum meter roll speed, or decreased by 5 degrees after 30 minutes of running at maximum meter roll speed. The Plenum Temperature will remain within the Min / Max boundaries established by options [3] and [4] . Note that the vaporizer, if equipped, may need adjustment under extreme circumstances.

An asterisk ( \* ) is shown to the left of the plenum temp (s) on the LCD screen to indicate that the electronic mod valve has reached maximum opening or closing. An exclamation mark ( ! ) is shown to the left of the Plenum Temp(s) to indicate that the actual temperature has been 15 degrees or more away from the Setpoint for more than a minute.

**Note:** After 10 minutes of being 15 degrees away from the setpoint, the dryer will be shut down. After 5 minutes of being 30 degrees away from the setpoint, the dryer will also be shut down.

## 12. Meter Roll Control Parameters

To access the meter roll control parameters, press [SET] then [6].

**CONTROL PARAMETERS**  
1= ADJ TIME 2= MULT  
3= PRT TIME 4= BREAKPT  
5= LINEAR RANGE

### A. Control Adjustment Time

Sets the frequency at which the software monitors the roll speed to see if an adjustment is necessary. Note that all corrections are scaled over a 15-minute period such that the sum of all corrections will be equivalent to one correction every 15 minutes.

Default = 0 (adjust every 6 seconds)  
Range = 0 to 30 minutes

### B. Multiplier Factor

Affects the size of an adjustment. A nonlinear scale is used to determine the amount of adjustment. As the moisture approaches the target setpoint, the amount of adjustment becomes significantly less. Increasing the multiplier will cause the control to adjust more quickly, using bigger steps, but may cause oscillation (swinging) problems. Decreasing the multiplier will cause the control to adjust more slowly, which should prevent oscillation problems.

Default for moisture control = 0.80  
Default for temperature control = 0.16  
Range = 0.01 to 9.99

### C. Print Time

Sets the frequency (in minutes) at which the data is printed.

Default = 10 minutes  
Range = 1 to 60 minutes, or 0 for OFF

### D. Breakpoint

Sets the point away from the setpoint where control begins to slow down. With a breakpoint of 1.0 %, once the moisture reaches + / - 1.0 %, no adjustments will be made if the current moisture reading is closer to the setpoint than the previous adjustment moisture reading. **NOTE:** When using temperature control, a breakpoint set to 1.0 will cause the same effect when within 1.0 degree F of the setpoint.

Default for moisture control = 1.0 %  
Default for temperature control = 5 degrees F  
Range = 0 % to 25.5 % or 0 F to 25.5 degrees F

### E. Linear Control Range

Sets the point away from the setpoint when the adjustment scale becomes linear. With a linear control range of 1.0 %, once the moisture reaches + / - 1.0 % of the setpoint, a linear scale will be used to determine the amount of adjustment (as the moisture moves closer to the setpoint, the smaller the adjustment becomes).

Default for moisture control = 1.0 %  
Default for temperature control = 5 degrees F  
Range = 0 % to 25.5 % or 0 to 25.5 degrees F

## F. Adjustment Recommendations

Verify that incoming moisture is somewhat stable. Keep in mind that as incoming moisture varies, the variance will be seen at the output until the control system can “catch up”.

If control is “swinging” a couple of points on either side of the setpoint, try decreasing the multiplier in small increments which will bring about smaller control adjustments. Note that a small change in the multiplier will have a big impact on the control. Changing 0.80 to 0.70 is sufficient. Another option is to increase the breakpoint from 1.0 % to 2.0 %. This will cause adjustments to not be made, assuming that control adjustments are in the correct direction. If control is sluggish and doesn’t seem to get to the setpoint fast enough, try increasing the multiplier from 0.80 to 0.90.

If the control is within range, a 0.5 – 1 point of the setpoint, but seems sluggish in reaching the target, try increasing the linear range from 1.0 % to 1.5 %. This will provide more of a boost when getting close to the setpoint, and help prevent overshooting. If the control is oscillating between .5 and 1 point from the setpoint, try decreasing the linear range from 1.0 % to 0.6 %. The breakpoint feature can also be utilized here to fine-tune the control.

Try to avoid changing multiple parameters at the same time, and making dramatic changes to any parameter. The default parameters are optimized for your control system and should require only small adjustments to tune the system. Allow a half-hour or so to pass before making another change. It is not recommended to make a change to the control adjustment time. Allowing the control system to make small corrections more often is a better method than making larger corrections less often.

## 13. Remote Monitoring

### A. Parts Required

1. Sukup RS-232 adapter cable – P/N J3293 installed on all dryers built after July 2005.
2. Grain Dryer Software V4.0 or higher – or – Stack Dryer Software V3.0 or higher – or – Tower Dryer Software V1.3 or higher, also installed on all dryers built after July 2005.
3. Windows based PC ( personal computer ) with an RS232 9-pin serial connection.
4. Appropriate length serial communication extension cable and gender changer.  
(Distances exceeding 1000 feet are not recommended!)
5. Assemble a Category – 5 cable using the following diagram:

2 >-----< 2  
3 >-----< 3  
5 >-----< 5

CAT – 5 cable and DB9 connectors and pins are readily available from most major electronics suppliers.

### B. Installation

1. Dryers built prior to July 2005, if necessary, remove the I/O board to gain access to the processor board.

Verify that the software installed is V4.0 or greater for the Portable Dryer or V3.0 or greater for Stack Dryers (refer to PROM replacement guide if replacing). Place the 10-pin stake connector from the RS232 adapter cable into the processor board connector J1 (found directly above the printer cable in the upper right hand corner of the PCB, next to the red DIP switches). Reconnect the I/O board to the processor board.

2. Drill a hole in the bottom of the Control Box large enough to route the serial communications cable. Plug the cable into the other end of the adapter cable. Use a grommet to prevent the cable from being cut by the sharp edge of the drilled hole.
3. Route the serial communications cable to an open communications port on the back of the PC or Laptop.

### C. Computer Setup

1. From within Windows based PC, open Hyperterminal (commonly found under Start --> Accessories --> Communications). If prompted, enter the connection name as "Sukup". Choose File -> Properties to select settings. Verify that the proper COM port is selected (typically COM 1). Select Configure. Set up communication for 57,600 bits per second, 8 data bits, no parity, 1 stop bit, and no flow control. Select OK twice to save settings.

### D. Connecting

1. Open Sukup Hyperterminal session. Verify that communication is connected (lower left hand corner of Hyperterminal). If not connected, click on the telephone icon to enable the connection.
2. Verify that the dryer control system is turned on. If communication is working properly, the screen currently displayed on the dryer LCD will be echoed to Hyperterminal. If communication is not working, Please refer to the troubleshooting section.

## **E. Settings**

1. The four line LCD will be echoed to Hyperterminal and updated every second.

Remote monitoring is on by default. Simply connect a straight through RS232 cable to our adapter cable (on the processor board) and the remote PC (personal computer) to monitor the LCD status using Windows Based Hyperterminal. Set Hyperterminal for 57600 baud. If data logging or graphing is desired, disable the remote monitoring by pressing [0] and then [5]. Enable CSV by pressing [0] and then [4]. In HyperTerminal, select transfer, and then capture text. Type in the file name followed by .CSV extension. Data will then be saved in comma separated variable format which can be opened in Excel or other spreadsheet application. Go to [SET] and then [6] then [6] again to set up CSV send frequency (1 minute by default).

## **14. Data Logging**

### **A. Setup**

1. While the dryer is unloading, HyperTerminal can be used to log moisture and temperature information. The information can be saved into a .CSV file for use with all spreadsheet applications, which can then be used to create graphical trending information showing dryer performance.
2. To save information into a .CSV file, from within HyperTerminal, select Transfer -> Capture Text. Name and save the file to an appropriate location and use a .CSV extension. Type '\$' from HyperTerminal to toggle between remote monitoring and data logging modes. Current mode will be displayed.
3. By default, information will be logged every 3 minutes. To change the log rate, type 0 to log every six seconds or 1 – 9 to log every x # of minutes.
4. Data may be viewed but not altered while capturing is taking place. To close the capture file, select Transfer -> Capture Text -> Stop.
5. Open the .CSV file in a text editor such as Notepad or Word. Condition the file for spreadsheet use by deleting any non-logging information ( excluding the header ) as needed. Save the file.
6. The file may then be opened using a spreadsheet application. Refer to the application manual to create graphs of trending information.

## **15. Remote Control**

### **A. Enable/Disable**

1. To gain access to the remote control features from within HyperTerminal, type '#', a message will appear stating:
  - a. REMOTE CONTROL ENABLED
  - b. AUTOMATICALLY DISABLED AFTER
  - c. THREE MINUTES OF INACTIVITY
  - d. OR PRESS '#' AGAIN TO DISABLE

NOTE: AUTOMATIC DRYER STARTUP WILL NOT BE ALLOWED REMOTELY.

2. The remote control features can be used to do everything that the keypad at the control box can do, except that it cannot be used to start the fans, heaters, or augers. If an attempt is made to do so, a message will appear, stating that the "DRYER CANNOT BE STARTED REMOTELY", and the program will return to the start screen.

## B. Control Keys

1. Once enabled, the following keys (all caps) can be used to control the dryer:

|                |                    |
|----------------|--------------------|
| 0 – 9 keys:    | same as the keypad |
| S:             | SET                |
| R:             | RESET              |
| T:             | START              |
| M:             | MODE               |
| O, K, +, OR Y: | OK                 |
| C, -, OR N:    | CHG                |

2. After 3 minutes of inactivity, remote features will be disabled and ' # ' must be typed again to gain access.

3. If a key is pressed at the dryer, remote features will be locked out for the one minute. A message will appear stating that "REMOTE CONTROL TEMPORARILY LOCKED OUT" if an attempt is made.

## C. Troubleshooting

1. PROBLEM: No communication between the dryer and the remote computer.

### POSSIBLE SOLUTIONS:

- Verify that the proper software is installed in the dryer control system and that HyperTerminal is set up properly and connected.
- Verify that all cabling connections are secure and properly pinned out.
- Verify that the adapter cable is plugged into J1 and not J2.
- Verify the baud rate of the dryer control system (press [0] then [6]) make sure that the baud rate matches the setting within HyperTerminal.
- Try lowering the baud rate of both the control system and HyperTerminal.
- Close and restart HyperTerminal.
- Verify that dryer control is in the remote monitoring mode and not the data-logging mode. Type ' \$ ' from HyperTerminal to toggle modes, or [0] and then [4] to toggle data logging and [0] and then [5] to toggle remote monitoring.
- Disconnect the serial communications cable from both ends. On the female end, place a paper clip between pins 2 and 5. Measure the resistance between pins 2 and 5 on the male end. If the resistance is much greater than 7 ohms per 100 FT, thoroughly check cabling for kinks or breaks and replace if necessary. Repeat for pins 3 and 5. If possible, try using another computer or replace the adapter cable or the processor board in the dryer control system.

2. PROBLEM: Garbled data appears on the HyperTerminal screen.

### POSSIBLE SOLUTIONS:

- Try lowering the baud rate settings for both the dryer control and HyperTerminal.
- Close and restart HyperTerminal.
- Check or replace the serial communications cabling or re-crimp or solder pins.

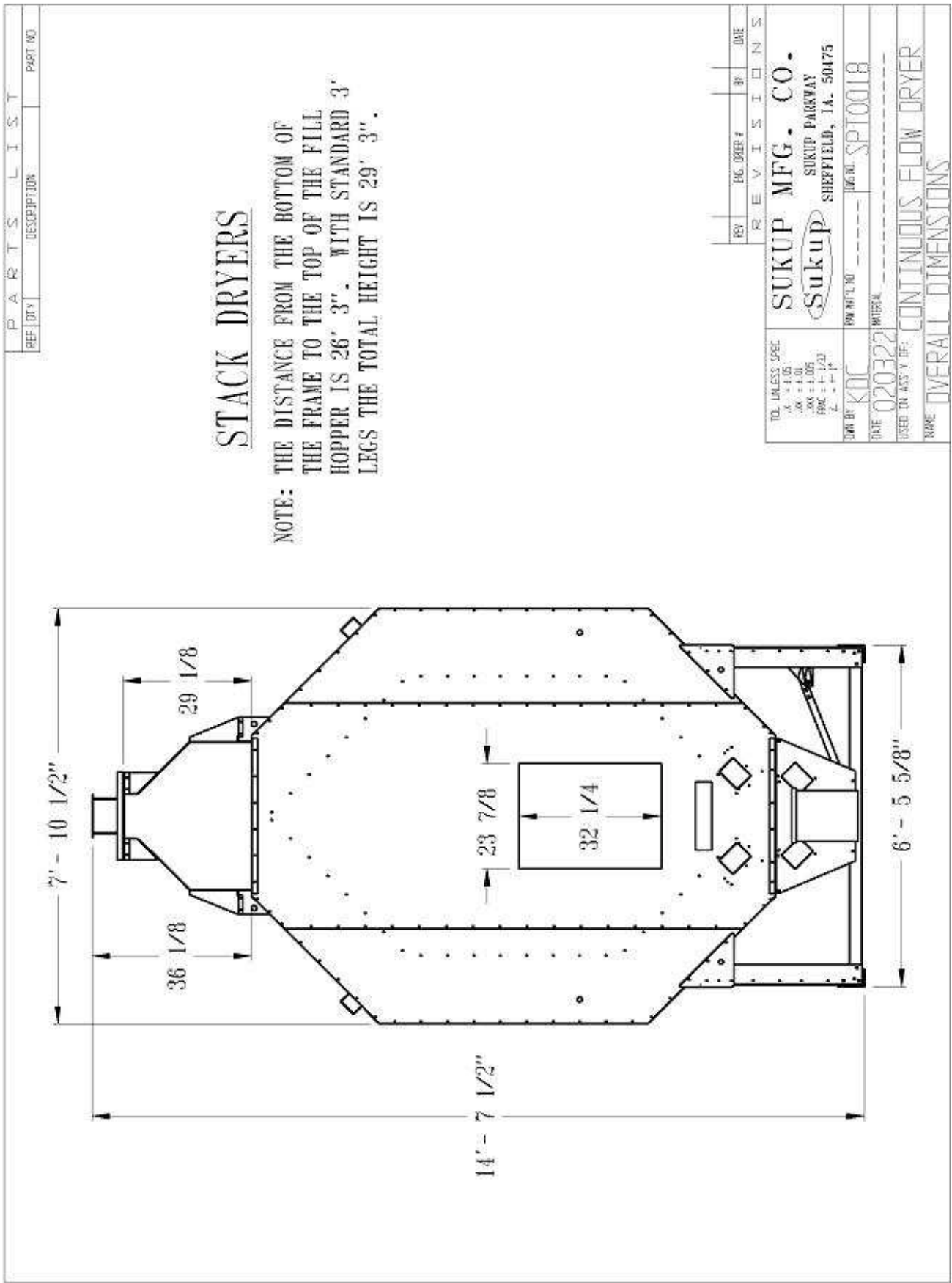
## NOTES

# SUKUP DRYER CATALOG TECHNICAL DATA

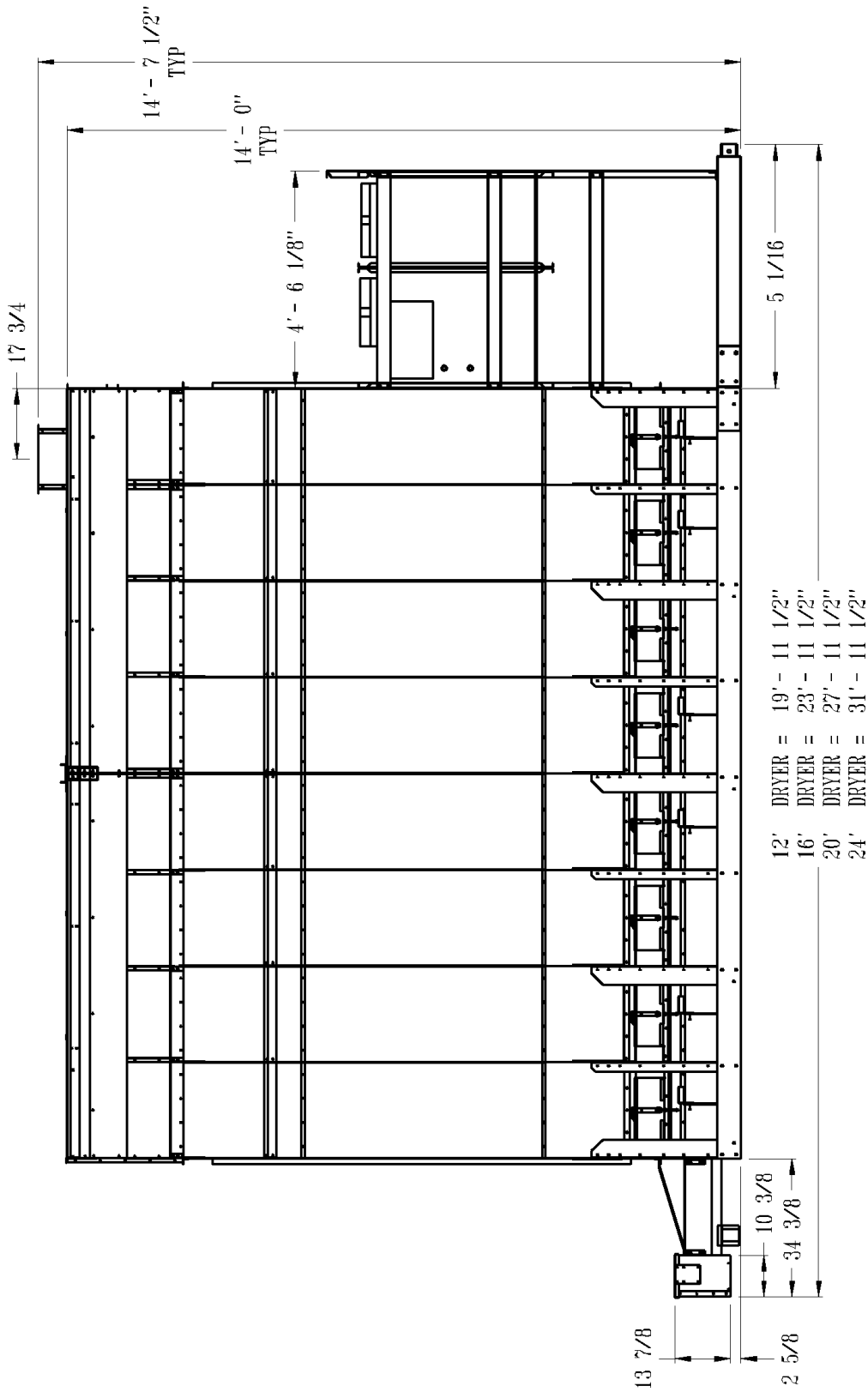
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Dimensional Drawings



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



|                   |                    |                       |  |
|-------------------|--------------------|-----------------------|--|
| TOL UNLESS SPEC   |                    | SUKUP MFG. CO.        |  |
| .X = ±.05         |                    | Sukup                 |  |
| .XX = ±.01        |                    | SUKUP PARKWAY         |  |
| .XXX = ±.005      |                    | SHEFFIELD, IA. 50475  |  |
| FEAC = ± 1/20     |                    | DWG NO. SPT0017       |  |
| Z = ±.1           |                    | MATERIAL              |  |
| OWN BY KOC        | DATE 020322        | CONTINUOUS FLOW DRYER |  |
| USED IN ASS'Y OF: | OVERALL DIMENSIONS |                       |  |
| NAME              | BY                 | DATE                  |  |

| REV | ENG. ORDER # | BY | DATE |
|-----|--------------|----|------|
|     |              |    |      |



## SUKUP 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" | 38"          | 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" | 38"          | 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                   |              | LP   | 230  | 3  | 50/50    | 620             | 1000           | 300             | 470            | 550bu         | (2) 5 mill    | 5       | 5         |
| T2022A | (2) 15hp                   |              | NG   | 230  | 1  | 50/50    | 620             | 1000           | 300             | 470            | 550bu         | (2) 5 mill    | 5       | 5         |
| T2022B | (2) 15hp                   |              | NG   | 230  | 3  | 50/50    | 620             | 1000           | 300             | 470            | 550bu         | (2) 5 mill    | 5       | 5         |
| T2431B | (1) 30hp-44", (1) 15hp-28" | 38"          | 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                   |              | LP   | 230  | 3  | 50/50    | 740             | 1180           | 350             | 570            | 660bu         | (2) 5 mill    | 5       | 5         |
| T2422B | (2) 20hp                   |              | NG   | 230  | 3  | 50/50    | 740             | 1180           | 350             | 570            | 660bu         | (2) 5 mill    | 5       | 5         |

# STREAMLINE SINGLE FAN MODELS

| PART # | HP    | FAN<br>DIAMETER | FUEL | VOLT | PH | PLENUM | 10 PT<br>FULL<br>HEAT | 5 PT<br>FULL<br>HEAT | 10 PT<br>HEAT/<br>COOL | 5 PT<br>HEAT/<br>COOL | HOLD<br>CAPACITY | BTU/HR | LOAD HP | UNLOAD<br>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            |

## 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

**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:

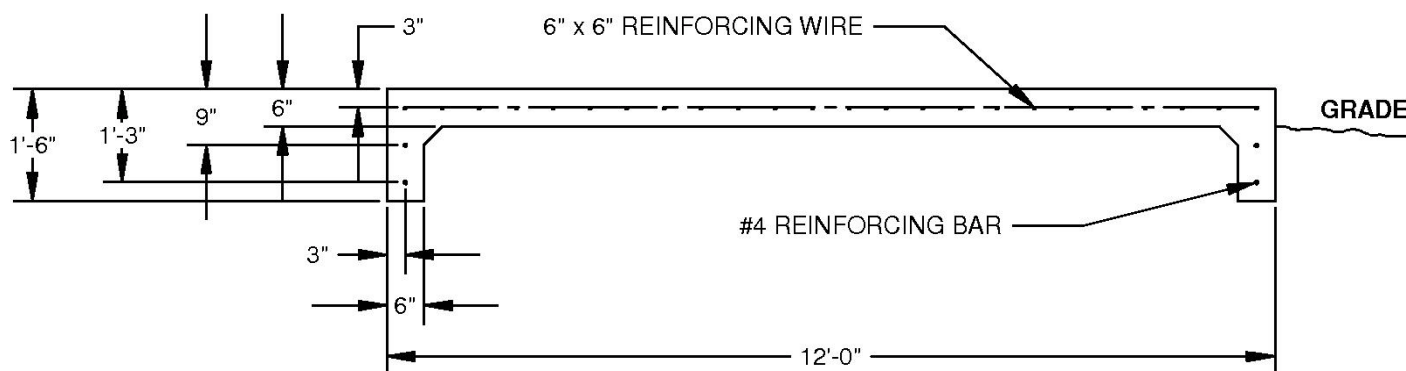
A reinforced concrete pad is recommended for dryer stability.

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

|                      | Concrete Pad Size | Yards of Concrete |
|----------------------|-------------------|-------------------|
| <b>8 Foot Dryer</b>  | 12' x 18'         | 5.9               |
| <b>12 Foot Dryer</b> | 12' x 22'         | 7.1               |
| <b>16 Foot Dryer</b> | 12' x 26'         | 8.3               |
| <b>20 Foot Dryer</b> | 12' x 30'         | 9.5               |
| <b>24 Foot Dryer</b> | 12' x 34'         | 10.7              |
| <b>28 Foot Dryer</b> | 12' x 38'         | 11.9              |

Quantities are approximate and requirements may vary due to site elevations. **See the Installation and Pre-operational check out section in the Installation-Service part of the manual for the proper support leg locations for 12, 16, 20, 24, and 28 foot dryers.**

### Foundation:



SPT0055  
8/10/06DDV

## 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|-------------------|-------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3HP/#10<br>22 FLA | 3HP/#10<br>22 FLA | 15 HP/#2<br>62 FLA | 122 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|-------------------|-------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3HP/#10<br>22 FLA | 3HP/#10<br>22 FLA | 15 HP/#2<br>62 FLA | 122 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|-------------------|-------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3HP/#10<br>22 FLA | 3HP/#10<br>22 FLA | 15 HP/#2<br>62 FLA | 122 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|---------------------|---------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3 HP/#14<br>9.4 FLA | 3 HP/#14<br>9.4 FLA | 15 HP/#6<br>44 FLA | 74 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|---------------------|---------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3 HP/#14<br>4.7 FLA | 3 HP/#14<br>4.7 FLA | 15 HP/#6<br>22 FLA | 37 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|-------------------|-------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3HP/#10<br>22 FLA | 3HP/#10<br>22 FLA | 15 HP/#2<br>62 FLA | 122 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|---------------------|---------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3 HP/#14<br>9.4 FLA | 3 HP/#14<br>9.4 FLA | 15 HP/#6<br>44 FLA | 74 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|---------------------|---------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3 HP/#14<br>4.7 FLA | 3 HP/#14<br>4.7 FLA | 15 HP/#6<br>22 FLA | 37 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<br>44"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|-------------------|-------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3HP/#10<br>22 FLA | 3HP/#10<br>22 FLA | 15 HP/#2<br>62 FLA | 122 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<br>44"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|---------------------|---------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3 HP/#14<br>9.4 FLA | 3 HP/#14<br>9.4 FLA | 15 HP/#6<br>56 FLA | 131 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<br>Amps | Maximum<br>Amps |
|--------------|--------------------|--------------------|--------------------|-----------------|-----------------|
| <b>Motor</b> | 3HP/#14<br>4.7 FLA | 3HP/#14<br>4.7 FLA | 20HP/#10<br>28 FLA | 43 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|-------------------|-------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3HP/#10<br>22 FLA | 3HP/#10<br>22 FLA | 15 HP/#2<br>62 FLA | 122 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<br>38"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|---------------------|---------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 3 HP/#14<br>9.4 FLA | 3 HP/#14<br>9.4 FLA | 15 HP/#6<br>44 FLA | 74 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<br>44"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|--------------------|--------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA | 30 HP/#3<br>83 FLA | 134 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<br>44"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|--------------------|--------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 5HP/#12<br>7.5 FLA | 5HP/#12<br>7.5 FLA | 30HP/#10<br>42 FLA | 68 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<br>44"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|--------------------|--------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA | 30 HP/#3<br>83 FLA | 134 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<br>44"         | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|--------------------|--------------------|--------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 5HP/#12<br>7.5 FLA | 5HP/#12<br>7.5 FLA | 30HP/#10<br>42 FLA | 68 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<br>44"          | Minimum<br>Amps | Maximum<br>Amps |
|-------------------|--------------------|--------------------|---------------------|-----------------|-----------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA | 40 HP/#3<br>120 FLA | 180 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 3 HP/#10<br>22 FLA | 3HP/#10<br>22 FLA   | 10-17HP/#3<br>62 FLA | 10-15HP/#4<br>66 FLA | 189 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**

|                   | <b>Top Auger</b>    | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 3 HP/#14<br>9.4 FLA | 3 HP/#14<br>9.4 FLA | 15HP/#6<br>44 FLA    | 15HP/#6<br>40 FLA    | 114 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**

|                   | <b>Top Auger</b>    | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 3 HP/#10<br>4.7 FLA | 3HP/#10<br>4.7 FLA  | 10-17HP/#3<br>22 FLA | 10-15HP/#4<br>20 FLA | 57 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 3 HP/#10<br>22 FLA | 3HP/#10<br>22 FLA   | 10-17HP/#3<br>62 FLA | 10-15HP/#4<br>66 FLA | 189 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**

|                   | <b>Top Auger</b>    | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 3 HP/#14<br>9.4 FLA | 3 HP/#14<br>9.4 FLA | 15HP/#6<br>44 FLA    | 15HP/#6<br>40 FLA    | 114 Amps            | 250 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**

|                   | <b>Top Auger</b>  | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|-------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5HP/#10<br>24 FLA | 5HP/#10<br>24 FLA   | 15HP/#2<br>62 FLA    | 15HP/#2<br>62 FLA    | 188 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA  | 15HP/#6<br>44 FLA    | 15HP/#6<br>44 FLA    | 129 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5HP/#12<br>7.5 FLA | 5HP/#12<br>7.5 FLA  | 15HP/#10<br>22 FLA   | 15HP/#10<br>22 FLA   | 65 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA  | 15HP/#6<br>44 FLA    | 15HP/#6<br>44 FLA    | 129 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5HP/#12<br>7.5 FLA | 5HP/#12<br>7.5 FLA  | 15HP/#10<br>22 FLA   | 15HP/#10<br>22 FLA   | 65 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan</b>    | <b>Lower Fan</b>    | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#10<br>24 FLA | 5HP/#10<br>24 FLA   | 10-17HP/3<br>62 FLA | 10-15HP/4<br>66 FLA | 193 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**

|                   | <b>Top Auger</b>  | <b>Bottom Auger</b> | <b>Upper Fan 44"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|-------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5HP/#12<br>15 FLA | 5HP/#12<br>15 FLA   | 15HP/#6<br>44 FLA    | 15HP/#6<br>40 FLA    | 125 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5HP/#12<br>7.5 FLA | 5HP/#12<br>7.5 FLA  | 15HP/#10<br>22 FLA   | 15HP/#10<br>20 FLA   | 63 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan</b>    | <b>Lower Fan</b>    | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#10<br>24 FLA | 5HP/#10<br>24 FLA   | 10-17HP/3<br>62 FLA | 10-15HP/4<br>66 FLA | 193 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA  | 15HP/#6<br>44 FLA    | 15HP/#6<br>40 FLA    | 125 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5HP/#12<br>7.5 FLA | 5HP/#12<br>7.5 FLA  | 15HP/#10<br>22 FLA   | 15HP/#10<br>20 FLA   | 63 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA  | 20 HP/#6<br>56 FLA   | 20 HP/#6<br>65 FLA   | 168 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan</b>    | <b>Lower Fan</b>    | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5HP/#12<br>7.5 FLA | 5HP/#12<br>7.5 FLA  | 20 HP/#10<br>28 FLA | 20 HP/#10<br>28 FLA | 78 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 38"</b> | <b>Lower Fan 38"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA  | 20 HP/#6<br>56 FLA   | 20 HP/#6<br>65 FLA   | 168 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 44"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA  | 30 HP/#3<br>83 FLA   | 15 HP/#6<br>40FLA    | 174 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**

|                   | <b>Top Auger</b>    | <b>Bottom Auger</b> | <b>Upper Fan 44"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#14<br>7.5 FLA | 5 HP/#14<br>7.5 FLA | 30 HP/#6<br>42 FLA   | 15 HP/#10<br>20 FLA  | 88 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**

|                   | <b>Top Auger</b>   | <b>Bottom Auger</b> | <b>Upper Fan 44"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|--------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#12<br>15 FLA | 5 HP/#12<br>15 FLA  | 30 HP/#3<br>83 FLA   | 15 HP/#6<br>40FLA    | 174 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**

|                   | <b>Top Auger</b>    | <b>Bottom Auger</b> | <b>Upper Fan 44"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 5 HP/#14<br>7.5 FLA | 5 HP/#14<br>7.5 FLA | 30 HP/#6<br>42 FLA   | 15 HP/#10<br>20 FLA  | 88 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**

|                   | <b>Top Auger</b>     | <b>Bottom Auger</b>  | <b>Upper Fan 44"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|----------------------|----------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 7.5 HP/#12<br>22 FLA | 7.5 HP/#12<br>22 FLA | 30 HP/#4<br>83 FLA   | 20 HP/#6<br>40 FLA   | 188 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**

|                   | <b>Top Auger</b>     | <b>Bottom Auger</b> | <b>Upper Fan 44"</b> | <b>Lower Fan 28"</b> | <b>Minimum Amps</b> | <b>Maximum Amps</b> |
|-------------------|----------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
| <b>Motor/Wire</b> | 7.5 HP/#14<br>11 FLA | 5 HP/#14<br>11 FLA  | 30 HP/#10<br>42 FLA  | 20 HP/#12<br>20 FLA  | 95 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 only be field 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     | T4620    | J4243 (13-18A)    | J5246 (40A) | #8        | 13       | 18       |
| 5   | 460     | 3     | T4621    | 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     | T4623    | J5230 (16-25A)    | J5246 (40A) | #8        | 16       | 25       |
| 7.5 | 460     | 3     | T4624    | J5237 (9-14A)     | J5246 (40A) | #10       | 9        | 14       |
| 10  | 230     | 1     | T4276    | J5242 (40-63A)    | J5247 (60A) | #6        | 40       | 63       |
| 10  | 230     | 3     | T4626    | J5232 (25-40A)    | J5246 (40A) | #8        | 25       | 40       |
| 10  | 460     | 3     | T4627    | 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.

## 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<br>HEAT CAPACITY<br>(BTU/HR) | MAXIMUM<br>FUEL FLOW<br>(GAL/HR) | FUEL LINE SIZE<br>(MINIMUM UP TO 100') |
|----------------------|--------------------------------------|----------------------------------|----------------------------------------|
| 8 FT, SINGLE HEATER  | 3,000,000                            | 33                               | 3 / 8"                                 |
| 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"                                     |
| 28 FT, DUAL HEATER   | 11,000,000                           | 120                              | 3 / 4"                                 |



Connection to liquid manifold on Dryer

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

## 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<br>HEAT CAPACITY<br>(BTU/HR) | MAXIMUM<br>FUEL FLOW<br>(CUBIC<br>FEET/HR) | FUEL LINE SIZE<br>(MINIMUM UP TO 100') |
|----------------------|--------------------------------------|--------------------------------------------|----------------------------------------|
| 8 FT, SINGLE HEATER  | 3,000,000                            | 3000                                       | 1 1 / 4"                               |
| 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"                                     |
| 28 FT, DUAL HEATER   | 11,000,000                           | 11,000                                     | 2"                                     |



1. See fuel specification chart above for 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 33 inch (B5083) and 44 inch (B5084) lengths.

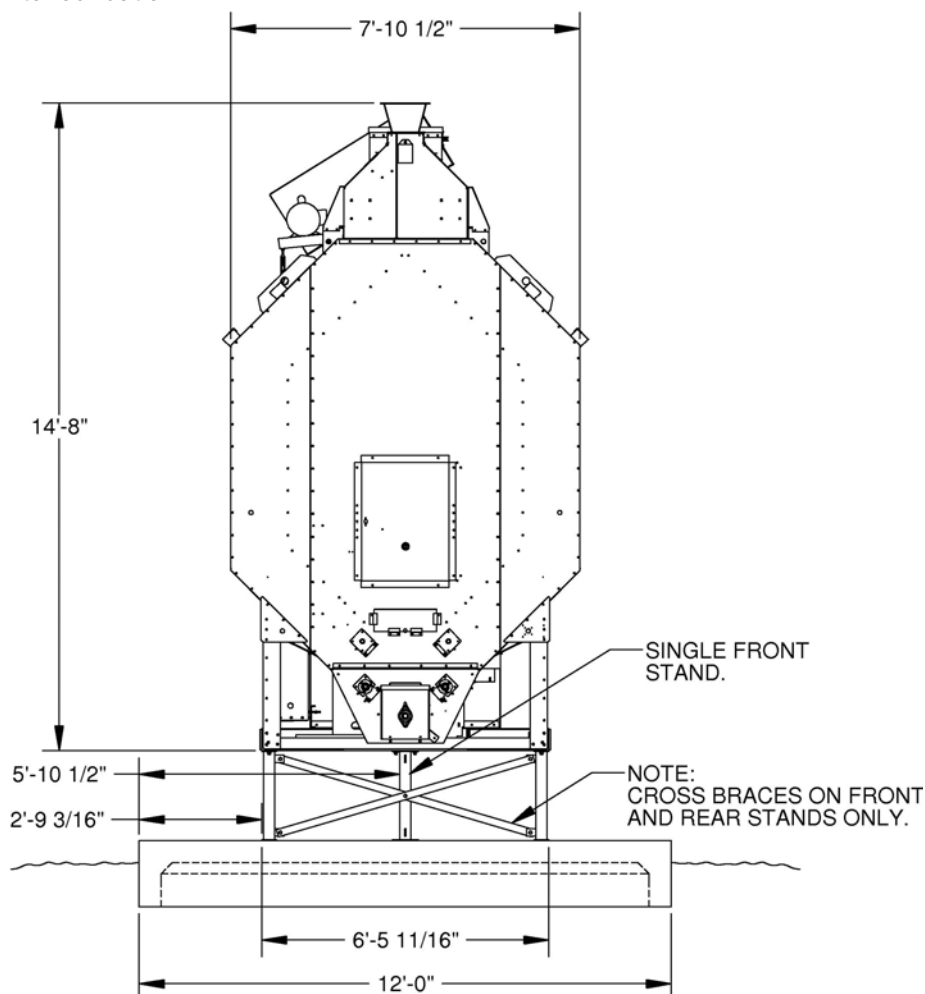
Contact your Sukup Dealer to order either the supports and / or ladder extensions.

**See the Installation and Pre-operational check out section in the Installation-Service part of the manual for the proper support leg locations for 12, 16, 20, 24, and 28 foot dryers.**

### Cross support braces and Front stand

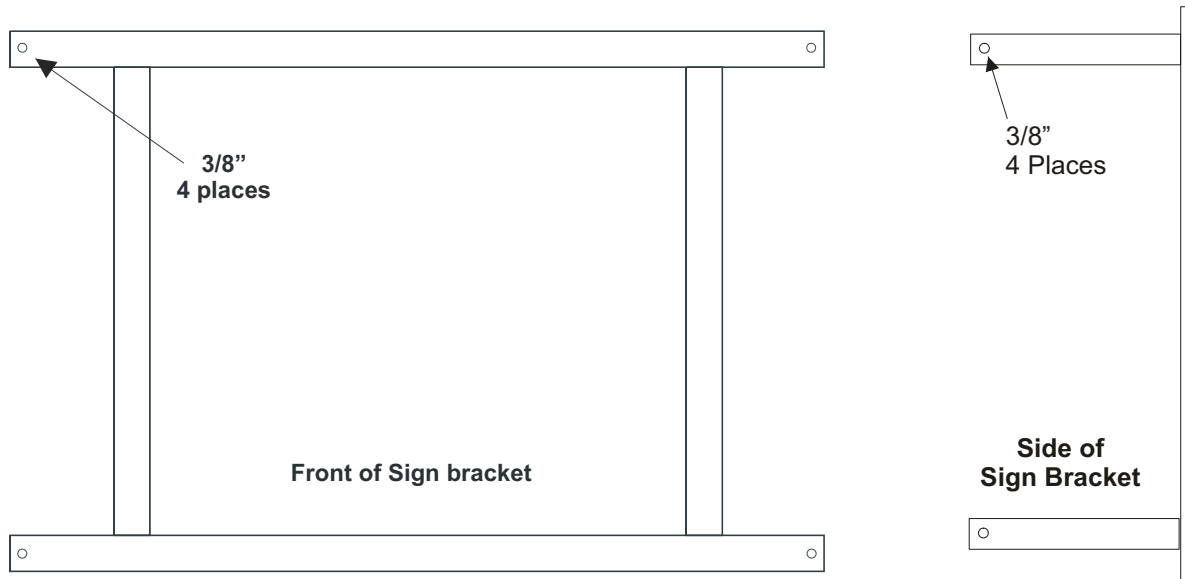
If the dryer is not mounted using Sukup Mfg supports, the following guidelines must be followed:

- 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. It can also be mounted under the fan(s) on a sheet metal support.



## 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.

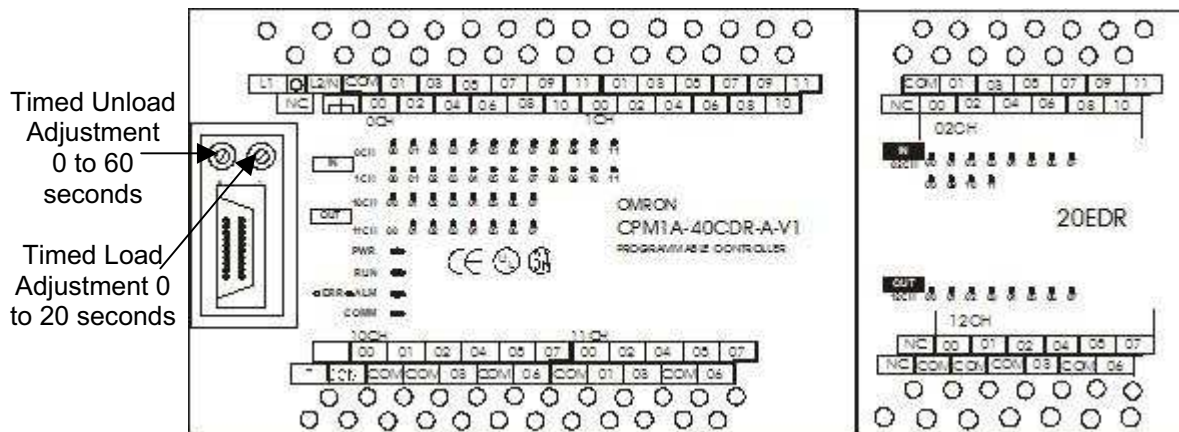
Note: The unload and fill system will still shut off immediately under the following conditions for safety reasons. 1.) Rear Door open. 2.) Grain discharge chute open. 3.) Motor Overload.

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 below)

Step 4. There are two adjustable potentiometers located at the top of opening (see picture below).



The potentiometer on the left side is the adjustment for 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.

Step 5. Close the access door on the PLC.

Step 6. Close control box inner door.

## **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 is 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

This chart is only an approximation!

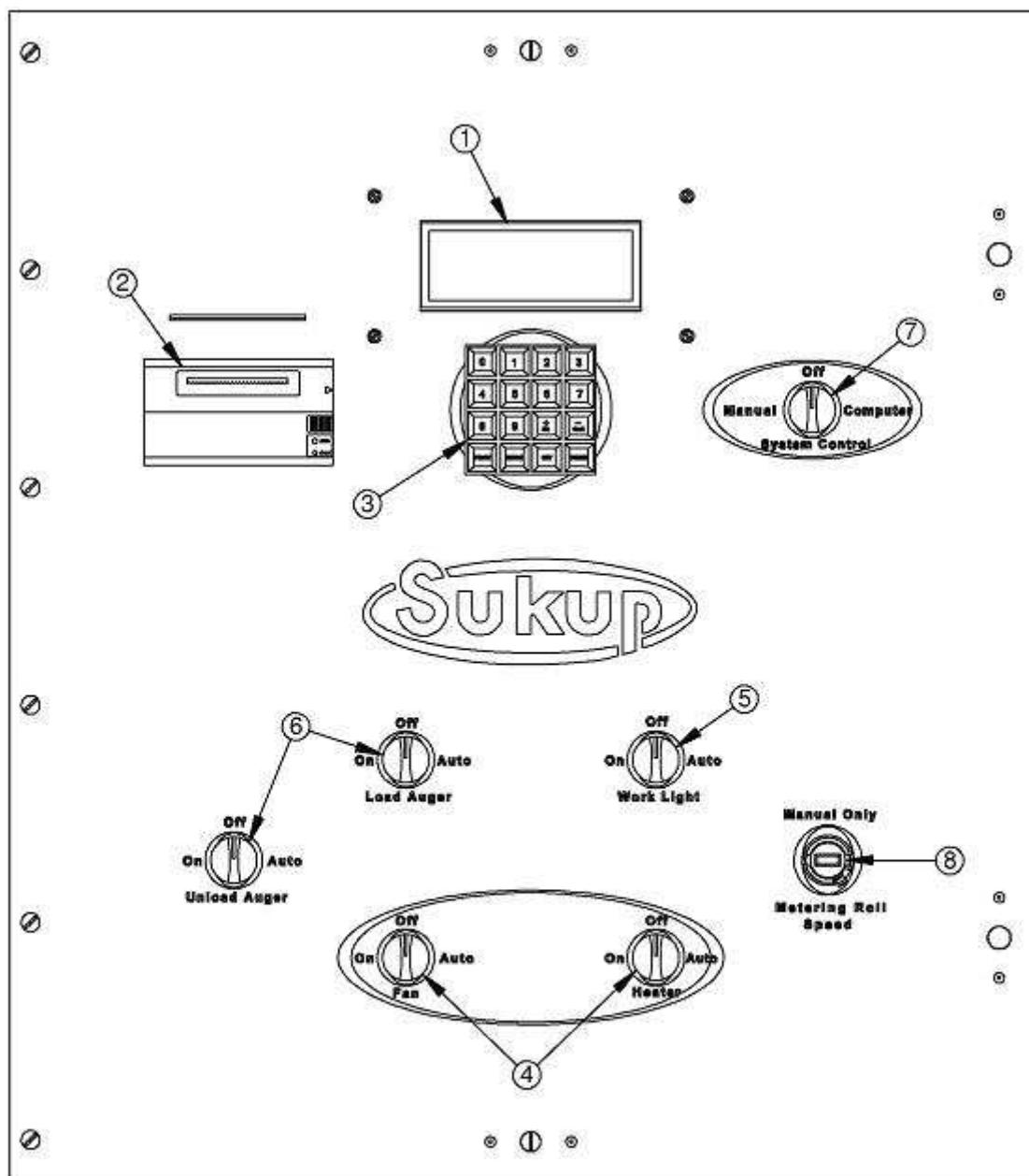
| Dryer              | 8 Foot<br>1 Module | 12 Foot<br>1 Module | 16 Foot<br>1 Module | 20 Foot<br>1 Module | 24 Foot<br>1 Module | 28 Foot<br>1 Module |
|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 10% Meter<br>Roll  | 80                 | 120                 | 160                 | 200                 | 240                 | 280                 |
| 20% Meter<br>Roll  | 160                | 240                 | 320                 | 400                 | 480                 | 560                 |
| 30% Meter<br>Roll  | 240                | 360                 | 480                 | 600                 | 720                 | 840                 |
| 40% Meter<br>Roll  | 320                | 480                 | 640                 | 800                 | 960                 | 1120                |
| 50% Meter<br>Roll  | 400                | 600                 | 800                 | 1,000               | 1,200               | 1400                |
| 60% Meter<br>Roll  | 480                | 720                 | 960                 | 1,200               | 1,440               | 1680                |
| 70% Meter<br>Roll  | 560                | 840                 | 1,120               | 1,400               | 1,680               | 1960                |
| 80% Meter<br>Roll  | 640                | 960                 | 1,280               | 1,600               | 1,920               | 2240                |
| 90% Meter<br>Roll  | 720                | 1,080               | 1,440               | 1,800               | 2,160               | 2520                |
| 100% Meter<br>Roll | 800                | 1,200               | 1,600               | 2,000               | 2,400               | 2800                |

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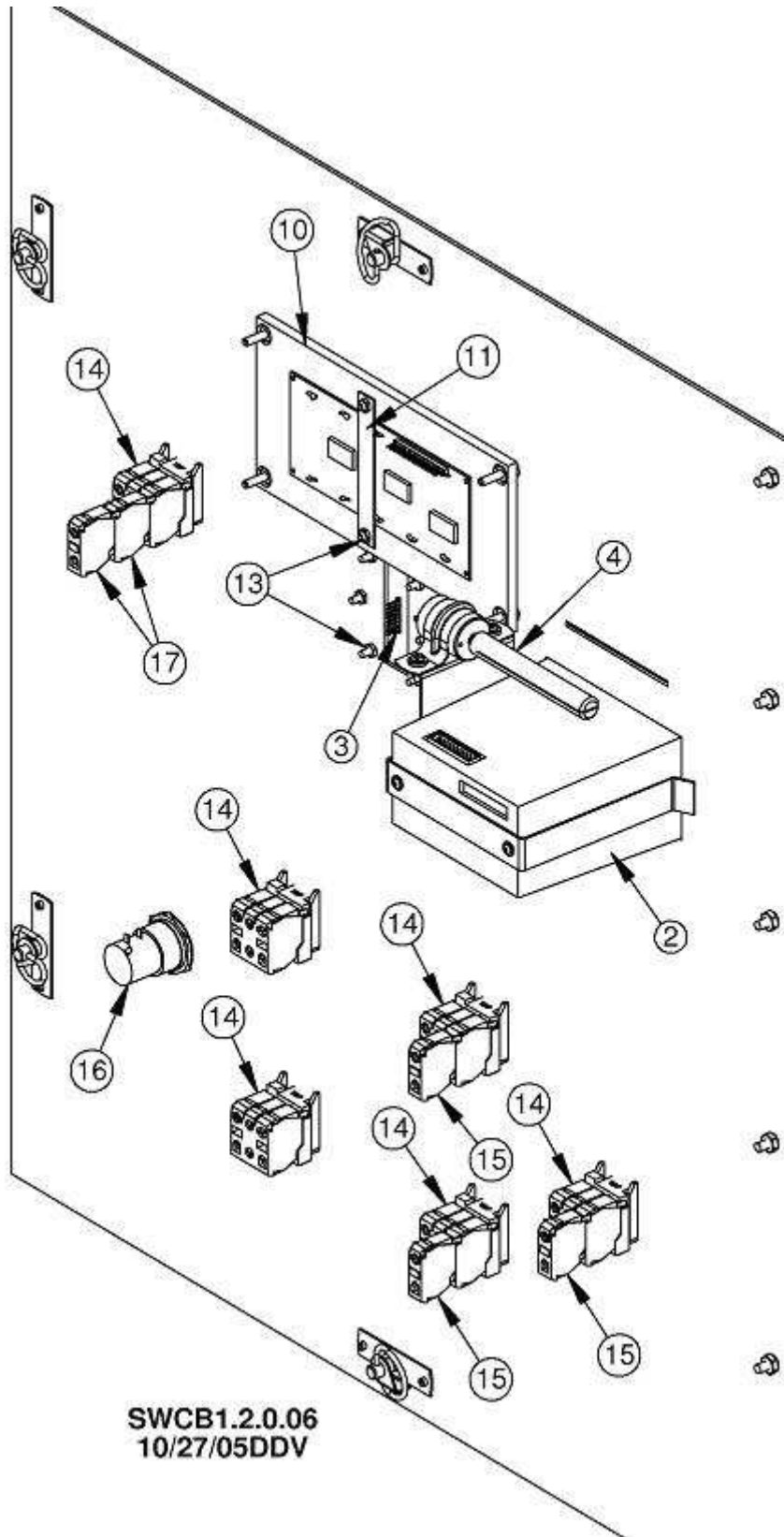
**Note: The charts in this section are for 230 & 460 Volt dryers. Please contact your local dealer or Sukup Manufacturing for additional information.**

SWCB1.1.0.06 Control Box Front Panel – Single Fan Diagram

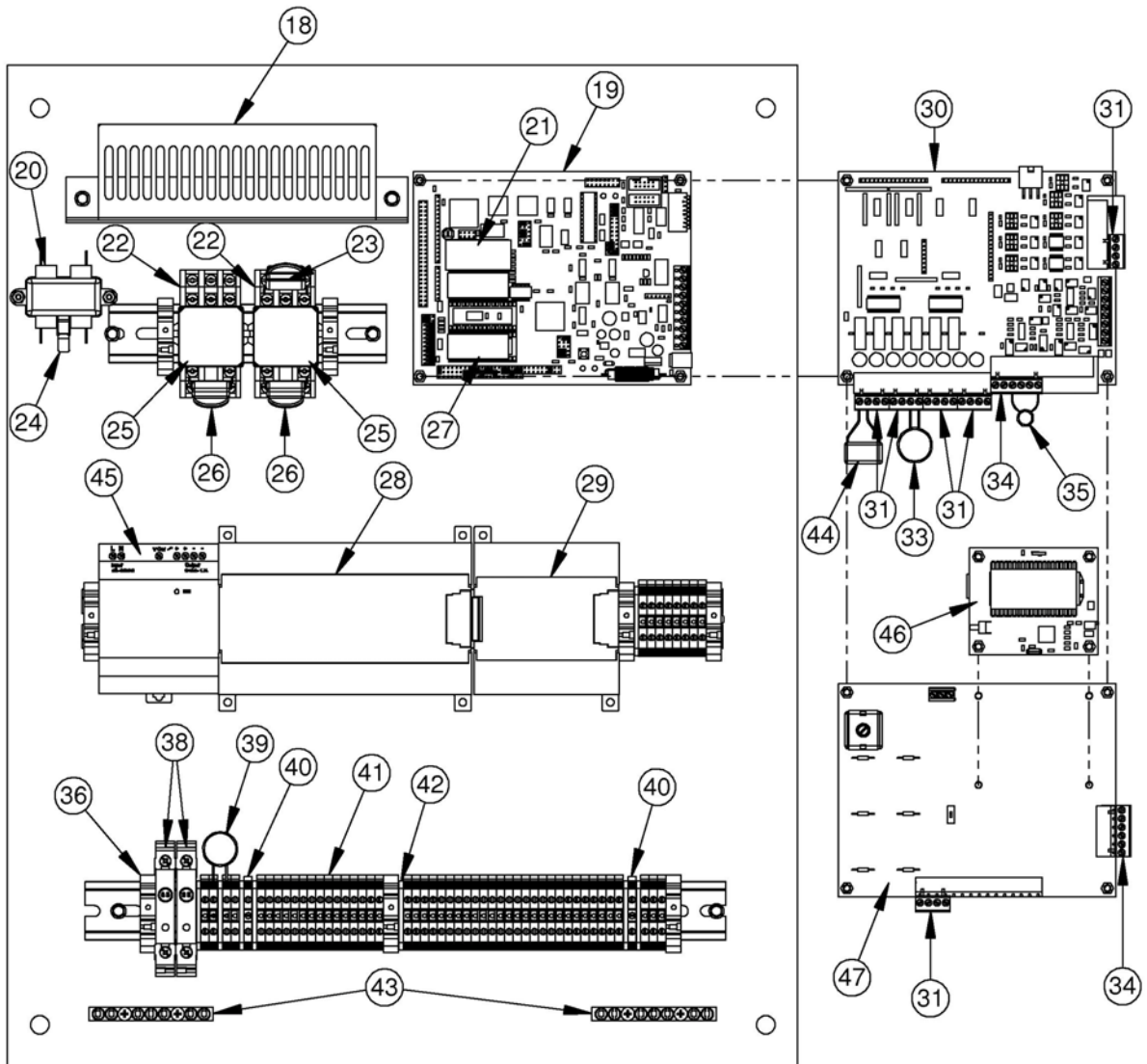


SWCB1.1.0.06  
10/27/05DDV

SWCB1.2.0.06 Control Box Front Panel (Rear) Diagram



SWCB1.3.0.06M Control Box Inside Panel Diagram

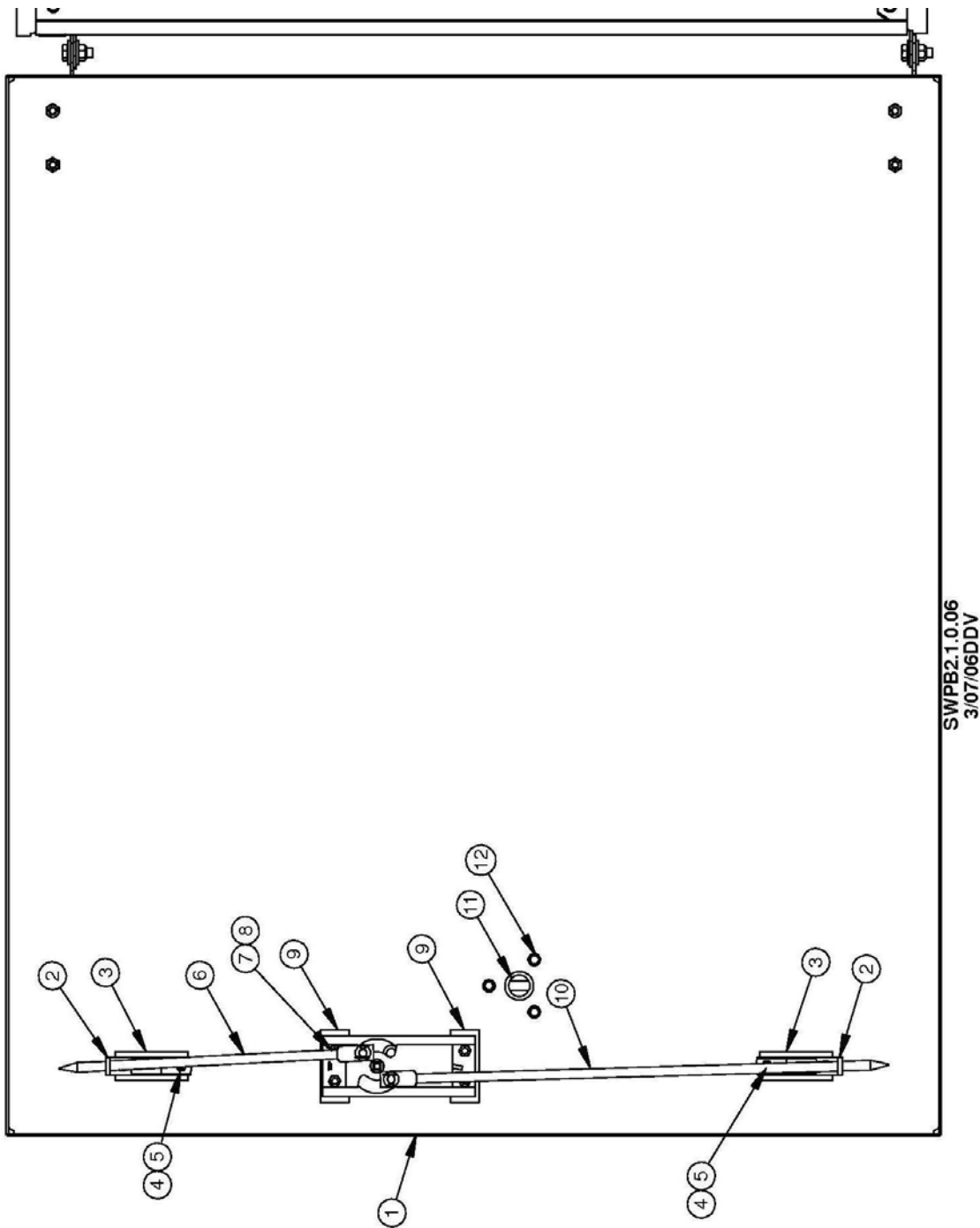


SWCB1.3.0.06M  
6/07/06DDV

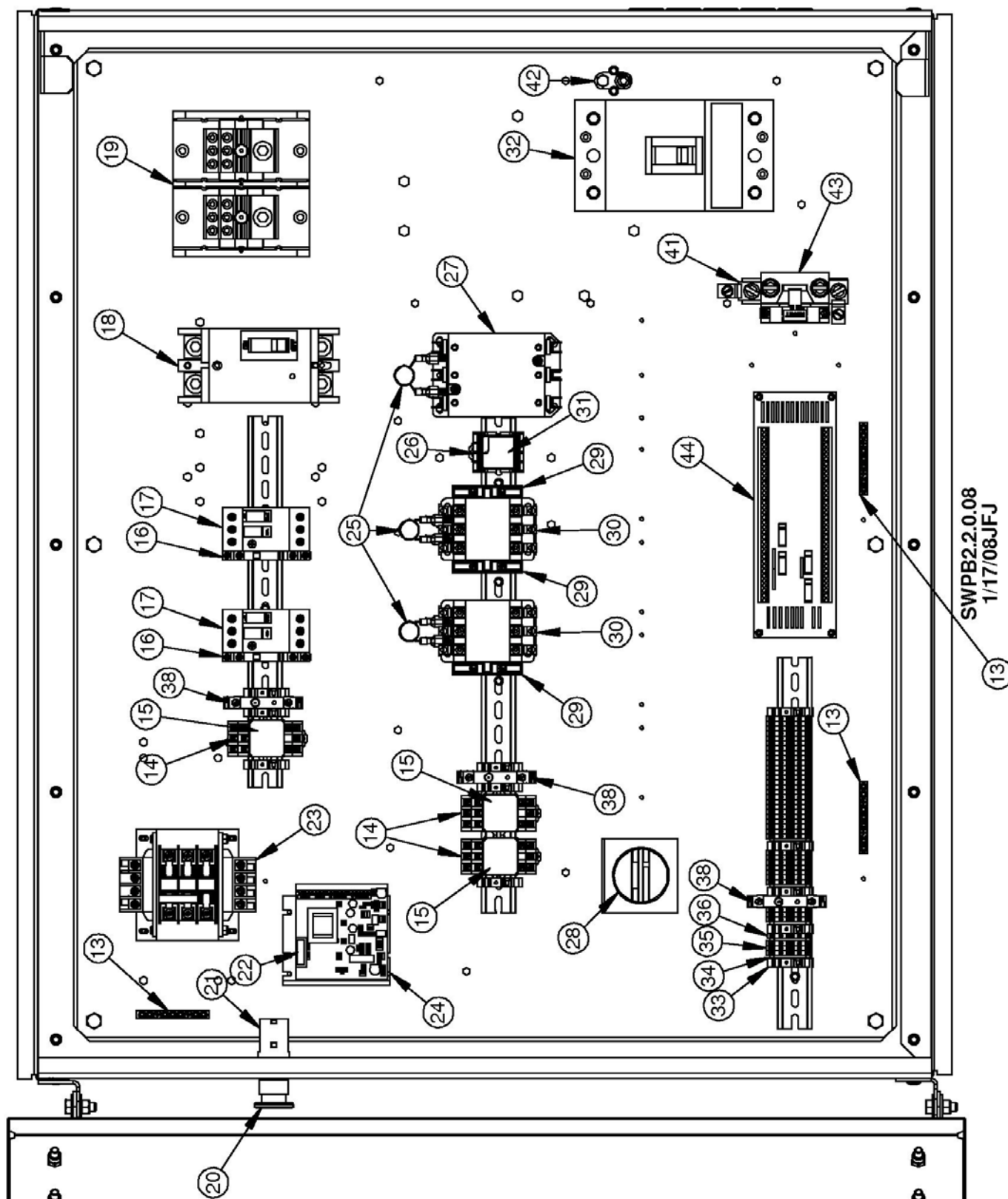
**SINGLE FAN / SINGLE & THREE PHASE PARTS – CONTROL BOX**

| Part Label Number | Drawing Number              | Parts for Model Numbers: <b>T1211, T1212, T1611, T1612, T2011, &amp; T2012</b> | Description                 |
|-------------------|-----------------------------|--------------------------------------------------------------------------------|-----------------------------|
| 1                 | SWCB1.1.0.06 & SWCB1.2.0.06 | F60679                                                                         | LCD,W/CONNECTOR             |
| 2                 | SWCB1.1.0.06 & SWCB1.2.0.06 | J47331                                                                         | PRINTER,CITIZEN             |
| 3                 | SWCB1.1.0.06 & SWCB1.2.0.06 | J47602                                                                         | KEYPAD,84SY3326-70          |
| 4                 | SWCB1.1.0.06                | J6772                                                                          | AMBER 3 POS.ILLUM.OPERATOR  |
| 5                 | SWCB1.1.0.06                | J6774                                                                          | OPERATOR,CLEAR,3 POS.ILLUM. |
| 6                 | SWCB1.1.0.06                | J6773                                                                          | BLUE 3 POS.ILLUM.OPERATOR   |
| 7                 | SWCB1.1.0.06                | J6775                                                                          | OPERATOR,GREEN,3 POS.ILLUM  |
| 8                 | SWCB1.1.0.06                | J8812                                                                          | ASSEMBLY,POTENTIOMETER      |
| 10                | SWCB1.2.0.06                | T16474                                                                         | FRAME,DISPLAY               |
| 11                | SWCB1.2.0.06                | J6768                                                                          | EXTRUS,TOP MARKING,TME 2    |
| 12                | SWCB1.2.0.06                | T17993                                                                         | PAPER ROLLER, 2006          |
| 13                | SWCB1.2.0.06                | J0982                                                                          | NUT,HEX,6-32,PLT,MS         |
| 14                | SWCB1.2.0.06                | J6777                                                                          | SUPPLYLIGHT,DIRECT,W/2N.O   |
| 15                | SWCB1.2.0.06                | J6792                                                                          | CONTACT,SUPLITE,2N.C        |
| 16                | SWCB1.2.0.06                | J6734                                                                          | POTENTIOMETER,MULTI-TURN    |
| 17                | SWCB1.2.0.06                | J6771                                                                          | CONTACT,SUPLITE,2N.O        |
| 18                | SWCB1.3.0.06M               | F6068                                                                          | POWER SUPPLY                |
| 19                | SWCB1.3.0.06M               | F60672                                                                         | PROCESSOR,COMPLETE          |
| 20                | SWCB1.3.0.06M               | J4751                                                                          | FILTER,CORCOM,1VB1          |
| 21                | SWCB1.3.0.06M               | J4603                                                                          | SMART WATCH,DS1243Y-120     |
| 22                | SWCB1.3.0.06M               | J3881                                                                          | SOCKET,11 PIN,8501NR82      |
| 23                | SWCB1.3.0.06M               | J8818                                                                          | CIRCUIT, ASSY, 10J MOV & RC |
| 24                | SWCB1.3.0.06M               | QP23934                                                                        | ADAPTOR,3 WAY (63V)         |
| 25                | SWCB1.3.0.06M               | J38802                                                                         | RELAY,8501KU13V20           |
| 26                | SWCB1.3.0.06M               | J8817                                                                          | CIRCUIT, ASSY, 100J MOV&RC  |
| 27                | SWCB1.3.0.06M               | T7080                                                                          | PROM, PROGRAM               |
| 28                | SWCB1.3.0.06M               | J6726                                                                          | OMRON PLC                   |
| 29                | SWCB1.3.0.06M               | J6757                                                                          | EXPANDER MODULE             |
| 30                | SWCB1.3.0.06M               | J46501                                                                         | I/O BOARD POPULATED         |
| 31                | SWCB1.3.0.06M               | J4641                                                                          | 4 TERMINAL PLUG             |
| 33                | SWCB1.3.0.06M               | J6787                                                                          | VARISTOR,100 JOULE          |
| 34                | SWCB1.3.0.06M               | J4623                                                                          | PLUG,6 TERMINAL             |
| 35                | SWCB1.3.0.06M               | J8819                                                                          | CIRCUIT, .1UF CAP & SHRINK  |
| 36                | SWCB1.3.0.06M               | J6754                                                                          | STOP,DIN END                |
| 38                | SWCB1.3.0.06M               | J48184                                                                         | ½ AMP BREAKER               |
| 39                | SWCB1.3.0.06M               | J6787                                                                          | VARISTOR,100 JOULE          |
| 40                | SWCB1.3.0.06M               | J6902                                                                          | GROUND,TERMINAL             |
| 41                | SWCB1.3.0.06M               | J6900                                                                          | TERMINAL,FEED THRU          |
| 42                | SWCB1.3.0.06M               | J6903                                                                          | BARRIER,END                 |
| 43                | SWCB1.3.0.06M               | J47901                                                                         | GROUND BAR,7 HOLE ALUM      |
| 44                | SWCB1.3.0.06M               | J8816                                                                          | CIRCUIT,ASSY,RC ONLY        |
| 45                | SWCB1.3.0.06M               | J46308                                                                         | SUPPLY,POWER,24VDC          |
| 46                | SWCB1.3.0.06M               | F6090                                                                          | DISPLAY,RTD TEMP            |
| 47                | SWCB1.3.0.06M               | J46505                                                                         | BOARD,E-MOD VALVE,1 FAN     |

SWPB2.1.0.06 Power Box Door Diagram



SWPB2.2.0.08 Power Box Single Phase / Single Fan Diagram / 230 Volts

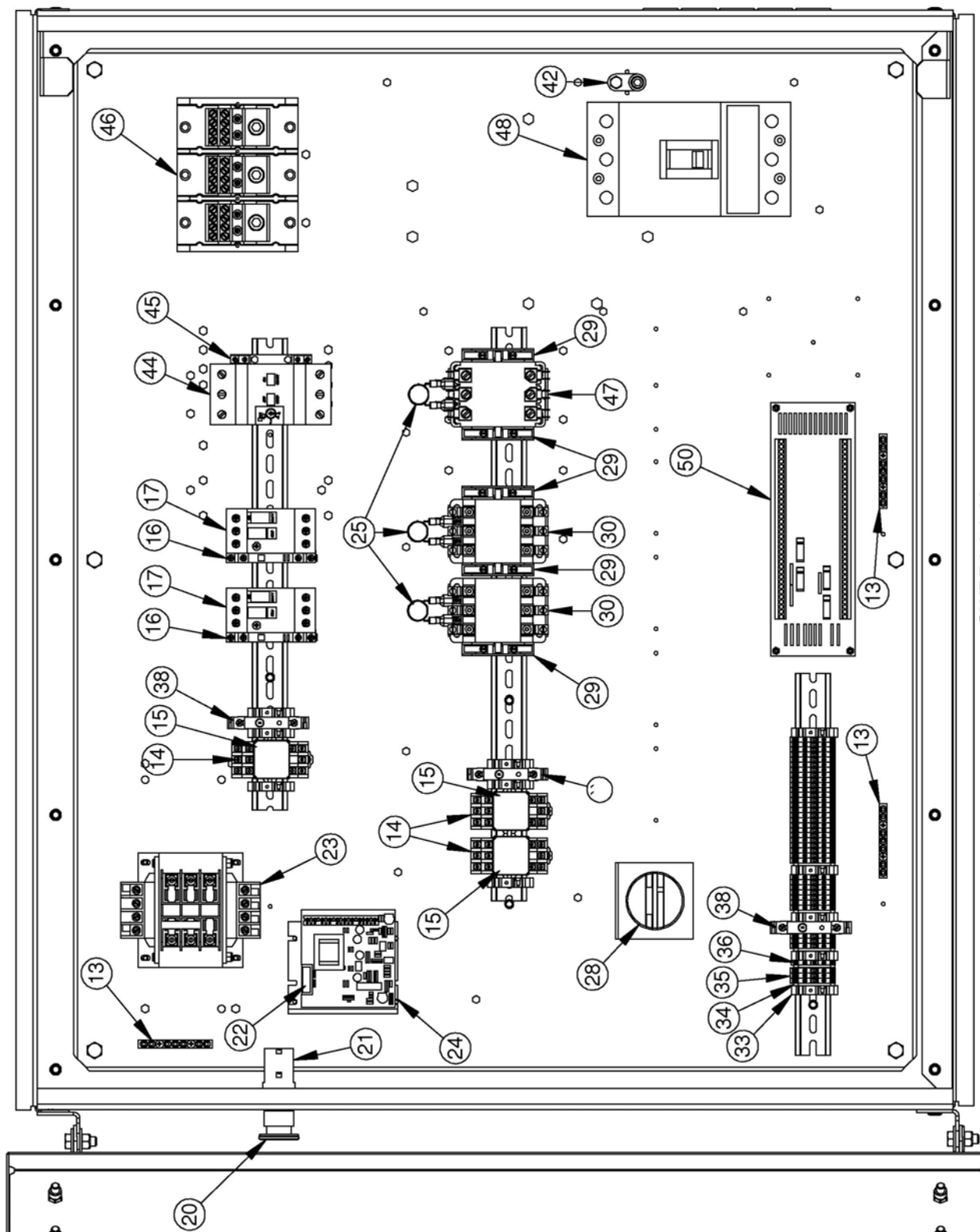


## Parts Index

### SINGLE FAN / SINGLE PHASE 230 VOLT PARTS – POWER BOX

| Part Label Number | Drawing Number | Parts for Model Numbers:<br><b>T1211, T1212, T1611, &amp; T1612</b> | Description                         |
|-------------------|----------------|---------------------------------------------------------------------|-------------------------------------|
| 1                 | SWPB2.1.0.06   | T18511                                                              | DOOR, POWER DIST                    |
| 2                 | SWPB2.1.0.06   | T18523                                                              | GUIDE, LATCH                        |
| 3                 | SWPB2.1.0.06   | T16520                                                              | SPACER, NYLN, GUIDE                 |
| 4                 | SWPB2.1.0.06   | J0472                                                               | SCREW, 10-24 X 1                    |
| 5                 | SWPB2.1.0.06   | J0985                                                               | NUT, HEX, 10-24, PLT, MS            |
| 6                 | SWPB2.1.0.06   | T18523                                                              | ROD, 13" LONG                       |
| 7                 | SWPB2.1.0.06   | J0513                                                               | SCREW, 1/4-20, 1.25,                |
| 8                 | SWPB2.1.0.06   | J0990                                                               | NUT, HEX, 1/4-20, PLT               |
| 9                 | SWPB2.1.0.06   | T16521                                                              | SPACER, NYLON, LTCH                 |
| 10                | SWPB2.1.0.06   | T18523                                                              | ROD, 21" LONG                       |
| 11                | SWPB2.1.0.06   | T16525                                                              | HANDLE & GASKET                     |
| 12                | SWPB2.1.0.06   | T16525                                                              | SHORT BOLT                          |
| 13                | SWPB2.2.0.08   | J47901                                                              | GROUND BAR, 7 HOLE ALUM             |
| 14                | SWPB2.2.0.08   | J3881                                                               | SOCKET, 11 PIN                      |
| 15                | SWPB2.2.0.08   | J38802                                                              | RELAY                               |
| 16                | SWPB2.2.0.08   | J5265                                                               | AUX CONTACT                         |
| 17                | SWPB2.2.0.08   | J5238                                                               | STARTER, PROTECTOR, 17-23 AMPS      |
| 18                | SWPB2.2.0.08   | J4818                                                               | BREAKER, FAN CIRCUIT, 150AMP        |
| 19                | SWPB2.2.0.08   | J6698                                                               | BLOCK, POWER DIST, 1P               |
| 20                | SWPB2.2.0.08   | J4492                                                               | OPERATOR, MUSHROOM, 2 POS. MAINT    |
| 21                | SWPB2.2.0.08   | J6729                                                               | DIRECT SUPPLY LIGHT MOD. W/N.C.     |
| 22                | SWPB2.2.0.08   | J5536                                                               | RESISTOR, 1/2 TO 1H, SCR BRD        |
| 23                | SWPB2.2.0.08   | J6490                                                               | TRANSFORMER, CONTROL                |
| 24                | SWPB2.2.0.08   | J6794                                                               | SCR, DC DRIVE                       |
| 25                | SWPB2.2.0.08   | J6787 & J3829                                                       | VARISTOR, 100 JOULE & SPADE, FEMALE |
| 26                | SWPB2.2.0.08   | J38811                                                              | SOCKET, ROUND 8 PIN                 |
| 27                | SWPB2.2.0.08   | J5248                                                               | CONTACTOR, 90A, 115V                |
| 28                | SWPB2.2.0.08   | J4766                                                               | HOURMETER, 115V, 60HZ               |
| 29                | SWPB2.2.0.08   | J5260                                                               | AUX CONT, 30/60AMP                  |
| 30                | SWPB2.2.0.08   | J5246                                                               | CONT, 40A, 115V CL                  |
| 31                | SWPB2.2.0.08   | J38804                                                              | RELAY, 8PIN                         |
| 32                | SWPB2.2.0.08   | J5213                                                               | SWITCH, MAIN, 250 AMP 2 POLE        |
| 33                | SWPB2.2.0.08   | J6754                                                               | STOP, DIN END                       |
| 34                | SWPB2.2.0.08   | J6903                                                               | BARRIER, END                        |
| 35                | SWPB2.2.0.08   | J6900                                                               | TERMINAL, FEED THRU                 |
| 36                | SWPB2.2.0.08   | J6902                                                               | GROUND, TERMINAL                    |
| 38                | SWPB2.2.0.08   | J48185                                                              | BREAKER, CIRCUIT, 3 AMP             |
| 41                | SWPB2.2.0.08   | J5274                                                               | OVERLOAD, 86 AMPS                   |
| 42                | SWPB2.2.0.08   | J4048 & J1195                                                       | LUG, COPPER TERMINAL & WASHER, LOCK |
| 43                | SWPB2.2.0.08   | J5349                                                               | HEATER STRIP                        |
| 44                | SWPB2.2.0.08   | J67831                                                              | AC SUPPRESSION BOARD                |

SWPB2.3.0.08 Power Box Three Phase / Single Fan Diagram / 230 Volts



SWPB2.3.0.08  
1/17/08JF.J

## Parts Index

### SINGLE FAN / THREE PHASE 230 VOLT PARTS – POWER BOX

| Part Label Number | Drawing Number | Parts for Model Numbers:<br><b>T1211, T1212, T1611, &amp; T1612</b> | Parts for Model Numbers:<br><b>T2011 &amp; T2012</b> | Parts for Model Numbers:<br><b>TC2011</b> | Description              |
|-------------------|----------------|---------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------|--------------------------|
| 1                 | SWPB2.1.0.06   | T18511                                                              | T18511                                               | T18511                                    | DOOR, POWER DIST         |
| 2                 | SWPB2.1.0.06   | T18523                                                              | T18523                                               | T18523                                    | GUIDE, LATCH             |
| 3                 | SWPB2.1.0.06   | T16520                                                              | T16520                                               | T16520                                    | SPACER, NYLN, GUIDE      |
| 4                 | SWPB2.1.0.06   | J0472                                                               | J0472                                                | J0472                                     | SCREW, 10-24 X 1         |
| 5                 | SWPB2.1.0.06   | J0985                                                               | J0985                                                | J0985                                     | NUT, HEX, 10-24, PLT, MS |
| 6                 | SWPB2.1.0.06   | T18523                                                              | T18523                                               | T18523                                    | ROD, 13" LONG            |
| 7                 | SWPB2.1.0.06   | J0513                                                               | J0513                                                | J0513                                     | SCREW, 1/4-20, 1.25,     |
| 8                 | SWPB2.1.0.06   | J0990                                                               | J0990                                                | J0990                                     | NUT, HEX, 1/4-20, PLT    |
| 9                 | SWPB2.1.0.06   | T16521                                                              | T16521                                               | T16521                                    | SPACER, NYLON, LTCH      |
| 10                | SWPB2.1.0.06   | T18523                                                              | T18523                                               | T18523                                    | ROD, 21" LONG            |
| 11                | SWPB2.1.0.06   | T16525                                                              | T16525                                               | T16525                                    | HANDLE & GASKET          |
| 12                | SWPB2.1.0.06   | T16525                                                              | T16525                                               | T16525                                    | SHORT BOLT               |
| 13                | SWPB2.3.0.08   | J47901                                                              | J47901                                               | J47901                                    | GROUND BAR               |
| 14                | SWPB2.3.0.08   | J3881                                                               | J3881                                                | J3881                                     | SOCKET, 11 PIN           |
| 15                | SWPB2.3.0.08   | J38802                                                              | J38802                                               | J38802                                    | RELAY                    |
| 16                | SWPB2.3.0.08   | J5265                                                               | J5265                                                | J5265                                     | AUX CONTACT              |
| 17                | SWPB2.3.0.08   | J5238                                                               | J5243                                                | J5243                                     | STARTER, PROTECTOR       |
| 20                | SWPB2.3.0.08   | J4492                                                               | J4492                                                | J4492                                     | OPERATOR, MUSHRM         |
| 21                | SWPB2.3.0.08   | J6729                                                               | J6729                                                | J6729                                     | DIRECT SUPPLYLIGHT       |
| 22                | SWPB2.3.0.08   | J5536                                                               | J5536                                                | J5536                                     | RESISTOR                 |
| 23                | SWPB2.3.0.08   | J6490                                                               | J6490                                                | J6490                                     | TRANSFORMER, CNTRL       |
| 24                | SWPB2.3.0.08   | J6794                                                               | J6794                                                | J6794                                     | SCR, DC DRIVE            |
| 25                | SWPB2.3.0.08   | J6787 & J3829                                                       | J6787 & J3829                                        | J6787 & J3829                             | VARISTOR & SPADE         |
| 28                | SWPB2.3.0.08   | J4766                                                               | J4766                                                | J4766                                     | HOURLMETER, 115V         |
| 29                | SWPB2.3.0.08   | J5260                                                               | J5260                                                | J5260                                     | AUX CONT, 30/90AMP       |
| 30                | SWPB2.3.0.08   | J5246                                                               | J5246                                                | J5246                                     | CONT, 40A, 115V          |
| 33                | SWPB2.3.0.08   | J6754                                                               | J6754                                                | J6754                                     | DIN END STOP             |
| 34                | SWPB2.3.0.08   | J6903                                                               | J6903                                                | J6903                                     | BARRIER, END             |
| 35                | SWPB2.3.0.08   | J6900                                                               | J6900                                                | J6900                                     | TERMINAL, FEED THRU      |
| 36                | SWPB2.3.0.08   | J6902                                                               | J6902                                                | J6902                                     | GROUND, TERMINAL         |
| 38                | SWPB2.3.0.08   | J48185                                                              | J48185                                               | J48185                                    | 3 AMP BREAKER            |
| 42                | SWPB2.3.0.08   | J4048 & J1195                                                       | J4048 & J1195                                        | J4048 & J1195                             | COPPER LUG               |
| 44                | SWPB2.3.0.08   | J5242                                                               | J5235                                                | J5241                                     | STARTER PROTECTOR        |
| 45                | SWPB2.3.0.08   | J5266                                                               | J5263                                                | J5263                                     | AUX CONTACT              |
| 46                | SWPB2.3.0.08   | J6700                                                               | J6700                                                | J6697                                     | POWER DIS BLOCK          |
| 47                | SWPB2.3.0.08   | J5247                                                               | J5248                                                | J5244                                     | CONTACTOR                |
| 48                | SWPB2.3.0.08   | J5212                                                               | J5212                                                | J5212                                     | MAIN SWITCH, 250 AMP     |
| 50                | SWPB2.1.0.08   | J67831                                                              | J67831                                               | J67831                                    | AC SUPPRESSION BRD       |

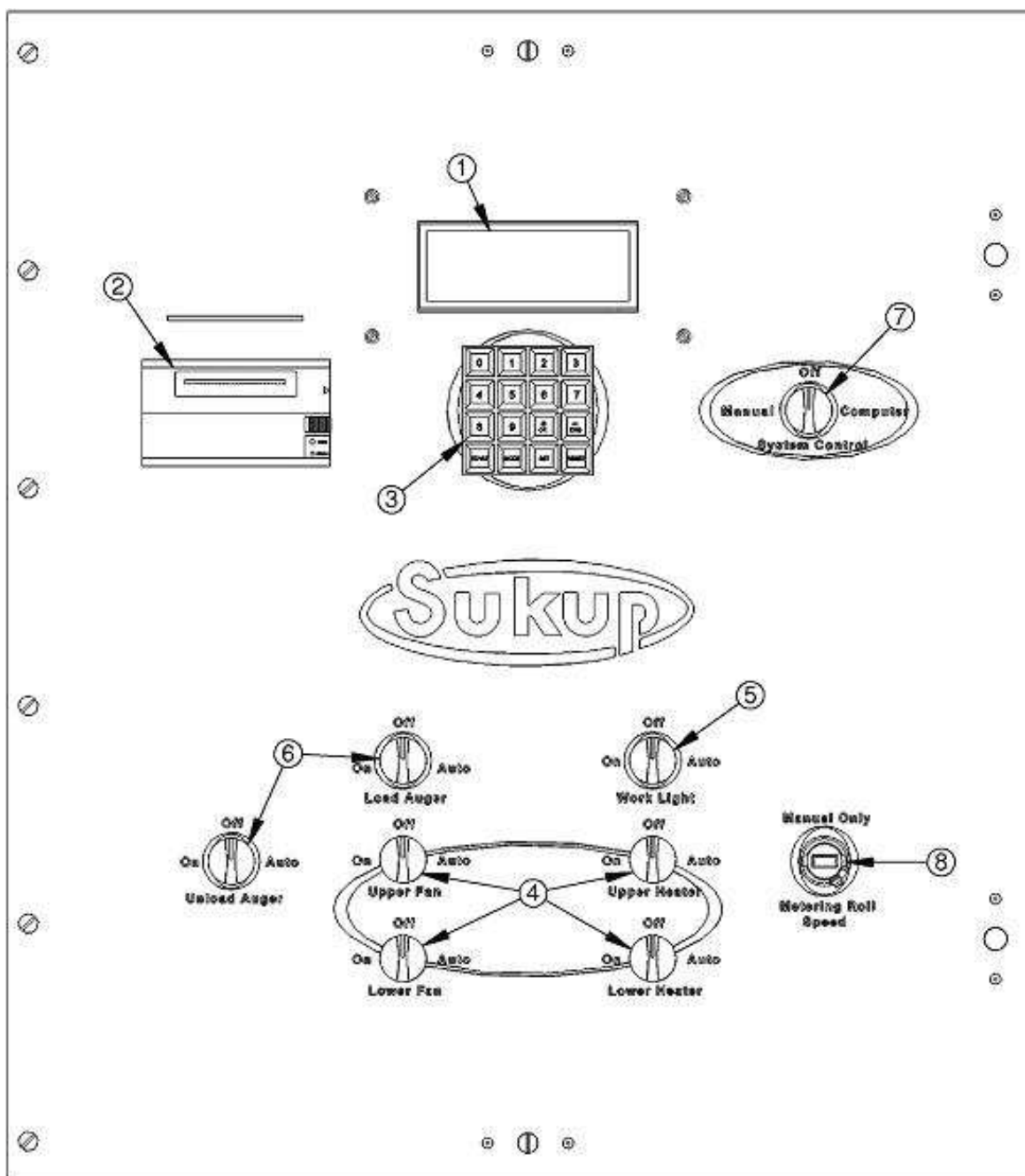


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### SINGLE FAN / THREE PHASE 460 VOLT PARTS – POWER BOX

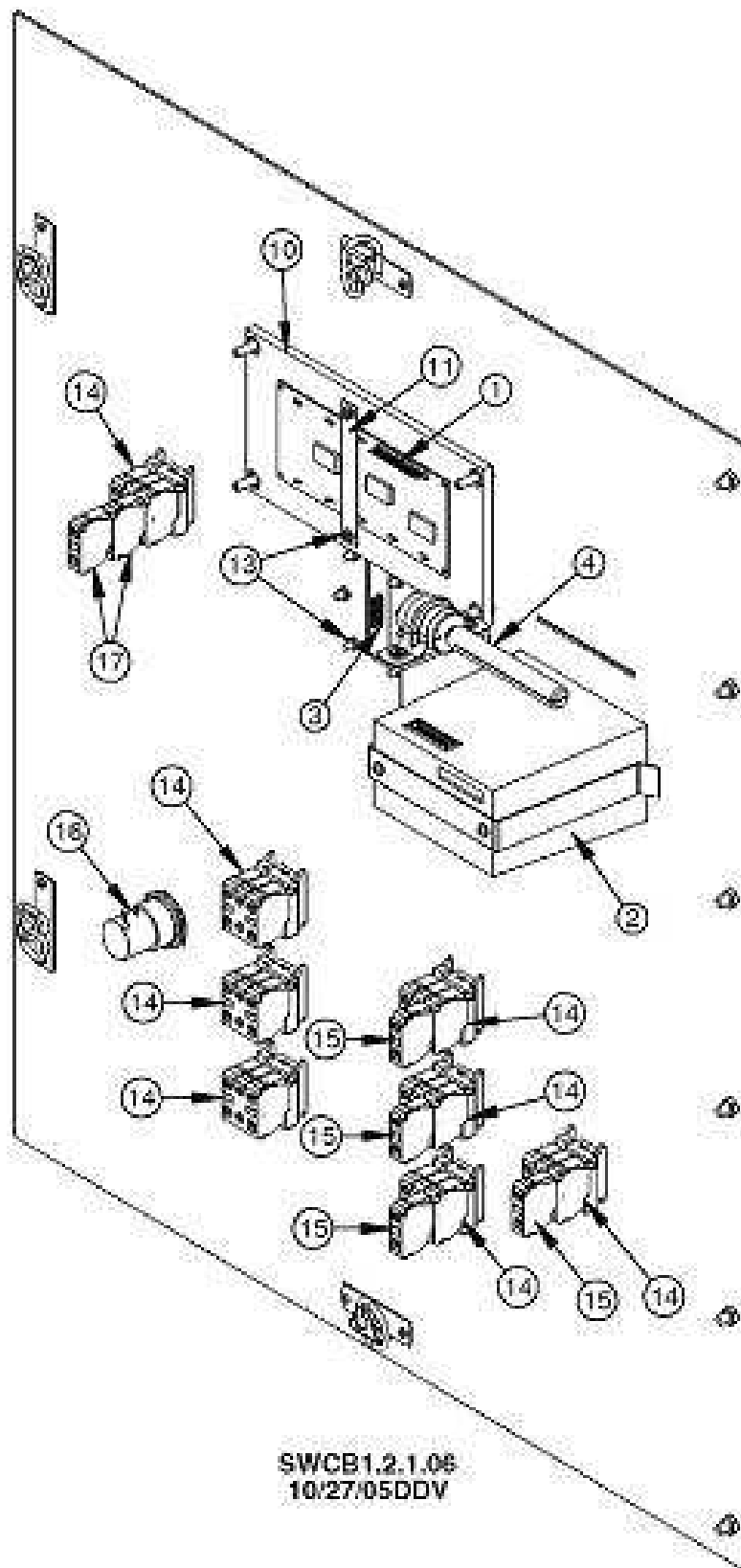
| Part Label Number | Drawing Number | Parts for Model Numbers:<br><b>T1211C, T1212C, &amp;T1611C</b> | Parts for Model Numbers:<br><b>T2011C &amp; T2012C</b> | Description              |
|-------------------|----------------|----------------------------------------------------------------|--------------------------------------------------------|--------------------------|
| 1                 | SWPB2.1.0.06   | T18511                                                         | T18511                                                 | DOOR, POWER DIST         |
| 2                 | SWPB2.1.0.06   | T18523                                                         | T18523                                                 | GUIDE, LATCH             |
| 3                 | SWPB2.1.0.06   | T16520                                                         | T16520                                                 | SPACER, NYLON, GUIDE     |
| 4                 | SWPB2.1.0.06   | J0472                                                          | J0472                                                  | SCREW, 10-24 X 1         |
| 5                 | SWPB2.1.0.06   | J0985                                                          | J0985                                                  | NUT, HEX, 10-24, PLT, MS |
| 6                 | SWPB2.1.0.06   | T18523                                                         | T18523                                                 | ROD, 13" LONG            |
| 7                 | SWPB2.1.0.06   | J0513                                                          | J0513                                                  | SCREW, 1/4-20, 1.25,     |
| 8                 | SWPB2.1.0.06   | J0990                                                          | J0990                                                  | NUT, HEX, 1/4-20, PLT    |
| 9                 | SWPB2.1.0.06   | T16521                                                         | T16521                                                 | SPACER, NYLON, LTCH      |
| 10                | SWPB2.1.0.06   | T18523                                                         | T18523                                                 | ROD, 21" LONG            |
| 11                | SWPB2.1.0.06   | T16527                                                         | T16525                                                 | HANDLE & GASKET          |
| 12                | SWPB2.1.0.06   | T16527                                                         | T16525                                                 | SHORT BOLT               |
| 13                | SWPB2.5.0.08   | J47901                                                         | J47901                                                 | GROUND BAR               |
| 14                | SWPB2.5.0.08   | J3881                                                          | J3881                                                  | SOCKET, 11 PIN           |
| 15                | SWPB2.5.0.08   | J38802                                                         | J38802                                                 | RELAY                    |
| 16                | SWPB2.5.0.08   | J5265                                                          | J5265                                                  | AUX CONTACT              |
| 17                | SWPB2.5.0.08   | J5234                                                          | J5236                                                  | STARTER, PROTECTOR       |
| 20                | SWPB2.5.0.08   | J4492                                                          | J4492                                                  | OPERATOR, MUSHRM         |
| 21                | SWPB2.5.0.08   | J6729                                                          | J6729                                                  | DIRECT SUPPLYLIGHT       |
| 22                | SWPB2.5.0.08   | J5536                                                          | J5536                                                  | RESISTOR                 |
| 23                | SWPB2.5.0.08   | J6490                                                          | J6490                                                  | TRANSFORMER, CNTRL       |
| 24                | SWPB2.5.0.08   | J6794                                                          | J6794                                                  | SCR, DC DRIVE            |
| 25                | SWPB2.5.0.08   | J6787 & J3829                                                  | J6787 & J3829                                          | VARISTOR & SPADE         |
| 28                | SWPB2.5.0.08   | J4766                                                          | J4766                                                  | HOURLMETER, 115V         |
| 29                | SWPB2.5.0.08   | J5260                                                          | J5260                                                  | AUX CONT, 30/90AMP       |
| 30                | SWPB2.5.0.08   | J5246                                                          | J5246                                                  | CONT, 40A, 115V          |
| 33                | SWPB2.5.0.08   | J6754                                                          | J6754                                                  | DIN END STOP             |
| 34                | SWPB2.5.0.08   | J6903                                                          | J6903                                                  | BARRIER, END             |
| 35                | SWPB2.5.0.08   | J6900                                                          | J6900                                                  | TERMINAL, FEED THRU      |
| 36                | SWPB2.5.0.08   | J6902                                                          | J6902                                                  | GROUND, TERMINAL         |
| 38                | SWPB2.5.0.08   | J48185                                                         | J48185                                                 | 3 AMP BREAKER            |
| 42                | SWPB2.5.0.08   | J4048 & J1195                                                  | J4048 & J1195                                          | COPPER LUG               |
| 44                | SWPB2.5.0.08   | J5238                                                          | J5231                                                  | STARTER PROTECTOR        |
| 45                | SWPB2.5.0.08   | J5265                                                          | J5263                                                  | AUX CONTACT              |
| 46                | SWPB2.5.0.08   | J6700                                                          | J6700                                                  | POWER DIS BLOCK          |
| 47                | SWPB2.5.0.08   | J5246                                                          | J5247                                                  | CONTACTOR                |
| 48                | SWPB2.5.0.08   | J5215                                                          | J5212                                                  | MAIN SWITCH              |
| 50                | SWPB2.5.0.08   | T16527                                                         | T16525                                                 | SHAFT, SWITCH DISC       |
| 51                | SWPB2.5.0.08   | J6491                                                          | J6491                                                  | TRANSFORMER, 460-110     |
| 55                | SWPB2.5.0.08   | J67831                                                         | J67831                                                 | AC SUPPRESSION BRD       |

SWCB1.1.1.06 Control Box Front Panel – Two Fan Diagram

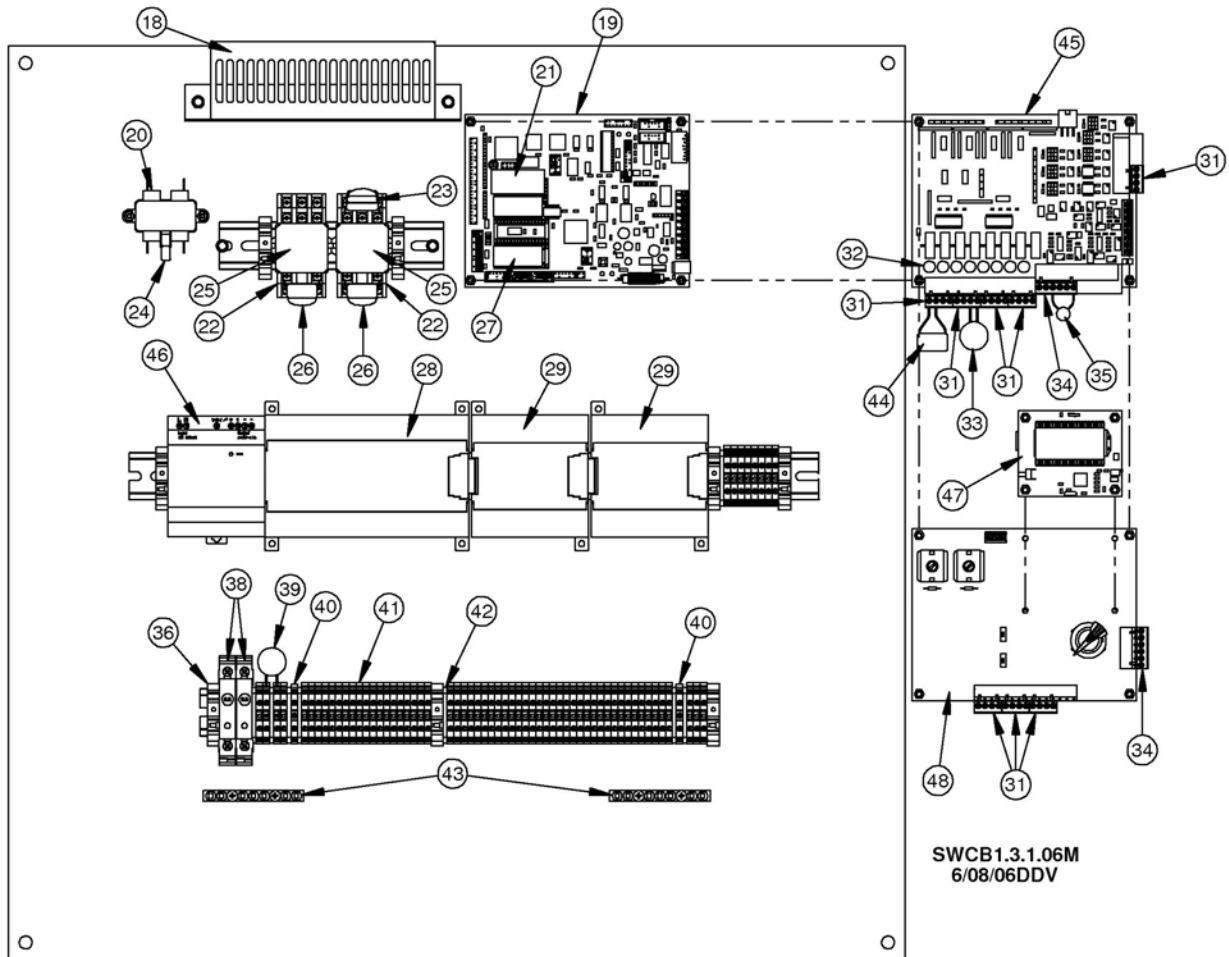


SWCB1.1.1.06  
10/27/05DDV

SWCB1.2.1.06 Control Box Front Panel (Rear) – Two Fan Diagram



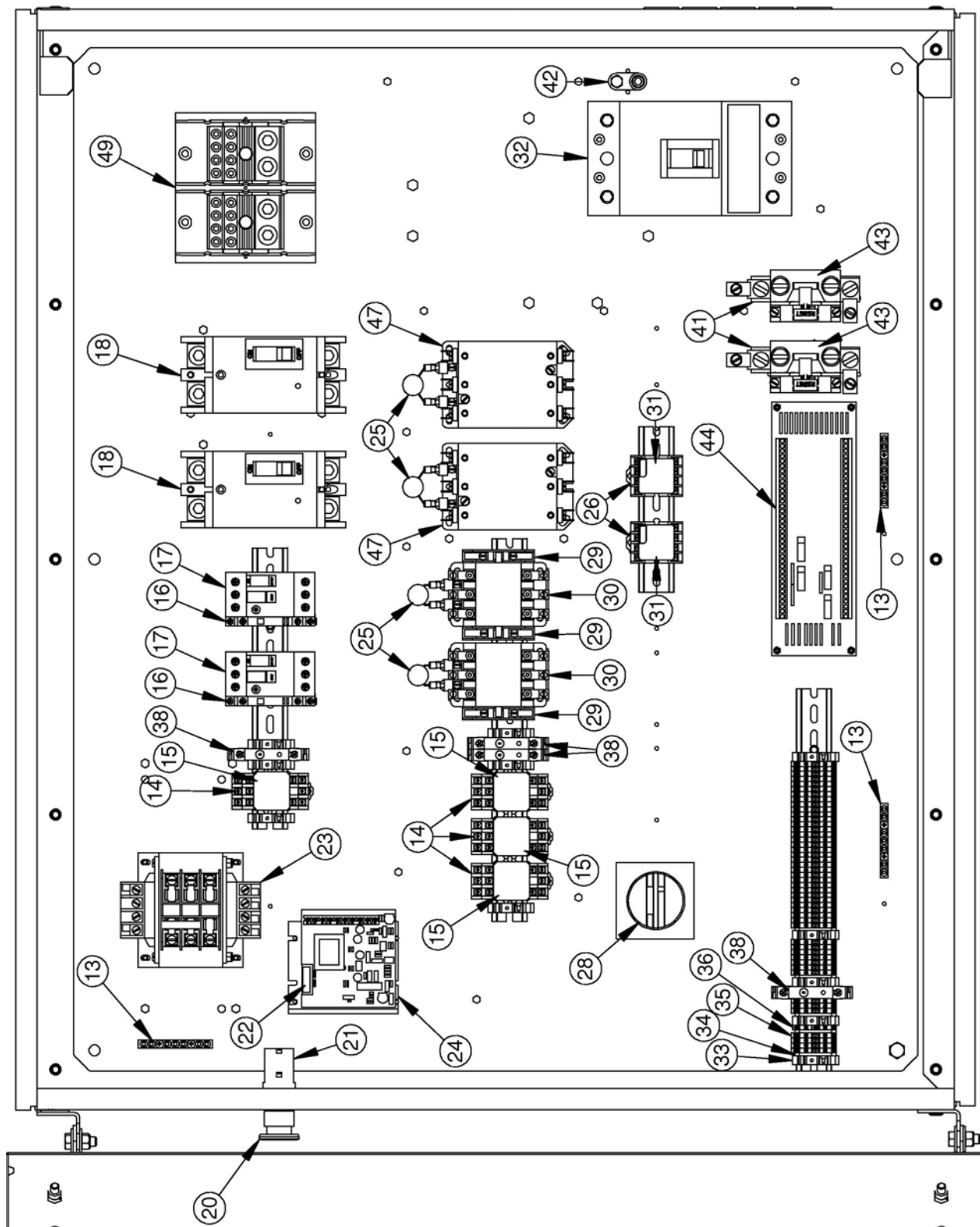
SWCB1.3.1.06 Control Box Inside Panel – Two Fan Diagram



**TWO FAN / SINGLE & THREE PHASE PARTS – CONTROL BOX**

| Part Label Number | Drawing Number              | Parts for Model Numbers:<br><b>T1631, T1632, T2021, T2022, T2031, T2032, T2421, T2422, T2431 &amp; T2432</b> | Description               |
|-------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------|
| 1                 | SWCB1.1.1.06 & SWCB1.2.1.06 | F60679                                                                                                       | LCD W/ CONNECTOR          |
| 2                 | SWCB1.1.1.06 & SWCB1.2.1.06 | J47331                                                                                                       | PRINTER, CITIZEN          |
| 3                 | SWCB1.1.1.06 & SWCB1.2.1.06 | J47602                                                                                                       | KEYPAD                    |
| 4                 | SWCB1.1.1.06                | J6772                                                                                                        | AMBER 3 POS.OPERATOR      |
| 5                 | SWCB1.1.1.06                | J6774                                                                                                        | CLEAR 3 POS.OPERATOR      |
| 6                 | SWCB1.1.1.06                | J6773                                                                                                        | BLUE 3 POS.OPERATOR       |
| 7                 | SWCB1.1.1.06                | J6775                                                                                                        | GREEN 3 POS.OPERATOR      |
| 8                 | SWCB1.1.1.06                | J8812                                                                                                        | POTENIOMETER ASSY         |
| 10                | SWCB1.2.1.06                | T16474                                                                                                       | DISPLAY FRAME             |
| 11                | SWCB1.2.1.06                | J6768                                                                                                        | MARKING EXRTUS            |
| 12                | SWCB1.2.1.06                | T17993                                                                                                       | PAPER ROLLER, 2006        |
| 13                | SWCB1.2.1.06                | J0982                                                                                                        | NUT, HEX, 6-32            |
| 14                | SWCB1.2.1.06                | J6777                                                                                                        | DIRECT SUPPLYLIGHT        |
| 15                | SWCB1.2.1.06                | J6792                                                                                                        | N.C. CONTACT              |
| 16                | SWCB1.2.1.06                | J6734                                                                                                        | POTENTIOMETER             |
| 17                | SWCB1.2.1.06                | J6771                                                                                                        | N.O. CONTACT              |
| 18                | SWCB1.3.1.06M               | F6068                                                                                                        | PWR SUPPLY COMPLETE       |
| 19                | SWCB1.3.1.06M               | F60672                                                                                                       | PROCESSOR COMPLETE        |
| 20                | SWCB1.3.1.06M               | J4751                                                                                                        | CORCOM FILTER             |
| 21                | SWCB1.3.1.06M               | J4603                                                                                                        | SMART WATCH               |
| 22                | SWCB1.3.1.06M               | J3881                                                                                                        | 11 PIN SOCKET             |
| 23                | SWCB1.3.1.06M               | J8818                                                                                                        | 10J MOV&RC CIRCUIT        |
| 24                | SWCB1.3.1.06M               | QP23934                                                                                                      | 3 WAY ADAPTOR             |
| 25                | SWCB1.3.1.06M               | J38802                                                                                                       | RELAY                     |
| 26                | SWCB1.3.1.06M               | J8817                                                                                                        | 100J MOV&RC CIRCUIT       |
| 27                | SWCB1.3.1.06M               | T7080                                                                                                        | PROM, PROGRAM             |
| 28                | SWCB1.3.1.06M               | J6726                                                                                                        | OMRON PLC                 |
| 29                | SWCB1.3.1.06M               | J6757                                                                                                        | EXPANDER MODULE           |
| 31                | SWCB1.3.1.06M               | J4641                                                                                                        | 4 TERMINAL PLUG           |
| 32                | SWCB1.3.1.06M               | J4678                                                                                                        | FUSE, MINI, 0.25AMP       |
| 33                | SWCB1.3.1.06M               | J6787                                                                                                        | 100 JOULE VARISTOR        |
| 34                | SWCB1.3.1.06M               | J4623                                                                                                        | 6 TERMINAL PLUG           |
| 35                | SWCB1.3.1.06M               | J8819                                                                                                        | 0.1UF CAP CIRCUIT         |
| 36                | SWCB1.3.1.06M               | J6754                                                                                                        | DIN END STOP              |
| 38                | SWCB1.3.1.06M               | J48184                                                                                                       | 1/2 AMP BREAKER           |
| 39                | SWCB1.3.1.06M               | J6787                                                                                                        | 100 JOULE VARISTOR        |
| 40                | SWCB1.3.1.06M               | J6902                                                                                                        | GROUND, TERMINAL          |
| 41                | SWCB1.3.1.06M               | J6900                                                                                                        | TERMINAL, FEED THRU       |
| 42                | SWCB1.3.1.06M               | J6903                                                                                                        | BARRIER, END              |
| 43                | SWCB1.3.1.06M               | J47901                                                                                                       | GROUND BAR                |
| 44                | SWCB1.3.1.06M               | J8816                                                                                                        | RC CIRCUIT                |
| 45                | SWCB1.3.1.06M               | J46501                                                                                                       | I/O BOARD, POPULATED      |
| 46                | SWCB1.3.1.06M               | J46308                                                                                                       | SUPPLY, POWER, 24VDC      |
| 47                | SWCB1.3.1.06M               | F6090                                                                                                        | DISPLAY, RTD TEMP         |
| 48                | SWCB1.3.1.06M               | J46504                                                                                                       | BOARD, E-MOD VALVE, 2 FAN |

SWPB2.2.1.08 Power Box Single Phase / Two Fan Diagram / 230 Volts



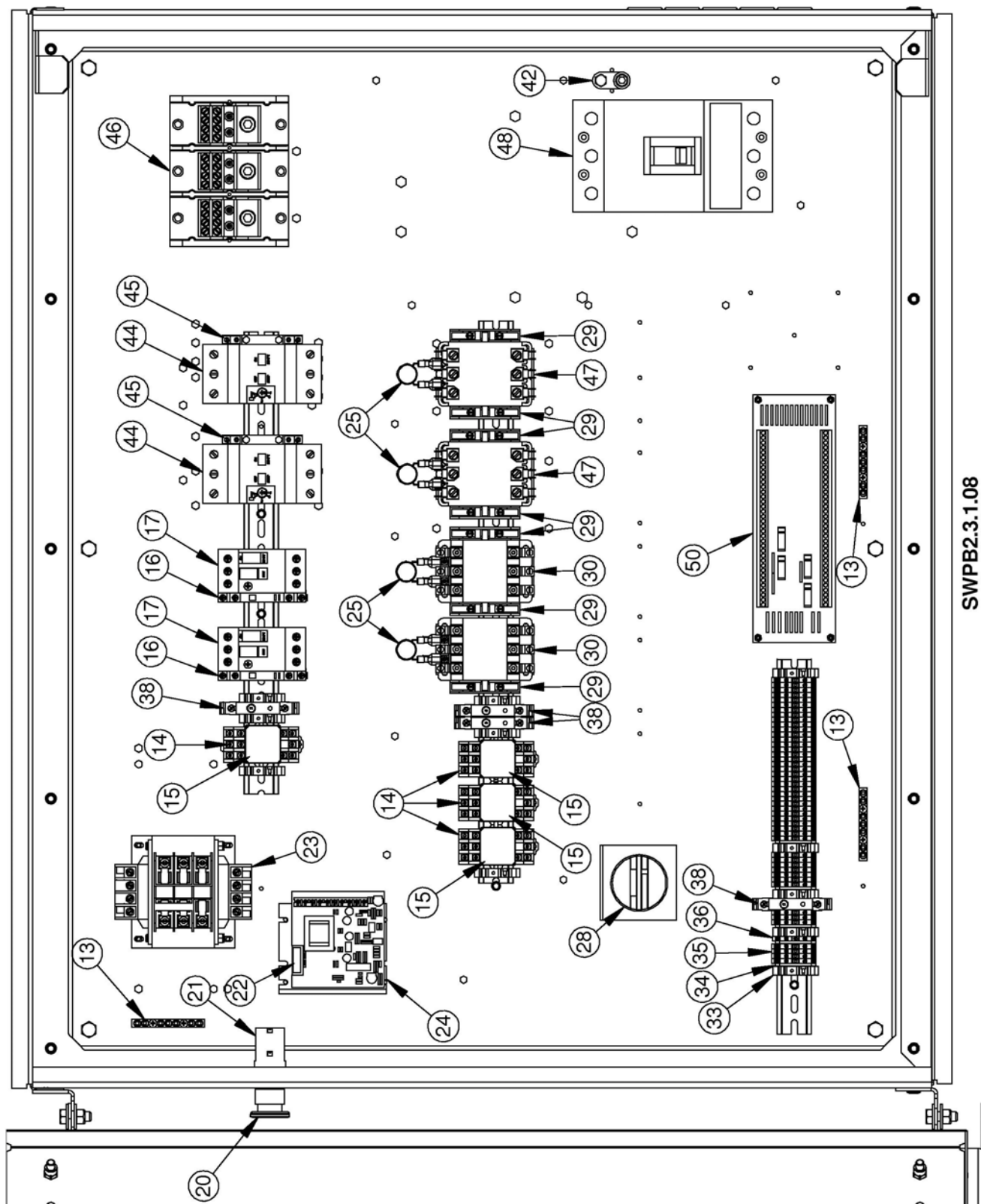
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### TWO FAN / SINGLE PHASE 230 VOLT PARTS – POWER BOX

| Part Label Number | Drawing Number | Parts for Model Numbers:<br><b>T1631A &amp; T1632A</b> | Parts for Model Numbers:<br><b>T2021A</b> | Parts for Model Numbers:<br><b>T2031A &amp; T2032A</b> | Description              |
|-------------------|----------------|--------------------------------------------------------|-------------------------------------------|--------------------------------------------------------|--------------------------|
| 1                 | SWPB2.1.0.06   | T18511                                                 | T18511                                    | T18511                                                 | DOOR, POWER DIST         |
| 2                 | SWPB2.1.0.06   | T18523                                                 | T18523                                    | T18523                                                 | GUIDE, LATCH             |
| 3                 | SWPB2.1.0.06   | T16520                                                 | T16520                                    | T16520                                                 | SPACER, NYLN, GUIDE      |
| 4                 | SWPB2.1.0.06   | J0472                                                  | J0472                                     | J0472                                                  | SCREW, 10-24 X 1         |
| 5                 | SWPB2.1.0.06   | J0985                                                  | J0985                                     | J0985                                                  | NUT, HEX, 10-24, PLT, MS |
| 6                 | SWPB2.1.0.06   | T18523                                                 | T18523                                    | T18523                                                 | ROD, 13" LONG            |
| 7                 | SWPB2.1.0.06   | J0513                                                  | J0513                                     | J0513                                                  | SCREW, 1/4-20, 1.25,     |
| 8                 | SWPB2.1.0.06   | J0990                                                  | J0990                                     | J0990                                                  | NUT, HEX, 1/4-20, PLT    |
| 9                 | SWPB2.1.0.06   | T16521                                                 | T16521                                    | T16521                                                 | SPACER, NYLON, LTCH      |
| 10                | SWPB2.1.0.06   | T18523                                                 | T18523                                    | T18523                                                 | ROD, 21" LONG            |
| 11                | SWPB2.1.0.06   | T16522                                                 | T16522                                    | T16522                                                 | HANDLE & GASKET          |
| 12                | SWPB2.1.0.06   | T16522                                                 | T16522                                    | T16522                                                 | SHORT BOLT               |
| 13                | SWPB2.2.1.08   | J47901                                                 | J47901                                    | J47901                                                 | GROUND BAR               |
| 14                | SWPB2.2.1.08   | J3881                                                  | J3881                                     | J3881                                                  | 11 PIN SOCKET            |
| 15                | SWPB2.2.1.08   | J38802                                                 | J38802                                    | J38802                                                 | 11 PIN RELAY             |
| 16                | SWPB2.2.1.08   | J5265                                                  | J5266                                     | J5266                                                  | AUX CONTACT              |
| 17                | SWPB2.2.1.08   | J5238                                                  | J5230                                     | J5230                                                  | STARTER PROTECTOR        |
| 18                | SWPB2.2.1.08   | J4818                                                  | J48182                                    | J48181 OR J48182                                       | FAN BREAKER              |
| 20                | SWPB2.2.1.08   | J4492                                                  | J4492                                     | J4492                                                  | MUSHRM OPERATOR          |
| 21                | SWPB2.2.1.08   | J6729                                                  | J6729                                     | J6729                                                  | DIRECT SUPPLYLITE        |
| 22                | SWPB2.2.1.08   | J5536                                                  | J5536                                     | J5536                                                  | RESISTOR                 |
| 23                | SWPB2.2.1.08   | J6490                                                  | J6490                                     | J6490                                                  | CNTRL TRANSFOMER         |
| 24                | SWPB2.2.1.08   | J6794                                                  | J6794                                     | J6794                                                  | SCR DRIVE                |
| 25                | SWPB2.2.1.08   | J6787                                                  | J6787                                     | J6787                                                  | 100 JOULE VARISTOR       |
| 26                | SWPB2.2.1.08   | J38811                                                 | J38811                                    | J38811                                                 | 8 PIN ROUND SOCKET       |
| 28                | SWPB2.2.1.08   | J4766                                                  | J4766                                     | J4766                                                  | HOURMETER                |
| 29                | SWPB2.2.1.08   | J5260                                                  | J5260                                     | J5260                                                  | AUX CONTACT              |
| 30                | SWPB2.2.1.08   | J5246                                                  | J5246                                     | J5246                                                  | 40A CONTACTOR            |
| 31                | SWPB2.2.1.08   | J38804                                                 | J38804                                    | J38804                                                 | 8 PIN RELAY              |
| 32                | SWPB2.2.1.08   | J5216                                                  | J5216                                     | J5216                                                  | MAIN SWITCH              |
| 33                | SWPB2.2.1.08   | J6754                                                  | J6754                                     | J6754                                                  | DIN END STOP             |
| 34                | SWPB2.2.1.08   | J6903                                                  | J6903                                     | J6903                                                  | BARRIER, END             |
| 35                | SWPB2.2.1.08   | J6900                                                  | J6900                                     | J6900                                                  | TERMINAL, FEED THRU      |
| 36                | SWPB2.2.1.08   | J6902                                                  | J6902                                     | J6902                                                  | GROUND, TERMINAL         |
| 38                | SWPB2.2.1.08   | J48185                                                 | J48185                                    | J48185                                                 | 3 AMP BREAKER            |
| 41                | SWPB2.2.1.08   | J5274                                                  | J5274                                     | J5274                                                  | OVERLOAD                 |
| 42                | SWPB2.2.1.08   | J4048                                                  | J4048                                     | J4048                                                  | COPPER LUG               |
| 43                | SWPB2.2.1.08   | J5349 OR J53491                                        | J5274                                     | J5349 OR J53491                                        | HEATER STRIP             |
| 44                | SWPB2.2.1.08   | J67831                                                 | J67831                                    | J67831                                                 | AC SUPP BOARD            |
| 47                | SWPB2.2.1.08   | J5248                                                  | J5248                                     | J5248                                                  | CONTACTOR                |
| 49                | SWPB2.2.1.08   | J6695                                                  | J6695                                     | J6695                                                  | PWR DIST BLOCK           |
| 50                | SWPB2.2.1.08   | T16522                                                 | T16522                                    | T16522                                                 | PWR DISCON SHAFT         |

SWPB2.3.1.08 Power Box Three Phase / Two Fan Diagram / 230 Volts



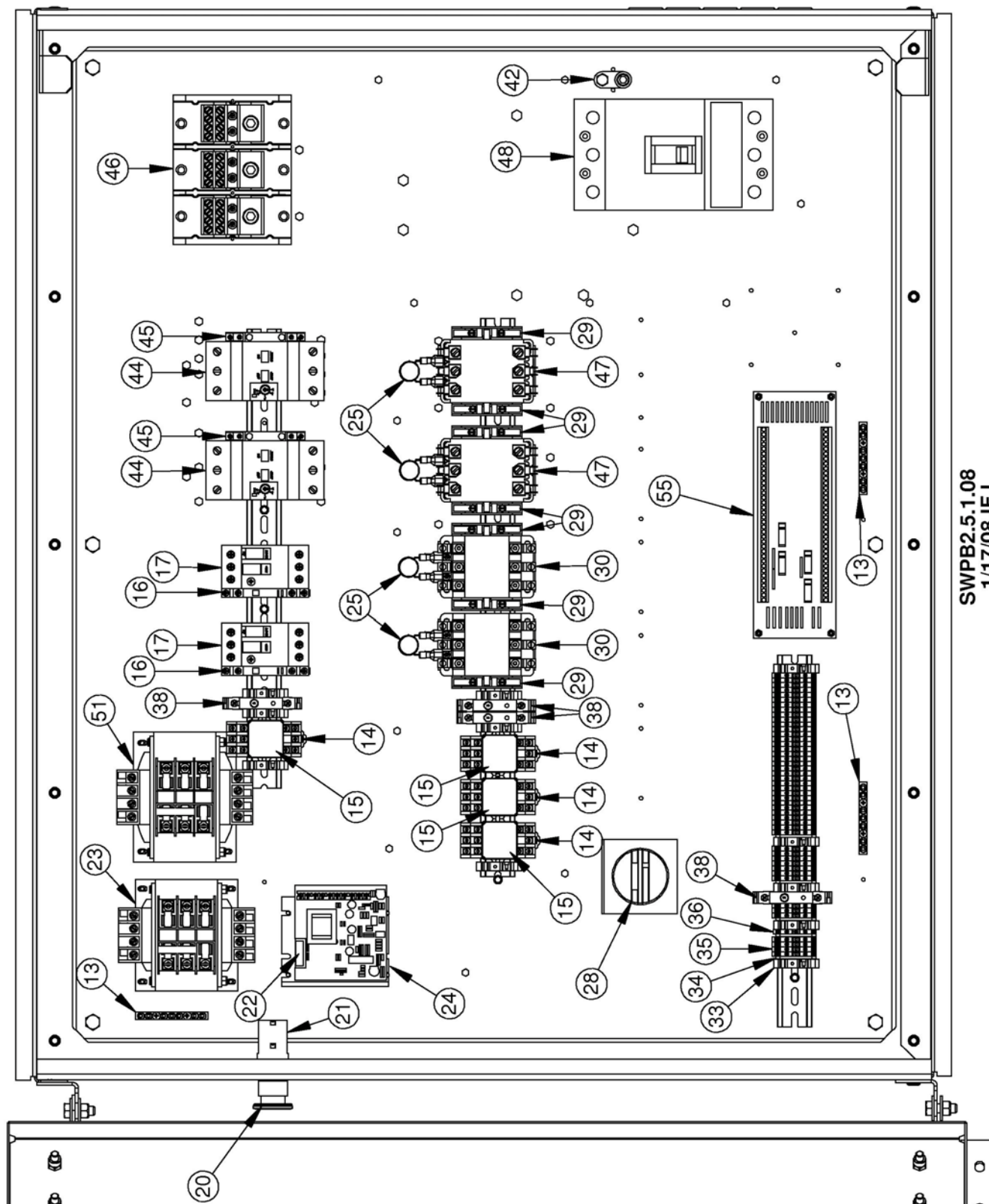
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### TWO FAN / THREE PHASE 230 VOLT PARTS– POWER BOX

| Part Label Number | Drawing Number | Parts for Model Numbers:<br><b>T2421B &amp; T2422B</b> | Parts for Model Numbers:<br><b>T2021B,T2022B, T2031B,T2032B</b> | Parts for Model Numbers:<br><b>T1631B &amp; T1632B</b> | Description:          |
|-------------------|----------------|--------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------|-----------------------|
| 1                 | SWPB2.1.0.06   | T18511                                                 | T18511                                                          | T18511                                                 | DOOR, POWER DIST      |
| 2                 | SWPB2.1.0.06   | T18523                                                 | T18523                                                          | T18523                                                 | GUIDE, LATCH          |
| 3                 | SWPB2.1.0.06   | T16520                                                 | T16520                                                          | T16520                                                 | SPACER, NYLN, GUIDE   |
| 4                 | SWPB2.1.0.06   | J0472                                                  | J0472                                                           | J0472                                                  | SCREW,10-24 X 1       |
| 5                 | SWPB2.1.0.06   | J0985                                                  | J0985                                                           | J0985                                                  | NUT, HEX,10-24,PLT,MS |
| 6                 | SWPB2.1.0.06   | T18523                                                 | T18523                                                          | T18523                                                 | ROD, 13" LONG         |
| 7                 | SWPB2.1.0.06   | J0513                                                  | J0513                                                           | J0513                                                  | SCREW, 1/4-20,1.25,   |
| 8                 | SWPB2.1.0.06   | J0990                                                  | J0990                                                           | J0990                                                  | NUT, HEX, 1/4-20,PLT  |
| 9                 | SWPB2.1.0.06   | T16521                                                 | T16521                                                          | T16521                                                 | SPACER, NYLON, LTCH   |
| 10                | SWPB2.1.0.06   | T18523                                                 | T18523                                                          | T18523                                                 | ROD, 21" LONG         |
| 11                | SWPB2.1.0.06   | T16525                                                 | T16525                                                          | T16525                                                 | HANDLE & GASKET       |
| 12                | SWPB2.1.0.06   | T16525                                                 | T16525                                                          | T16525                                                 | SHORT BOLT            |
| 13                | SWPB2.3.1.06   | J47901                                                 | J47901                                                          | J47901                                                 | GROUND BAR            |
| 14                | SWPB2.3.1.06   | J3881                                                  | J3881                                                           | J3881                                                  | 11 PIN SOCKET         |
| 15                | SWPB2.3.1.06   | J38802                                                 | J38802                                                          | J38802                                                 | 11 PIN RELAY          |
| 16                | SWPB2.3.1.06   | J5265                                                  | J5265                                                           | J5265                                                  | AUX CONTACT           |
| 17                | SWPB2.3.1.06   | J5243                                                  | J5242                                                           | J5236                                                  | STARTER PROTECTOR     |
| 20                | SWPB2.3.1.06   | J4492                                                  | J4492                                                           | J4492                                                  | MUSHRM OPERATOR       |
| 21                | SWPB2.3.1.06   | J6729                                                  | J6729                                                           | J6729                                                  | DIRECT SUPPLYLITE     |
| 22                | SWPB2.3.1.06   | J5536                                                  | J5536                                                           | J5536                                                  | RESISTOR              |
| 23                | SWPB2.3.1.06   | J6490                                                  | J6490                                                           | J6490                                                  | CNTRL TRANSFORMER     |
| 24                | SWPB2.3.1.06   | J6794                                                  | J6794                                                           | J6794                                                  | SCR DRIVE             |
| 25                | SWPB2.3.1.06   | J6787                                                  | J6787                                                           | J6787                                                  | 100 JOULE VARISTOR    |
| 28                | SWPB2.3.1.06   | J4766                                                  | J4766                                                           | J4766                                                  | HOURLMETER            |
| 29                | SWPB2.3.1.06   | J5260                                                  | J5260                                                           | J5260                                                  | AUX CONTACT           |
| 30                | SWPB2.3.1.06   | J5246                                                  | J5246                                                           | J5246                                                  | 40A CONTACTOR         |
| 33                | SWPB2.3.1.06   | J6754                                                  | J6754                                                           | J6754                                                  | DIN END STOP          |
| 34                | SWPB2.3.1.06   | J6903                                                  | J6903                                                           | J6903                                                  | BARRIER,END           |
| 35                | SWPB2.3.1.06   | J6900                                                  | J6900                                                           | J6900                                                  | TERMINAL,FEED THRU    |
| 36                | SWPB2.3.1.06   | J6902                                                  | J6902                                                           | J6902                                                  | GROUND,TERMINAL       |
| 38                | SWPB2.3.1.06   | J48185                                                 | J48185                                                          | J48185                                                 | 3 AMP BREAKER         |
| 44                | SWPB2.3.1.06   | J5242                                                  | J5242                                                           | J5242                                                  | STARTER PROTECTOR     |
| 45                | SWPB2.3.1.06   | J5266                                                  | J5266                                                           | J5266                                                  | AUX CONTACT           |
| 47                | SWPB2.3.1.06   | J5247                                                  | J5247                                                           | J5247                                                  | CONTACTOR             |
| 48                | SWPB2.3.1.06   | J5212                                                  | J5212                                                           | J5212                                                  | MAIN SWITCH           |
| 50                | SWPB2.3.1.06   | J67831                                                 | J67831                                                          | J67831                                                 | AC SUPP BOARD         |

SWPB2.5.1.08 Power Box Three Phase / Two Fan Diagram / 460 Volts



SWPB2.5.1.08  
1/17/08JFJ

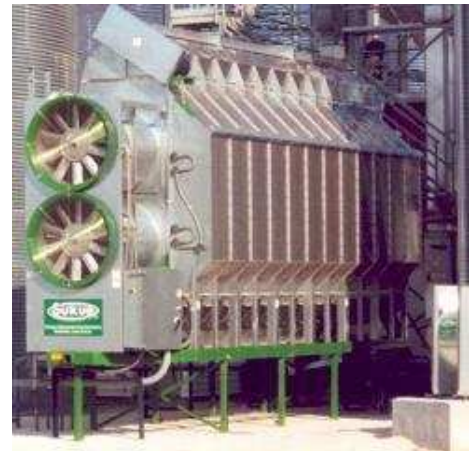
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### TWO FAN / THREE PHASE 460 VOLT PARTS– POWER BOX

| Part Label No. | Drawing Number | Parts for Model Numbers: T1631C | Parts for Model Numbers: T2031C, & T2032C | Parts for Model Numbers: T2021C, T2022C, T2421C | Parts for Model Numbers: T2431C, T2432C | Description:             |
|----------------|----------------|---------------------------------|-------------------------------------------|-------------------------------------------------|-----------------------------------------|--------------------------|
| 1              | SWPB2.1.0.06   | T18511                          | T18511                                    | T18511                                          | T18511                                  | DOOR, POWER DIST         |
| 2              | SWPB2.1.0.06   | T18523                          | T18523                                    | T18523                                          | T18523                                  | GUIDE, LATCH             |
| 3              | SWPB2.1.0.06   | T16520                          | T16520                                    | T16520                                          | T16520                                  | SPACER, NYLN, GUIDE      |
| 4              | SWPB2.1.0.06   | J0472                           | J0472                                     | J0472                                           | J0472                                   | SCREW, 10-24 X 1         |
| 5              | SWPB2.1.0.06   | J0985                           | J0985                                     | J0985                                           | J0985                                   | NUT, HEX, 10-24, PLT, MS |
| 6              | SWPB2.1.0.06   | T18523                          | T18523                                    | T18523                                          | T18523                                  | ROD, 13" LONG            |
| 7              | SWPB2.1.0.06   | J0513                           | J0513                                     | J0513                                           | J0513                                   | SCREW, 1/4-20, 1.25,     |
| 8              | SWPB2.1.0.06   | J0990                           | J0990                                     | J0990                                           | J0990                                   | NUT, HEX, 1/4-20, PLT    |
| 9              | SWPB2.1.0.06   | T16521                          | T16521                                    | T16521                                          | T16521                                  | SPACER, NYLON, LTCH      |
| 10             | SWPB2.1.0.06   | T18523                          | T18523                                    | T18523                                          | T18523                                  | ROD, 21" LONG            |
| 11             | SWPB2.1.0.06   | T16525                          | T16525                                    | T16525                                          | T16525                                  | HANDLE & GASKET          |
| 12             | SWPB2.1.0.06   | T16525                          | T16525                                    | T16525                                          | T16525                                  | SHORT BOLT               |
| 13             | SWPB2.5.1.08   | J47901                          | J47901                                    | J47901                                          | J47901                                  | GROUND BAR               |
| 14             | SWPB2.5.1.08   | J3881                           | J3881                                     | J3881                                           | J3881                                   | 11 PIN SOCKET            |
| 15             | SWPB2.5.1.08   | J38802                          | J38802                                    | J38802                                          | J38802                                  | 11 PIN RELAY             |
| 16             | SWPB2.5.1.08   | J5265                           | J5265                                     | J5265                                           | J5265                                   | AUX CONTACT              |
| 17             | SWPB2.5.1.08   | J5234                           | J5236                                     | J5236                                           | J5236                                   | STARTER PROTECTOR        |
| 20             | SWPB2.5.1.08   | J4492                           | J4492                                     | J4492                                           | J4492                                   | MUSHRM OPERATOR          |
| 21             | SWPB2.5.1.08   | J6729                           | J6729                                     | J6729                                           | J6729                                   | DIRECT SUPPLYLITE        |
| 22             | SWPB2.5.1.08   | J5536                           | J5536                                     | J5536                                           | J5536                                   | RESISTOR                 |
| 23             | SWPB2.5.1.08   | J6490                           | J6490                                     | J6490                                           | J6490                                   | CNTRL TRANSFORMER        |
| 24             | SWPB2.5.1.08   | J6794                           | J6794                                     | J6794                                           | J6794                                   | SCR DRIVE                |
| 25             | SWPB2.5.1.08   | J6787                           | J6787                                     | J6787                                           | J6787                                   | 100 JOULE VARISTOR       |
| 28             | SWPB2.5.1.08   | J4766                           | J4766                                     | J4766                                           | J4766                                   | HOURMETER                |
| 29             | SWPB2.5.1.08   | J5260                           | J5260                                     | J5260                                           | J5260                                   | AUX CONTACT              |
| 30             | SWPB2.5.1.08   | J5246                           | J5246                                     | J5246                                           | J5246                                   | 40A CONTACTOR            |
| 33             | SWPB2.5.1.08   | J6754                           | J6754                                     | J6754                                           | J6754                                   | DIN END STOP             |
| 34             | SWPB2.5.1.08   | J6903                           | J6903                                     | J6903                                           | J6903                                   | BARRIER, END             |
| 35             | SWPB2.5.1.08   | J6900                           | J6900                                     | J6900                                           | J6900                                   | TERMINAL, FEED THRU      |
| 36             | SWPB2.5.1.08   | J6902                           | J6902                                     | J6902                                           | J6902                                   | GROUND, TERMINAL         |
| 38             | SWPB2.5.1.08   | J48185                          | J48185                                    | J48185                                          | J48185                                  | 3 AMP BREAKER            |
| 44             | SWPB2.5.1.08   | J5238                           | J5238                                     | J5238 / J5239                                   | J5231 / J5238                           | STARTER PROTECTOR        |
| 45             | SWPB2.5.1.08   | J5265                           | J5265                                     | J5265                                           | J5265 / J5263                           | AUX CONTACT              |
| 47             | SWPB2.5.1.08   | J5246                           | J5246                                     | J5246                                           | J5246 / J5247                           | CONTACTOR                |
| 48             | SWPB2.5.1.08   | J5215                           | J5215                                     | J5212                                           | J5212                                   | MAIN SWITCH              |
| 50             | SWPB2.5.1.08   | T16527                          | T16527                                    | T16525                                          | T16525                                  | PWR DISCON SHAFT         |
| 51             | SWPB2.5.1.08   | J6491                           | J6491                                     | J6491                                           | J6491                                   | TRANSFORMER 460-110      |
| 55             | SWPB2.5.1.08   | J67831                          | J67831                                    | J67831                                          | J67831                                  | AC SUPPRESSION BRD       |



## AUTOMATIC DRYER PARTS ASSEMBLIES

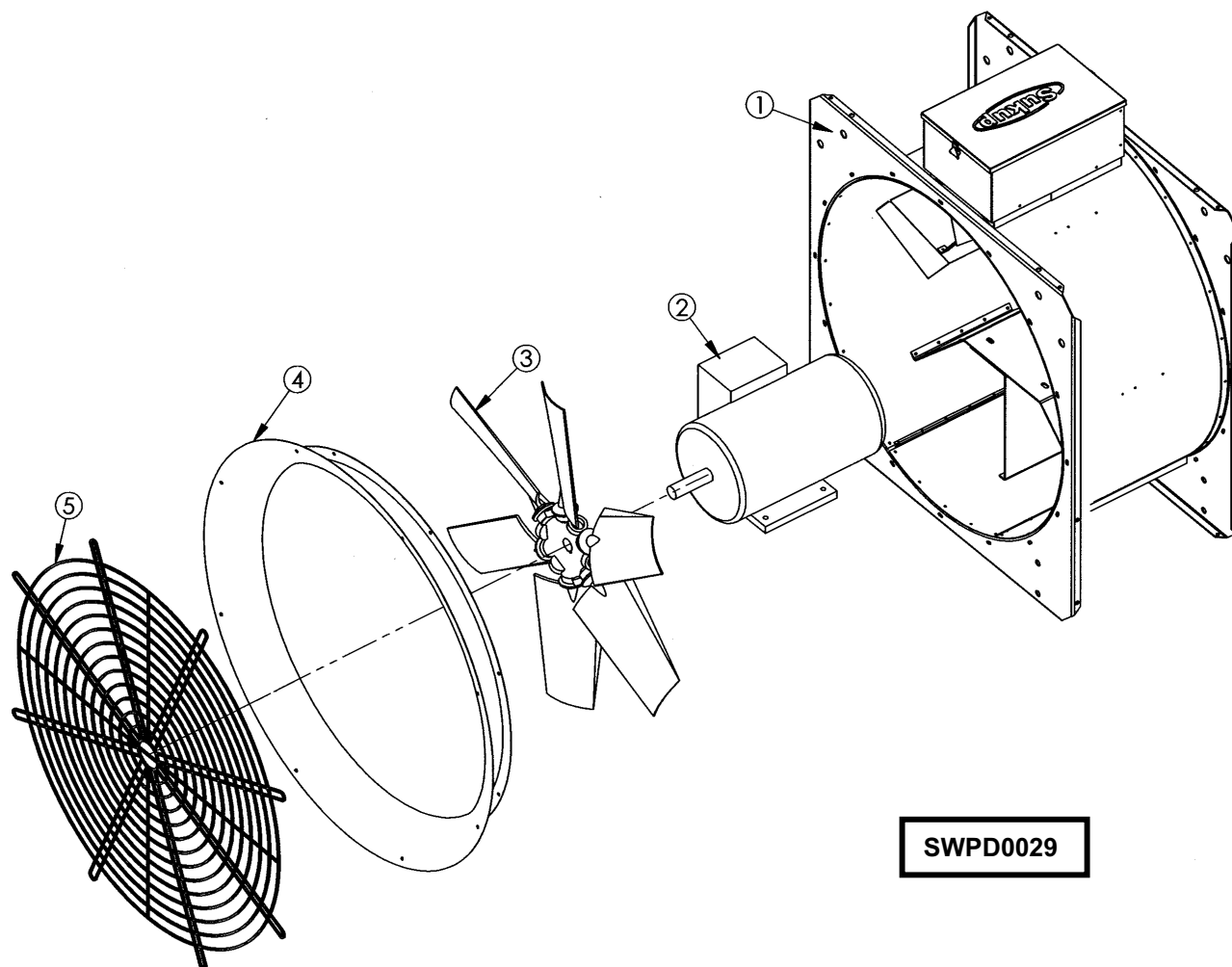


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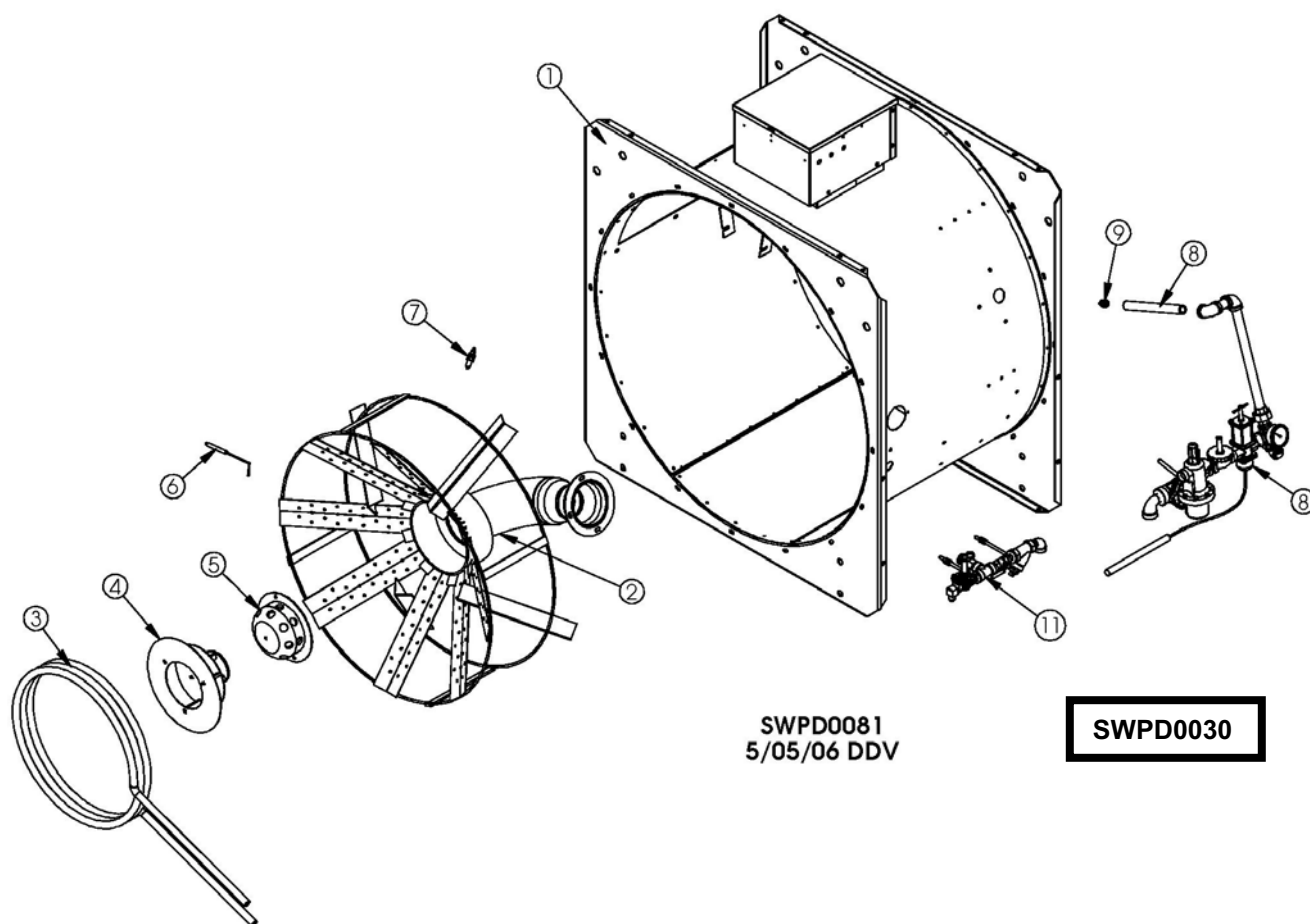
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| PIPE TRAIN, EL MOD VALVE, 3/4" .....                        | 10 |
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| 28' CAM LOCK ASSEMBLY .....                                 | 35 |
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| 16' BOTTOM AUGER .....                                      | 39 |
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## DRYER FAN PARTS



| Ref. # | Description  | 28"<br>15HP<br>1hp | 28"<br>15HP<br>3ph | 38"<br>15HP<br>1ph | 38"<br>15HP<br>3ph | 38"<br>20HP<br>3ph | 44"<br>15HP<br>1ph | 44"<br>15HP<br>3ph | 44"<br>30HP<br>3ph | 44"<br>40PH<br>3ph |
|--------|--------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| 1      | Housing      | T28550             | T28550             | T12980             | T12981             | T12981             | T16980             | T16980             | T20980             | T24980             |
| 2      | Motor        | H5753              | H5758              | H5755              | H6275              | H6800              | H5755              | H6275              | H7125              | H7175              |
| 3      | Blade        | J3062              | J3962              | T12175             | T12175             | T121752            | J3070              | J3070              | J3067              | J3068              |
| 4      | Venturi      | J3080              | J3080              | J3085              | J3085              | J3085              | J3090              | J3090              | J3090              | J3090              |
| 5      | Inlet Screen | D3824              | D3824              | J3132              | J3132              | J3132              | J2957              | J2957              | J2957              | J2957              |

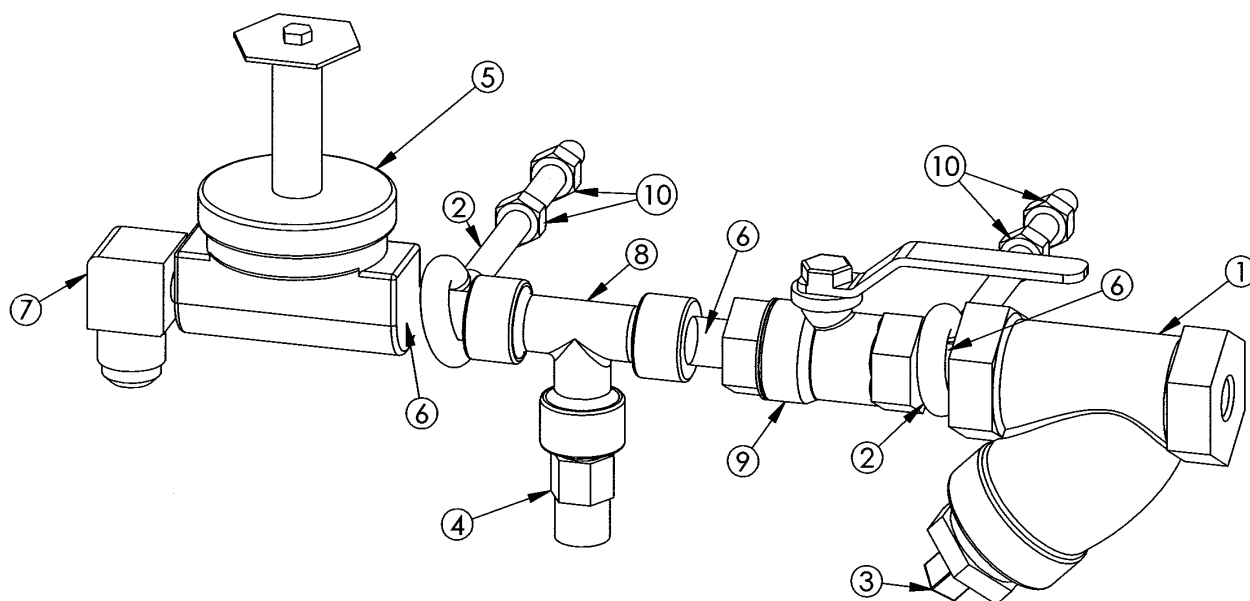
## DRYER HEATER PARTS



| REF. # | DESCRIPTION       | 28" LP | 28" NG | 38" LP        | 38" NG         | 44" LP<br>15HP | 44" NG<br>15HP | 44" LP<br>30HP | 44" NG<br>30HP |
|--------|-------------------|--------|--------|---------------|----------------|----------------|----------------|----------------|----------------|
| 1      | Housing           | T28550 | T28550 | T12990        | T12990         | T16990         | T16990         | T16990         | T16990         |
| 2      | Burner            | D4017  | D4017  | T12196        | T12196         | T16201         | T16201         | T16201         | T16201         |
| 3      | Vaporizer         | D70321 | ----   | T16194        | ----           | T16194         | ----           | T16194         | ----           |
| 4      | Flame Deflector   | ----   | ----   | T16204        | ----           | T16204         | ----           | T16204         | ----           |
| 5      | Port Cup          | D4027  | D4027  | D4044         | D4044          | D4044          | D4044          | D4044          | D4044          |
| 6      | Flame Sensor      | J5747  | J5747  | J5747         | J5747          | J5747          | J5747          | J5747          | J5747          |
| 7      | Spark Plug        | J5739  | J5739  | J5739         | J5739          | J5739          | J5739          | J5739          | J5739          |
| 8      | Pipe Train        | T24173 | T24172 | T16193        | T24193         | T16193         | T20193         | T16193         | T25193         |
| 9      | Orifice Pipe      | D7119  | D7119  | D71281        | D71191         | D71281         | D71192         | D71281         | D71192         |
| 10     | Orifice           | D7110  | D71125 | D7112<br>15HP | D71124<br>15HP | D7112          | D71124         | D7113          | D71127         |
| 11     | Liquid Pipe Train | D4006  | ----   | T16187        | ----           | T16187         | ----           | T16187         | ----           |

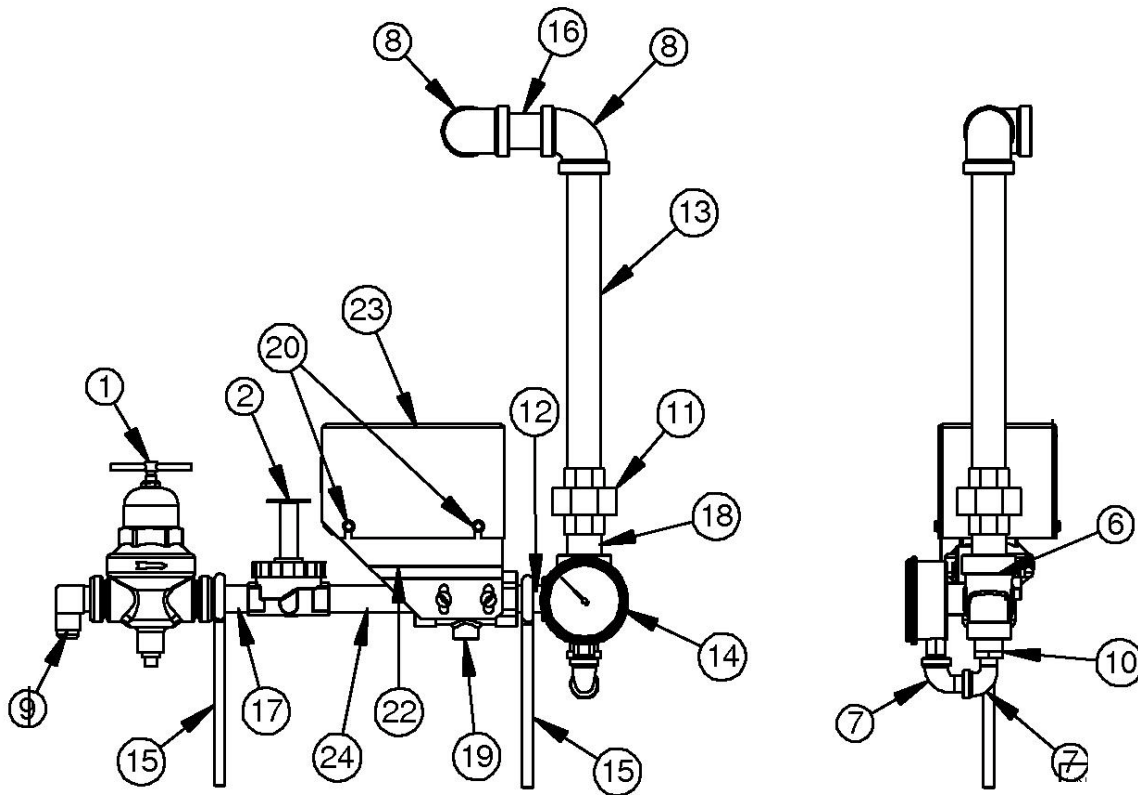
## 28" HEATER LIQUID PIPE TRAIN - 1/4"

### D4006



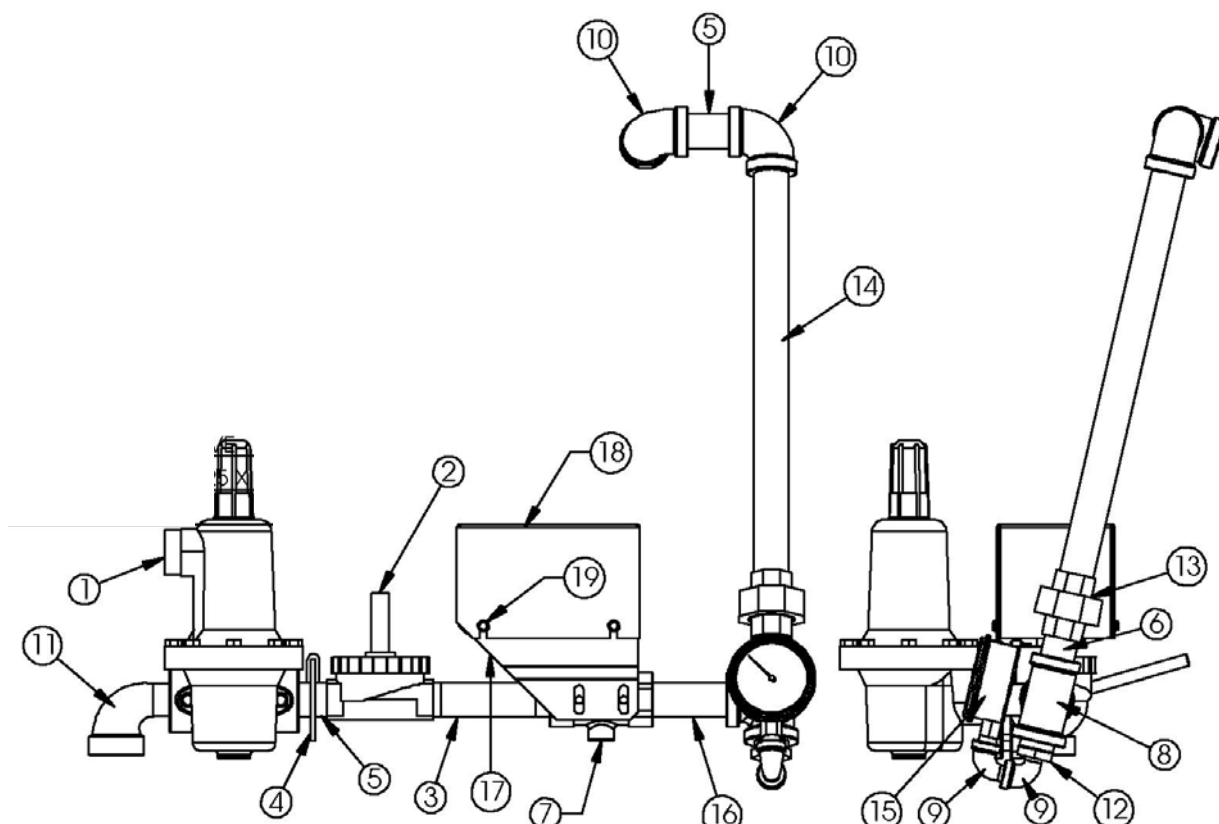
| REF. # | DESCRIPTION                               | QTY | COMP. # |
|--------|-------------------------------------------|-----|---------|
| 1      | Strainer, Liquid, 1/4"                    | 1   | J5990   |
| 2      | Eyebolt, 5/16-18, 4, 5/8" ID Eye          | 2   | J0850   |
| 3      | Plug, 1/4"                                | 1   | J2612   |
| 4      | Relief Valve, 1/4"                        | 1   | J6050   |
| 5      | Valve, Solenoid, Body, 1/4"               | 1   | J6025   |
|        | Coil, 11 Watt                             | 1   | J6030   |
| 6      | Nipple , 1/4" x 1-1/2", Black pipe, Sch80 | 3   | J2400   |
| 7      | Elbow, 3/8" FL X 1/4MIP, 90°, E1-6B       | 1   | J2740   |
| 8      | Tee, 1/4" x 1/4" x 1/4", Sch80            | 1   | J2470   |
| 9      | Valve, 1/2", Ball, ITT 1550               | 1   | J6080   |
| 10     | Nut, Hex, 5/16-18, PLT                    | 4   | J1002   |

**PIPE TRAIN, EL MOD VALVE 1/2" 250°  
28" FAN-HEATER (LP MODEL) - T241731**



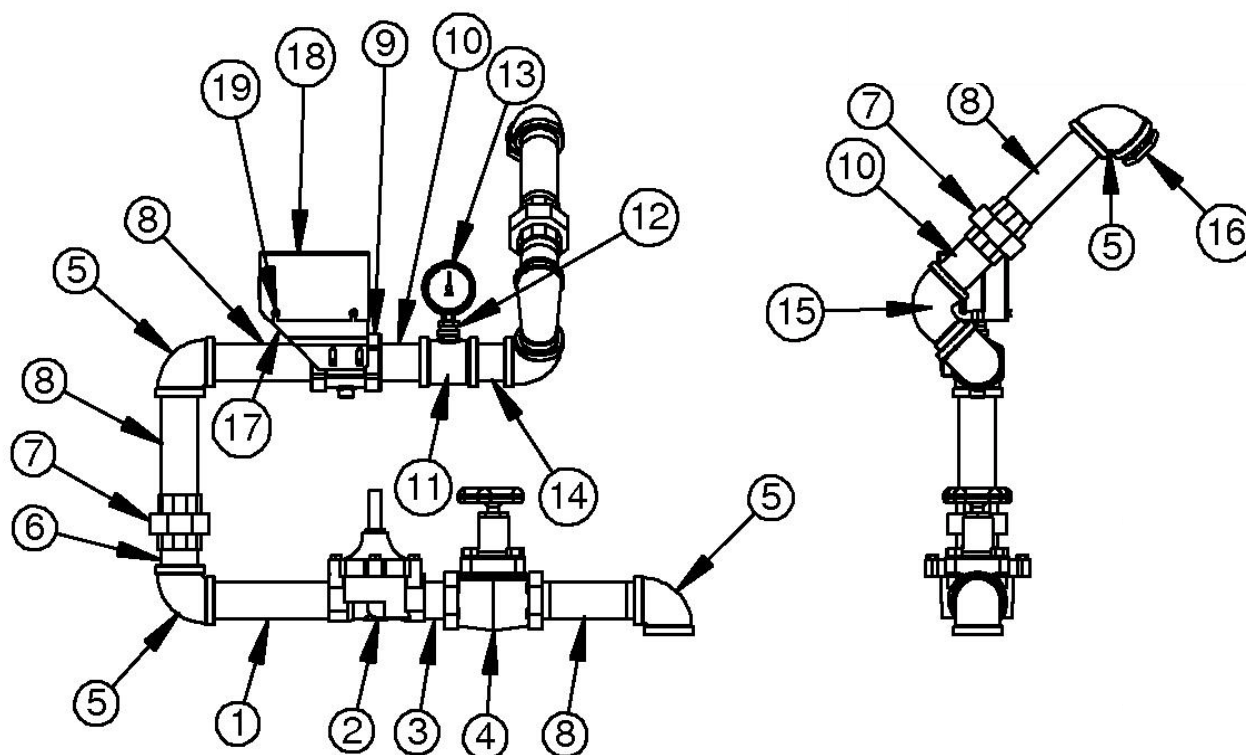
| REF. # | DESCRIPTION                              | QTY | COMP. # |
|--------|------------------------------------------|-----|---------|
| 1      | Regulator, Cash Acme, 1/2"               | 1   | J6111   |
| 2      | Valve, Solenoid, Body, 1/2"              | 1   | J6254   |
| 6      | Tee, Reducing, 3/4 x 1/2 x 1/2 Sch40     | 1   | J2481   |
| 7      | Elbow, Street, 1/4" 90° , Sch40          | 2   | J2517   |
| 8      | Elbow, 3/4", 90° , Sch40                 | 2   | J2525   |
| 9      | Elbow, 1/2: FL x 1/2" MIP, 90° E1-8D     | 1   | J2745   |
| 10     | Bushing, Reducing, 1/2 x 1/4"            | 1   | J2569   |
| 11     | Union, 3/4", Black, #150                 | 1   | J2710   |
| 12     | Nipple, 1/2" x 1-1/2", Sch40             | 1   | J24062  |
| 13     | Orifice Pipe, 3/4" X10', Sch90           | 1   | J2429   |
| 14     | Gauge, Pressure 0-30, Liquid, 1/4BTM, MT | 1   | J5960   |
| 15     | Eyebolt, 3/8-16, 4.25, 1" ID EYE         | 2   | J0860   |
| 16     | Nipple, 3/4" x 2", Sch40                 | 2   | J2420   |
| 17     | Nipple, 1/2" x 2", Sch40                 | 1   | J24061  |
| 18     | Nipple, 3/4" x Close, SCH 40             | 1   | J2410   |
| 19     | Valve, Butterfly, L/Actuator, 1/2, Maxon | 1   | J6125   |
| 20     | Screw, #10-16, 3/4, PLT, Selfdrill       | 4   | J0469   |
| 22     | Bracket, Electronic, MOD Valve           | 1   | T161935 |
| 23     | Cover, Electronic Valve, 5.625 X 3.5     | 1   | T26902  |
| 24     | Nipple, 1/2 X 3 1/2, SCH 40              | 1   | J24083  |

**PIPE TRAIN, EL MOD VALVE 3/4", PIPE TRAIN LIQUID 1/2"  
38" 44" Heater, CONTINOUS FLOW DRYER – T161934**



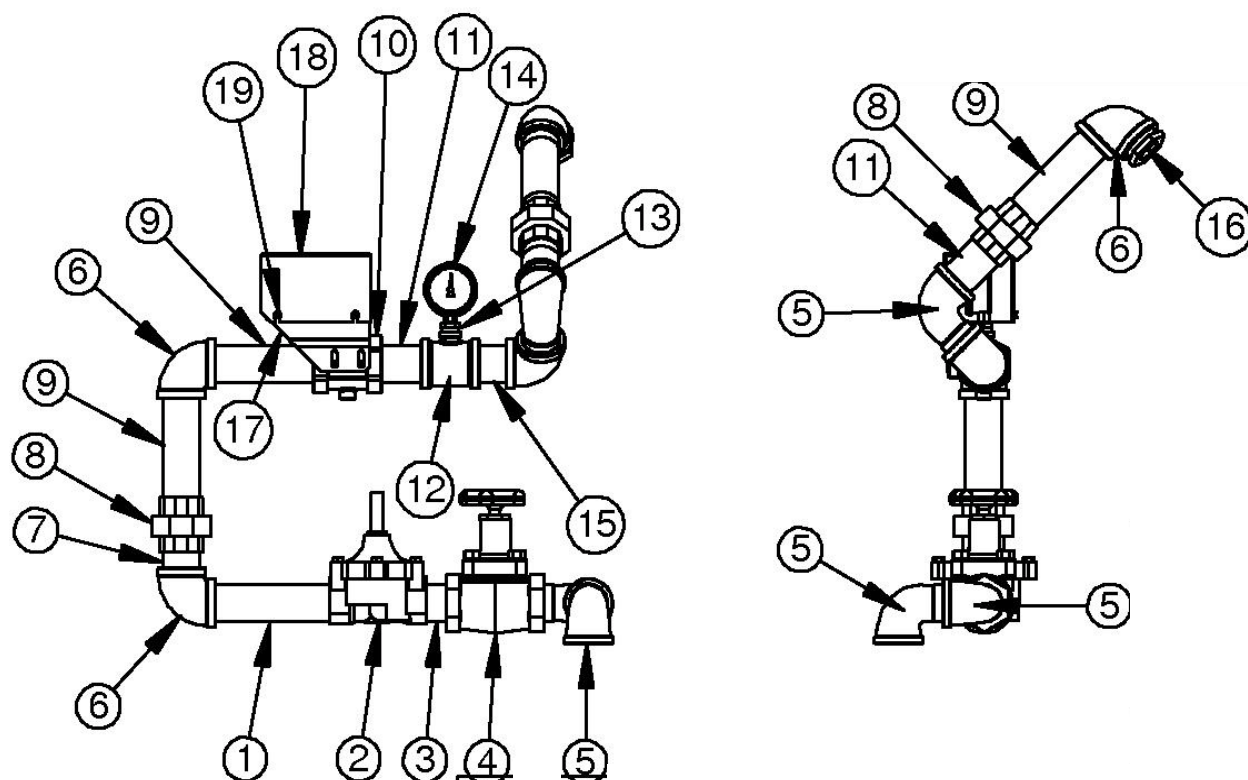
| REF. # | DESCRIPTION                               | QTY | COMP. #  |
|--------|-------------------------------------------|-----|----------|
| 1      | Regulator, 3/4", 627/5810, 5-20 lbs.      | 1   | J6112    |
| 2      | Valve, Solenoid, Body, 3/4, GP600         | 1   | J6264    |
| 3      | Nipple, 3/4 X 4 1/2, SCH 40               | 1   | J2425    |
| 4      | Eyebolt, Pipe Train, Heater               | 1   | T16224   |
| 5      | Nipple, 3/4 x 2, Sch40                    | 2   | J2420    |
| 6      | Nipple, 3/4" x Close                      | 1   | J2410    |
| 7      |                                           | 1   | J6126-02 |
| 8      | Tee, 3/4" x 3/4" x 3/4", Sch40            | 1   | J2485    |
| 9      | Elbow, Street, 1/4", 90°, Sch40           | 2   | J2517    |
| 10     | Elbow, 3/4", 90°, Extra Sch40             | 2   | J2525    |
| 11     | Elbow, Street, 3/4", 90°, Extra Heavy     | 1   | J2532    |
| 12     | Bushing, Reducing, 3/4" x 1/4", Sch40     | 1   | J2570    |
| 13     | Union, 3/4", Black, #150                  | 1   | J2710    |
| 14     | Nipple, 3/4 x 14", Sch40                  | 1   | T161931  |
| 15     | Gauge, Pressure, 0-30, Liquid, 1/4BTM, MT | 1   | J5960    |
| 16     | Pipe, 3/4 x 3. SCH 40                     | 1   | J2423    |
| 17     | Bracket, Electronic MOD Valve             | 1   | T161935  |
| 18     | Cover, Electronic Valve, 5.625 x 3.5      | 1   | T26902   |
| 19     | Screw, #10-16, 3/4, PLT, Selfdrill        | 4   | J0469    |

**PIPE TRAIN, EL MOD VALVE, 1-1/2" NATURAL GAS, 250°  
NATURAL GAS - HEATER, CONTINOUS FLOW DRYER  
T25192**



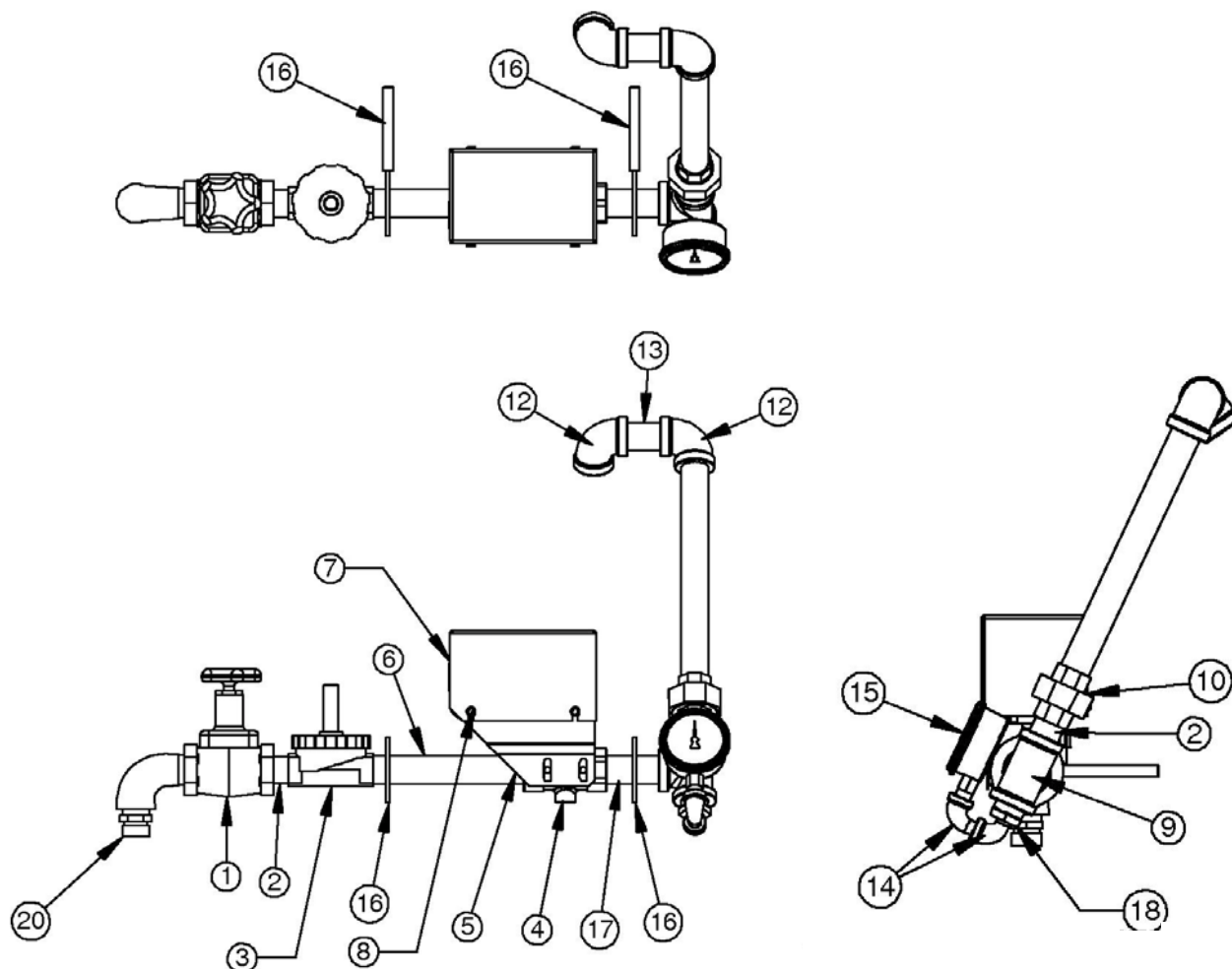
| REF. # | DESCRIPTION                                 | QTY | COMP. # |
|--------|---------------------------------------------|-----|---------|
| 1      | Nipple, 1 1/2" x 7", SCH 40                 | 1   | J2445   |
| 2      | Solnd Assy, Nat. Gas, 1 1/2"                | 1   | T20205  |
| 3      | Nipple, 1 1/2 x 2, SCH 40                   | 1   | J2432   |
| 4      | Valve, Globe, 1-1/2"                        | 1   | J2880   |
| 5      | Elbow, 1-1/2", 90° Sch40                    | 5   | J2541   |
| 6      | Nipple, 1.5 x Close Sch40                   | 4   | J2431   |
| 7      | Union, 1-1/2", Sch40                        | 1   | J2707   |
| 8      | Nipple, 1.5 x 6", Sch40                     | 2   | J2437   |
| 9      | Valve, Butterfly, L/Actuator, 1 1/2", Maxon | 1   | J6127   |
| 10     | Nipple, 1.5 x 3" SCH40                      | 2   | J2433   |
| 11     | Tee, Reduce, 1 1/2 x 1 1/2 x 1/2            | 1   | J2479   |
| 12     | Bushing, Reducing, 1/2 x 1/4                | 1   | J2569   |
| 13     | Gauge, Pressure, 0-15, Liq, 1/4" BTM, MT    | 1   | J5967   |
| 14     | Nipple, 1 1/2 x 2 1/2, SCH 40               | 1   | J24084  |
| 15     | Elbow, Street, 1.5", 90 Deg, SCH 40         | 1   | J2542   |
| 16     | Bushing, Reducing, 1.50 x 1.00, Black       | 1   | J2581   |
| 17     | Bracket, Electronic MOD Valve               | 1   | T161935 |
| 18     | Cover, Electronic Valve, 5.625 x 3.5        | 1   | T26902  |
| 19     | Screw, #10-16, 3/4, PLT, Selfdrill          | 4   | J0469   |

**PIPE TRAIN, EL MOD VALVE, 1-1/2" & 2"  
NATURAL GAS - T25194**



| REF. # | DESCRIPTION                                | QTY | COMP. #  |
|--------|--------------------------------------------|-----|----------|
| 1      | Nipple, 1 1/2" x 7", SCH 40                | 1   | J2445    |
| 2      | Solenoid Assembly, Natural Gas, 1-1/2"     | 1   | T20205   |
| 3      | Nipple, 1 1/2 x 2, SCH 40                  | 1   | J2432    |
| 4      | Valve, Globe, 1-1/2"                       | 1   | J2880    |
| 5      | Elbox, Street, 1.5", 90 Deg, SCH 40        | 3   | J2542    |
| 6      | Elbow, 1-1/2", 90° Sch40                   | 4   | J2541    |
| 7      | Nipple, 1.5xClose SCH40                    | 1   | J2431    |
| 8      | Union, 1-1/2", Sch40                       | 2   | J2707    |
| 9      | Nipple, 1.5 x 6" Sch40                     | 3   | J2437    |
| 10     | Valve, Butterfly & Actuator, 1 1/2", Maxon | 1   | J6127-02 |
| 11     | Nipple, 1.5 x 3", SCH 40                   | 2   | J2433    |
| 12     | Tee, Reduce, 1 1/2 x 1 1/2 x 1/2           | 1   | J2479    |
| 13     | Bushing, Reducing, 1/2 x 1/4"              | 1   | J2569    |
| 14     | Gauge, Pressure, 0-30, Liquid, 1/4BTM, MT  | 1   | J5967    |
| 15     | Nipple, 1 1/2 x 2 1/2, SCH 40              | 1   | J24084   |
| 16     | Bushing, Reducing, 1.50 x 1.00, Black      | 1   | J2581    |
| 17     | Bracket, Electronic MOD Valve              | 1   | T161935  |
| 18     | Cover, Electronic Valve, 5.625 x 3.5       | 1   | T26902   |
| 19     | Screw, #10-16, 3/4, PLT, Selfdrill         | 4   | J0469    |

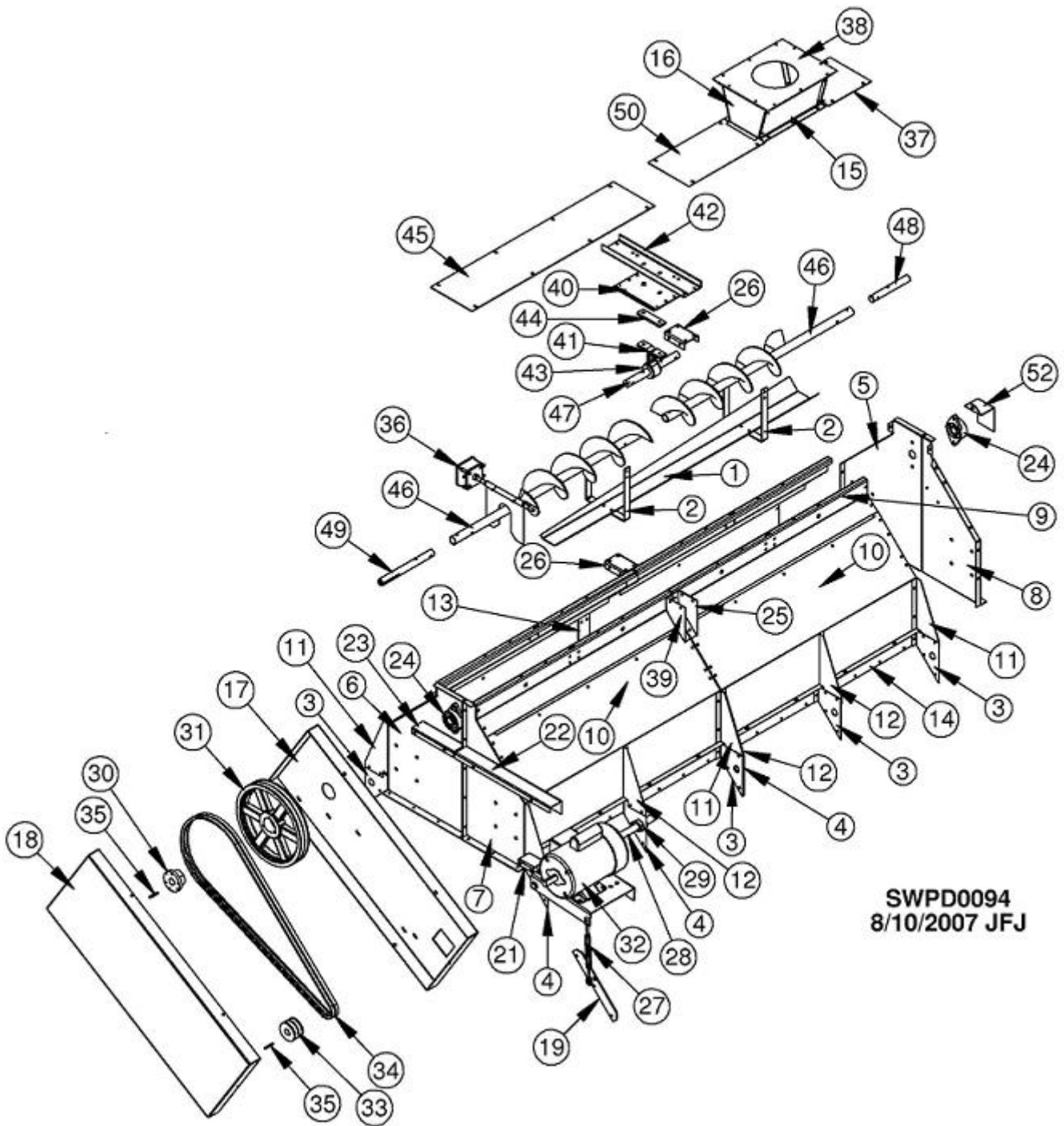
**PIPE TRAIN, EL MOD VALVE, 3/4"**  
**Continuous flow Dryer**  
**T24172M**



| REF. # | DESCRIPTION                               | QTY | COMP. # |
|--------|-------------------------------------------|-----|---------|
| 1      | Valve, Globe, 3/4"                        | 1   | J2875   |
| 2      | Nipple, 3/4" x Close                      | 2   | J2410   |
| 3      | Valve, Solenoid, Body, 3/4, GP600         | 1   | J6264   |
| 4      | Valve, Butterfly, L/Actuator, 3/4, Maxon  | 1   | J6126   |
| 5      | Bracket, Electronic MOD Valve             | 1   | T161935 |
| 6      | Nipple, 3/4 x 6 1/2", SCH 40              | 1   | J2427   |
| 7      | Cover, Electronic Valve, 5.625 x 3.5      | 1   | T26902  |
| 8      | Screw, #10-16, 3/4, PLT, Selfdrill        | 4   | J0469   |
| 9      | Tee, 3/4 x 3/4x 3/4, Sch40                | 1   | J2485   |
| 10     | Union, 3/4, Black, #150                   | 1   | J2710   |
| 11     | Nipple, 3/4 x 10", SCH80                  | 1   | J2429   |
| 12     | Elbow, 3/4, 90°, SCH40                    | 2   | J2525   |
| 13     | Nipple, 3/4 x 2, SCH40                    | 1   | J2420   |
| 14     | Elbow, Street, 1/4, 90° SCH40             | 2   | J2517   |
| 15     | Gauge, Pressure, 0-30, Liquid, 1/4BTM, MT | 1   | J5967   |
| 16     | Eyebolt, Pipe Train                       | 2   | T16224  |
| 17     | Nipple, 3/4 x 3, SCH40                    | 1   | J2423   |
| 18     | Bushing, Reducing, 3/4 x 1/4, SCH40       | 1   | J2570   |
| 19     | Elbow, Street, 3/4", 90 Deg, SCH40        | 1   | J2530   |
| 20     | Nipple, 3/4 x CLS, BRS, HEX               | 1   | J2416   |

# NOTES

# 8' WET BIN

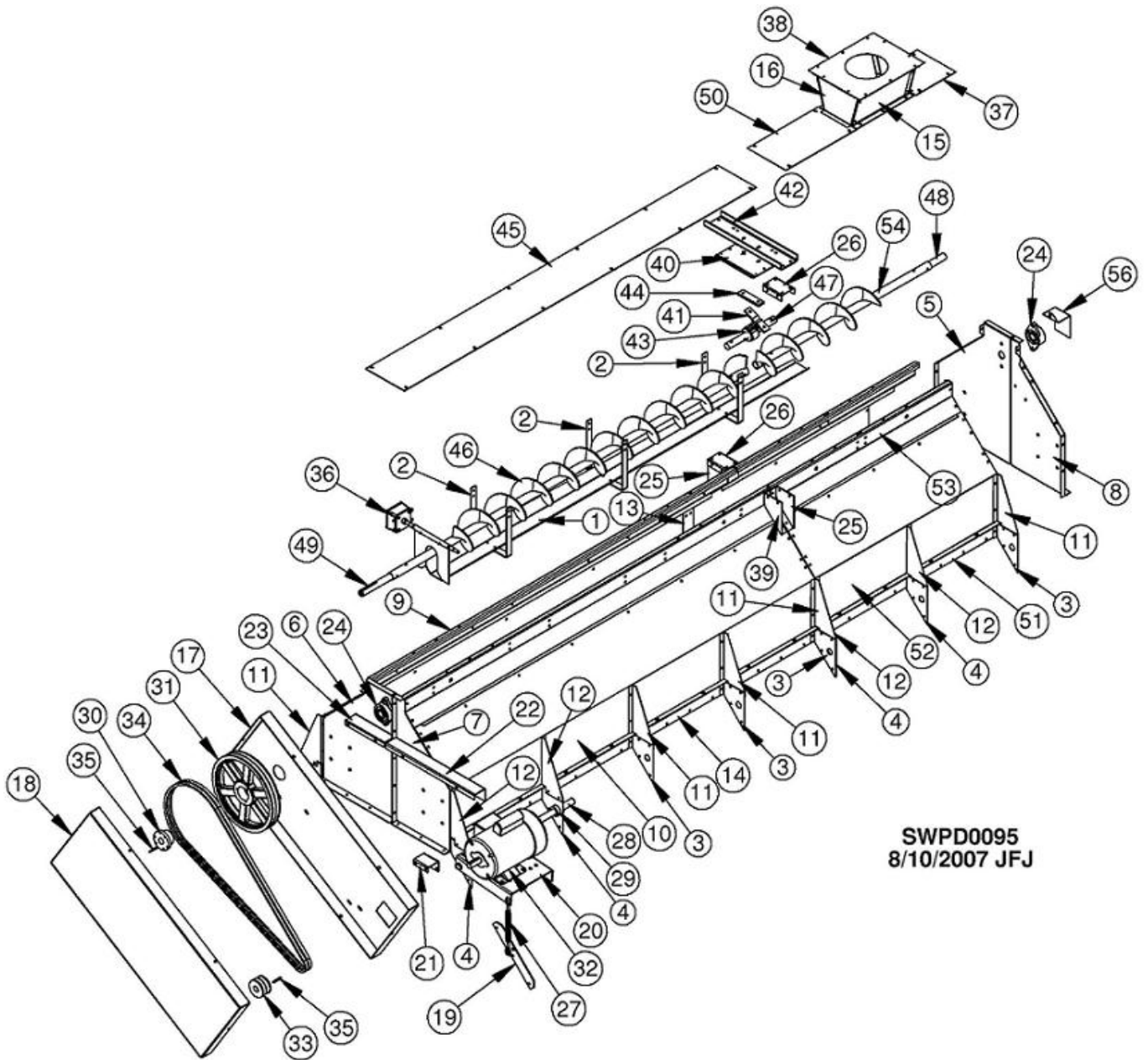


SWPD0094  
8/10/2007 JFJ

## 8' WET BIN

| REF. # | DESCRIPTION                           | QTY | COMP. # |
|--------|---------------------------------------|-----|---------|
| 1      | Trash Pan                             | 1   | T10235  |
| 2      | Support, Trash Pan                    | 2   | T16236  |
| 3      | Left Support Gusset                   | 6   | T16117  |
| 4      | Right Support Gusset                  | 6   | T16118  |
| 5      | RR Wet Bin End Plate                  | 1   | T17401  |
| 6      | RF Wet Bin End Plate                  | 1   | T17400  |
| 7      | LF Wet Bin End Plate                  | 1   | T17402  |
| 8      | LR Wet Bin End Plate                  | 1   | T17403  |
| 9      | Top 4' Panel (Fill Switch)            | 4   | T12537  |
| 10     | Side, Wet Bin, 4FT 2000               | 4   | T12525  |
| 11     | LT Pivot Brace Wet Bin                | 4   | T17410  |
| 12     | RT Pivot Brace Wet Bin                | 8   | T17411  |
| 13     | Splice, Wet Bin Side                  | 2   | T17412  |
| 14     | Bolt Down Lip 8' 2000                 | 2   | T17453  |
| 15     | Hopper Side                           | 2   | T17935  |
| 16     | Hopper End                            | 2   | T17936  |
| 17     | Top Auger Shield (Inner)              | 1   | T16256  |
| 18     | Top Auger Shield (Outer)              | 1   | T16255  |
| 19     | Plate, Turnbuckle, Motor Mount        | 1   | T16283  |
| 20     | Top Motor Mount                       | 1   | T16277  |
| 21     | Top Shield Brace                      | 1   | T16258  |
| 22     | Bracket, LF Top auger Shield          | 1   | T16861  |
| 23     | Bracket, RF top Auger Shield          | 1   | T16860  |
| 24     | Bearing, 1.25, FLG, W/LC, HCFTS207-20 | 2   | J0010   |
| 25     | Splice Gusset Right                   | 2   | T16145  |
| 26     | Splice Channel Short                  | 2   | T16146  |
| 27     | Turnbuckle, 3/8" x 6"                 | 1   | J0904   |
| 28     | Pivot, Motor Mount, Top               | 1   | T18150  |
| 29     | Collar, Shaft, 1-3/16"                | 2   | J1338   |
| 30     | Bushing, 1.25, SK                     | 1   | J0410   |
| 31     | Pulley, 15.75 OD, DBL "B" Gr, SK      | 1   | J03992  |
| 32     | MTR, Auger 3HP, TEFC,                 | 1   | T12590  |
| 33     | Pulley, 3.5 OD, 1.25, DBL, B, Cast    | 1   | J0317   |
| 34     | Belt, B95                             | 2   | J0252   |
| 35     | Key, 1/4 x 1/4 x 2"                   | 2   | F4499   |
| 36     | Paddle, Assembly                      | 1   | T16262  |
| 37     | Lid, Extension, wet Bin               | 1   | T16159  |
| 38     | Cover, Hopper                         | 1   | T17937  |
| 39     | Splice Gusset Left                    | 2   | T16144  |
| 40     | Crimp Plate                           | 1   | T16142  |
| 41     | Hanger, Auger, T, 6CH2203             | 1   | J0097   |
| 42     | Splice Channel                        | 1   | T16143  |
| 43     | Bushing, Wood, 1.25" ID               | 1   | J0096   |
| 44     | Spacer, T-Hanger, Top auger           | 1   | T16096  |
| 45     | Lid, Wet Holding Bin                  | 1   | T08100  |
| 46     | 4' Rear, Top auger                    | 2   | T12503  |
| 47     | Shaft, 8" Hanger Bearing              | 1   | F4720   |
| 48     | Shaft, 1.25" x 9" LG                  | 1   | G73291  |
| 49     | Shaft, Top Front, 12 3/4"             | 1   | T16436  |
| 50     | Lid, Bin, Wet HLD. 12'                | 1   | T12519  |
| 51     | Plate, Short Splice                   | 2   | T16141  |
| 52     | Rear Shaft Shield                     | 1   | T16420  |

# 12' WET BIN

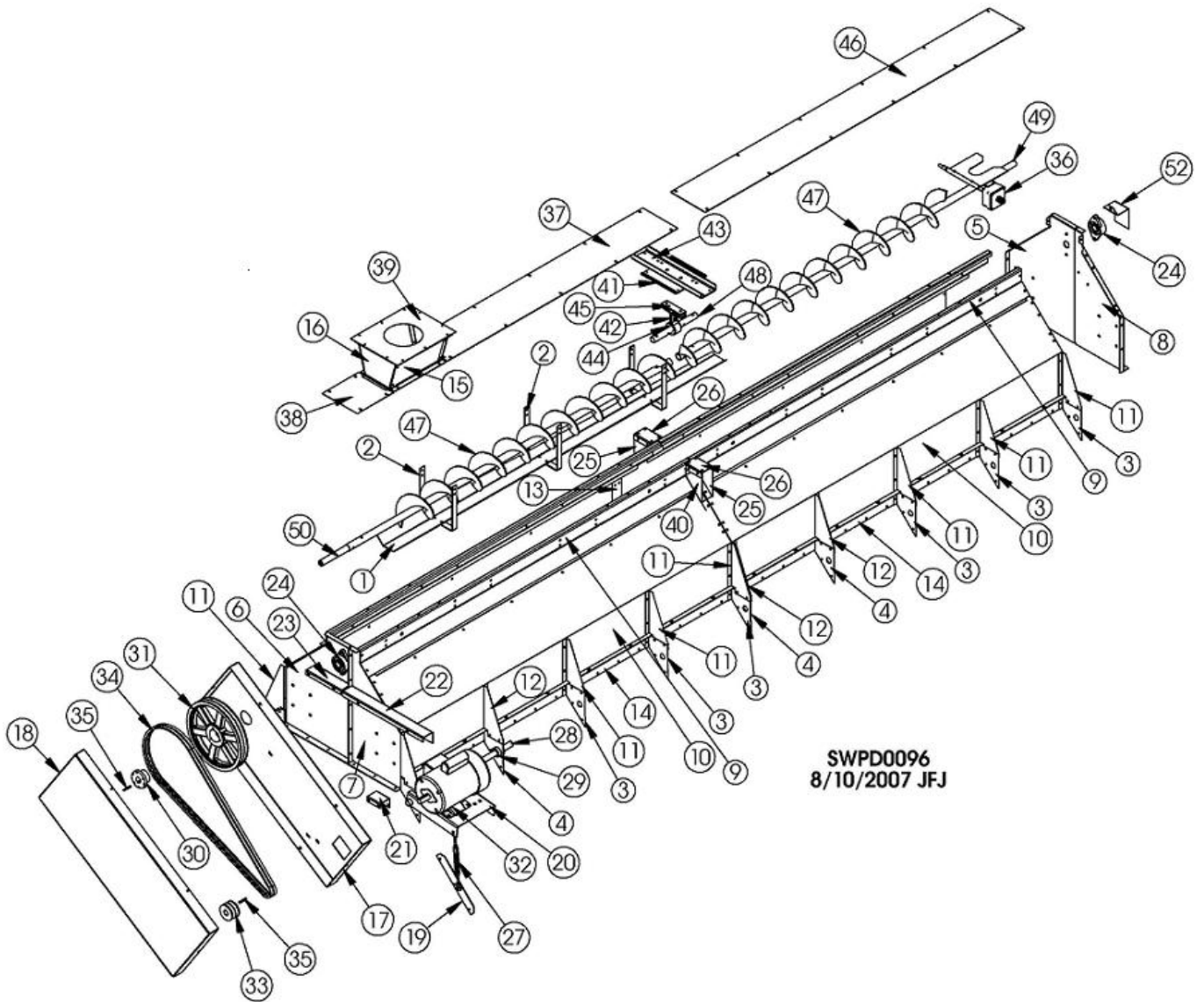


SWPD0095  
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## 12' WET BIN

| REF. # | DESCRIPTION                           | QTY | COMP. # |
|--------|---------------------------------------|-----|---------|
| 1      | Trash Pan                             | 1   | T16235  |
| 2      | Support, Trash Pan                    | 3   | T16236  |
| 3      | Left Support Gusset                   | 8   | T16117  |
| 4      | Right Support Gusset                  | 8   | T16118  |
| 5      | RR Wet Bin End Plate                  | 1   | T17401  |
| 6      | RF Wet Bin End Plate                  | 1   | T17400  |
| 7      | LF Wet Bin End Plate                  | 1   | T17402  |
| 8      | LR Wet Bin End Plate                  | 1   | T17403  |
| 9      | Top 8' Panel (Fill switch)            | 2   | T17457  |
| 10     | Wet Bin Side Perforated (Stainless)   | 2   | T17450S |
|        | Wet Bin Side Perforated (Galvanized)  | 2   | T17450  |
| 11     | LT Pivot Brace Wet Bin                | 8   | T17410  |
| 12     | RT Pivot Brace Wet Bin                | 8   | T17411  |
| 13     | Splice, Wet Bin Side                  | 2   | T17412  |
| 14     | Bolt Down Lip 8' 2000                 | 2   | T17453  |
| 15     | Hopper Side                           | 2   | T17935  |
| 16     | Hopper End                            | 2   | T17936  |
| 17     | Top Auger Shield (Inner)              | 1   | T16256  |
| 18     | Top Auger Shield (Outer)              | 1   | T16255  |
| 19     | Plate, Turnbuckle, Connector          | 1   | T16283  |
| 20     | Top Motor Mount                       | 1   | T16277  |
| 21     | Top Shield Brace                      | 1   | T16258  |
| 22     | Bracket, LF Top auger Shield          | 1   | T16861  |
| 23     | Bracket, RF top Auger Shield          | 1   | T16860  |
| 24     | Bearing, 1.25, FLG, W/LC, HCFTS207-20 | 2   | J0010   |
| 25     | Splice Gusset Right                   | 2   | T16145  |
| 26     | Splice Channel Short                  | 2   | T16146  |
| 27     | Turnbuckle, 3/8" x 6"                 | 1   | J0904   |
| 28     | Pivot, Motor Mount, Top               | 1   | T18150  |
| 29     | Collar, Shaft, 1-3/16"                | 2   | J1338   |
| 30     | Bushing, 1.25, SK                     | 1   | J0410   |
| 31     | Pulley, 15.75 OD, DBL "B" Gr, SK      | 1   | J03992  |
| 32     | MTR, Auger 3HP, 1ph, TEFC,            | 1   | T12590  |
|        | MTR, Auger 3HP, 3ph, TEFC             | 1   | H3345   |
| 33     | Pulley, 3.5 OD, 1.25, DBL, B, Cast    | 1   | J0317   |
| 34     | Belt, B95                             | 2   | J0252   |
| 35     | Key, 1/4 x 1/4 x 2"                   | 2   | F4499   |
| 36     | Paddle, Assembly                      | 1   | T16262  |
| 37     | Lid, Extension, wet Bin               | 1   | T16159  |
| 38     | Cover, Hopper                         | 1   | T17937  |
| 39     | Splice Gusset Left                    | 2   | T16144  |
| 40     | Crimp Plate                           | 1   | T16142  |
| 41     | Hanger, Auger, T, 6CH2203             | 1   | J0097   |
| 42     | Splice Channel                        | 1   | T16143  |
| 43     | Bushing, Wood, 1.25" ID               | 1   | J0096   |
| 44     | Spacer, T-Hanger, Top auger           | 1   | T16096  |
| 45     | Lid, Wet Holding Bin                  | 1   | T16158  |
| 46     | Top auger                             | 1   | T16428  |
| 47     | Stub Shaft                            | 1   | F4720   |
| 48     | Bottom Auger Shaft                    | 1   | G73291  |
| 49     | Auger Shaft, Top Front                | 1   | T16436  |
| 50     | Lid, Bin, Wet HLD. 12"                | 1   | T12519  |
| 51     | Bolt Down Lip, 4'                     | 2   | T12524  |
| 52     | Side, Wet Bin 4' (Galvanized)         | 2   | T12525  |
|        | Side, Wet Bin 4' (Stainless)          | 2   | T12525S |
| 53     | Top 4' Panel (Fill switch)            | 2   | T12537  |
| 54     | 4' Rear, Top Auger                    | 1   | T12503  |
| 55     | Plate, Short Splice                   | 2   | T16141  |
| 56     | Rear Shaft Shield                     | 1   | T16420  |

# 16' WET BIN

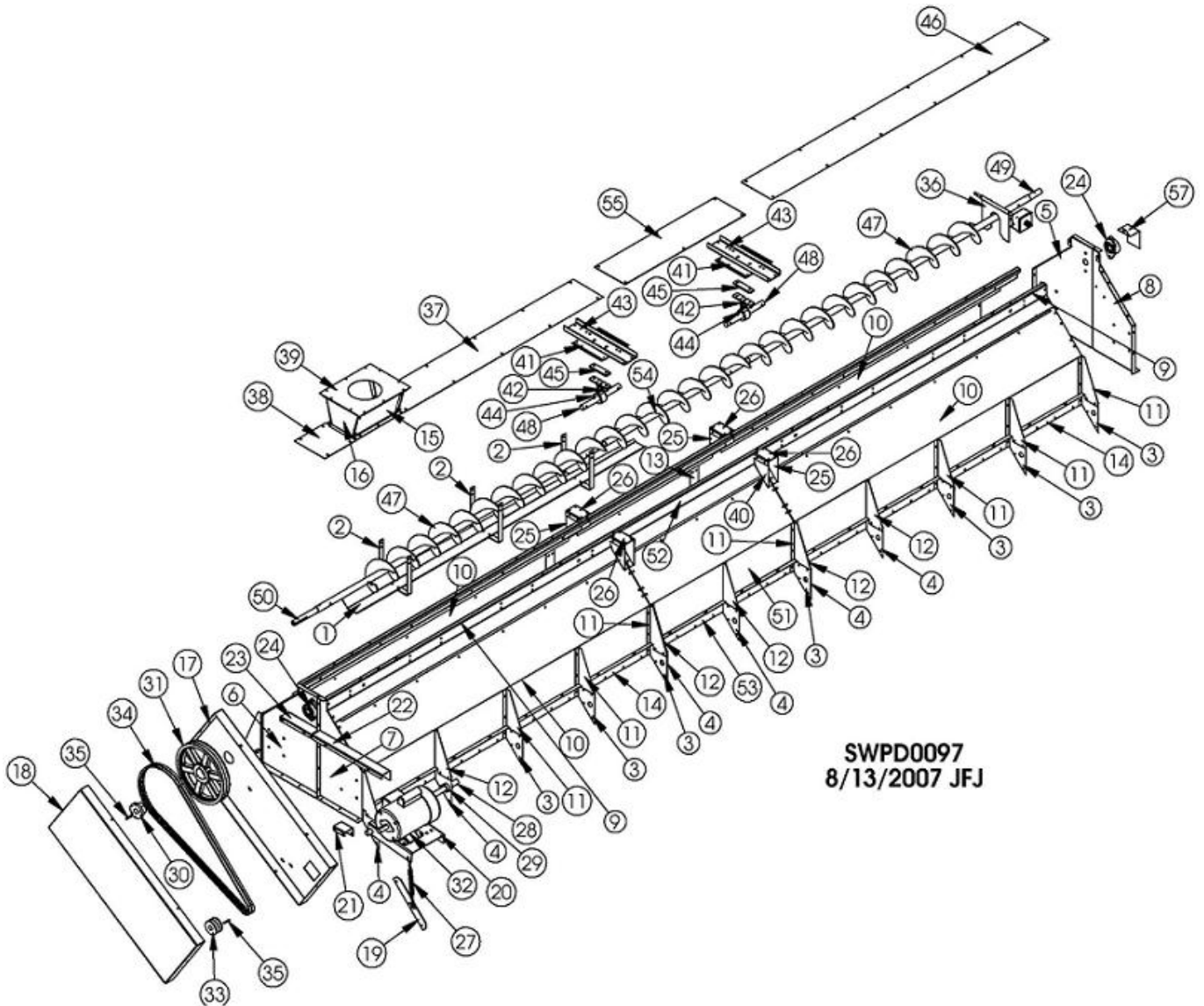


SWPD0096  
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## 16' WET BIN

| REF. # | DESCRIPTION                             | QTY | COMP. # |
|--------|-----------------------------------------|-----|---------|
| 1      | Trash Pan                               | 1   | T16235  |
| 2      | Support, Trash Pan                      | 3   | T16236  |
| 3      | Left Support Gusset                     | 12  | T16117  |
| 4      | Right Support Gusset                    | 8   | T16118  |
| 5      | RR Wet Bin End Plate                    | 1   | T17401  |
| 6      | RF Wet Bin End Plate                    | 1   | T17400  |
| 7      | LF Wet Bin End Plate                    | 1   | T17402  |
| 8      | LR Wet Bin End Plate                    | 1   | T17403  |
| 9      | Top 8' Panel (Fill switch)              | 4   | T17457  |
| 10     | Wet Bin Side Perf, (Stainless)          | 4   | T17450S |
|        | Wet Bin Side Perf, (Galvanized)         | 4   | T17450  |
| 11     | LT Pivot Brace Wet Bin                  | 12  | T17410  |
| 12     | RT Pivot Brace Wet Bin                  | 8   | T17411  |
| 13     | Splice, Wet Bin Side                    | 2   | T17412  |
| 14     | Bolt Down Lip 8', 2000                  | 4   | T17453  |
| 15     | Hopper Side                             | 2   | T17935  |
| 16     | Hopper End                              | 2   | T17936  |
| 17     | Top Auger Shield (Inner)                | 1   | T16256  |
| 18     | Top Auger Shield (Outer)                | 1   | T16255  |
| 19     | Plate, Turnbuckle, Connector            | 1   | T16283  |
| 20     | Top Motor Mount                         | 1   | T16277  |
| 21     | Top Shield Brace                        | 1   | T16258  |
| 22     | Bracket, LF Top Auger Shield            | 1   | T16861  |
| 23     | Bracket, RF Top Auger Shield            | 1   | T16860  |
| 24     | Bearing, 1.25, FLG, W/LC, HCFTS207 - 20 | 2   | J0010   |
| 25     | Splice Gusset Right                     | 2   | T16145  |
| 26     | Channel, Splice, Short                  | 2   | T16146  |
| 27     | Turnbuckle, 3/8" x 6"                   | 1   | J0904   |
| 28     | Pivot, Motor Mount, Top                 | 1   | T18150  |
| 29     | Collar, Shaft, 1-3/16"                  | 2   | J1338   |
| 30     | Bushing, 1.25 SK                        | 1   | J0410   |
| 31     | Pulley, 15.75OD, Double "B" Gr. SK      | 1   | J03992  |
| 32     | Motor, Auger 3HP, 1ph, TEFC             | 1   | T12590  |
|        | Motor, Auger 3HP, 3ph, TEFC             | 1   | H3345   |
| 33     | Pulley, 3.5 OD, 1.25, Double, B, Cast   | 1   | J0317   |
| 34     | Belt, B95                               | 2   | J0252   |
| 35     | Key, 1/4 x 1/4 x 2                      | 2   | F4499   |
| 36     | Paddle, Assembly                        | 1   | T16262  |
| 37     | Lid, Wet Holding Bin                    | 1   | T16157  |
| 38     | Lid, 10.5", Extension, Wet Bin          | 1   | T16159  |
| 39     | Cover, Hopper                           | 1   | T17937  |
| 40     | Splice Gusset Left                      | 2   | T16144  |
| 41     | Crimp Plate                             | 1   | T16142  |
| 42     | Hanger, Auger, T, 6CH2203               | 1   | J0097   |
| 43     | Splice Channel                          | 1   | T16143  |
| 44     | Bushing, Wood, 1.25" ID                 | 1   | J0096   |
| 45     | Spacer, T-Hanger, Top auger             | 1   | T16096  |
| 46     | Lid, 92-1/2" Wet Holding Bin            | 1   | T16158  |
| 47     | Top Auger                               | 2   | T16428  |
| 48     | Shaft, 8' Hanger Bearing                | 1   | F4720   |
| 49     | Shaft, 1.25" x 9"                       | 1   | G73291  |
| 50     | Shaft, Top Front, 12-3/4"               | 1   | T16436  |
| 51     | Plate, Short Splice                     | 2   | T16141  |
| 52     | Rear Shaft Shield                       | 1   | T16420  |

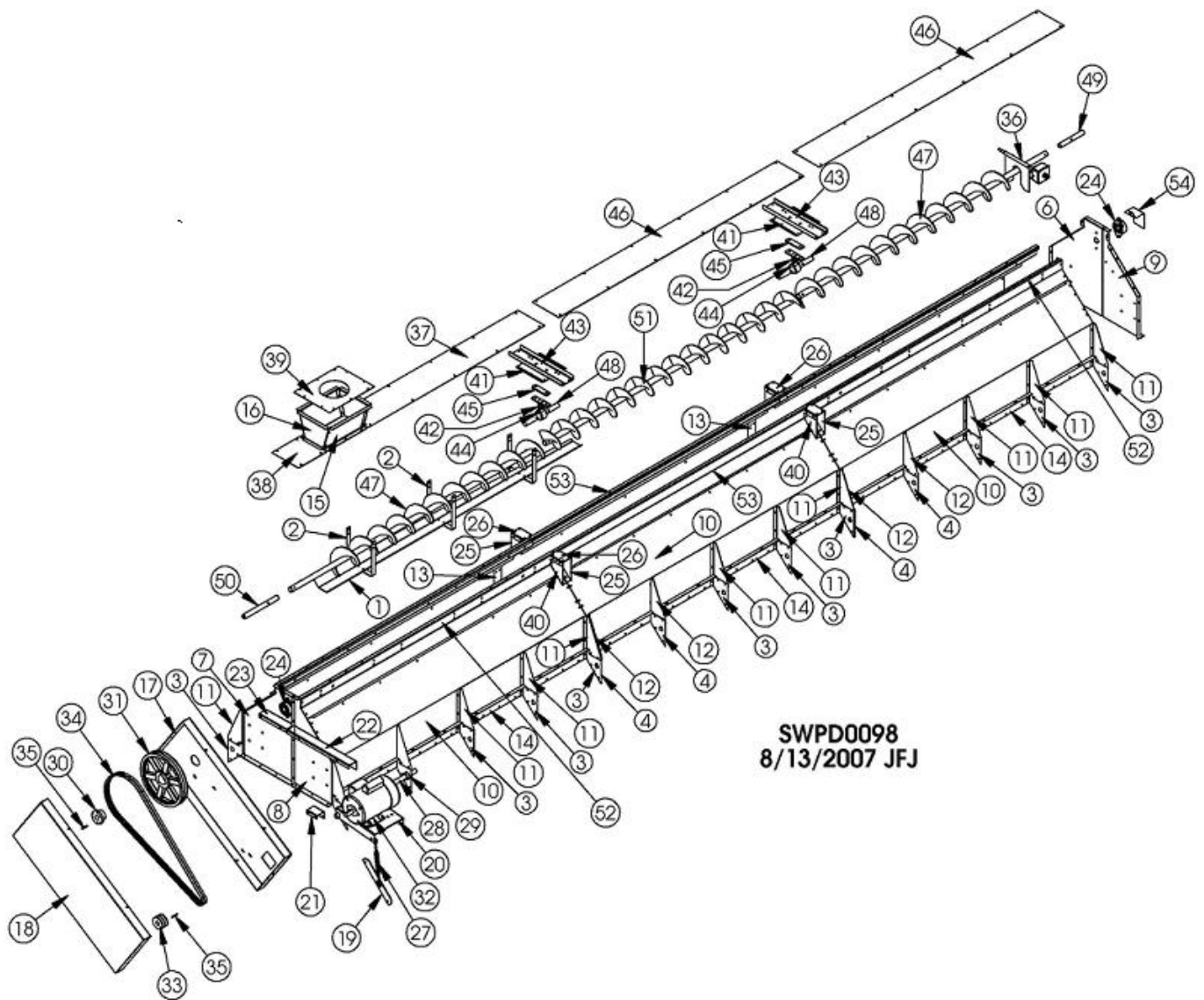
## 20' WET BIN



## 20' WET BIN

| REF. # | DESCRIPTION                             | QTY | COMP. # |
|--------|-----------------------------------------|-----|---------|
| 1      | Trash Pan                               | 1   | T16235  |
| 2      | Support, Trash Pan                      | 3   | T16236  |
| 3      | Left Support Gusset                     | 14  | T16117  |
| 4      | Right Support Gusset                    | 12  | T16118  |
| 5      | RR Wet Bin End Plate                    | 1   | T17401  |
| 6      | RF Wet Bin End Plate                    | 1   | T17400  |
| 7      | LF Wet Bin End Plate                    | 1   | T17402  |
| 8      | LR Wet Bin End Plate                    | 1   | T17403  |
| 9      | Top 8' Panel (Fill Switch)              | 4   | T17457  |
| 10     | Wet Bin Side Perf, (Stainless)          | 4   | T17450S |
|        | Wet Bin Side Perf, (Galvanized)         | 4   | T17450  |
| 11     | LT Pivot Brace Wet Bin                  | 14  | T17410  |
| 12     | RT Pivot Brace Wet Bin                  | 12  | T17411  |
| 13     | Splice, Wet Bin Side                    | 4   | T17412  |
| 14     | Bolt Down Lip 8', 2000                  | 4   | T17453  |
| 15     | Hopper Side                             | 2   | T17935  |
| 16     | Hopper End                              | 2   | T17936  |
| 17     | Top Auger Shield (Inner)                | 1   | T16256  |
| 18     | Top Auger Shield (Outer)                | 1   | T16255  |
| 19     | Plate, Turnbuckle, Connector            | 1   | T16283  |
| 20     | Top Motor Mount                         | 1   | T16277  |
| 21     | Top Shield Brace                        | 1   | T16258  |
| 22     | Bracket, LF Top Auger Shield            | 1   | T16861  |
| 23     | Bracket, RF Top Auger Shield            | 1   | T16860  |
| 24     | Bearing, 1.25, FLG, W/LC, HCFTS207 - 20 | 2   | J0010   |
| 25     | Splice Gusset Right                     | 4   | T16145  |
| 26     | Channel, Splice, Short                  | 4   | T16146  |
| 27     | Turnbuckle, 3/8" x 6"                   | 1   | J0904   |
| 28     | Pivot, Motor Mount, Top                 | 1   | T18150  |
| 29     | Collar, Shaft, 1-3/16"                  | 2   | J1338   |
| 30     | Bushing, 1.25 SK                        | 1   | J0410   |
| 31     | Pulley, 15.75OD, Double "B" Gr. SK      | 1   | J03992  |
| 32     | Motor, Auger 5HP, 1ph, TEFC             | 1   | T20590  |
|        | Motor, Auger 5HP, 3ph, TEFC             | 1   | H4190   |
| 33     | Pulley, 3.5 OD, 1.25, Double, B, Cast   | 1   | J0317   |
| 34     | Belt, B95                               | 2   | J0252   |
| 35     | Key, 1/4 x 1/4 x 2                      | 2   | F4499   |
| 36     | Paddle, Assembly                        | 1   | T16262  |
| 37     | Lid, Wet Holding Bin                    | 1   | T16157  |
| 38     | Lid, 10.5", Extension, Wet Bin          | 1   | T16159  |
| 39     | Cover, Hopper                           | 1   | T17937  |
| 40     | Splice Gusset Left                      | 4   | T16144  |
| 41     | Crimp Plate                             | 2   | T16142  |
| 42     | Hanger, Auger, T, 6CH2203               | 2   | J0097   |
| 43     | Splice Channel                          | 2   | T16143  |
| 44     | Bushing, Wood, 1.25" ID                 | 2   | J0096   |
| 45     | Spacer, T-Hanger, Top auger             | 2   | T16096  |
| 46     | Lid, 92-1/2" Wet Holding Bin            | 1   | T16158  |
| 47     | Top Auger                               | 2   | T16428  |
| 48     | Shaft, 8' Hanger Bearing                | 2   | F4720   |
| 49     | Shaft, 1.25" x 9"                       | 1   | G73291  |
| 50     | Shaft, Top Front, 12-3/4"               | 1   | T16436  |
| 51     | Side, Wet Bin, 4', 2000                 | 2   | T12525  |
| 52     | Top 4' Panel (LR) 12'                   | 2   | T20526  |
| 53     | Bolt Down Lip, 4'                       | 2   | T12524  |
| 54     | Top Middle Auger 20'                    | 1   | T16427  |
| 55     | Lid, Wet Holding Bin 20'                | 1   | T20158  |
| 56     | Plate, Short Splice                     | 4   | T16141  |
| 57     | Rear Shaft Shield                       | 1   | T16420  |

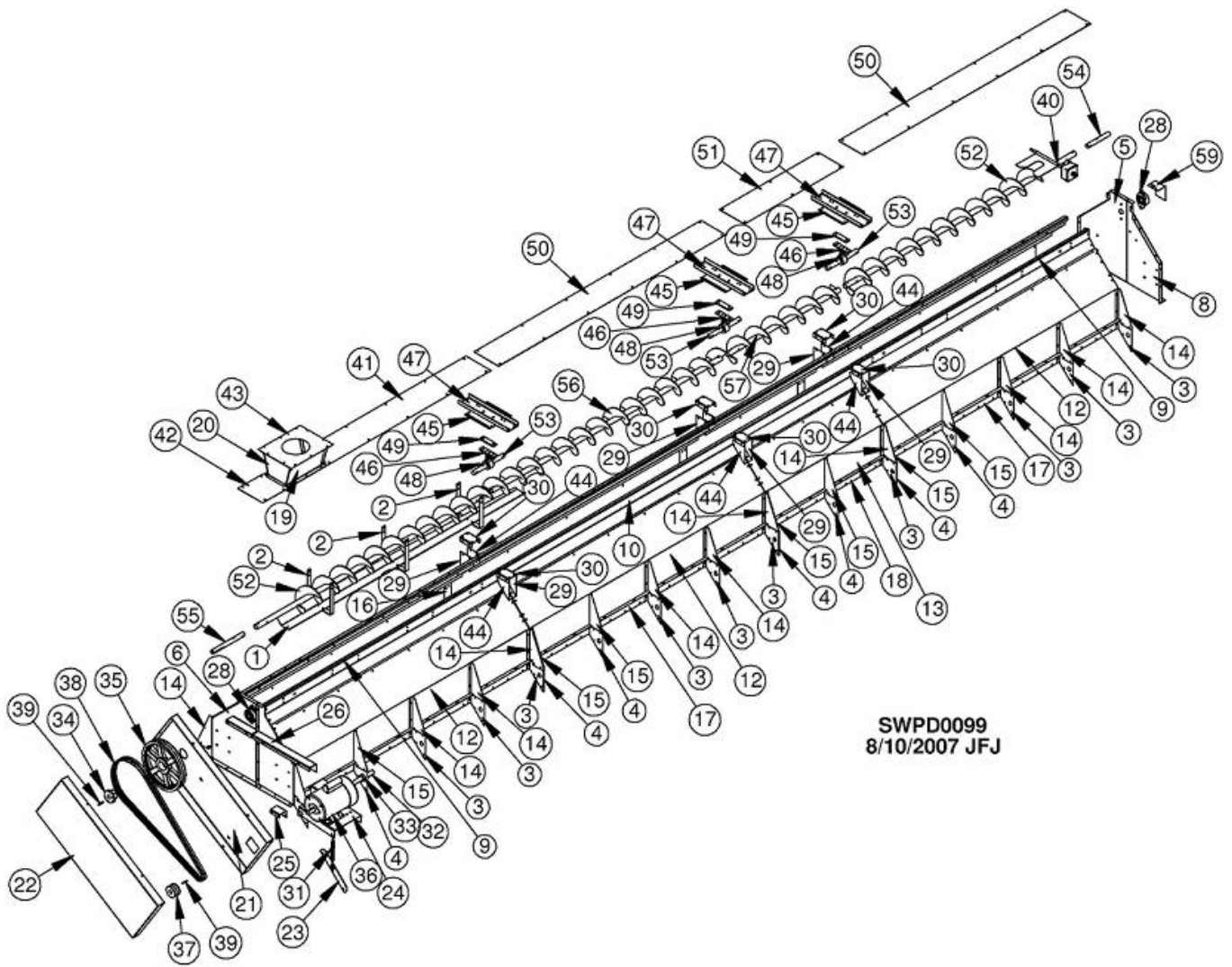
## 24' WET BIN



## 24' WET BIN

| REF. # | DESCRIPTION                             | QTY | COMP. # |
|--------|-----------------------------------------|-----|---------|
| 1      | Trash Pan                               | 1   | T16235  |
| 2      | Support, Trash Pan                      | 3   | T16236  |
| 3      | Left Support Gusset                     | 17  | T16117  |
| 4      | Right Support Gusset                    | 13  | T16118  |
| 5      | Plate, Short Splice                     | 4   | T16141  |
| 6      | RR Wet Bin End Plate                    | 1   | T17401  |
| 7      | RF Wet Bin End Plate                    | 1   | T17400  |
| 8      | LF Wet Bin End Plate                    | 1   | T17402  |
| 9      | LR Wet Bin End Plate                    | 1   | T17403  |
| 10     | Wet Bin Side Perf, (Stainless)          | 6   | T17450S |
|        | Wet Bin Side Perf, (Galvanized)         | 6   | T17450  |
| 11     | LT Pivot Brace Wet Bin                  | 17  | T17410  |
| 12     | RT Pivot Brace Wet Bin                  | 13  | T17411  |
| 13     | Splice, Wet Bin Side                    | 4   | T17412  |
| 14     | Bolt Down Lip 8', 2000                  | 6   | T17453  |
| 15     | Hopper Side                             | 2   | T17935  |
| 16     | Hopper End                              | 2   | T17936  |
| 17     | Top Auger Shield (Inner)                | 1   | T16256  |
| 18     | Top Auger Shield (Outer)                | 1   | T16255  |
| 19     | Plate, Turnbuckle, Connector            | 1   | T16283  |
| 20     | Top Motor Mount                         | 1   | T16277  |
| 21     | Top Shield Brace                        | 1   | T16258  |
| 22     | Bracket, LF Top Auger Shield            | 1   | T16861  |
| 23     | Bracket, RF Top Auger Shield            | 1   | T16860  |
| 24     | Bearing, 1.25, FLG, W/LC, HCFTS207 - 20 | 2   | J0010   |
| 25     | Splice Gusset Right                     | 4   | T16145  |
| 26     | Channel, Splice, Short                  | 4   | T16146  |
| 27     | Turnbuckle, 3/8" x 6"                   | 1   | J0904   |
| 28     | Pivot, Motor Mount, Top                 | 1   | T18150  |
| 29     | Collar, Shaft, 1-3/16"                  | 2   | J1338   |
| 30     | Bushing, 1.25 SK                        | 1   | J0410   |
| 31     | Pulley, 15.75OD, Double "B" Gr. SK      | 1   | J03992  |
| 32     | Motor, Auger 5HP, 1ph, TEFC             | 1   | T20590  |
|        | Motor, Auger 5HP, 3ph, TEFC             | 1   | H4190   |
| 33     | Pulley, 3.5 OD, 1.25, Double, B, Cast   | 1   | J0317   |
| 34     | Belt, B95                               | 2   | J0252   |
| 35     | Key, 1/4 x 1/4 x 2                      | 2   | F4499   |
| 36     | Paddle, Assembly                        | 1   | T16262  |
| 37     | Lid, Wet Holding Bin                    | 1   | T16157  |
| 38     | Lid, 10.5", Extension, Wet Bin          | 1   | T16159  |
| 39     | Cover, Hopper                           | 1   | T17937  |
| 40     | Splice Gusset Left                      | 4   | T16144  |
| 41     | Crimp Plate                             | 2   | T16142  |
| 42     | Hanger, Auger, T, 6CH2203               | 2   | J0097   |
| 43     | Splice Channel                          | 2   | T16143  |
| 44     | Bushing, Wood, 1.25" ID                 | 2   | J0096   |
| 45     | Spacer, T-Hanger, Top auger             | 2   | T16096  |
| 46     | Lid, 92-1/2" Wet Holding Bin            | 2   | T16158  |
| 47     | Top Auger                               | 2   | T16428  |
| 48     | Shaft, 8' Hanger Bearing                | 2   | F4720   |
| 49     | Shaft, 1.25" x 9"                       | 1   | G73291  |
| 50     | Shaft, Top Front, 12-3/4"               | 1   | T16436  |
| 51     | Auger, Bottom Front, 93-1/2"            | 1   | T16430  |
| 52     | Top 8' Panel (Fill Switch)              | 4   | T17457  |
| 53     | Top 8' Panel (LR&RF) 2000               | 2   | T24451  |
| 54     | Rear Shaft Shield                       | 1   | T16420  |

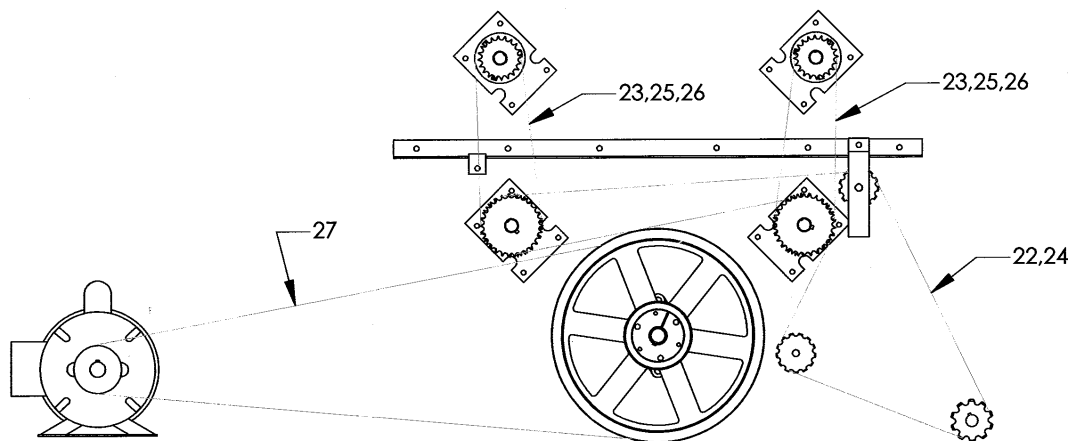
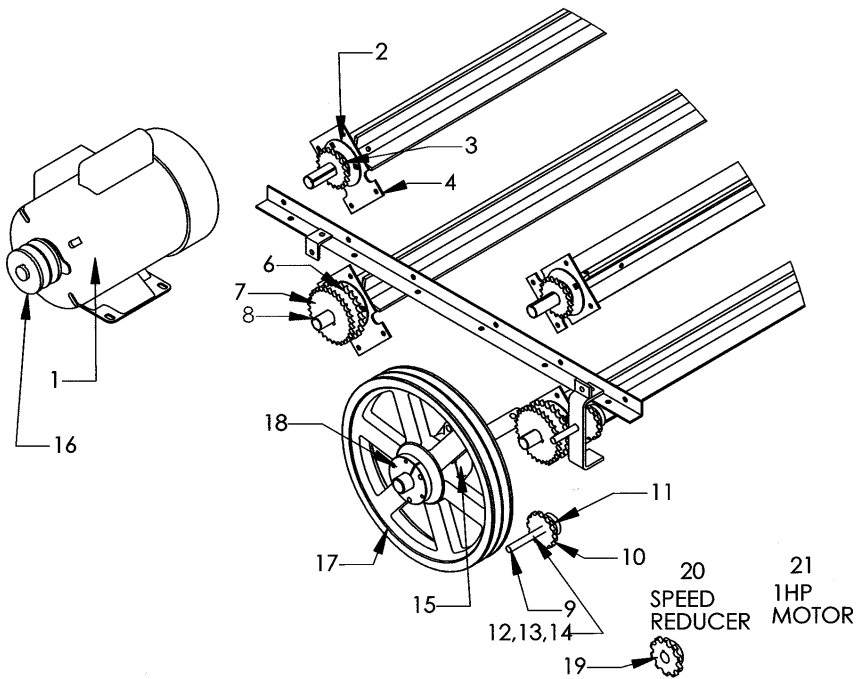
## 28' WET BIN



## 28' WET BIN

| REF. # | DESCRIPTION                             | QTY | COMP. # |
|--------|-----------------------------------------|-----|---------|
| 1      | Trash Pan                               | 1   | T16235  |
| 2      | Support, Trash Pan                      | 3   | T16236  |
| 3      | Left Support Gusset                     | 20  | T16117  |
| 4      | Right Support Gusset                    | 16  | T16118  |
| 5      | RR Wet Bin End Plate                    | 1   | T17401  |
| 6      | RF Wet Bin End Plate                    | 1   | T17400  |
| 7      | LF Wet Bin End Plate                    | 1   | T17402  |
| 8      | LR Wet Bin End Plate                    | 1   | T17403  |
| 9      | Top 8' Panel (Fill Switchj)             | 4   | T17457  |
| 10     | Top 8' Panel (LR & RF) 2000             | 2   | T24451  |
| 11     | Top 4' Panel (LR) 12FT 2000             | 2   | T20526  |
| 12     | Wet Bin Side Perf, (Stainless)          | 6   | T17450S |
|        | Wet Bin Side Perf, (Galvanized)         | 6   | T17450  |
| 13     | Side, Wet Bin, 4FT 2000                 | 2   | T12525  |
| 14     | LT Pivot Brace Wet Bin                  | 20  | T17410  |
| 15     | RT Pivot Brace Wet Bin                  | 16  | T17411  |
| 16     | Splice, Wet Bin Side                    | 6   | T17412  |
| 17     | Bolt Down Lip 8', 2000                  | 6   | T17453  |
| 18     | Bolt Down Lip 4', 2000                  | 2   | T12524  |
| 19     | Hopper Side                             | 2   | T17935  |
| 20     | Hopper End                              | 2   | T17936  |
| 21     | Top Auger Shield (Inner)                | 1   | T16256  |
| 22     | Top Auger Shield (Outer)                | 1   | T16255  |
| 23     | Plate, Turnbuckle, Connector            | 1   | T16283  |
| 24     | Top Motor Mount                         | 1   | T16277  |
| 25     | Top Shield Brace                        | 1   | T16258  |
| 26     | Bracket, LF Top Auger Shield            | 1   | T16861  |
| 27     | Bracket, RF Top Auger Shield            | 1   | T16860  |
| 28     | Bearing, 1.25, FLG, W/LC, HCFTS207 - 20 | 2   | J0010   |
| 29     | Splice Gusset Right                     | 6   | T16145  |
| 30     | Channel, Splice, Short                  | 6   | T16146  |
| 31     | Turnbuckle, 3/8" x 6"                   | 1   | J0904   |
| 32     | Pivot, Motor Mount, Top                 | 1   | T18150  |
| 33     | Collar, Shaft, 1-3/16"                  | 2   | J1338   |
| 34     | Bushing, 1.25 SK                        | 1   | J0410   |
| 35     | Pulley, 15.75OD, Double "B" Gr. SK      | 1   | J03992  |
| 36     | Motor, Auger 5HP, 1ph, TEFC             | 1   | T20590  |
|        | Motor, Auger 5HP, 3ph, TEFC             | 1   | H4190   |
| 37     | Pulley, 3.5 OD, 1.25, Double, B, Cast   | 1   | J0317   |
| 38     | Belt, B95                               | 2   | J0252   |
| 39     | Key, 1/4 x 1/4 x 2                      | 2   | F4499   |
| 40     | Paddle, Assembly                        | 1   | T16262  |
| 41     | Lid, Wet Holding Bin                    | 1   | T16157  |
| 42     | Lid, 10.5", Extension, Wet Bin          | 1   | T16159  |
| 43     | Cover, Hopper                           | 1   | T17937  |
| 44     | Splice Gusset Left                      | 6   | T16144  |
| 45     | Crimp Plate                             | 3   | T16142  |
| 46     | Hanger, Auger, T, 6CH2203               | 3   | J0097   |
| 47     | Splice Channel                          | 3   | T16143  |
| 48     | Bushing, Wood, 1.25" ID                 | 3   | J0096   |
| 49     | Spacer, T-Hanger, Top auger             | 3   | T16096  |
| 50     | Lid, 92-1/2" Wet Holding Bin            | 2   | T16158  |
| 51     | Lid, Wet Holding Bin 20FT               | 1   | T20158  |
| 52     | Top Auger                               | 2   | T16428  |
| 53     | Shaft, 8' Hanger Bearing                | 3   | F4720   |
| 54     | Shaft, 1.25" x 9"                       | 1   | G73291  |
| 55     | Shaft, Top Front, 12-3/4"               | 1   | T16436  |
| 56     | Auger, Bottom Front, 93-1/2"            | 1   | T16430  |
| 57     | Top Middle Auger (20FT)                 | 1   | T16427  |
| 58     | Plate, Short Splice                     | 6   | T16141  |
| 59     | Rear Shaft Shield                       | 1   | T16420  |

# DRIVE END OF DRYERS

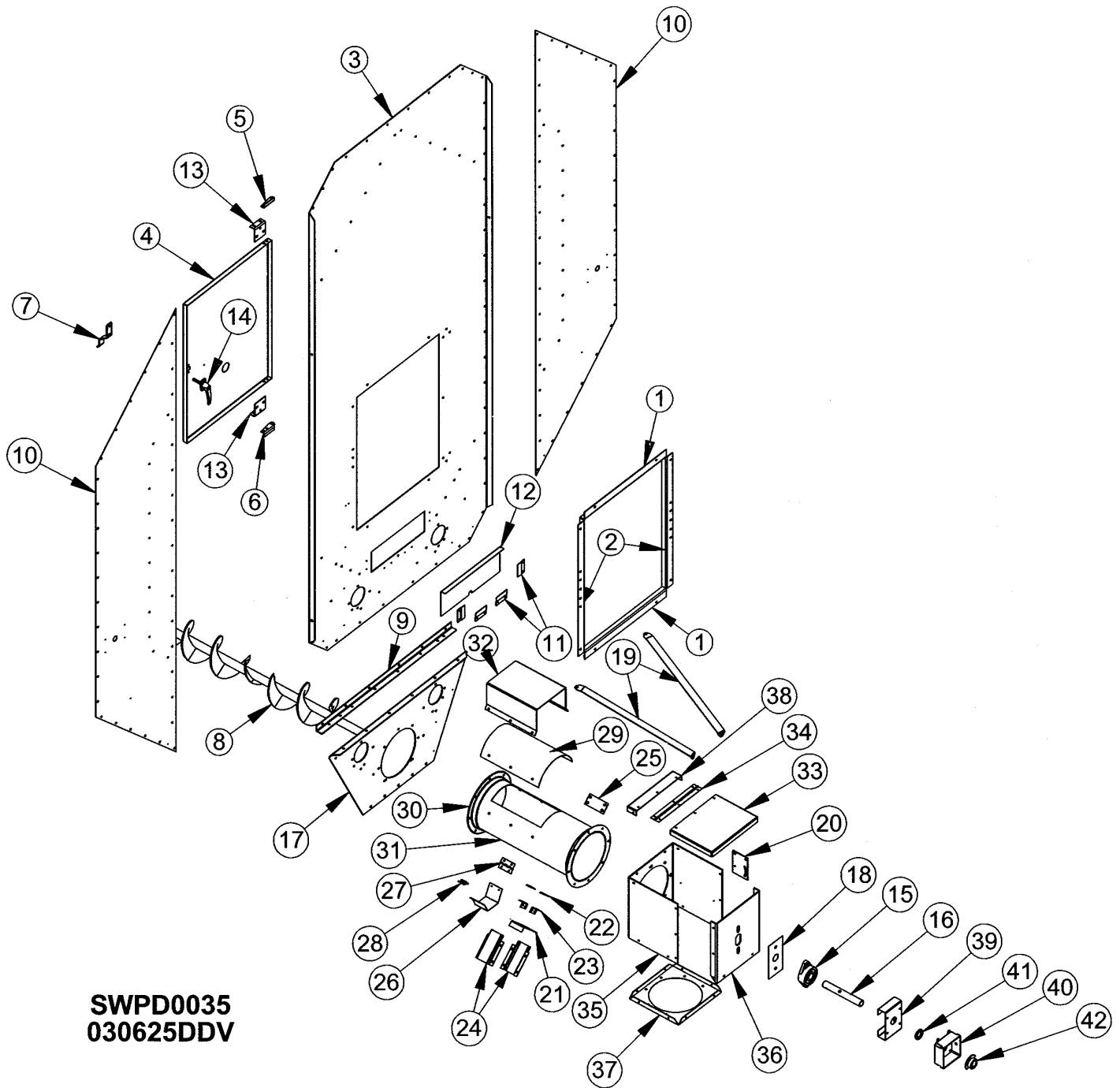


SWPD0014  
010824BDW

## DRIVE END OF DRYERS

| REF. # | DESCRIPTION                           | QTY | COMP. # |
|--------|---------------------------------------|-----|---------|
| 1      | Motor, 3HP, 1ph                       | 1   | T12590  |
|        | Motor, 3HP, 3ph                       | 1   | H3345   |
|        | Motor, 5HP, 1ph                       | 1   | T20590  |
|        | Motor, 5HP, 3ph                       | 1   | H4190   |
| 2      | Flangette, 3 hole for 205 Bearing     | 8   | J0098   |
| 3      | Sprocket, 40B20, 1" Bore              | 2   | J16487  |
| 4      | Meter Plate                           | 4   | T17920  |
| 6      | Sprocket, 50B12, 1" Bore              | 2   | J1678   |
| 7      | Sprocket, 40B30, 1" Bore              | 2   | J1649   |
| 8      | Shaft, Front, Meter Roll              | 4   | T16266  |
| 9      | Screw, 1/2-13, 3, PLTD, Gr. 5, HHCS   | 2   | J0750   |
| 10     | Sprocket, Idler, 50-13                | 2   | J1685   |
| 11     | Spacer, Sprocket, Continuous          | 2   | T16282  |
| 12     | Nut, Hex, 1/2-13, PLT, Gr. 5          | 2   | J1040   |
| 13     | Washer, Lock, 1/2, PLT, Split         | 2   | J1215   |
| 14     | Washer, Flat, 1/2, PLT                | 2   | J1125   |
| 15     | Bearing, 1.25, FLG, W/LC, HCFTS207-20 | 1   | J0010   |
| 16     | Pulley, 3.5 OD, 1.125, DBL, B, Cast   | 1   | J0317   |
| 17     | Pulley, 15.75OD, DBL "B" Gr., SK      | 2   | J03992  |
| 18     | Bushing, 1.25, SK                     | 2   | J0410   |
| 19     | Sprocket, 50B12, 1.125" Bore          | 1   | J16612  |
| 20     | Reducer, Speed, 150: 1, 6003869       | 1   | J3682   |
| 21     | Motor, 1HP, 180V DC, 1750 RPM, TEFC   | 1   | H1140   |
| 22     | Chain, #50 157 Links                  | 1   | T16803  |
| 23     | Chain, #40 73 Links                   | 2   | T16800  |
| 24     | Chain Link, #50 Connector             | 1   | J1760   |
| 25     | Chain Link, #40 Connector             | 2   | J1745   |
| 26     | Chain Link, #40 Offset 1/2 Link       | 2   | J1750   |
| 27     | Belt, BX 72                           | 2   | J0246   |

## DRIVE END OF DRYERS, SINGLE FAN - BACK END

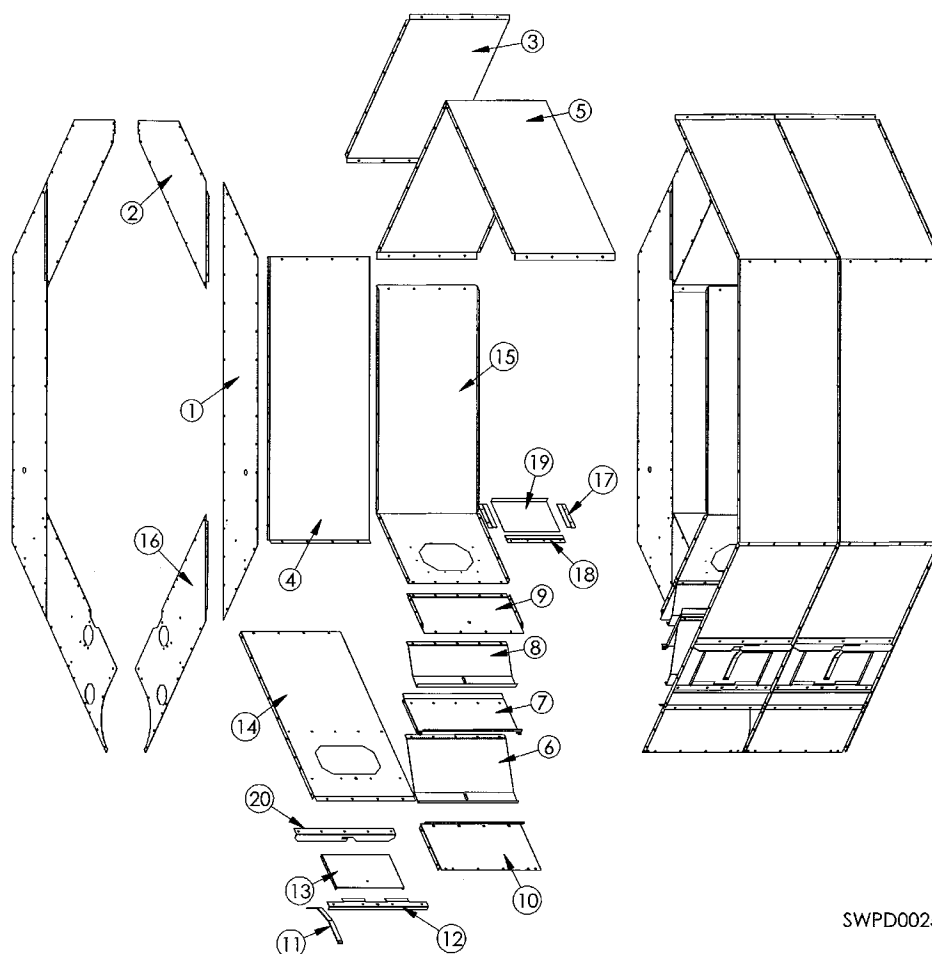


SWPD0035  
030625DDV

## SINGLE FAN - BACK END

| COMP. # | DESCRIPTION                              | QTY | COMP. # |
|---------|------------------------------------------|-----|---------|
| 1       | Edging Top & Bottom, Door                | 2   | T16136  |
| 2       | Edging Sides, Back Door                  | 2   | T16137  |
| 3       | Back End Plate                           | 1   | T17916  |
| 4       | Access Door                              | 1   | T16147  |
| 5       | Top Hinge, Access Door                   | 1   | T16149  |
| 6       | Bottom Hinge, Access Door                | 1   | T16150  |
| 7       | Catch, Rear Access Door                  | 1   | T16151  |
| 8       | Bottom Back Auger                        | 1   | T16431  |
| 9       | Bottom Angle Splice                      | 1   | T17925  |
| 10      | Side End Plate                           | 2   | T16101  |
| 11      | Side Rail, Blowout Door                  | 4   | T16154  |
| 12      | Blowout Door                             | 1   | T17658  |
| 13      | Hinge Bracket                            | 2   | T16148  |
| 14      | Handle, Locking, #GD303                  | 1   | J2313   |
| 15      | Bearing, 1.25, Flange, W/LC, HCFTS207-20 | 1   | J0010   |
| 16      | Bottom Auger Shaft, 1, 1.25" x 10"       | 1   | T17251  |
| 17      | Back Bottom End Plate                    | 1   | T25521  |
| 18      | Bearing Shim Plate                       | 1   | T25682  |
| 19      | Brace for Unload Auger                   | 2   | T25681  |
| 20      | Mercury Switch Plate                     | 1   | T16358  |
| 21      | Gate, Sample Spout                       | 1   | T17652  |
| 22      | Spacer, Sample Spout                     | 2   | T17653  |
| 23      | Sample Spout Angle                       | 2   | T17651  |
| 24      | Spout, Sample                            | 2   | T17655  |
| 25      | Cover, Sample Spout, (Unload)            | 1   | T17663  |
| 26      | Strap, Moisture Sensor - Back            | 1   | T17850  |
| 27      | Hinge, Moisture Sensor- Back             | 1   | T17851  |
| 28      | Latch, 3-10 LL, 2-57-1625-07-00          | 1   | J2310   |
| 29      | Cover, Tube, Rear Discharge              | 1   | T25679  |
| 30      | Ring, 10" Flange                         | 2   | J6610   |
| 31      | Tube, Discharge                          | 1   | T25677  |
| 32      | Step, Unload Tub                         | 1   | T25678  |
| 33      | Lid, Sump Box                            | 1   | T25672  |
| 34      | Hinge, Sump Box                          | 1   | T25676  |
| 35      | Front-Sides, Sump box                    | 1   | T25670  |
| 36      | Back Plate, Sump Box                     | 1   | T25671  |
| 37      | Bottom, Sump Box                         | 1   | T25674  |
| 38      | Lid Hinge Side, Sump Box                 | 1   | T25675  |
| 39      | Bracket, Prox. Switch, Unload Auger      | 1   | T17252  |
| 40      | Box, Prox. Switch, Unload Auger          | 1   | T17263  |
| 41      | Seal, 2" OD, 1-1/4" ID, CR #12481        | 1   | J7023   |
| 42      | Target, Prox. Switch, Unload Auger       | 1   | T17256  |

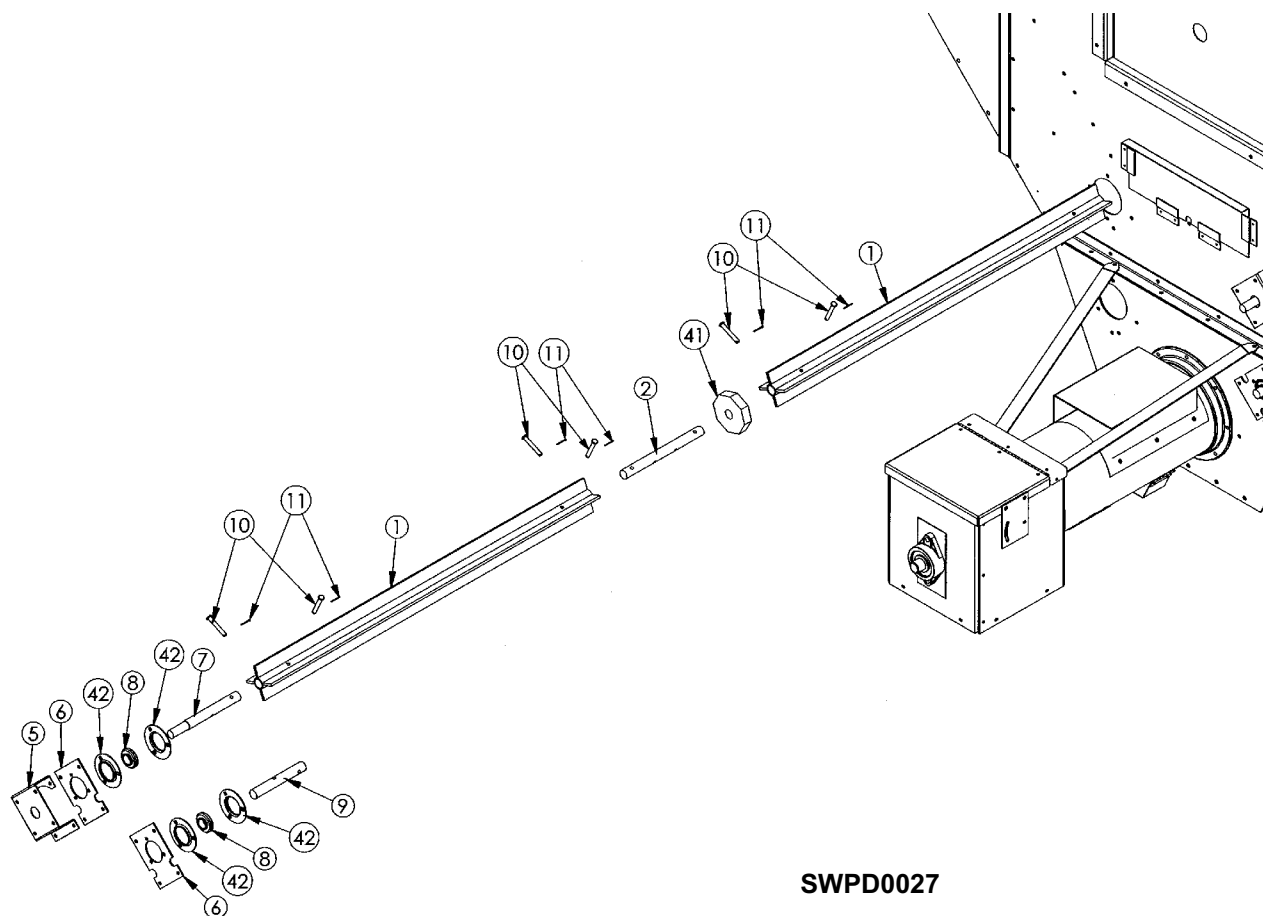
## COLUMN PARTS



SWPD0025

| REF. # | DESCRIPTION                                 | 12' |         | 16' |         | 20' |         | 24' |         |
|--------|---------------------------------------------|-----|---------|-----|---------|-----|---------|-----|---------|
|        |                                             | QTY | COMP. # | QTY | COMP. # | QTY | COMP. # | QTY | COMP. # |
| 1      | Side Divider                                | 10  | T16110  | 14  | T16110  | 18  | T16110  | 22  | T16110  |
| 2      | Upper Divider                               | 10  | T16111  | 14  | T16111  | 18  | T16111  | 22  | T16111  |
| 3      | Outer Top Perforated Panel (Stainless)      | 12  | T16105S | 16  | T16105S | 20  | T16105S | 24  | T16105S |
|        | Outer Top Perforated Panel (Galvanized)     | 12  | T16105  | 16  | T16105  | 20  | T16105  | 24  | T16105  |
| 4      | Outside Middle Perforated Panel (Stainless) | 12  | T16104S | 16  | T16104S | 20  | T16104S | 24  | T16104S |
|        | Outside Middle Perforated Panel (Galv.)     | 12  | T16104  | 16  | T16104  | 20  | T16104  | 24  | T16104  |
| 5      | Top Inner Perforated Panel                  | 6   | T16114  | 8   | T16114  | 10  | T16114  | 12  | T16114  |
| 6      | Bottom Flow Control Gate                    | 12  | T17900  | 16  | T17900  | 20  | T17900  | 24  | T17900  |
| 7      | Column Separator                            | 12  | T17901  | 16  | T17901  | 20  | T17901  | 24  | T17901  |
| 8      | Top Flow Control Gate                       | 12  | T17902  | 16  | T17902  | 20  | T17902  | 24  | T17902  |
| 9      | Rigid Adjustment Plate                      | 12  | T17903  | 16  | T17903  | 20  | T17903  | 24  | T17903  |
| 10     | Bottom Rigid Door                           | 12  | T17904  | 16  | T17904  | 20  | T17904  | 24  | T17904  |
| 11     | Latch                                       | 12  | T17906  | 16  | T17906  | 20  | T17906  | 24  | T17906  |
| 12     | Support Latch Strap                         | 12  | T17907  | 16  | T17907  | 20  | T17907  | 24  | T17907  |
| 13     | Outer Cleanout Door                         | 12  | T17908  | 16  | T17908  | 20  | T17908  | 24  | T17908  |
| 14     | Bottom Outer Perforated Panel (Stainless)   | 12  | T17909S | 16  | T17909S | 20  | T17909S | 24  | T17909S |
|        | Bottom Outer Perforated Panel (Galv.)       | 12  | T17909  | 16  | T17909  | 20  | T17909  | 24  | T17909  |
| 15     | Inner Side Perforated Panel                 | 12  | T17910  | 16  | T17910  | 20  | T17910  | 24  | T17910  |
| 16     | Lower Divider                               | 10  | T17924  | 14  | T17924  | 18  | T17924  | 22  | T17924  |
| 17     | Side Rail, Inner Access                     | 24  | T16219  | 32  | T16219  | 40  | T16219  | 48  | T16219  |
| 18     | Bottom Rail, Inner Access                   | 12  | T16220  | 16  | T16220  | 20  | T16220  | 24  | T16220  |
| 19     | Inner Access Door                           | 12  | T16221  | 16  | T16221  | 20  | T16221  | 24  | T16221  |
| 20     | Door Latch Bracket                          | 12  | T17657  | 16  | T17657  | 20  | T17657  | 24  | T17657  |

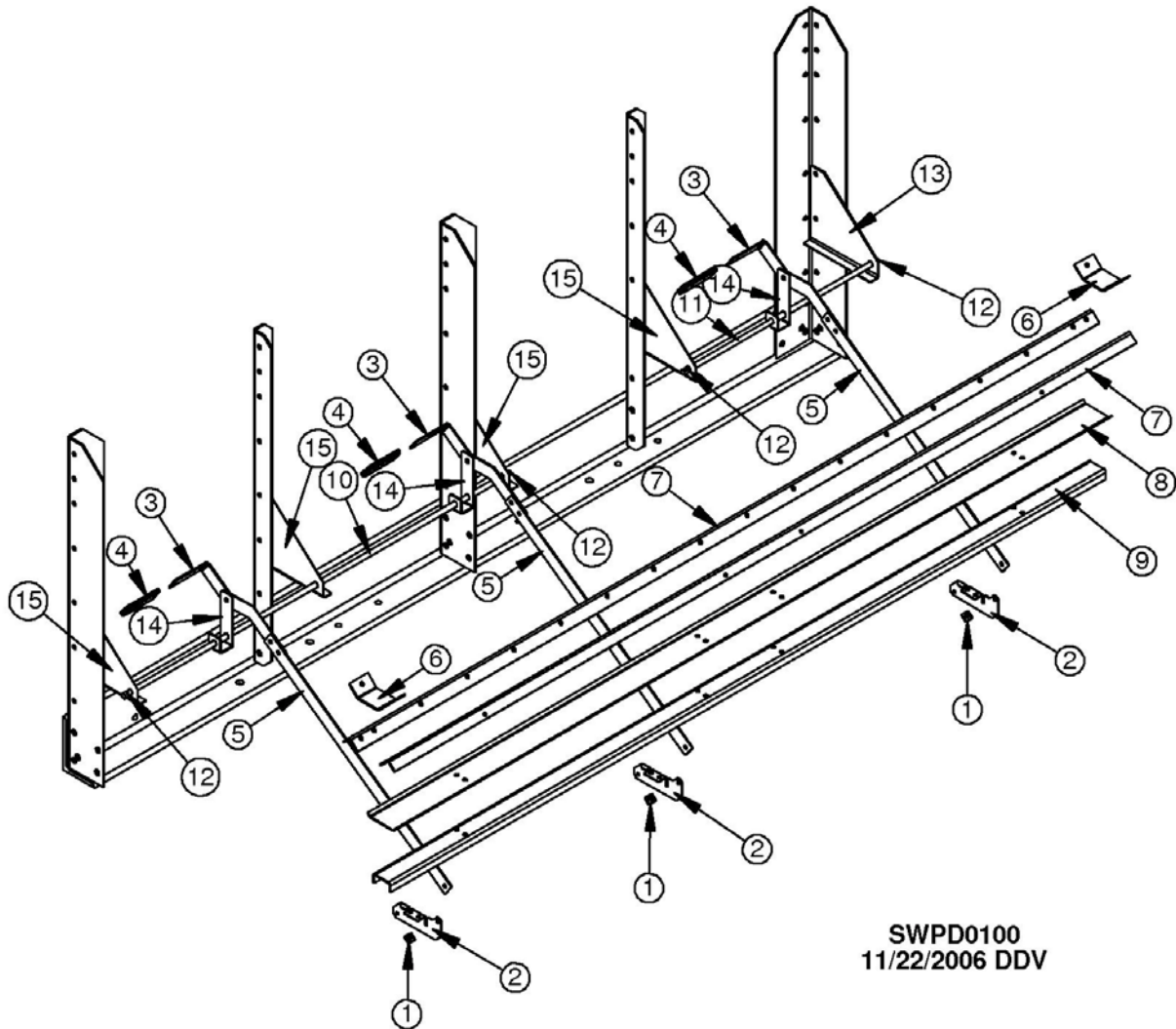
## BACK METERING ROLLS



SWPD0027

| REF. # | DESCRIPTION                            | COMP. # |
|--------|----------------------------------------|---------|
| 1      | Metering Roll Assembly, 8'             | T16297  |
|        | Metering Roll Assembly, 4'             | T16298  |
| 2      | Connecting Shaft, Meter Roll           | T16269  |
| 3      | Bushing, Wooden, Octagon, 1" ID        | J1245   |
| 4      | Flangette, for 205 Bearing             | J0098   |
| 5      | Encoder Bracket                        | T17921  |
| 6      | Meter plate                            | T17920  |
| 7      | Top Back Shaft, Meter Roll             | T16267  |
| 8      | Bearing, 1", Center, FH205-16, W/L CLR | J0005   |
| 9      | Bottom Back Shaft, Meter Roll          | T16268  |
| 10     | Pin, Picker, 3/8, 1-1/2, PLT           | J15431  |
| 11     | Pin, Cotter, 1/8, 1, PLT               | J1420   |

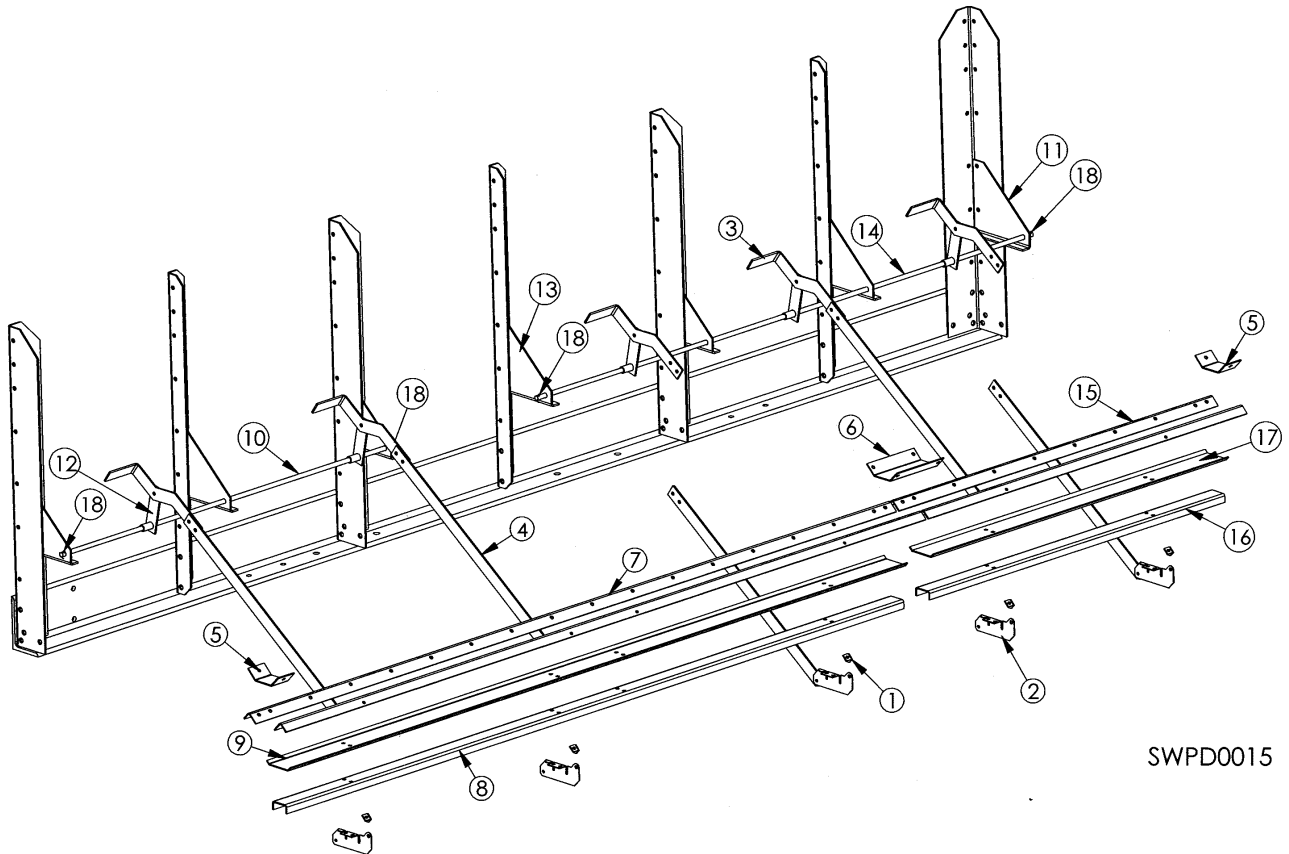
## 8' CAM LOCK ASSEMBLY



SWPD0100  
11/22/2006 DDV

| REF. # | DESCRIPTION                        | QTY | COMP. # |
|--------|------------------------------------|-----|---------|
| 1      | Pivot Bracket                      | 3   | T16393  |
| 2      | Hinge, Bottom Door, Cam Lock       | 3   | T16387  |
| 3      | Handle, Cam Lock                   | 3   | T16382  |
| 4      | Cover, Plastic, Handle, 1 ½ x 4 LG | 3   | J23182  |
| 5      | Extension Arm, Cam Lock            | 3   | T16386  |
| 6      | Seal Plate, End, Cam Lock          | 2   | T16398  |
| 7      | 8' Angle, Cam Lock                 | 2   | T17456  |
| 8      | 8' Door, Cam Lock                  | 1   | T17455  |
| 9      | 8' Door Support, Cam Lock          | 1   | T17454  |
| 10     | Shaft, Long, Cam Lock              | 1   | T16400  |
| 11     | Shaft, Short, Cam Lock             | 1   | T20401  |
| 12     | Pin, Cotter, 1/8, 1, PLT           | 4   | J1420   |
| 13     | Gusset, Rear, Cam Lock             | 1   | T16381  |
| 14     | Pivot Arm, Cam Lock                | 3   | T16383  |
| 15     | Gusset, Front, Cam Lock            | 4   | T16380  |

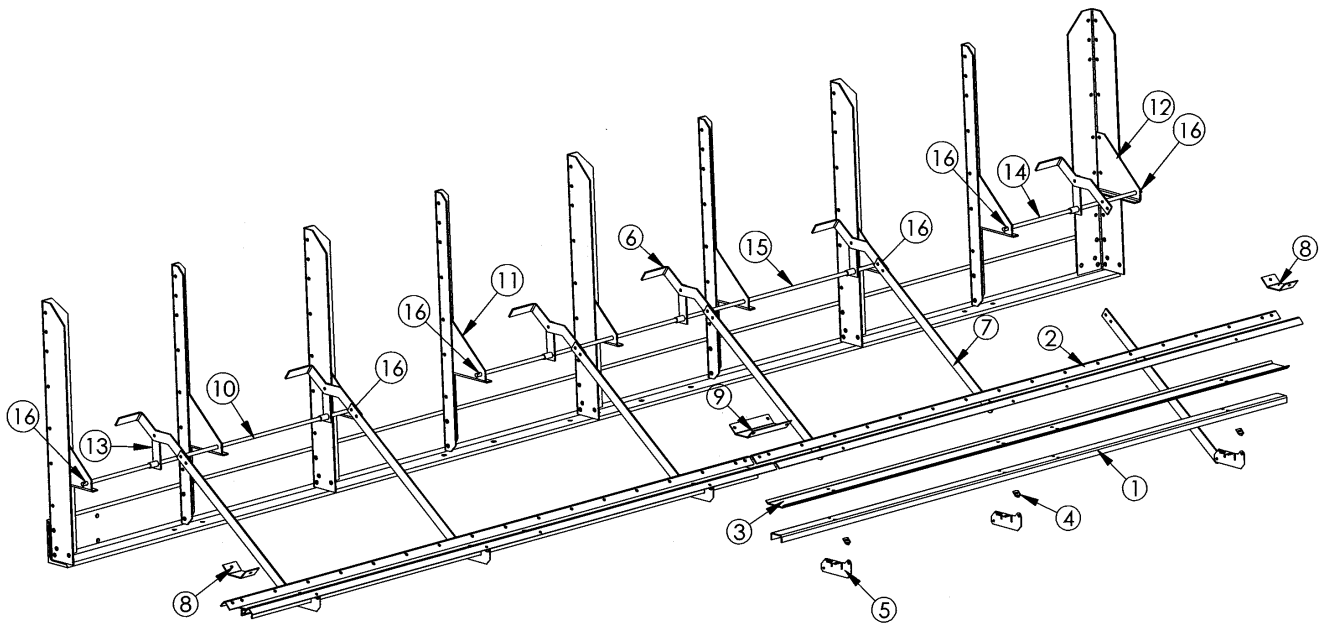
## 12' CAM LOCK ASSEMBLY



SWPD0015

| REF. # | DESCRIPTION                  | QTY | COMP. # |
|--------|------------------------------|-----|---------|
| 1      | Pivot Bracket                | 5   | T16393  |
| 2      | Hinge, Bottom Door, Cam Lock | 5   | T16387  |
| 3      | Handle                       | 5   | T16382  |
| 4      | Extension Arm, Cam Lock      | 5   | T16386  |
| 5      | Seal Plate, End, Cam Lock    | 2   | T16386  |
| 6      | Seal Plate, Mid, Cam Lock    | 1   | T16390  |
| 7      | 8' Angle, Cam Lock           | 2   | T17456  |
| 8      | 8' Door Support, Cam Lock    | 1   | T17454  |
| 9      | 8' Door, Cam Lock            | 1   | T17455  |
| 10     | Shaft, 49-3/4", Cam Lock     | 1   | T16400  |
| 11     | Gusset, Rear, Cam Lock       | 1   | T16381  |
| 12     | Pivot Arm Weldment, Cam Lock | 5   | T16383  |
| 13     | Gusset, Front, Cam Lock      | 6   | T16380  |
| 14     | Shaft, 74", Cam Lock         | 1   | T12516  |
| 15     | Angle, Cam Lock, 4'          | 2   | T12529  |
| 16     | Door Support, Cam Lock, 4'   | 1   | T12530  |
| 17     | Door, Cam Lock, 4"           | 1   | T12528  |
| 18     | Pin, Cotter, 1/8, 1, PLT     | 4   | J1420   |

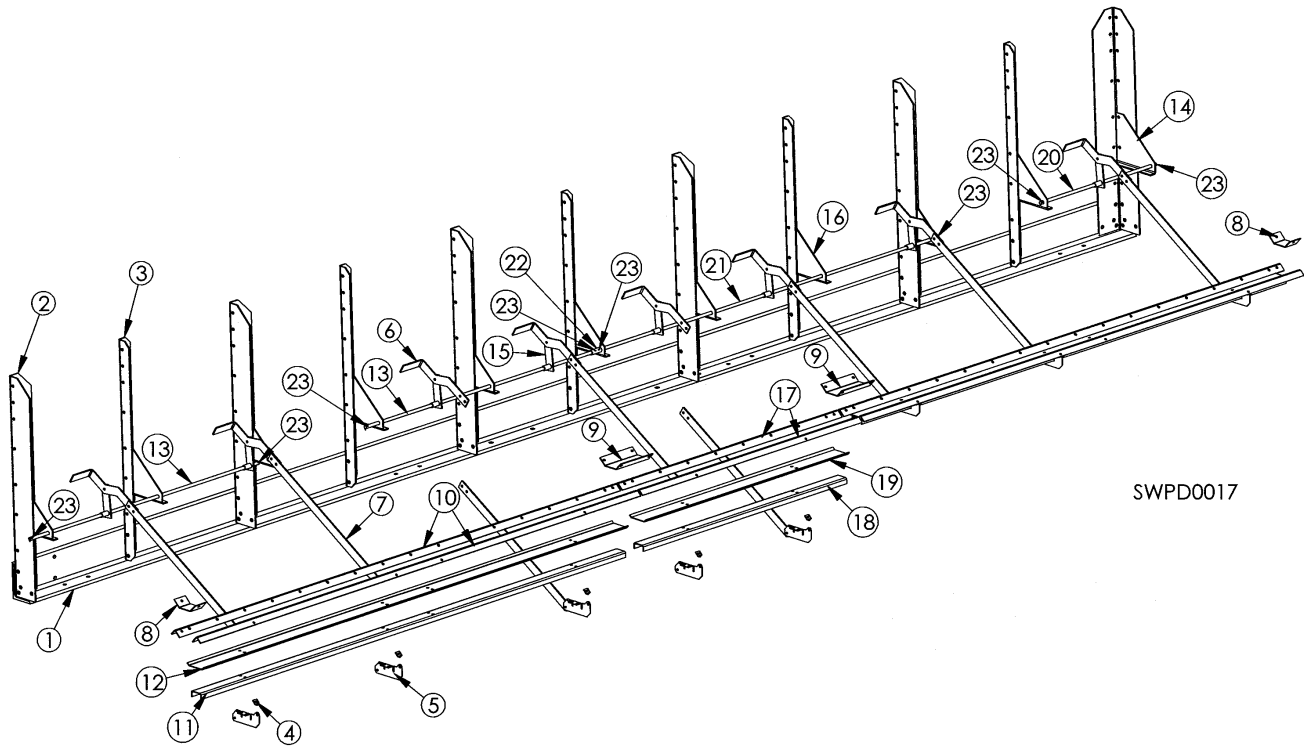
## 16' CAM LOCK ASSEMBLY



SWPD0016

| REF. # | DESCRIPTION                  | QTY | COMP. # |
|--------|------------------------------|-----|---------|
| 1      | 8' Door Support, Cam Lock    | 2   | T17454  |
| 2      | 8' Angle, Cam Lock           | 4   | T17456  |
| 3      | 8' Door, Cam Lock            | 2   | T17455  |
| 4      | Pivot Bracket                | 6   | T16393  |
| 5      | Hinge, Bottom Door, Cam Lock | 6   | T16387  |
| 6      | Handle, Cam Lock             | 6   | T16382  |
| 7      | Extension Arm, Cam Lock      | 6   | T16386  |
| 8      | Seal Plate, End, Cam Lock    | 2   | T16398  |
| 9      | Seal Plate, Mid, Cam Lock    | 1   | T16390  |
| 10     | Shaft, 49.75", Cam Lock      | 1   | T16400  |
| 11     | Gusset, Front, Cam Lock      | 8   | T16380  |
| 12     | Gusset, Rear, Cam Lock       | 1   | T16381  |
| 13     | Pivot Arm Weldment, Cam Lock | 6   | T16383  |
| 14     | Shaft, 25", Cam Lock         | 1   | T20401  |
| 15     | Shaft, Cam Lock, 74"         | 1   | T12516  |
| 16     | Pin, Cotter, 1/8", 1, PLT    | 6   | J1420   |

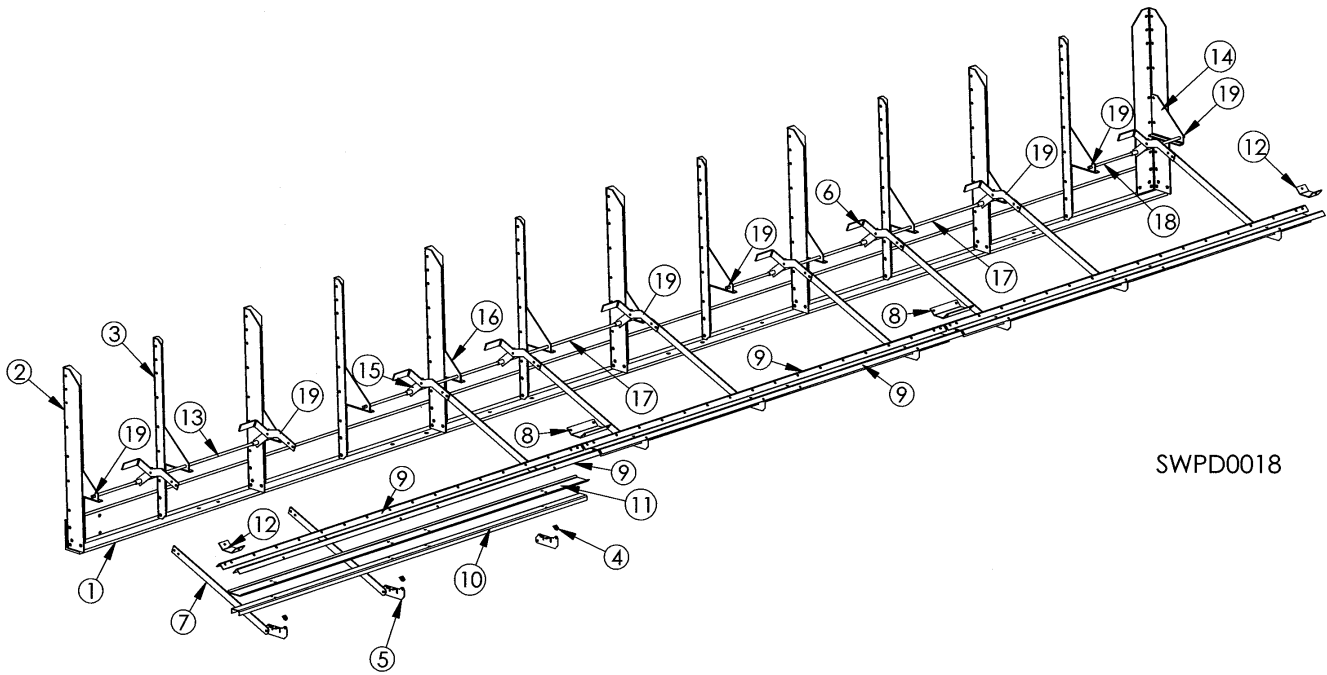
## 20' CAM LOCK ASSEMBLY



SWPD0017

| REF. # | DESCRIPTION                  | QTY | COMP. # |
|--------|------------------------------|-----|---------|
| 1      | Right Frame Angle            | 1   | T20319  |
| 2      | Wide Vertical Support        | 6   | T16322  |
| 3      | Narrow Vertical Support      | 5   | T16323  |
| 4      | Pivot Bracket                | 8   | T16393  |
| 5      | Hinge Bottom Door Cam Lock   | 8   | T16387  |
| 6      | Handle Cam Lock              | 8   | T16382  |
| 7      | Extension Arm, Cam Lock      | 8   | T16386  |
| 8      | Seal Plate, End, Cam Lock    | 2   | T16398  |
| 9      | Seal Plate, Mid, Cam Lock    | 2   | T16390  |
| 10     | 8' Angle, Cam Lock           | 4   | T17456  |
| 11     | 8' Door Support, Cam Lock    | 2   | T17454  |
| 12     | 8' Door, Cam Lock            | 2   | T17455  |
| 13     | Shaft, 49.75", Cam Lock      | 2   | T16400  |
| 14     | Gusset, Rear, Cam Lock       | 1   | T16381  |
| 15     | Pivot Arm Weldment, Cam Lock | 8   | T16383  |
| 16     | Gusset, Front, Cam Lock      | 10  | T16380  |
| 17     | Angle, Cam Lock 4'           | 2   | T12529  |
| 18     | Door Support, Cam Lock 4'    | 1   | T12530  |
| 19     | Door, Cam Lock 4'            | 1   | T12528  |
| 20     | Shaft, 25", Cam Lock         | 1   | T20401  |
| 21     | Shaft, Cam Lock, 74"         | 1   | T12516  |
| 22     | Connector, Shaft             | 1   | T20403  |
| 23     | Pin, Cotter, 1/8, 1, PLT     | 8   | J1420   |

## 24' CAM LOCK ASSEMBLY



SWPD0018

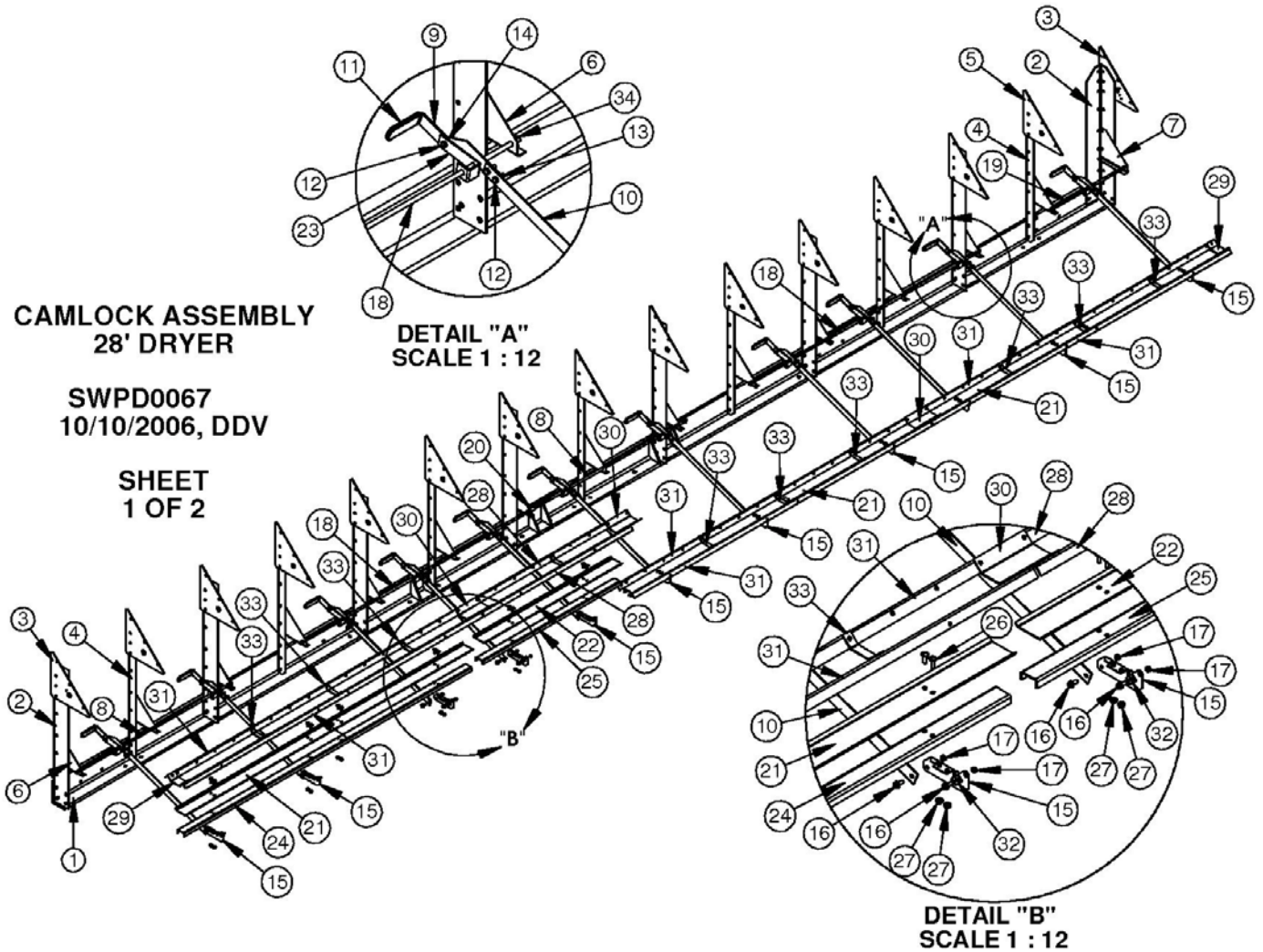
| REF. # | DESCRIPTION                  | QTY | COMP. # |
|--------|------------------------------|-----|---------|
| 1      | Right Frame Angle            | 1   | T24319  |
| 2      | Wide Vertical Support        | 7   | T16322  |
| 3      | Narrow Vertical Support      | 8   | T16323  |
| 4      | Pivot Bracket                | 9   | T16393  |
| 5      | Hinge, Bottom Door, Cam Lock | 9   | T16387  |
| 6      | Handle, Cam Lock             | 9   | T16382  |
| 7      | Extension Arm, Cam Lock      | 9   | T16386  |
| 8      | Seal Plate, Mid, Cam Lock    | 2   | T16390  |
| 9      | 8' Angle, Cam Lock           | 6   | T17456  |
| 10     | 8' Door Support              | 3   | T17454  |
| 11     | 8' Door, Cam Lock            | 3   | T17455  |
| 12     | Seal Plate, End, Cam Lock    | 2   | T16398  |
| 13     | Shaft, Cam Lock, 49.75"      | 1   | T16400  |
| 14     | Gusset, Rear                 | 1   | T16381  |
| 15     | Pivot Arm Weldment           | 9   | T16383  |
| 16     | Gusset, Front                | 12  | T16380  |
| 17     | Shaft, Cam Lock, 74"         | 2   | T12516  |
| 18     | Shaft, Cam Lock, 25"         | 1   | T20401  |
| 19     | Pin, Cotter, 1/8, 1, PLT     | 8   | J1420   |

## 28' CAM LOCK ASSEMBLY

### CAMLOCK ASSEMBLY 28' DRYER

SWPD0067  
10/10/2006, DDV

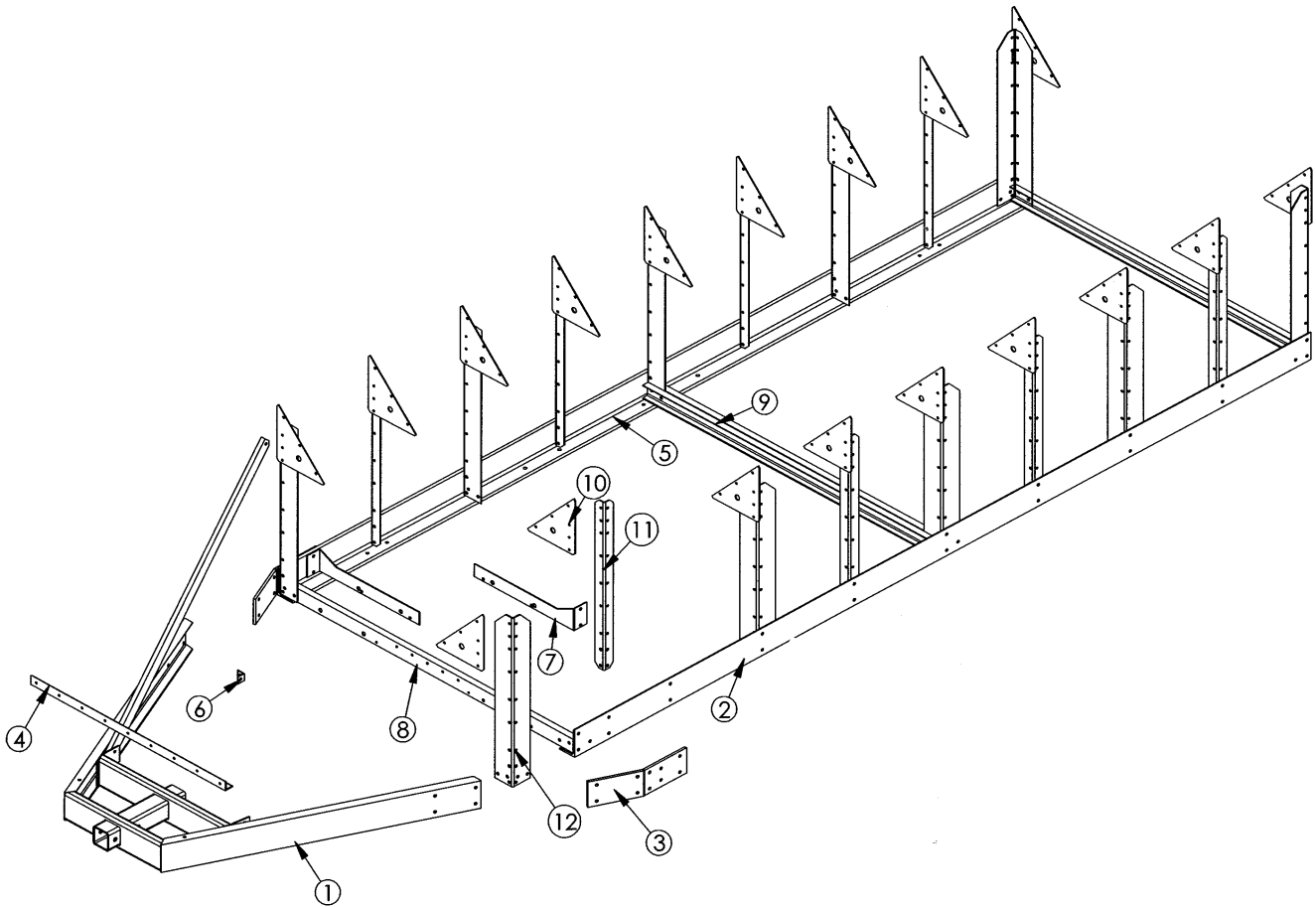
SHEET  
1 OF 2



| REF. # | DESCRIPTION                          | COMP. # | REF. # | DESCRIPTION                          | COMP. # |
|--------|--------------------------------------|---------|--------|--------------------------------------|---------|
| 1      | Right Frame Angle                    | T28318  | 18     | Shaft, Cam Lock, 74"                 | T12516  |
| 2      | Wide Vertical Support                | T16322  | 19     | Shaft, Cam Lock, 25"                 | T20401  |
| 3      | Main Conn. Plate Conduit Box         | T16331  | 20     | Connector, Shaft                     | T20403  |
| 4      | Narrow Vertical Support              | T16323  | 21     | 8' Door, Cam Lock                    | T17455  |
| 5      | Main Connector Plate                 | T16324  | 22     | Door, Cam Lock 2000                  | T12528  |
| 6      | Gusset, Front, Cam Lock              | T16380  | 23     | Pivot Arm Weldment                   | T16383  |
| 7      | Gusset, Rear, Cam Lock               | T16381  | 24     | 8' Door Support                      | T17454  |
| 8      | Shaft, Cam Lock, 49.75"              | T16400  | 25     | Door Support, Cam Lock 4' 2000       | T12530  |
| 9      | Handle, Cam Lock                     | T16382  | 26     | Screw, 5/16-18, 1, PLT, TR, SL, RHMS | J0528   |
| 10     | Extension Arm, Cam Lock              | T16386  | 27     | Nut, Whiz, 5/16-18                   | J1110   |
| 11     | Cover, Plastic, Handle, 1 1/2 x 4 LG | J23182  | 28     | Angle, Cam Lock 4' 2000              | T12529  |
| 12     | Screw, 3/8-16 x 1, JS500, GD5        | J06063  | 29     | Seal Plate, End, Cam Lock            | T16398  |
| 13     | Nut, Whizlock, 3/8-16                | B5962   | 30     | Seal Plate, Mid, Cam Lock            | T16390  |
| 14     | Nut, Hex, 3/8-16, PLT Lock           | J1025   | 31     | 8' Angle, Cam Lock                   | T17456  |
| 15     | Hinge, Bottom Door, Cam Lock         | T16387  | 32     | Pivot Bracket                        | T16393  |
| 16     | Bolt, 5/16-18x3/4" GR5, Hex Wash     | J0536   | 33     | Connecting Bracket                   | T16399  |
| 17     | Nut, Lock, 5/16-18, PLT              | J1010   | 34     | Pin, Cotter, 1/8, 1, PLT             | J1420   |

# FRAME FOR BOTH STANDARD & STACKED DRYERS

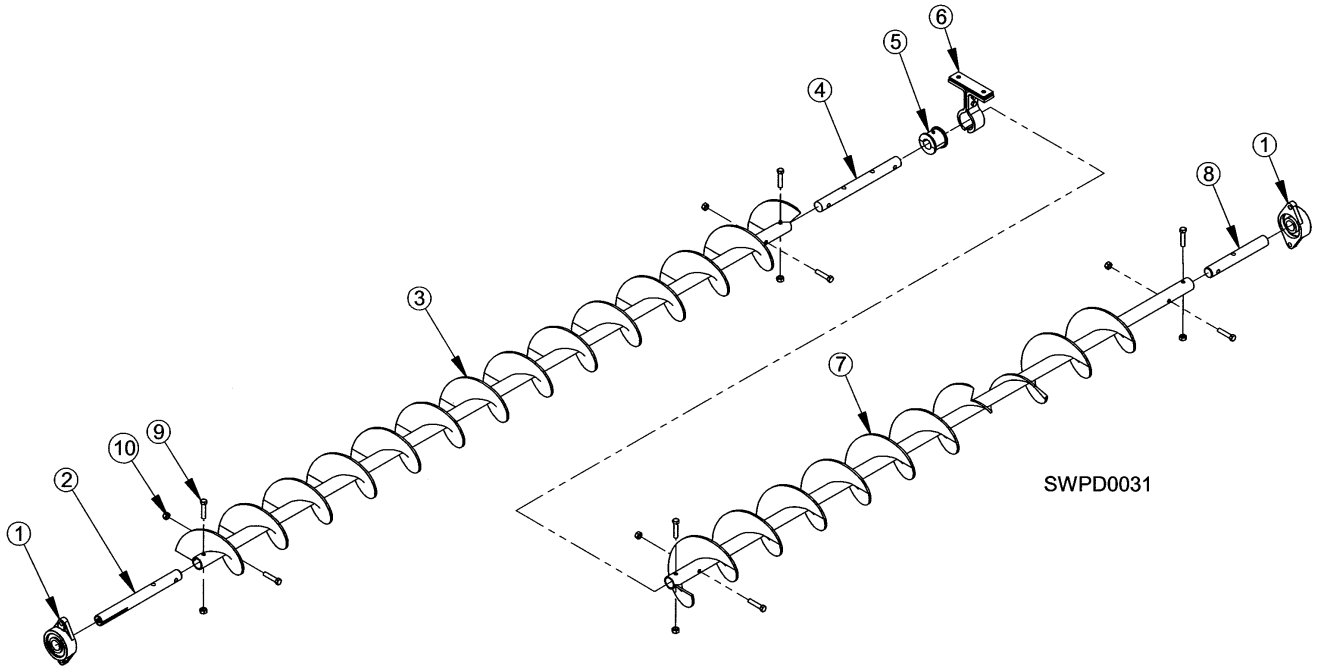
8', 12', 16', 20', 24, & 28'



SWPD0026

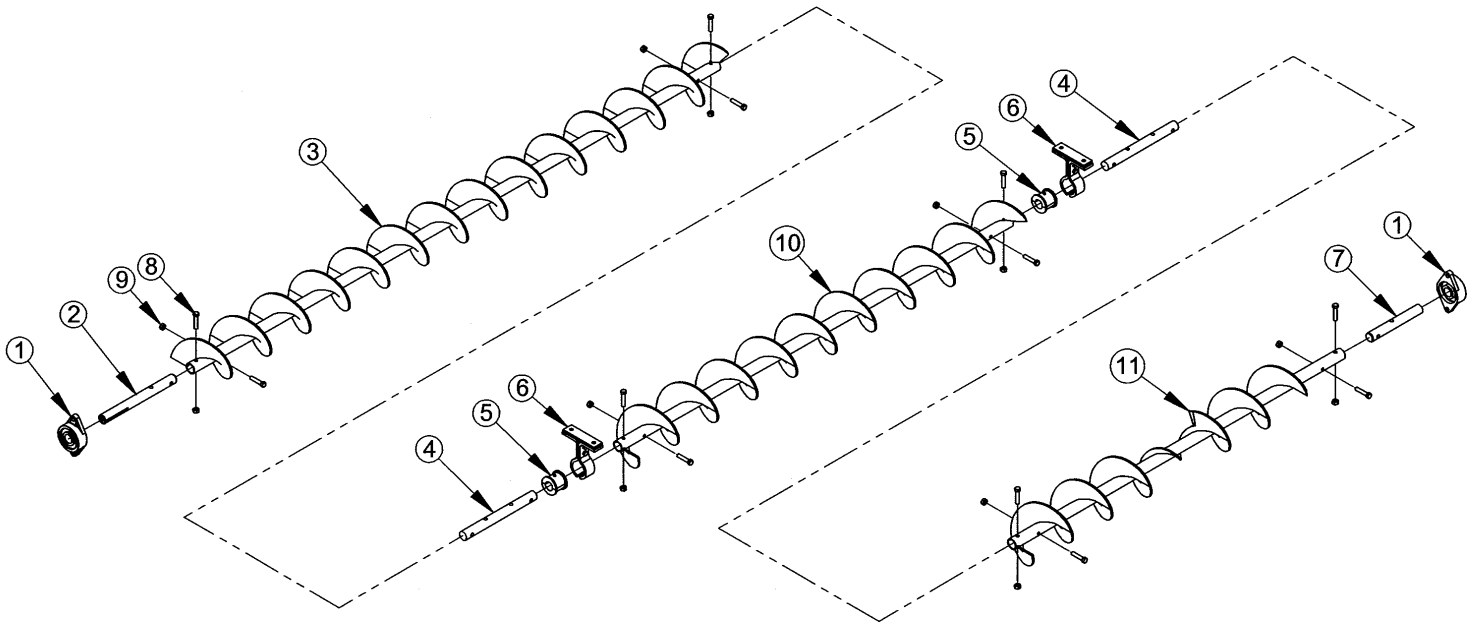
| REF. # | DESCRIPTION          | 8'  |         | 12' |         | 16' |         | 20' |         | 24' |         | 28' |         |
|--------|----------------------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|
|        |                      | QTY | COMP. # | QTY | COMP. # | QTY | COMP. # | QTY | COMP. # | QTY | COMP. # | QTY | COMP. # |
| 1      | Hitch Receiver Weld  | 1   | T16310  | 1   | T16310  | 1   | T16310  | 1   | T16310  | 1   | T16310  | 1   | T16310  |
| 2      | Left Frame Angle     | 1   | T08518  | 1   | T12518  | 1   | T16319  | 1   | T20320  | 1   | T24320  | 1   | T28320  |
| 3      | Connector Plate      | 2   | T16321  | 2   | T16321  | 2   | T16321  | 2   | T16321  | 2   | T16321  | 2   | T16321  |
| 4      | Angle (Fan Support)  | 1   | T16176  | 1   | T16176  | 1   | T16176  | 1   | T16176  | 1   | T16176  | 1   | T16176  |
| 5      | Right Frame Angle    | 1   | T08517  | 1   | T12517  | 1   | T16320  | 1   | T20319  | 1   | T24319  | 1   | T28319  |
| 6      | Tightener Angle      | 1   | T16329  | 1   | T16329  | 1   | T16329  | 1   | T16329  | 1   | T16329  | 1   | T16329  |
| 7      | DC Motor Brace       | 2   | T16328  | 2   | T16328  | 2   | T16328  | 2   | T16328  | 2   | T16328  | 2   | T16328  |
| 8      | Front Cross Channel  | 1   | T16333  | 1   | T16333  | 1   | T16333  | 1   | T16333  | 1   | T16333  | 1   | T16333  |
| 9      | Cross Channel        | 1   | T16325  | 3   | T16325  | 3   | T16325  | 5   | T16325  | 5   | T16325  | 7   | T16325  |
| 10     | Main Connector Plate | 8   | T16324  | 14  | T16324  | 18  | T16323  | 22  | T16323  | 26  | T16323  | 30  | T16323  |
| 11     | Narrow Vert Support  | 4   | T16323  | 6   | T16323  | 8   | T16323  | 8   | T16323  | 12  | T16323  | 12  | T16323  |
| 12     | Wide Vert Support    | 6   | T16322  | 8   | T16322  | 10  | T16322  | 14  | T16322  | 14  | T16322  | 16  | T16322  |

## 12' BOTTOM AUGER



| REF. # | DESCRIPTION                              | QTY | COMP. # |
|--------|------------------------------------------|-----|---------|
| 1      | Bearing, 1.25, Flange, W/LC, HCFTS207-20 | 2   | J0010   |
| 2      | Shaft, Top Front, 12-3/4"                | 1   | T16436  |
| 3      | Auger, Bottom Front, 93-1/2"             | 1   | T16430  |
| 4      | Shaft, 8", Hanger Bearing                | 1   | F4720   |
| 5      | Bushing, Wood, 1.25", I.D.               | 1   | J0096   |
| 6      | Hanger, Auger, T, 6CH2203                | 1   | J0097   |
| 7      | Bottom Rear Auger                        | 1   | T12490  |
| 8      | Shaft, 1, 1.25" x 10"                    | 1   | T17251  |
| 9      | Screw, 7/16-14, 2, PLT                   | 8   | J0718   |
| 10     | Nut, Lock, 7/16"-14, PLT                 | 8   | J1034   |

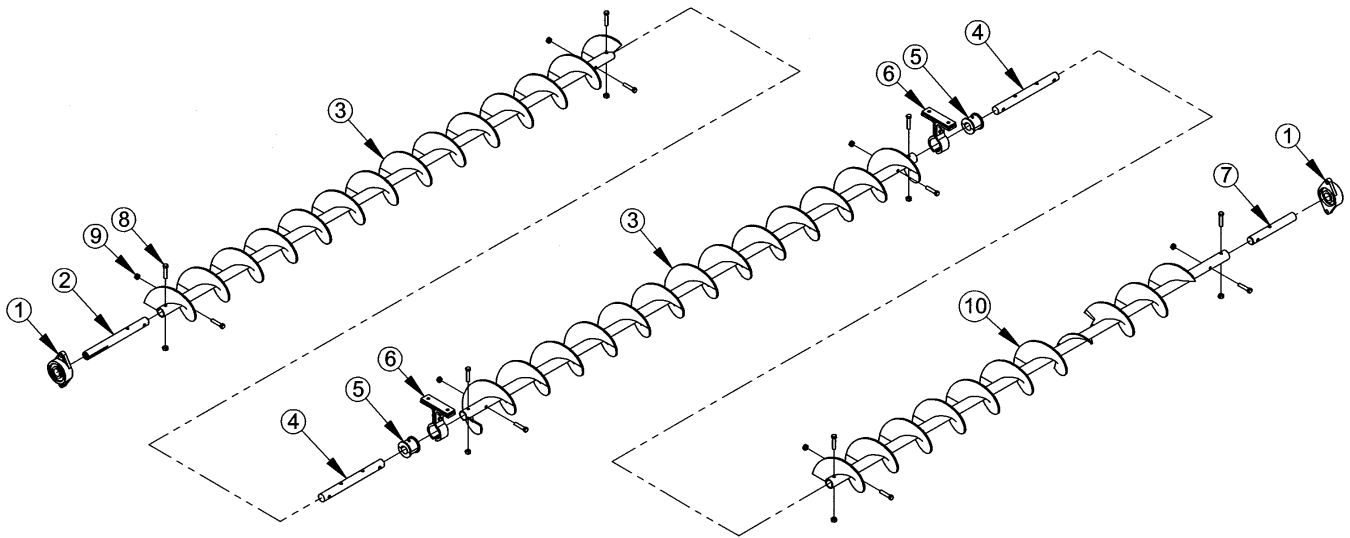
## 16' BOTTOM AUGER



SWPD0032

| REF. # | DESCRIPTION                              | QTY | COMP. # |
|--------|------------------------------------------|-----|---------|
| 1      | Bearing, 1.25, Flange, W/LC, HCFTS207-20 | 2   | J0010   |
| 2      | Shaft, Top Front, 12-3/4"                | 1   | T16436  |
| 3      | Auger, Bottom Front, 93-1/2"             | 1   | T16430  |
| 4      | Shaft, 8", Hanger Bearing                | 2   | F4720   |
| 5      | Bushing, Wood, 1.25", I.D.               | 2   | J0096   |
| 6      | Hanger, Auger, T, 6CH2203                | 2   | J0097   |
| 7      | Shaft, 1.25" x 10"                       | 1   | T17251  |
| 8      | Screw, 7/16-14, 2, PLT                   | 12  | J0718   |
| 9      | Nut, Lock, 7/16-14, PLT                  | 12  | J1034   |
| 10     | Auger, Bottom Middle, 69-1/2"            | 1   | T16432  |
| 11     | Bottom Rear Auger, 1                     | 1   | T16433  |

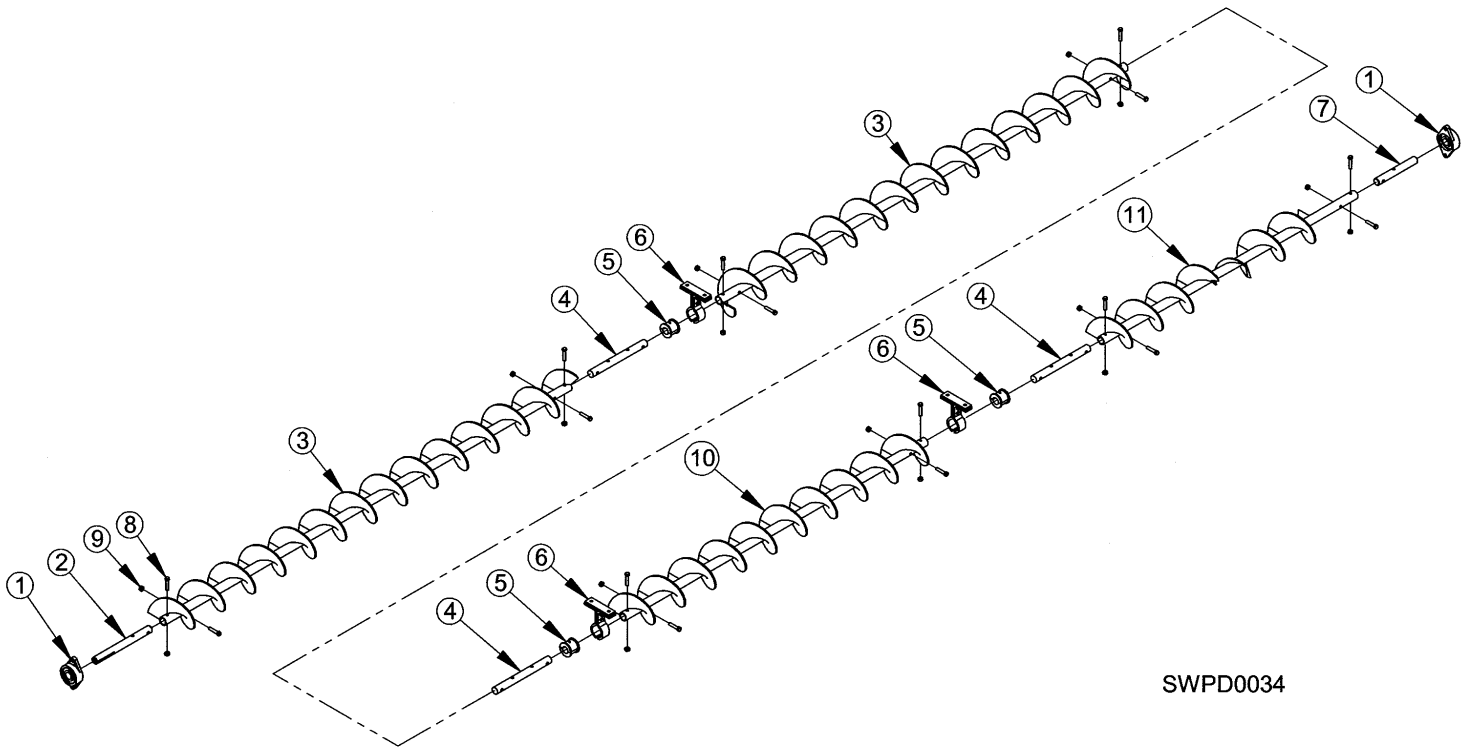
## 20' BOTTOM AUGER



SWPD0033

| REF. # | DESCRIPTION                             | QTY | COMP. # |
|--------|-----------------------------------------|-----|---------|
| 1      | Bearing, 1.25, Flange W/LC, HCFTS207-20 | 2   | J0010   |
| 2      | Shaft, Top Front, 12-3/4"               | 1   | T16436  |
| 3      | Auger, Bottom Front, 93-1/2"            | 2   | T16430  |
| 4      | Shaft, 8" Hanger Bearing                | 2   | F4720   |
| 5      | Bushing, Wood, 1.25" I.D.               | 2   | J0096   |
| 6      | Hanger, Auger, T, 6CH2203               | 2   | J0097   |
| 7      | Shaft, 1.25" x 10"                      | 1   | T17251  |
| 8      | Screw, 7/16-14, 2, PLT                  | 12  | J0718   |
| 9      | Nut, Lock, 7/16-14, PLT                 | 12  | J1034   |
| 10     | Bottom Rear Auger                       | 1   | T12490  |

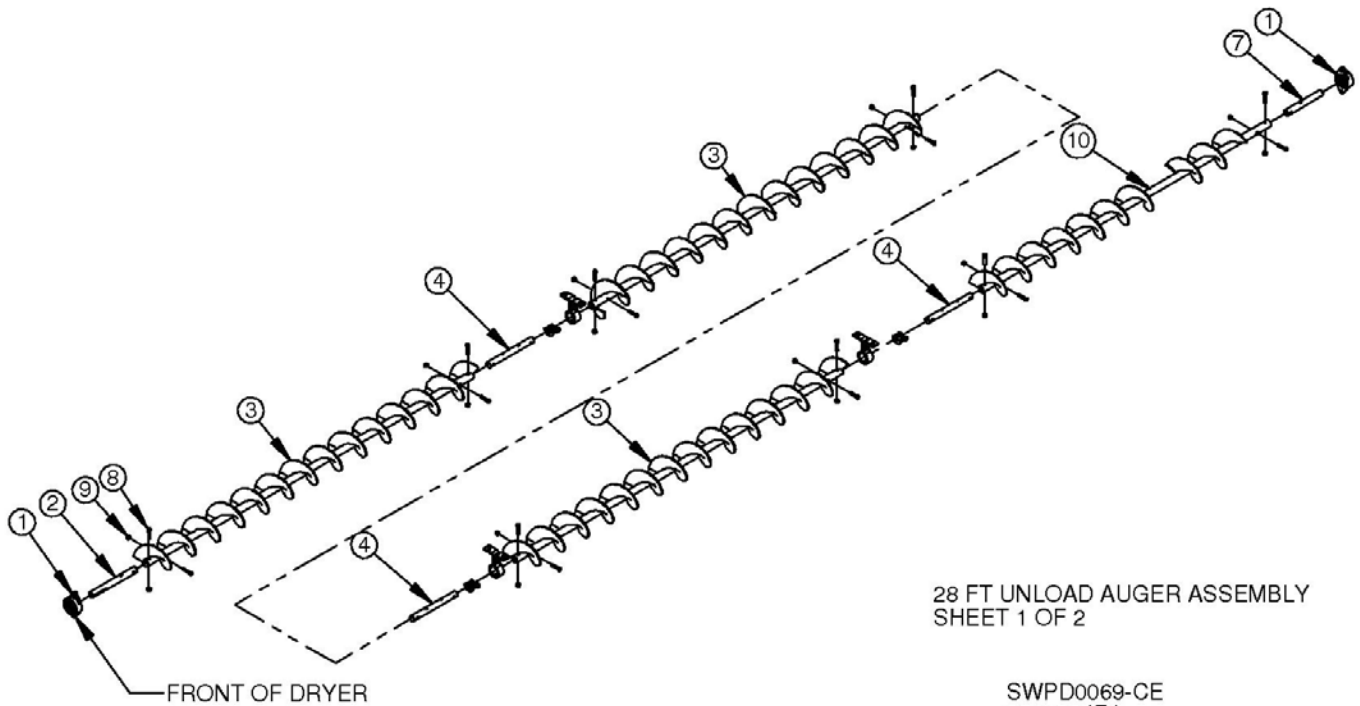
## 24' BOTTOM AUGER



SWPD0034

| REF. # | DESCRIPTION                              | QTY | COMP. # |
|--------|------------------------------------------|-----|---------|
| 1      | Bearing, 1.25, Flange, W/LC, HCFTS207-20 | 2   | J0010   |
| 2      | Shaft, Top Front, 12-3/4"                | 1   | T16436  |
| 3      | Auger, Bottom Front, 93-1/2"             | 2   | T16430  |
| 4      | Shaft, 8" Hanger Bearing                 | 3   | F4720   |
| 5      | Bushing, Wood, 1.25" I.D.                | 3   | J0096   |
| 6      | Hanger Auger, T, 6CH2203                 | 3   | J0097   |
| 7      | Shaft, 1.25" x 10"                       | 1   | T17251  |
| 8      | Screw, 7/16-14, 2, PLT                   | 16  | J0718   |
| 9      | Nut, Lock, 7/16-14, PLT                  | 16  | J1034   |
| 10     | Auger, Bottom middle, 69-1/2"            | 1   | T16432  |
| 11     | Bottom Rear Auger                        | 1   | T16433  |

## 28' BOTTOM AUGER



| REF. # | DESCRIPTION                              | QTY | COMP. # |
|--------|------------------------------------------|-----|---------|
| 1      | Bearing, 1.25, Flange, W/LC, HCFTS207-20 | 2   | J0010   |
| 2      | Shaft, Top Front, 12-3/4"                | 1   | T16436  |
| 3      | Auger, Bottom Front, 93-1/2"             | 3   | T16430  |
| 4      | Shaft, 8" Hanger Bearing                 | 3   | F4720   |
| 5      | Bushing, Wood, 1.25" I.D.                | 3   | J0096   |
| 6      | Hanger Auger, T, 6CH2203                 | 3   | J0097   |
| 7      | Shaft, 1.25" x 10"                       | 1   | T17251  |
| 8      | Screw, 7/16-14, 2, PLT                   | 16  | J0718   |
| 9      | Nut, Lock, 7/16-14, PLT                  | 16  | J1034   |
| 10     | Bottom Rear Auger                        | 1   | T12490  |

## DRYER ASPIRATOR COMPONENT INSTRUCTIONS

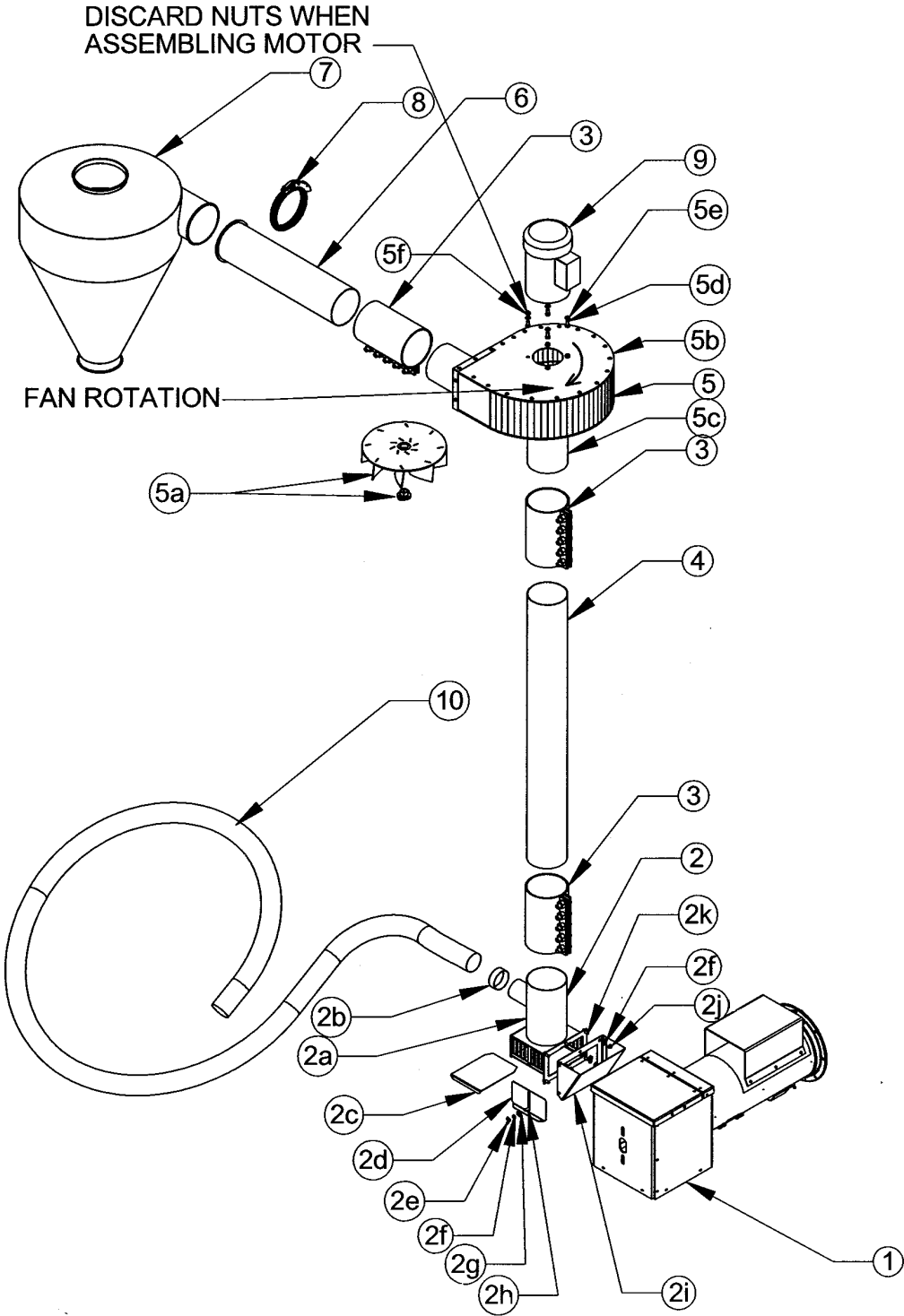
### ASSEMBLY:

1. Attach the aspirator base assembly to the side of the dryer discharge housing. Mark and cut a 3  $\frac{3}{4}$ " x 7  $\frac{1}{4}$ " hole (about 2 inches from the top) in the side of dryer discharge housing and drill (6)  $\frac{3}{8}$ " mounting holes using the base flange as a template. Mount the deflector with these same holes on the inside face of the dryer discharge housing.
2. Assemble the C-face motor to the aspirator fan housing using the hex-head  $\frac{3}{8}$ " -16 x  $\frac{3}{4}$ " screws and lock-washers that are provided in the housing (discard the  $\frac{3}{8}$ " nuts). Attach the fan wheel to the motor shaft with a  $\frac{7}{8}$ " split tapered bushing (J0409). Position the bushing so it is flush with the end of the motor shaft and tighten the  $\frac{1}{4}$ " screws evenly to a torque of 95 inch-pounds.
3. Wire the motor so the fan wheel rotates in a clockwise direction when viewed from the top. (see exploded view on page 2)
4. The fan may be assembled directly on top of the aspirator base, or extended with a length of 6" tube. Use 6" compression couplers to fasten the extension tube.
5. Assemble the cyclone to the fan in the same manner using a 6" extension tube if desired. The 6" to 160mm tube adapter and clamp ring are used to secure the cyclone.
6. Use standard 6" tube supports and brackets (not shown in exploded view) to secure the aspirator assembly to the dryer or other convenient structure.

### OPERATION:

1. Remove the clean-up plate (Item 2b) from the aspirator base when the unit is to be used to clean light material from discharged grain. Adjust the restrictor plates up or down to vary the amount of air pulling chaff from the grain.
2. The aspirator base may also be used to clean up around the dryer. Remove the 3" cap (Item 2a) and attach a 3" flexible hose (Item 15), slide the clean-up plate back into the base and use it to regulate the amount of air required to pull material up the 6" tube to the fan.

# DRYER ASPIRATOR COMPONENT ASSEMBLY (Optional)



## DRYER ASPIRATOR COMPONENT ASSEMBLY (Optional)

| ITEM NO. | QTY. | PART NO. | DESCRIPTION                                 |
|----------|------|----------|---------------------------------------------|
| 1        | 1    | T25670-A | DRYER OUTLET TUBE                           |
| 2        | 1    | D9585    | ASPIRATOR BASE ASSM                         |
| 2a       | 1    | D9586    | ASPIRATOR BASE WELDMT (PART OF D9585)       |
| 2b       | 1    | J7535    | CAP, 3" (PART OF D9585)                     |
| 2c       | 1    | D9588    | PLATE, CLEAN-UP (PART OF D9585)             |
| 2d       | 2    | D9587    | PLATE, RESTRICTOR (PART OF D9585)           |
| 2e       | 2    | J1005    | 5/16 WING NUT (PART OF D9585)               |
| 2f       | 8    | J1200    | 5/16 LOCK WASHER (PART OF D9585)            |
| 2g       | 2    | J1111    | 5/16 FLAT WASHER (PART OF D9585)            |
| 2h       | 2    | J0535    | 5/15 X 1 CARRIAGE BOLT (PART OF D9585)      |
| 2i       | 1    | D95861   | DEFLECTOR, ASPIRATOR (PART OF D9585)        |
| 2j       | 6    | J1002    | NUT, 5/16-18, PLT                           |
| 2k       | 6    | J0527    | SCREW, 5/16-18 X 1, PLT, GRD 5, HHCS        |
| 3        | 3    | J7560    | COUPLER, COMPRESSION, 6", 5 BOLT            |
| 4        | 1    | K2941-48 | 6" TUBE, CUT TO DESIRED LENGTH              |
| 5        | 1    | D9580    | FAN, ASPIRATOR, 2 HP, W/O MOTOR             |
| 5a       | 1    | D9575    | FAN WHEEL W/J0409 BUSHING(PART OF D9580)    |
| 5b       | 1    | D9581    | HOUSING ASSY, ASPIRATOR (PART OF D9580)     |
| 5c       | 1    | D9583    | INLET PLATE, WELDMENT (PART OF D9580)       |
| 5d       | 4    | J0605    | SCREW, 3/8-16 X 3/4 , PLT (PART OF D9580)   |
| 5e       | 4    | J1205    | WASHER, LOCK, 3/8, PLT (PART OF D9580)      |
| 5f       | 4    | J1020    | NUT, HEX, 3/8-16 (PART OF D9580)            |
| 6        | 1    | D9589    | TUBE WELDMENT, 160MM TO 6" ADAPTOR          |
| 7        | 1    | J7565    | CYCLONE, LIGHT MATERIAL                     |
| 8        | 1    | J7566    | CLAMP, 160 MM TUBE                          |
| 9        | 1    | H2020    | MOTOR, 2 HP, 3 PH, 3450 RPM, C FACE, F145TC |
| 9        | 1    | H2010    | MOTOR, 2 HP, 1 PH, 3450 RPM, C FACE, F145TC |
| 10       | 1    | K5248    | HOSE, 3" I.D. FLEX                          |

# NOTES



# **Sukup Automatic Grain Dryer**

## **Troubleshooting Guide**

L14106  
1/2008 Rev.1

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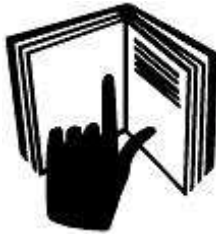
**GRAIN DRYER  
Safety Section**

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:  
TRUCKER/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.

+++++

## Safety Section

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.

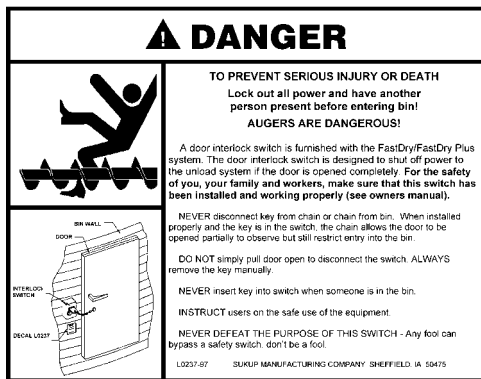
### 1. WARNING-L0281-To Avoid serious injury or death.



### 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.



## Safety Section

### 7. CAUTION - L0285-98

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



### 8. WARNING - L02831

Lower & secure parking stands before unhitching unit.



### 9. DANGER - L0301

Rotating augers are dangerous!



### 10. CAUTION - L0520

Failure to keep unit clean may cause fire and serious injury or death.



### 11. WARNING - L0164

Metal is slippery when wet; Never carry items when climbing; Have another person present; Use safety harness & safety line; etc

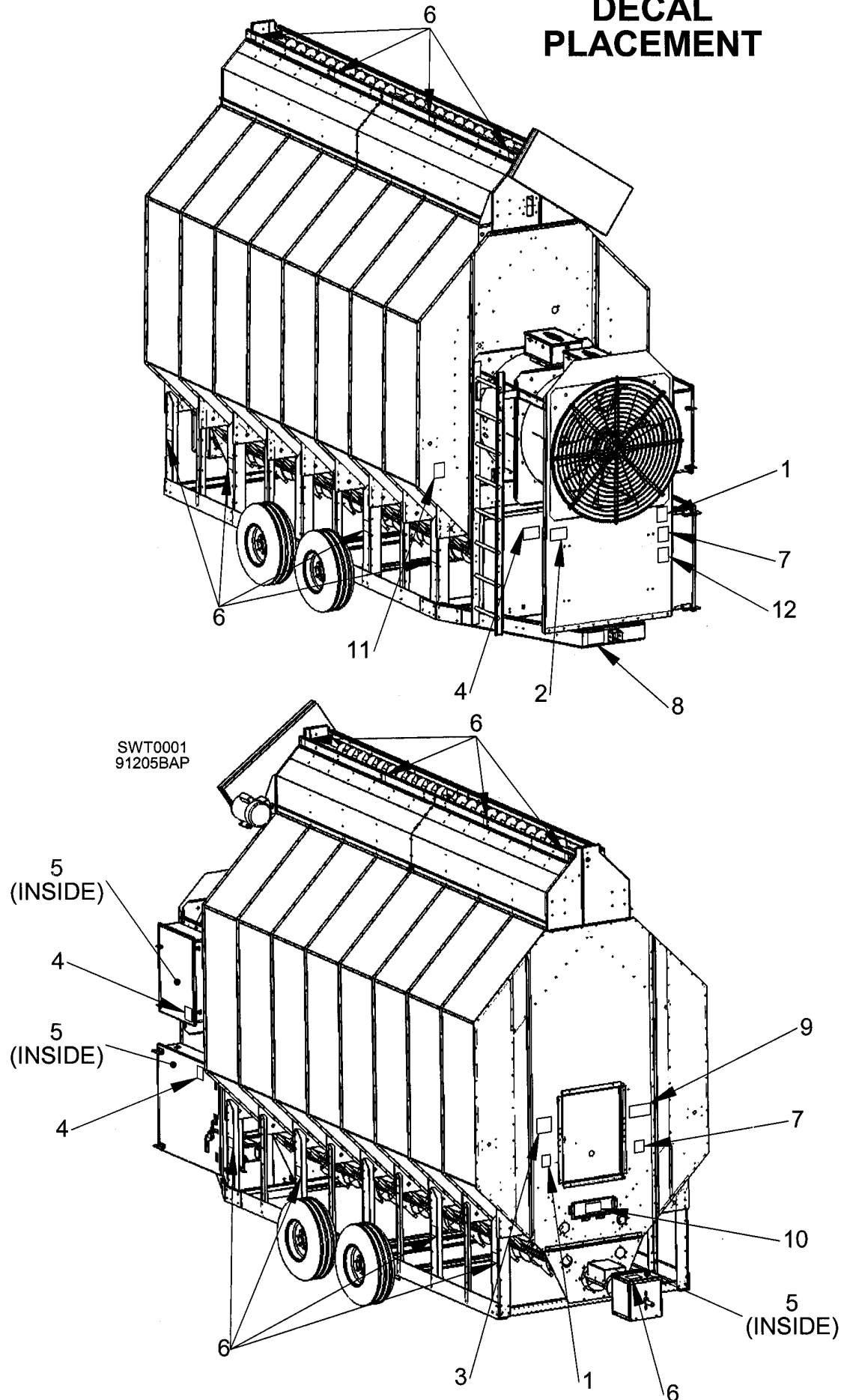


### 12. WARNING - L0512

Use safety chain when towing unit to eliminate detachment hazard.



## DECAL PLACEMENT



## Safety Section

### 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.

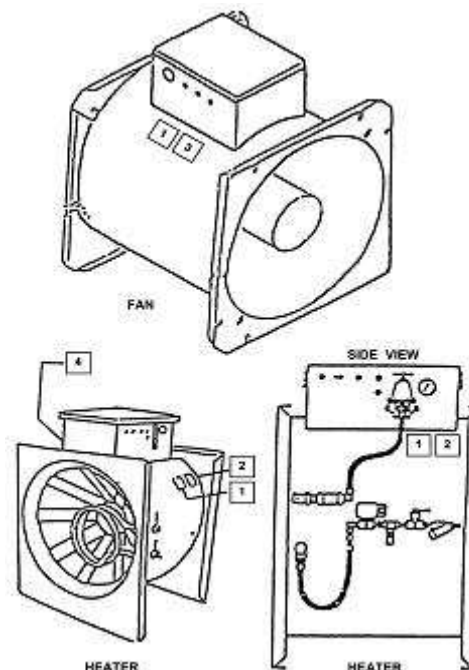


#### 4. DANGER - L0204

Close service door.



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



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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.

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

Figure 1.1a: Grain Discharge Chute Fault



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 | 0CH02 | 42     | N/A    | N/A    |
| 3 Module Stack Dryer | 0CH02 | 42     | N/A    | N/A    |

- Is the Discharge Chute open?
  - Determine the cause of the door being opened and return the door to the closed position.
- Is the sensor out of adjustment?
  - 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.
- 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.
- At the Discharge Chute, find the junction box fastened to the lid. This box contains the sensor.
  - 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).
- 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.
- 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.
- 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.
- 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.
- If 24VDC is now measured on the PLC input, but the input light is not on, the PLC may be malfunctioning.
- If the PLC input light is on but the PLC output light (on portable dryers) is not on, the PLC may be malfunctioning.
- 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.

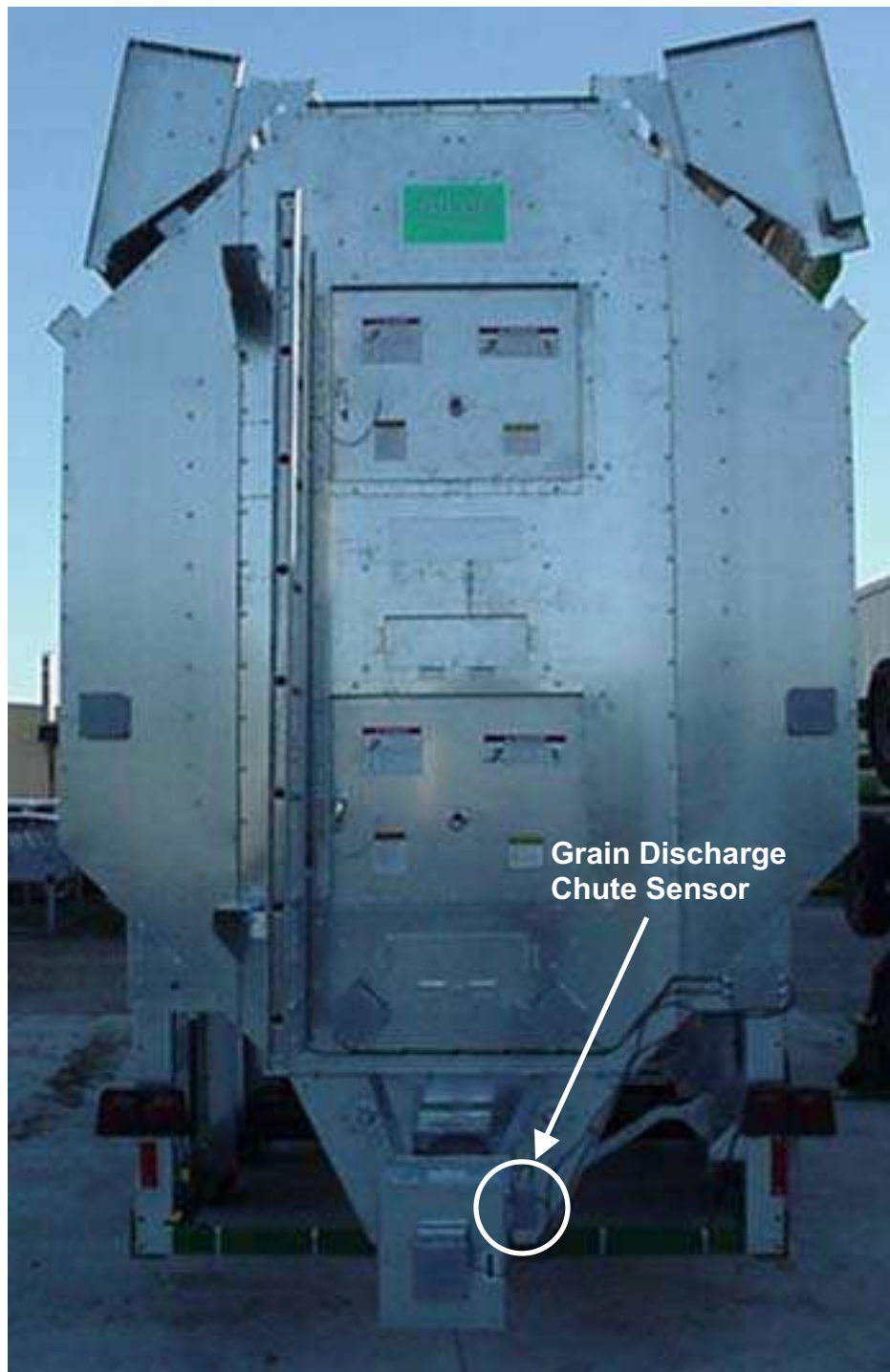


Figure 1.1c: Placement of sensor on dryer

### 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.

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

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    |

1. Is the wet bin out of grain?
  - a. If this is the last load for the season, press 2 for Final Dry.
2. Has an auxiliary load malfunctioned?
  - a. Repair the cause of the load failure and press RESET.
3. If wet grain is available and the load auxiliaries are functioning, is the paddle switch bound up?
  - a. If so, free the paddle switch and repair the cause.
4. 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)
  - a. 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
5. Observe the upper and lower PLC input lights while someone moves the paddle switch from the down position to the up position.
  - a. 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.)
6. If 24VDC is measured on wire #18, measure for 24VDC on the other wire going to the sensor.
  - a. With the paddle switch in the up position, 24VDC should be measured on wire #44 and #53.
  - b. If not, replace the respective sensor and recheck for voltage.
7. 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.
  - a. 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.

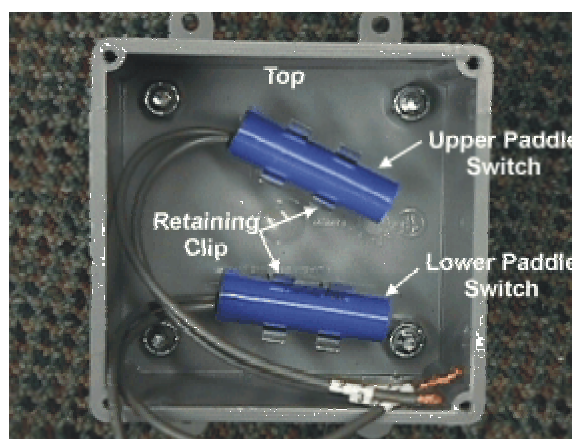


Figure 1.2C: Grain Level Sensor Installed

## Fault Troubleshooting

8. 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.
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.

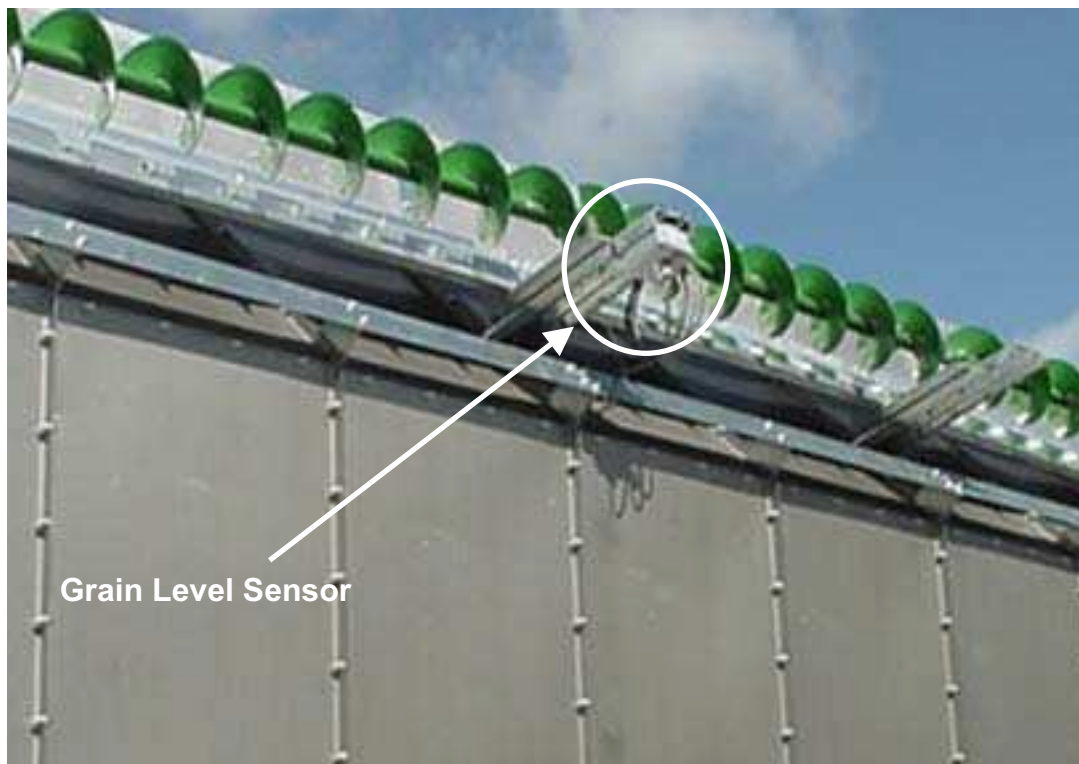


Figure 1.2d: Grain Level Sensor Installed on Dryer (wet bin down)

### 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.

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

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.

### Unload Auger Proximity Sensor (continued)

- 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.

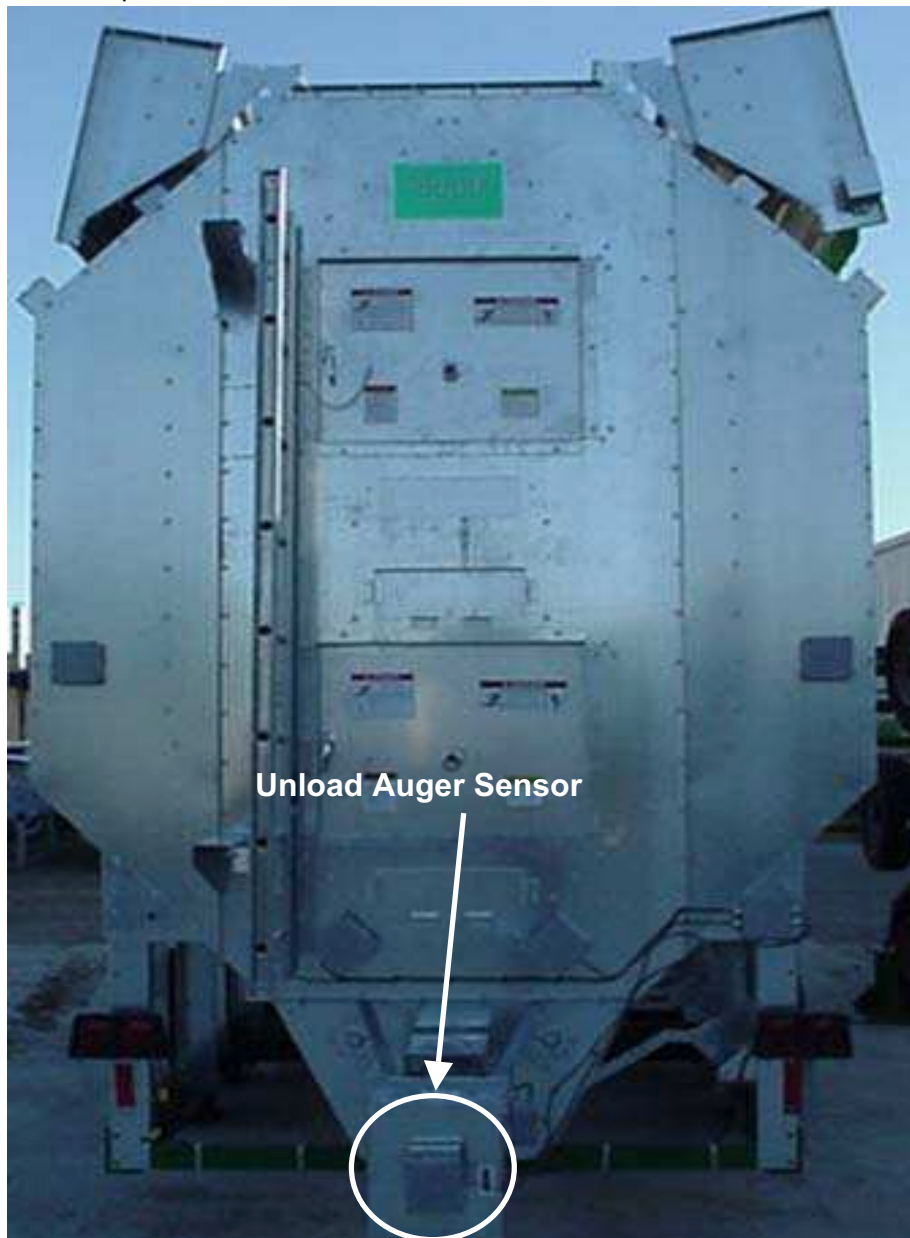


Figure 1.3c: Unload Auger Proximity Sensor Installed on Dryer

### 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 HIGH TEMP  
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    |        |        |

1. This fault indicates when the output of the vaporizer coil has become too hot (above 140 F.)
  - a. The tubing near the fault device should be fairly warm to the touch but not hot.
  - b. Check the fuel supply - is the tank low on fuel?
  - c. Air inlet obstruction – clean debris from the fan grill.
  - d. Vaporizer coil is too close to the flame. – Adjust vaporizer coil.
2. Has the Vaporizer Coil had sufficient time to cool down?
  - a. This device will automatically reset when the device has cooled down.
3. Is the PLC Input light on?
  - a. After the device has cooled down and reset, the PLC Input light should now be ON.
  - b. If not, follow the wiring from the coil to the heater box and measure for 24VDC on wire # 18.
4. If 24VDC is not measured on wire # 18, go to the Power Box and measure 24VDC on the terminal strip.
  - a. 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.
  - b. 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.
5. 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.
  - a. 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.
  - b. 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 | 0CH02 | 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.

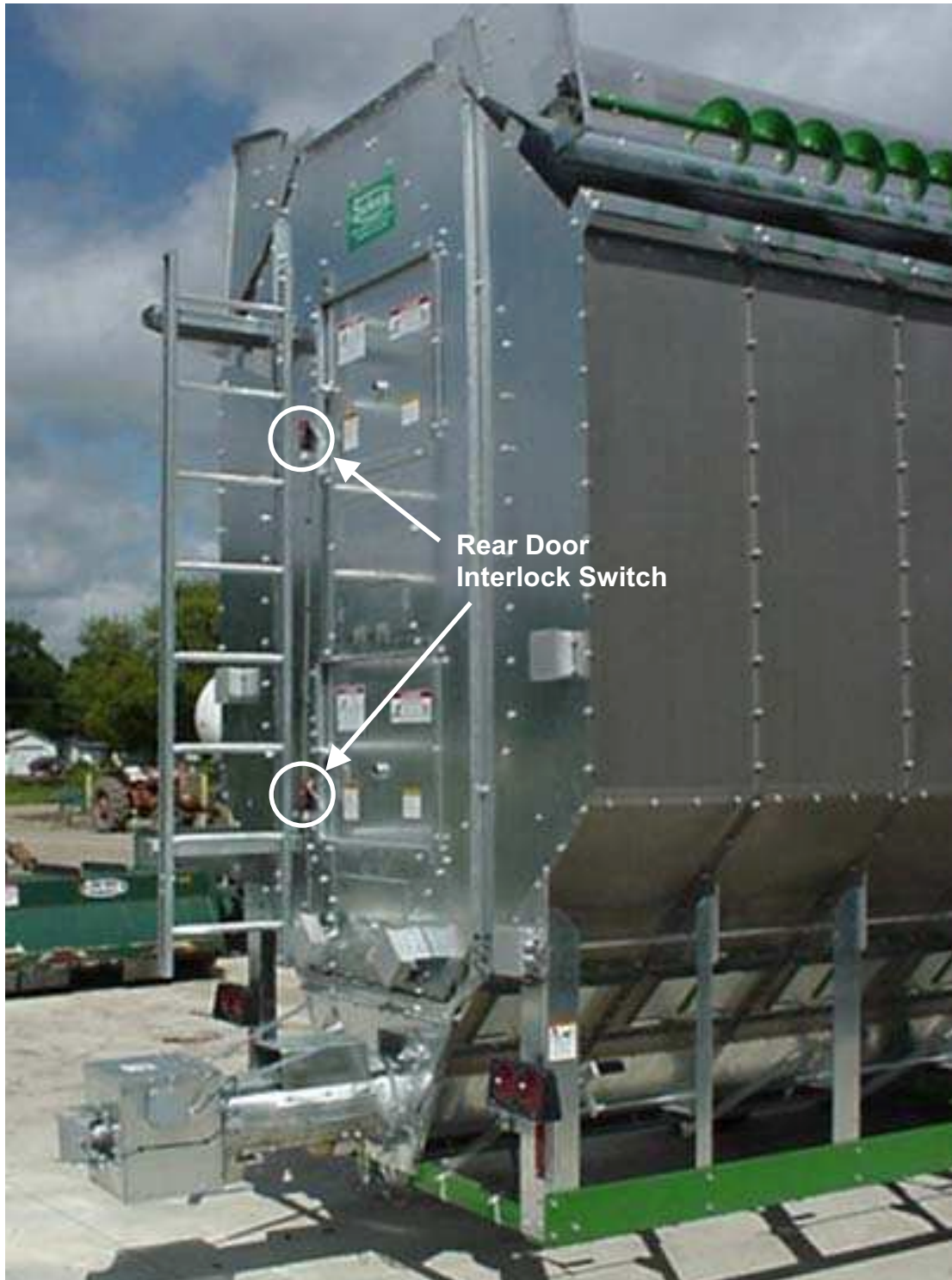


Figure 1.5c: Rear Door Interlock Switch Installed on Dryer

### 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**

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.

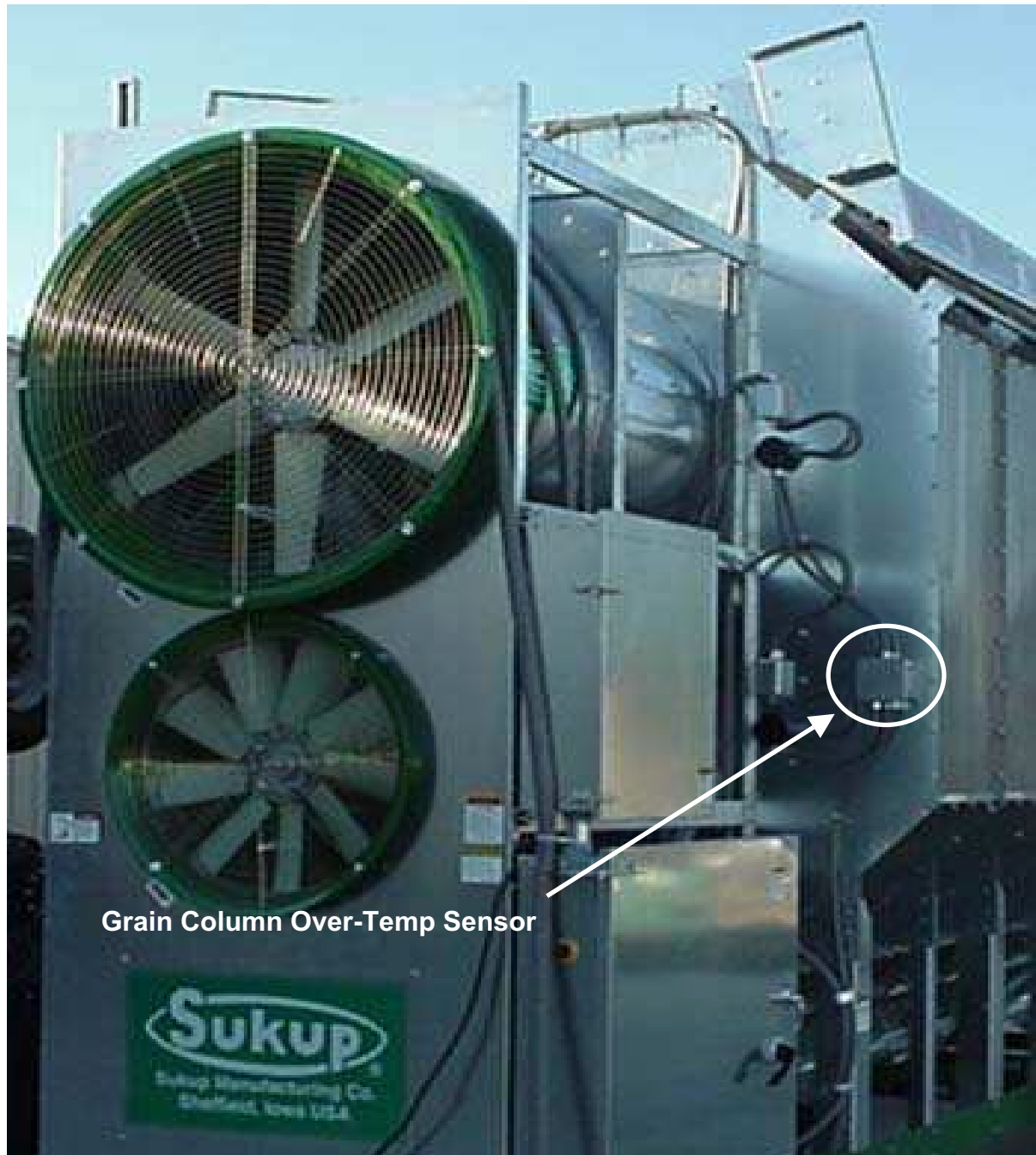
NOTE: To check for an obstruction, go to manual and turn the Load to OFF and turn the Unload to ON. Run the Unload long enough for the grain level in the columns to drop at least 1 foot. Stand back from the dryer and look through the screens to notice the grain level in each column. Any column, which 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.

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

Figure 1.7a: Fault Display

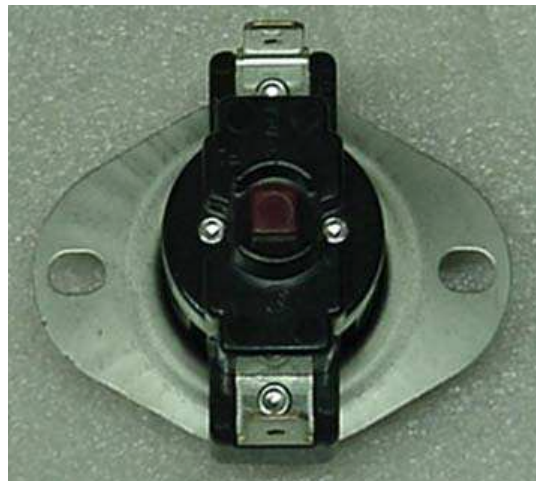


Figure 1.7b: Heater Housing Hi-Limit Switch

| 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.

**Heater Housing Hi-Limit Switch (continued)**

- 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.
- 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.

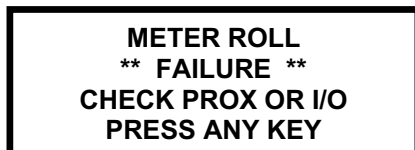


Figure 1.8a: Fault Display



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.

**Metering Roll Proximity Switch (continued)**

- 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.
  - 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 1/8<sup>th</sup> 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.

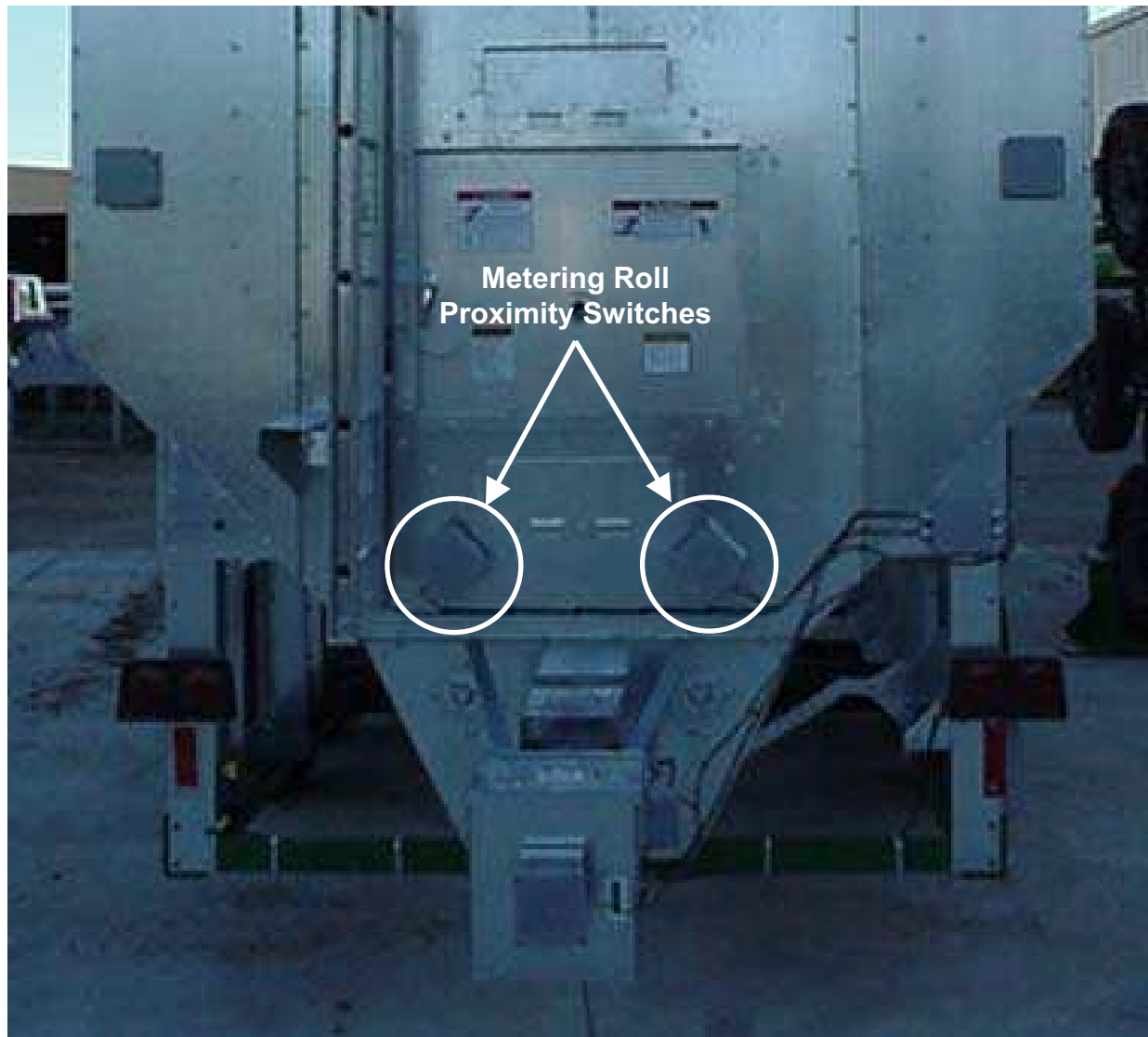


Figure 1.8c: Metering Roll Proximity Switches Installed on Dryer

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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 airflow.
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.

**LOW STATIC PRESSURE  
CHECK FAN/AIR SWITCH**

**PRESS ANY KEY**

Figure 1.9a: Fault Display

**Static Air Pressure Sensor (continued)**

- g. If 24VDC is measured at the ( + ) terminal, check the wiring connections between the Control Box terminal strip and the PLC Power Supply terminals.
- 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.

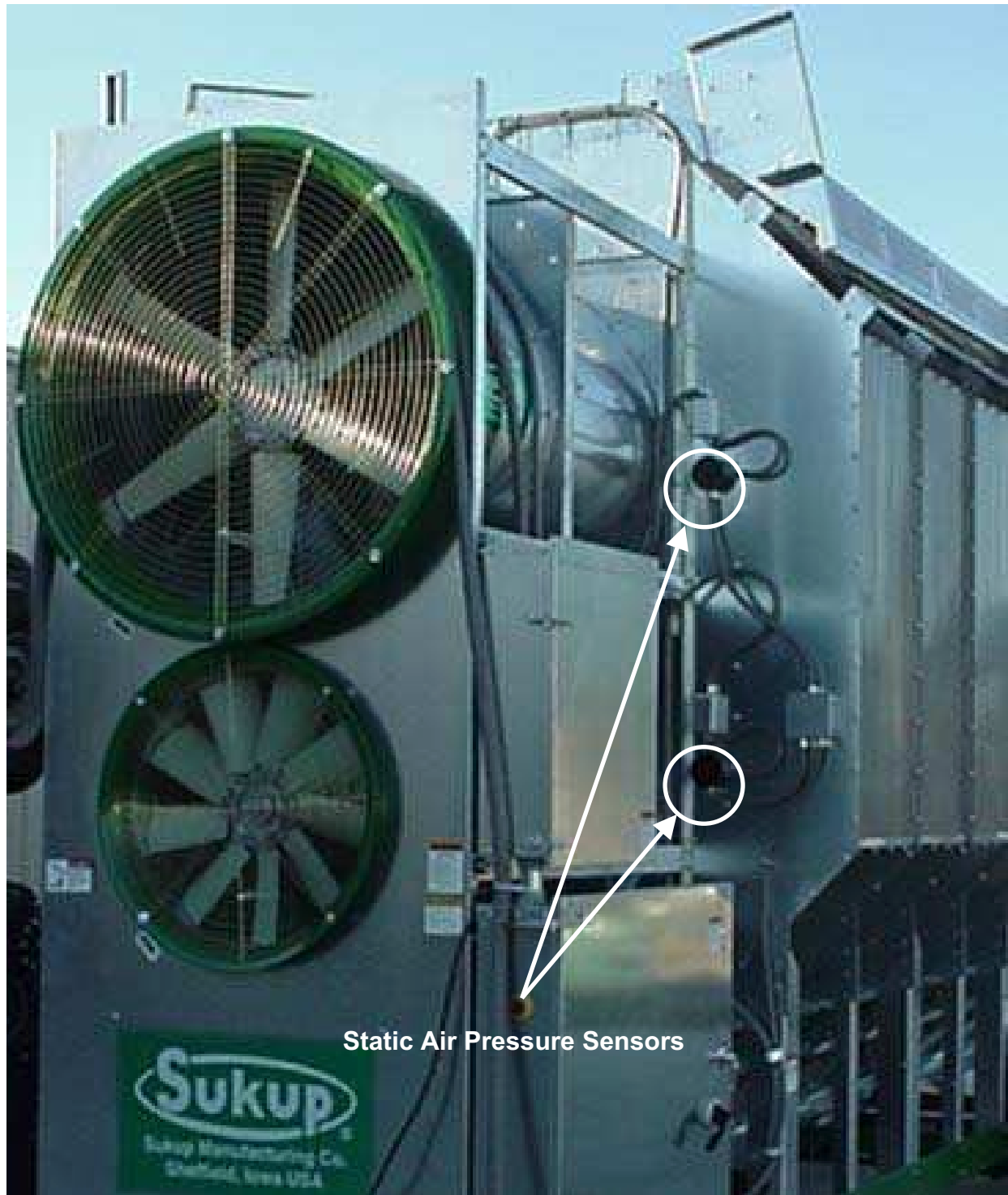


Figure 1.9c: Static Air Pressure Sensors Installed on Dryer

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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 TEMP  
POSSIBLE CLOG OR  
TEMPERATURE 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.

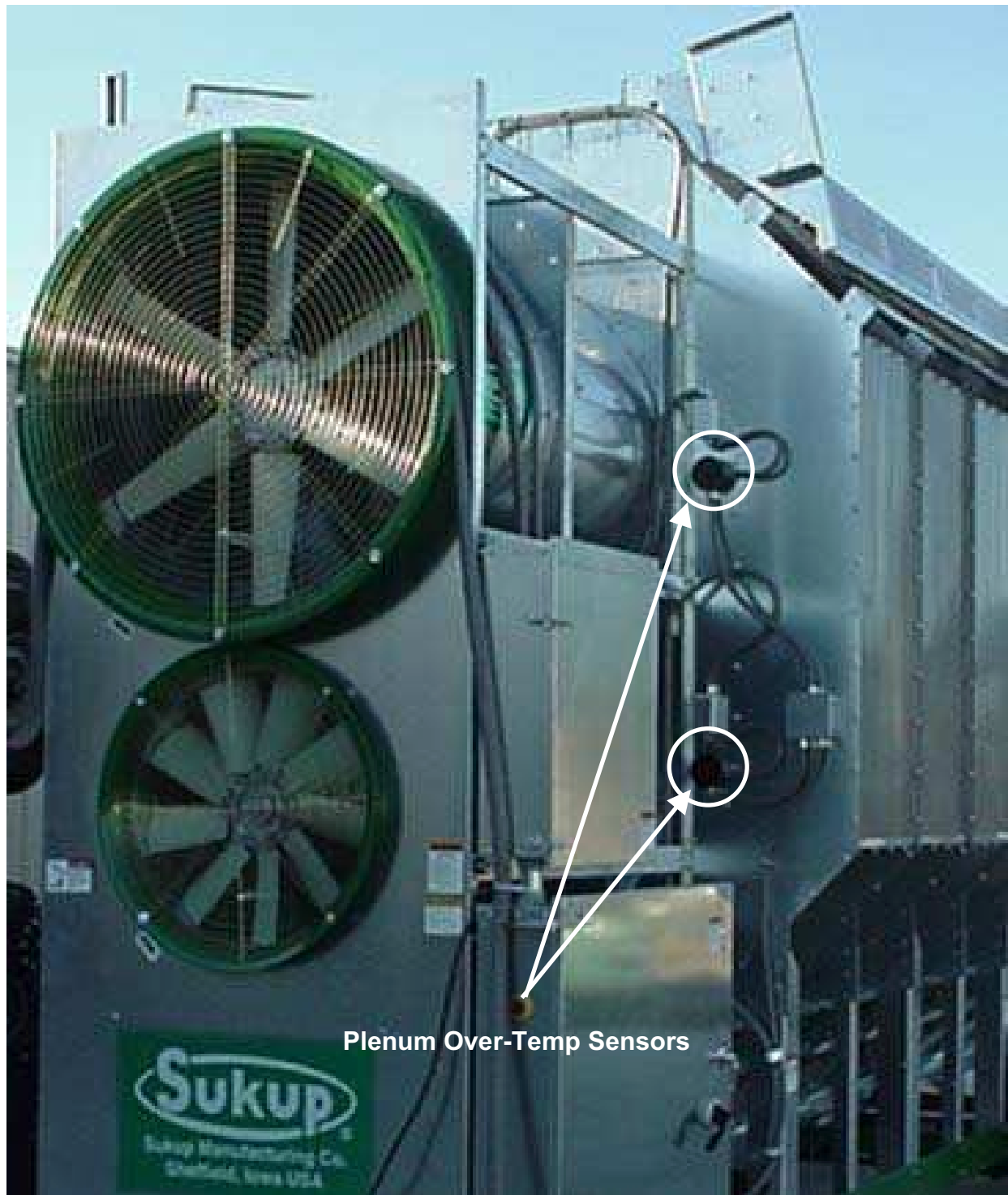


Figure 1.9c: Plenum Over-Temperature Sensors Installed on Dryer

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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.



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

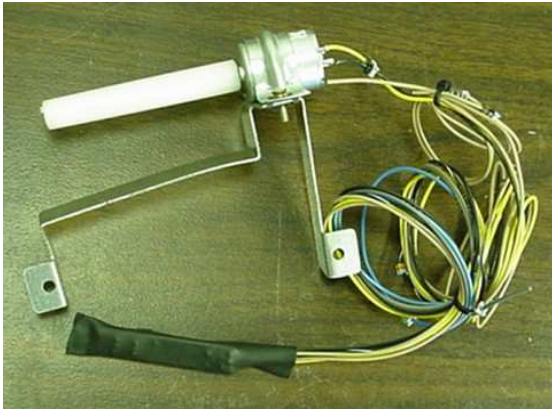


Figure 2.2a: Paper Roller



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 # 95 & # 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 # 95 & # 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. If the Paper Roll motor still does not turn, press [0] + [0] on the keypad to print and check the roller.
- e. 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 top side 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 (3<sup>rd</sup> and 4<sup>th</sup> 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. (2<sup>nd</sup> and 3<sup>rd</sup> 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.

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.



Figure 2.7a: Plenum Temperature Sensor

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.

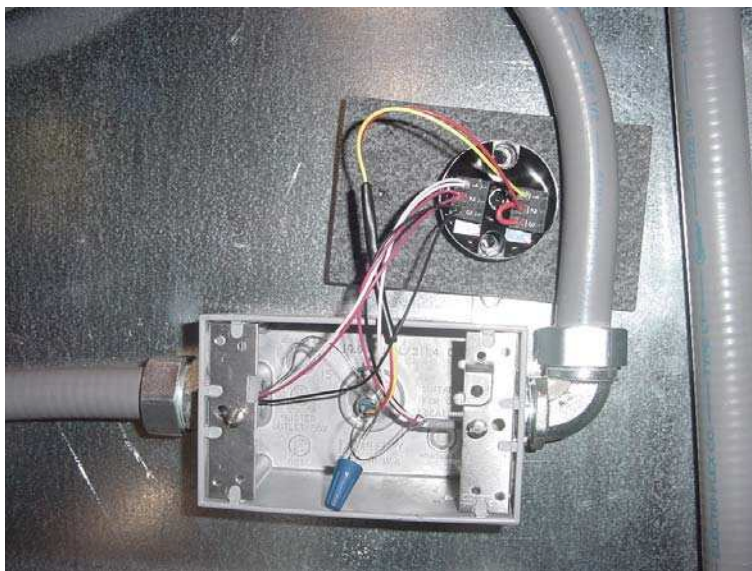


Figure 2.7b: Plenum Temperature Sensor Installed

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.

| <b>Temperature</b> | <b>Resistance</b> | <b>Voltage</b> |
|--------------------|-------------------|----------------|
| 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.

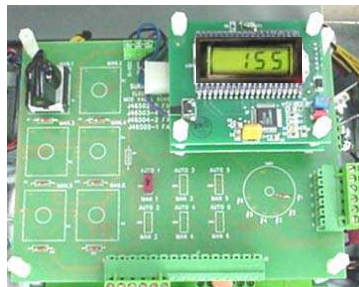


Figure 2.6a: Plenum Temp Display

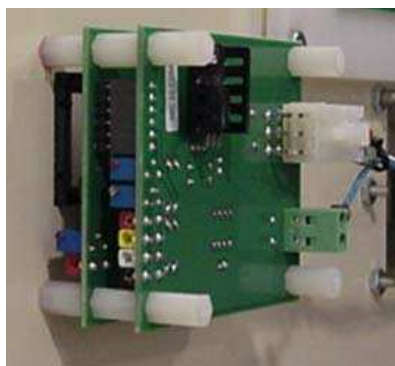


Figure 2.6b: Plenum Temp Display

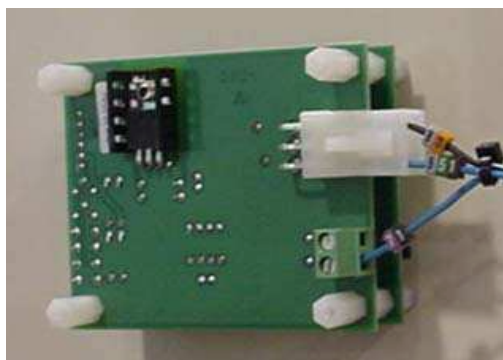
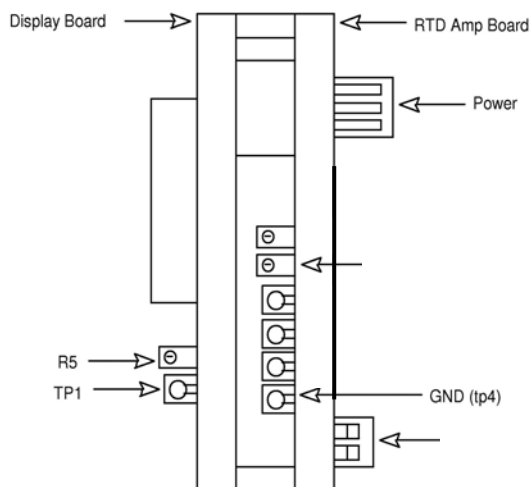


Figure 2.6c: Plenum Temp Display Rear Right

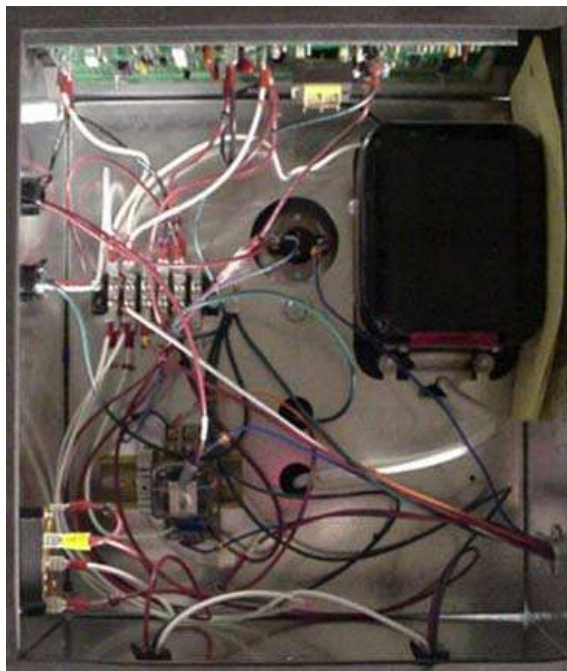




### Heater Box

#### 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 1<sup>st</sup> 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 1<sup>st</sup> vapor solenoid is energized. Gas flows through this solenoid and through the drilled orifice in the 2<sup>nd</sup> vapor solenoid (2<sup>nd</sup> 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 2<sup>nd</sup> vapor solenoid is energized and the burner is now operational.



NOTE: The RED Light on the heater box is on during the ignition sequence.

## Fault Troubleshooting

### Printer (Citizen)

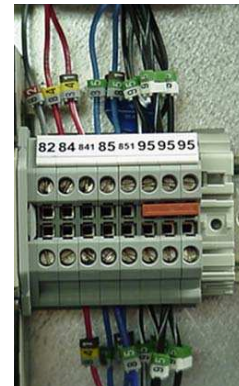
Located on the front panel of the control box, the printer provides a printout of the dryer actions at user determined increments.

The printer uses two harnesses (J8811 & J8814), which contain wires 82, 84, 841, 85, 851, and 95.

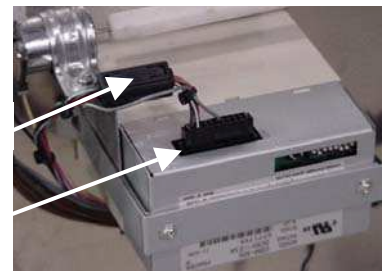
If printer is not functioning correctly, please check the following:

1. Check voltage at below terminals for correct VDC using terminal 95.

| Terminal | Voltage |
|----------|---------|
| 84       | 15VDC   |
| 841      | 15VDC   |
| 85       | 5VDC    |
| 851      | 5VDC    |

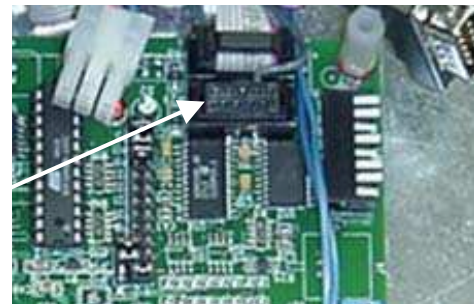


2. Make sure the harness located on the back of the printer (J8811) is seated properly on the printer and the EMI filter is covering all of the wires EXCEPT the grey 82.



Printer harness (J8811)

3. Remove the EMV board and I/O board to expose the Processor board. Check the internal printer harness (J8814) located on the processor for proper seating. See picture.



Internal printer harness

4. Located on the back of the printer is a set of DIP switches. The switches must be set to the following. See picture and chart below (printer is mounted upside down, as shown in picture):

| SW 1 | SW 2 | SW 3 | SW 4 | SW 5 | SW 6 | SW 7 | SW 8 |
|------|------|------|------|------|------|------|------|
| OFF  | ON   | ON   | OFF  | OFF  | OFF  | ON   | OFF  |



5. If the above steps do not find the problem, please contact your service department or Sukup Dryer Service.

## Electronic MOD Valve

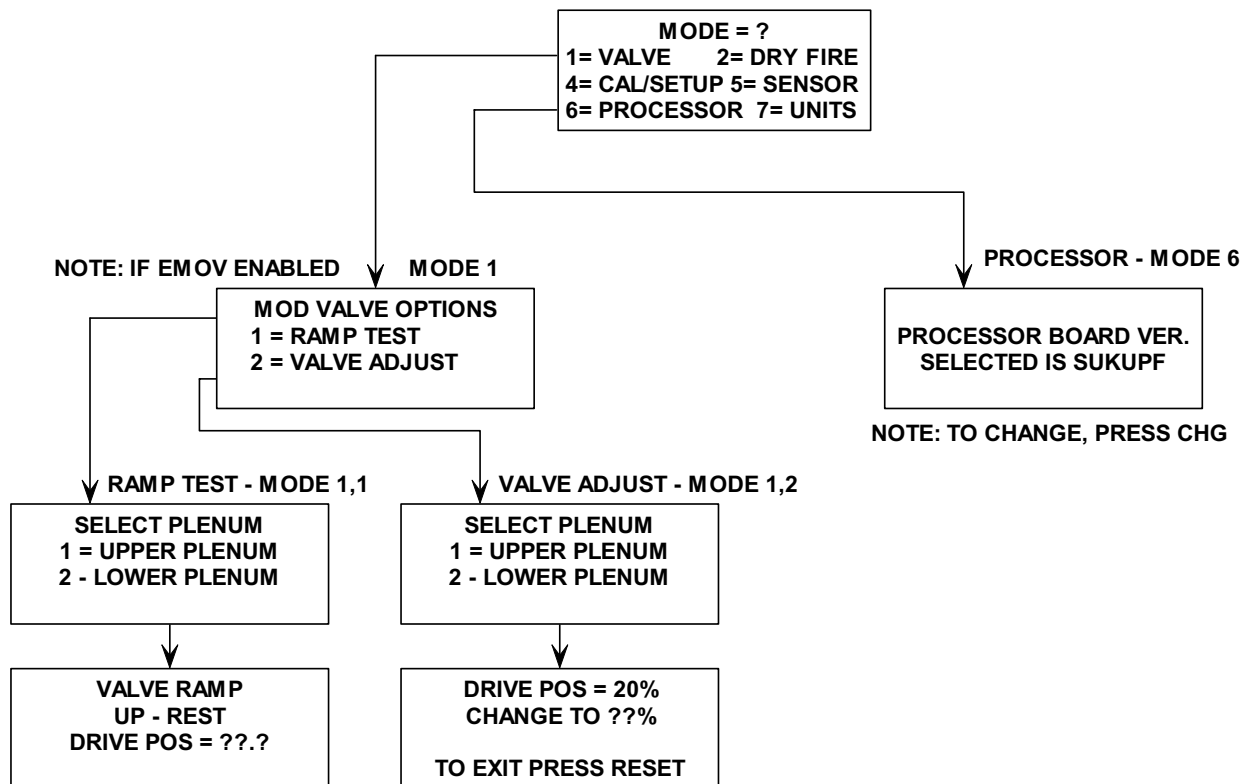
### General Information

1. A plenum RTD and Transmitter are required. The transmitter requires a 15 VDC power source which generates a 0 – 5 VDC signal which is sent to the processor board and the EMOV board.
2. A new 24 VDC power supply is installed. This power supply replaces the current 24 VDC power supply built into the PLC. (# 95 – Gnd, #18 - +24 VDC)
3. A Belimo actuator is connected to a butterfly valve, which opens or closes to control the temperature of the plenum. The Belimo actuator requires a 24 VDC power source and accepts a 0 – 10 VDC control signal. This signal comes from the processor board. (via the EMOV board )
4. An Electronic Mod Valve board (EMOV) is mounted on top of the I/O board. This board has a dual function. A slide switch is provided for each valve, which, when switched to the Manual position, allows the user to set a 0 – 10 VDC signal to be sent to the Belimo actuator for Manual control. Also, each plenum may be selected and the temperature displayed.
5. Trouble shooting the Belimo valve requires a familiarity with the software being used to control the valve. The following covers software information:

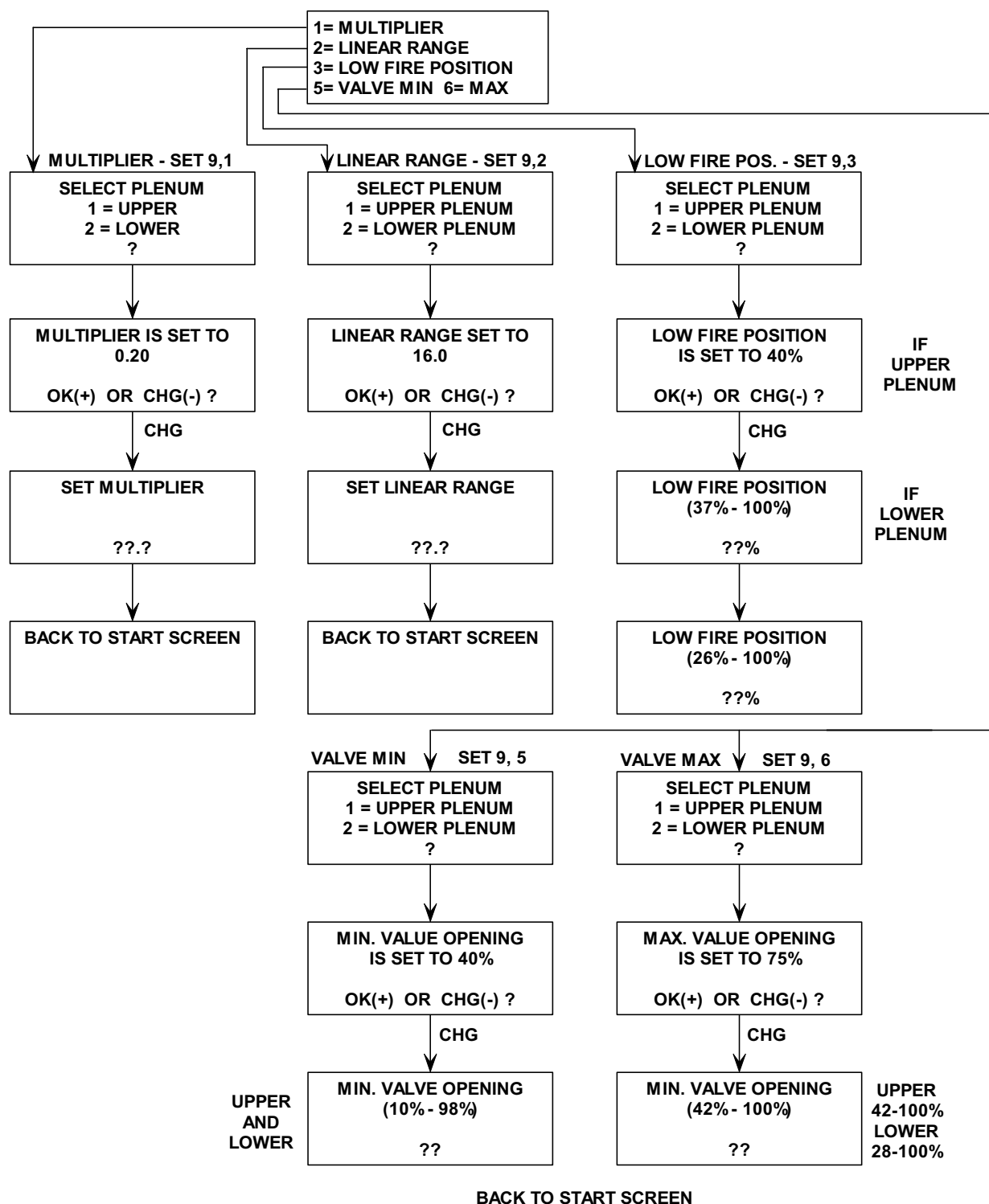
### QUICK REFERENCE:

- a. Press 0 and then 8 to enable or disable the EMOV.
- b. DRY FIRE OPERATION:
  1. Press MODE 2 for Dry Fire Operation. Select the option calling for Fan(s) and heater(s). Fan(s) will be started, followed by the heater(s).
  2. Upon heater ignition, verify that each heater is operating at a pressure of 4 – 5 PSI. If the pressure is less than 4 PSI, or exceeds 5 PSI, loosen the nuts on the u-bolt that connect the actuator to the butterfly valve shaft and rotate the valve shaft until the gas pressure is reading between 4 – 5 PSI.
  3. Press SET 2 to select the plenum temperature menu. Set the plenum temperatures to a minimum value. Verify that the valve is controlling to the desired temperature. To monitor valve status, press the number of the heater desired on the keypad.
  4. Press RESET to return to the start screen.

MODE – PRESS [MODE] ON KEYPAD



**CONTROL ALGORITHM – ELECTRONIC MOD VALVE – HIDDEN MENU**  
**SET 9 – PRESS [SET] THE [9] ON KEYPAD**

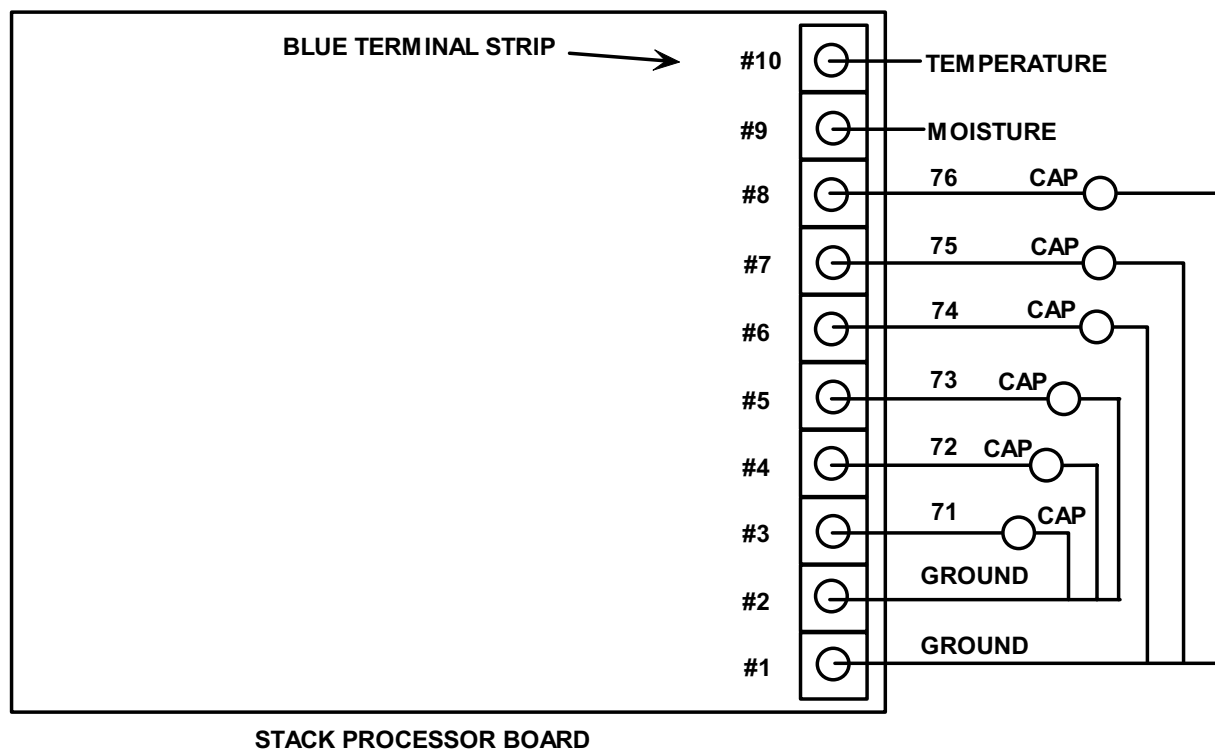
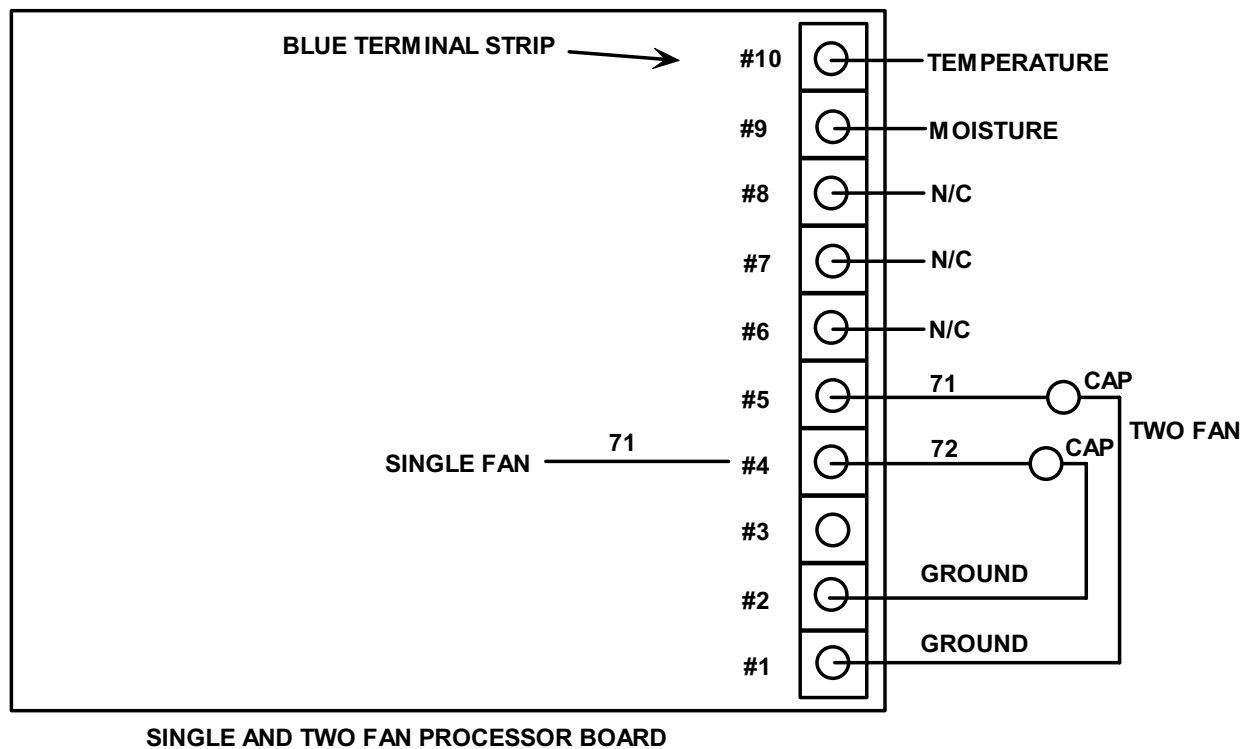


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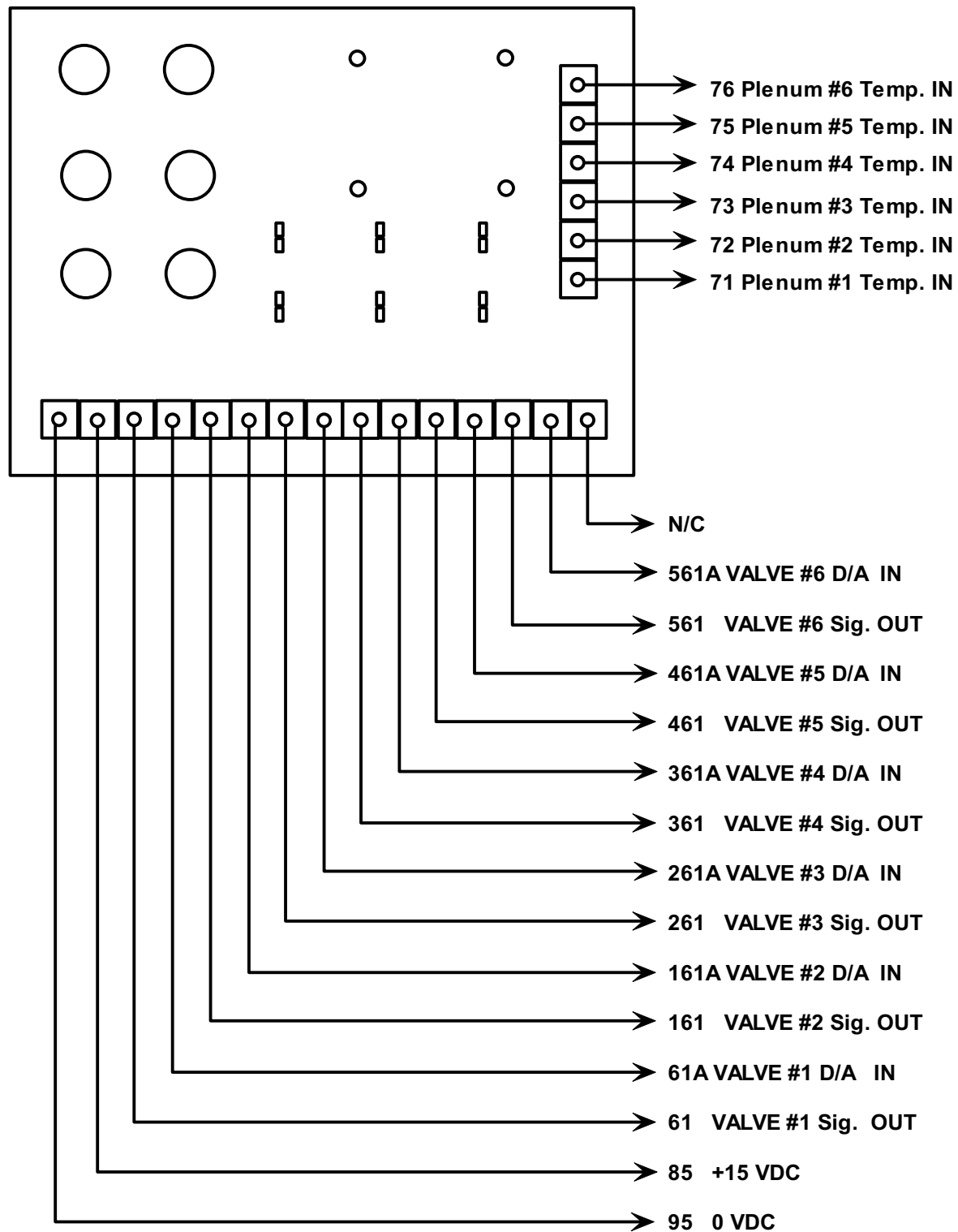
## Fault Troubleshooting

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1. The first step in trouble shooting an EMOV problem is to determine whether or not the problem is with just one heater or with all of the heaters.
2. If the problem is with all of the heaters, check for 24 VDC coming from the power supply. This is the supply voltage to all of the Belimo actuators.
3. If the 24 VDC is present, check for a voltage on each actuator's signal wire. If these voltages are not present, the processor board may be the cause.
4. If the problem has been isolated to one heater, locate the Auto/Manual slide switch on the EMOV board located on top of the I/O board in the Control Box). With power applied to the control box, place the slide switch for that heater in the Manual position. (fan(s) and heater(s) are off during testing).
5. While measuring the DC voltage on the EMOV board, (between GND - #95) and the signal wire going to that actuator (61, 161, 261, 361, 461, or 561). With the manual potentiometer turned fully clockwise, a voltage of approximately 10 VDC should be measured. As you slowly turn the potentiometer counter-clockwise, the voltage will decrease until 0 VDC is read. With the potentiometer set to read 10 VDC on the voltmeter, go to the heater pipe train and check the butterfly valve shaft for a fully open position (the slot on the end of the shaft should be at 60° to the pipe train). With the potentiometer set to read 0 VDC on the volt meter, the slot on the end of the butterfly valve shaft should be perpendicular to the pipe train.
6. If a voltage is measured at the EMOV board, but not at the valve, check for a loose wiring connection between the EMOV board and the actuator.
7. If voltage is measured at the valve, but the valve did not open or close, re-confirm the presence of 24 VDC to the valve. If 24 VDC is present, the valve is probably defective, or the u-bolt, which mechanically connects the valve to the butterfly shaft is loose and needs to be tightened.
8. The above tests will test the wiring from the EMOV board to the actuator and the actuator itself.
9. If voltage is not measured at the EMOV board on the wires going out to the Belimo actuator, # 61, 161, 261, 361, 461, or 561, check the voltage on the wires coming in from the processor board (61A, 161A, 261A, 361A, 461A, or 561A). If voltage is not measured on the wires coming in from the processor board, check the wiring harness that plugs into the processor board or replace the processor board itself.



## Electronic MOD Valve Board



### 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 in manual mode                                                                                                                          |

## Fault Troubleshooting

|            |                                                                   |                                                                                                                                                     |
|------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 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                                                               |

## Fault Troubleshooting

|         |                                                                           |                                                                                                 |
|---------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 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                     |

## Fault Troubleshooting

|     |                                                                            |                                                                                                                      |
|-----|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| 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                                                                  |

## Fault Troubleshooting

|              |                                                                     |                                                                                                                                                                                                                                         |
|--------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 <sup>ST</sup> Aux Load<br>5 Sec. Delay On  |        |
| 8  |         | 9  |                                  | 2 <sup>ND</sup> Aux Load<br>10 Sec. Delay On |        |
| 14 |         | 15 |                                  | Aux Unload                                   |        |
| 18 | 49<br>D |    | Motor Overload<br>Safety Circuit |                                              |        |

## 16 Pin Header Faults and Inputs From the Dryer

