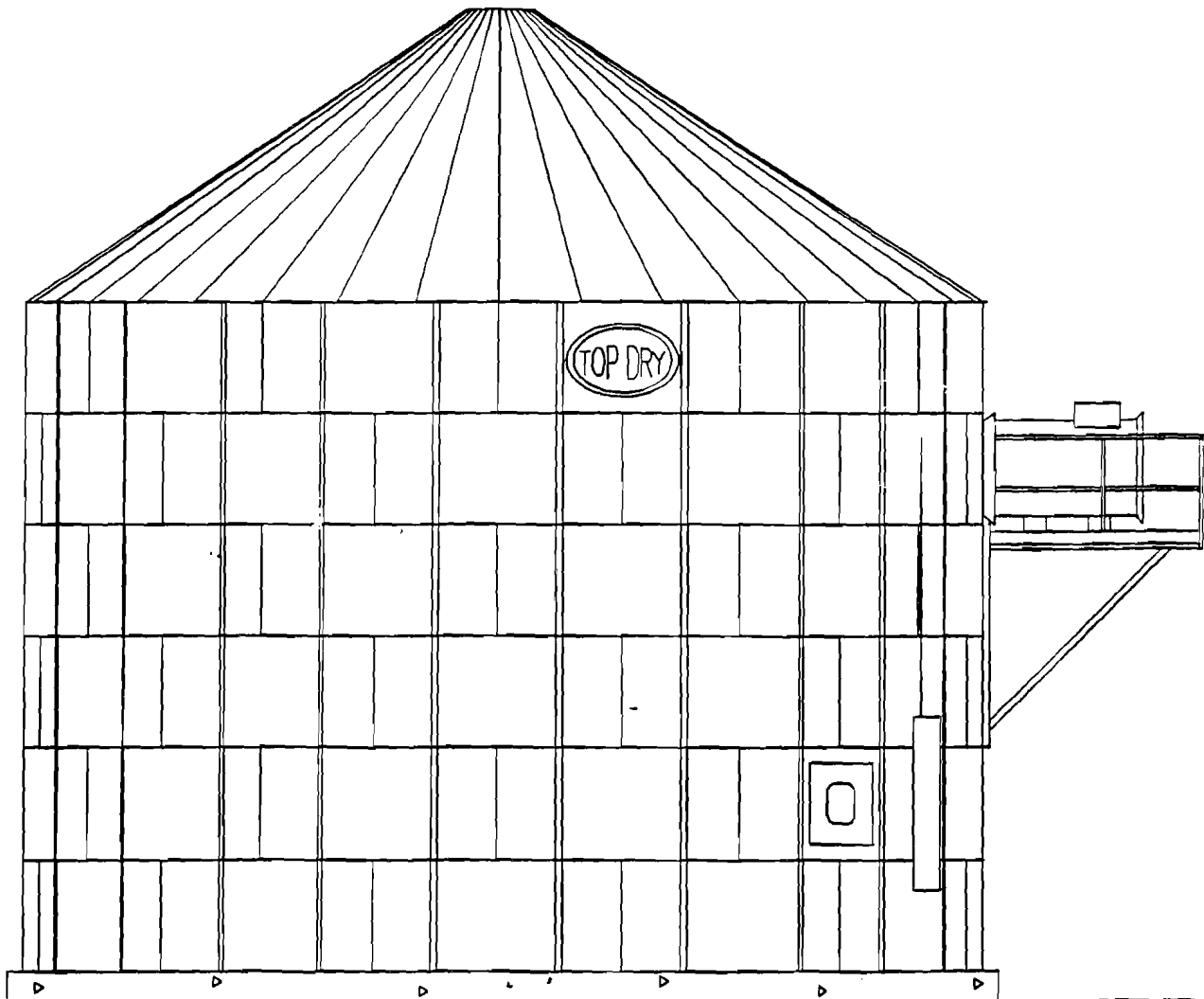




Grain Systems, Inc.

# AUTO-FLO

## ELECTRICAL INSTALLATION & OWNER'S MANUAL



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# AUTO-FLO INSTALLATION - GENERAL

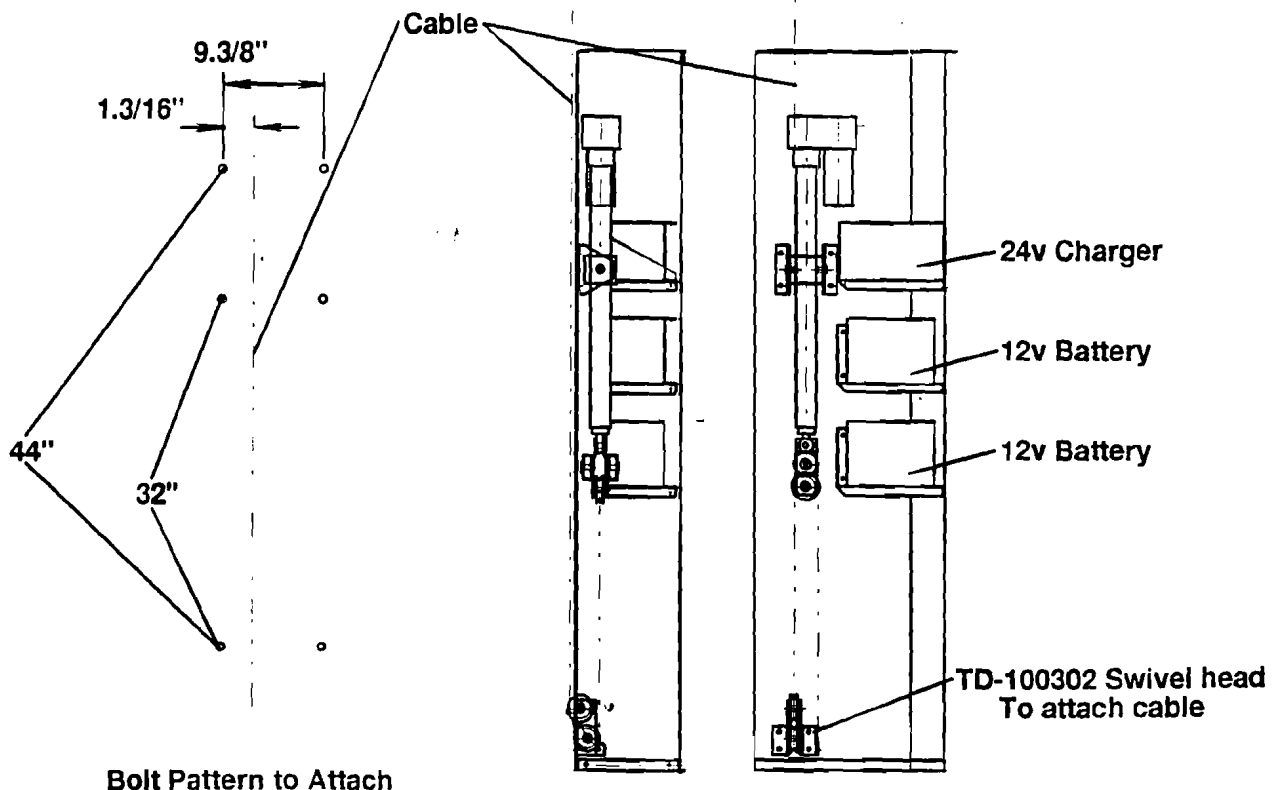
The Top Dry Auto-Flo may be installed in new or previously built GSI Top Dries, Stormor Ezee Dries, or MFS Modern Dries. Changes are required in leveling band arrangement as well as the addition of flow control plates, flashing, etc. on units previously erected. Supplementary instructions for the specific model Top Dry or Ezee Dry detail these changes.

## INSTALLATION - CONTROL BOX, ACTUATOR, SWITCHES

**1.1** Mount the Auto-Flo control box on the side of the Top Dry bin. Position the box so that it is approximately at eye level. Ideally the control box should be positioned so the operator can see the fan/heater unit and the cable for operating the dump chutes. Locate and drill the appropriate holes for mounting the control box. Mount the Auto-Flo control box with four (4) 5/16" bin bolts and nuts.

**1.2** If installing the Auto-Flo on an existing dryer, keep dump spouts closed by fastening two (2) cable clamps just below outside pulley bracket. Mark third sidewall ring from ground to indicate cable path. If present, remove existing winch and plug any holes in sidewall.

**1.3** Mount the dump actuator using the mounting hole patterns shown below. If the horizontal seam bolts are within 1" horizontally of the hole pattern shown, existing holes may be used to attach the actuator. Use four (4) 5/16" x 1.1/4" bin bolts with bolt heads to the inside of the bin. Also use flat washers each side of the mounting brackets.

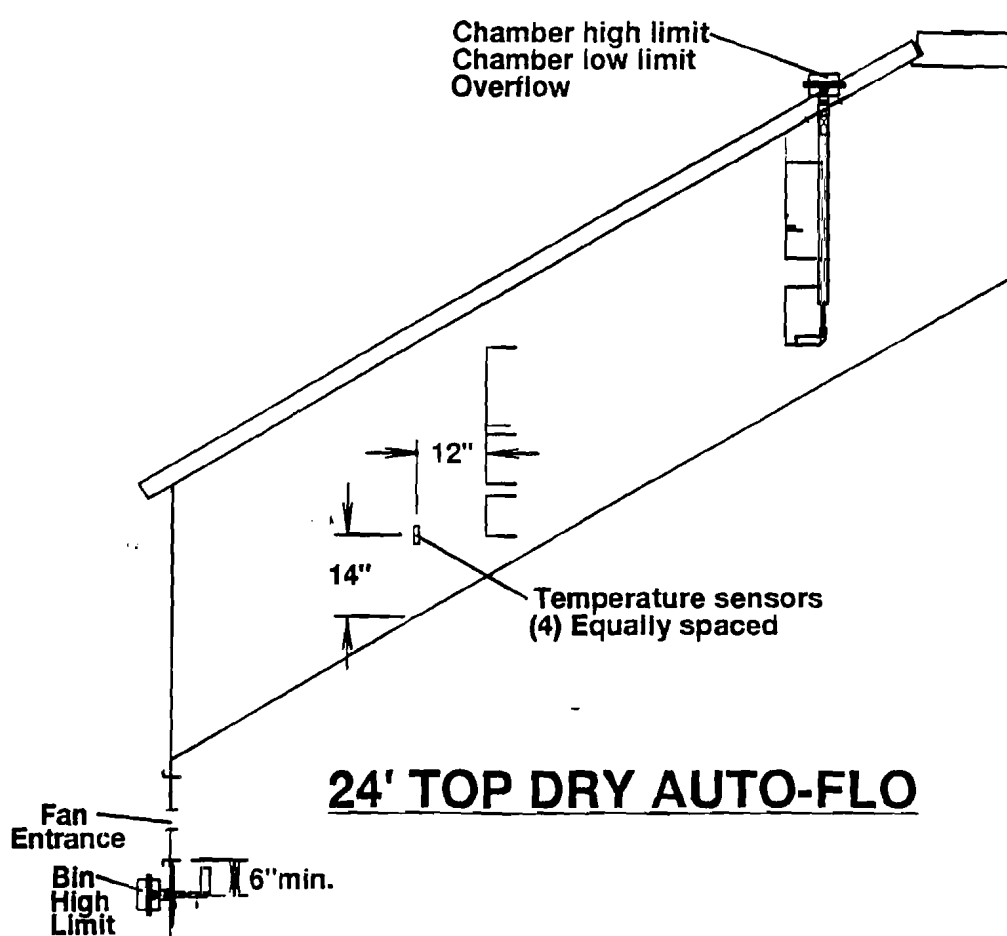


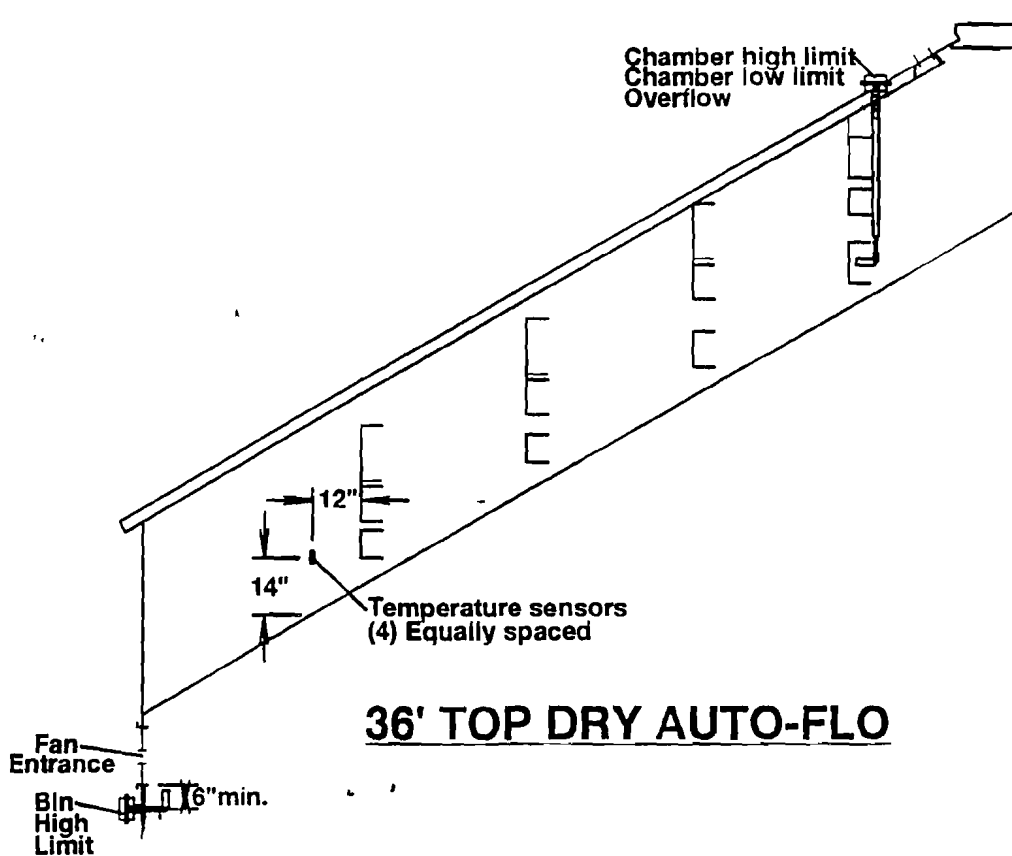
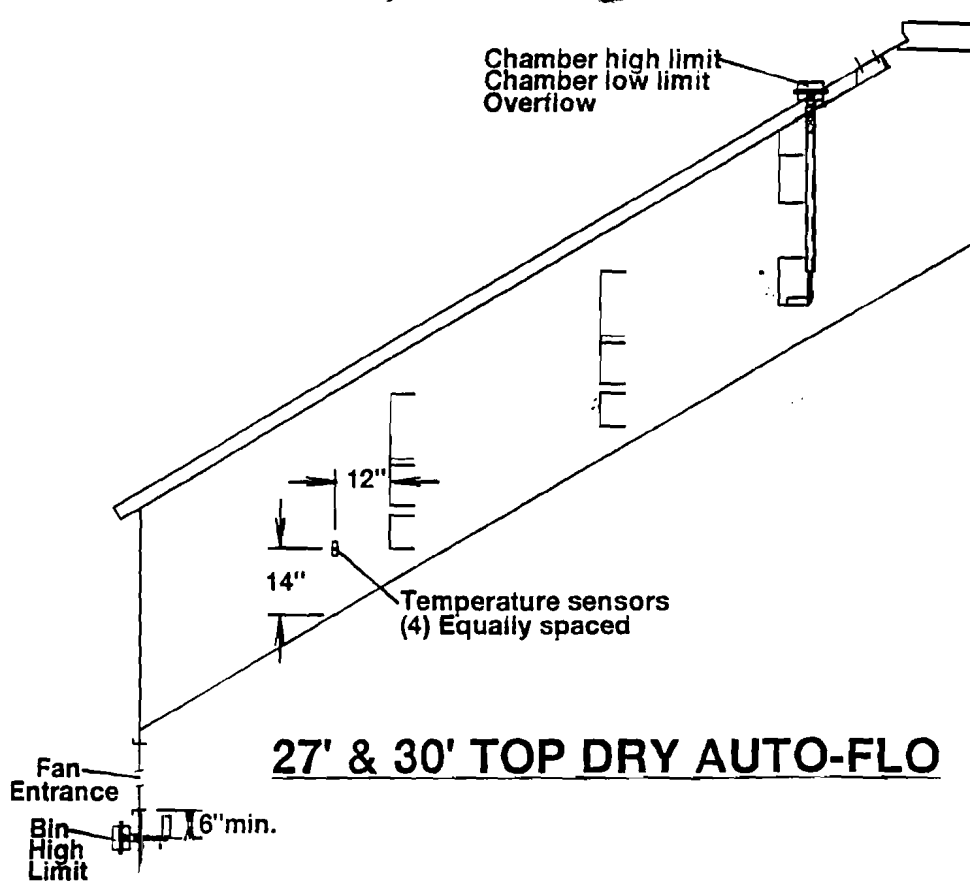
1.4 Route cable as shown on previous page. Attach cable to bracket with swivel head connector.

1.5 Mount 24 volt power supply on top shelf of actuator unit, then mount 12 volt batteries on the two lower shelves. Note that batteries are shipped dry. Acid must be added.

1.6 Run 2 wires from terminals 13 and 14 of terminal block B to 110 volt side of 24 volt power supply. Run 4 wires from terminals 15 thru 18 on terminal block A to junction box at top of actuator. Run 2 wires from terminal 1 and 2 on terminal block B to 24V - and + terminals of batteries. Refer to Control Box Back Panel Interior Wiring, Actuator Wiring and Battery Wiring diagrams.

1.7 Assemble and install the rotary high and low limit switches per the instructions provided in this manual. Once the switches are assembled, mount the overflow fill switch just below the peak ring of the roof. The chamber high limit fill switch should be mounted on the top leveling band on the inner most ring. Mount chamber low limit fill switch on the lowest leveling band on the inner most ring. See drawing below for correct diameter Top-Dry. Locate the bin high limit fill switch at least 6" below the fan entrance hole. The switch should be mounted in a location that is easily reached from the inside ladder. The wet supply fill switch should be mounted so when the wet supply tank is empty, the sensor will be uncovered and indicate so on the control box. Two wires should be ran from each of the fill switches to the Auto-Flo control box.





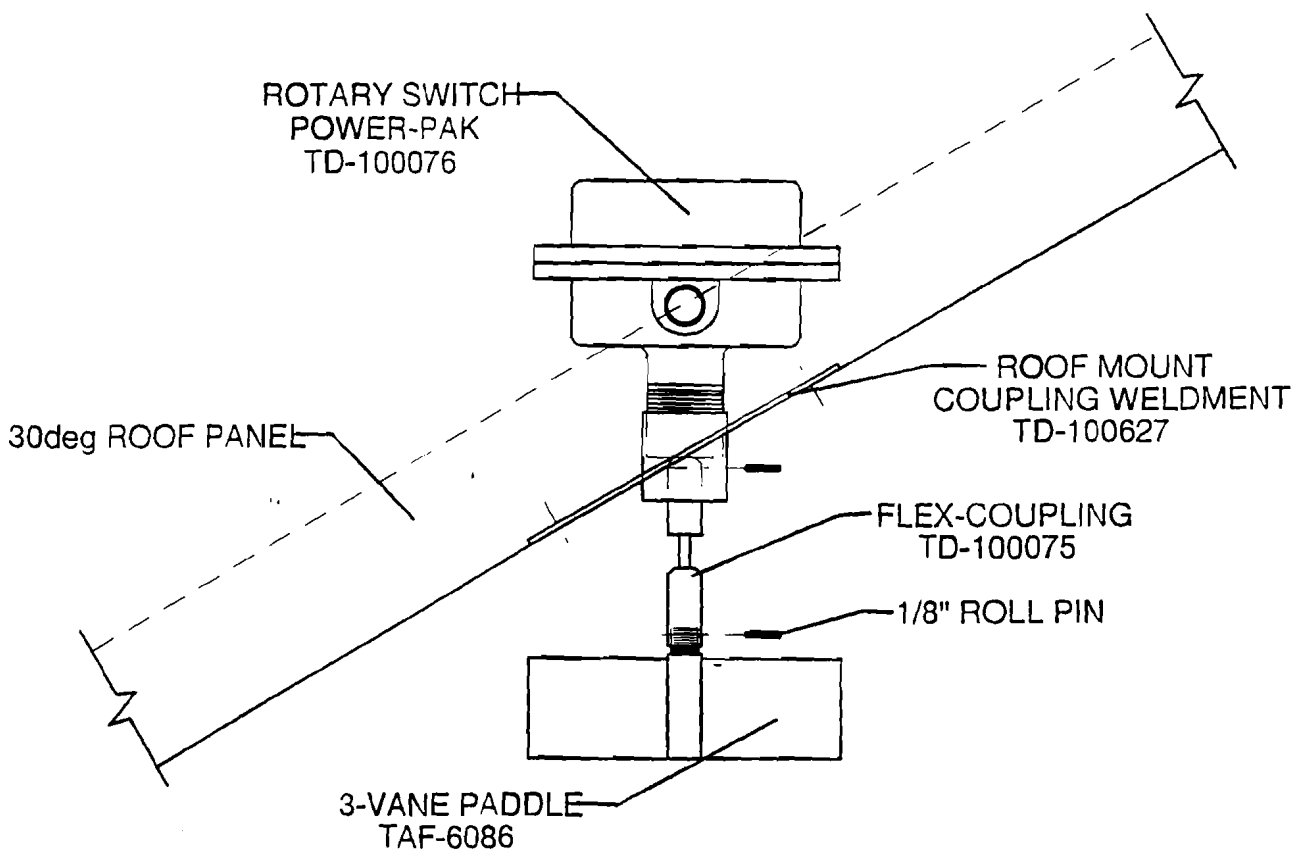
# INSTALLATION OF ROOF-MOUNTED LEVEL SWITCHES

Drill 2" diameter holes through roof panels at locations shown on page 3. Use a mounting plate as a pattern and drill (4) 3/8" holes through roof panels at each switch location so the plate can be bolted to the roof.

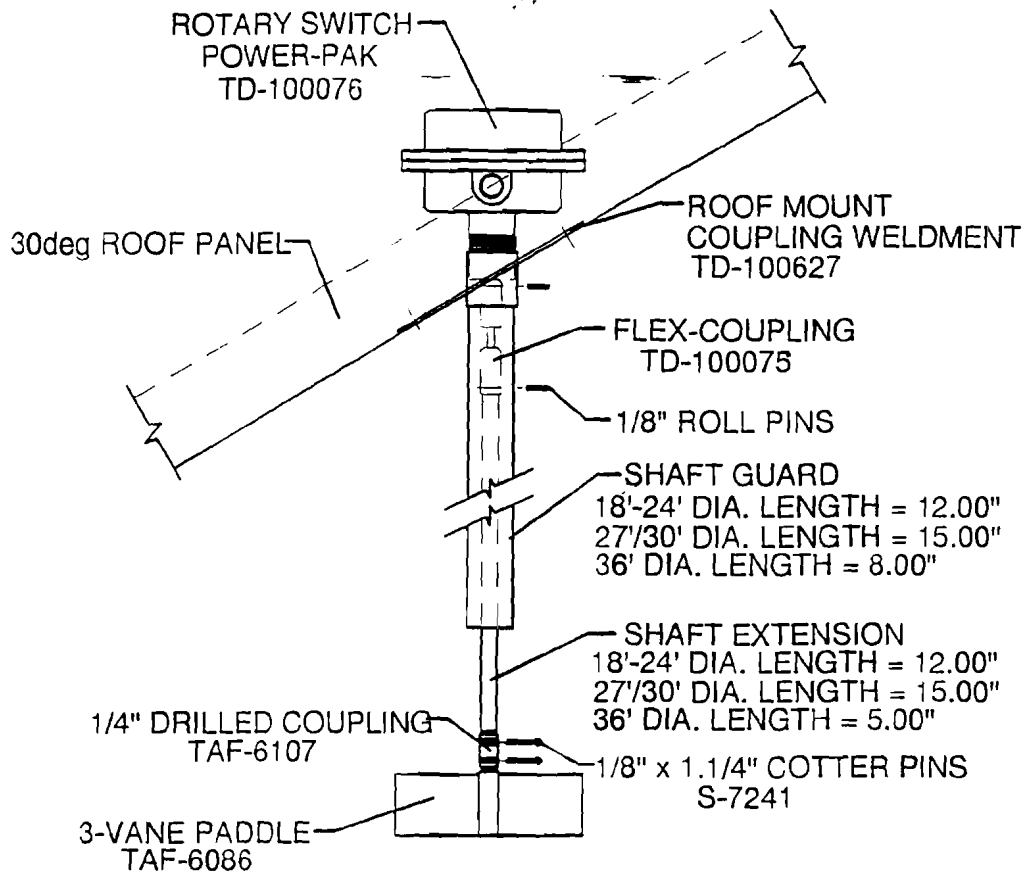
Attach flex-coupling to the power-pak. Apply teflon tape or pipe sealant (not included) to power-pak pipe threads and thread power-pak into mounting plate coupling. Conduit opening in power-pak should be at right angles to roof rib or face toward eave.

Caulk underside of mounting plate above and both sides of 2" hole. Bolt to roof panel.

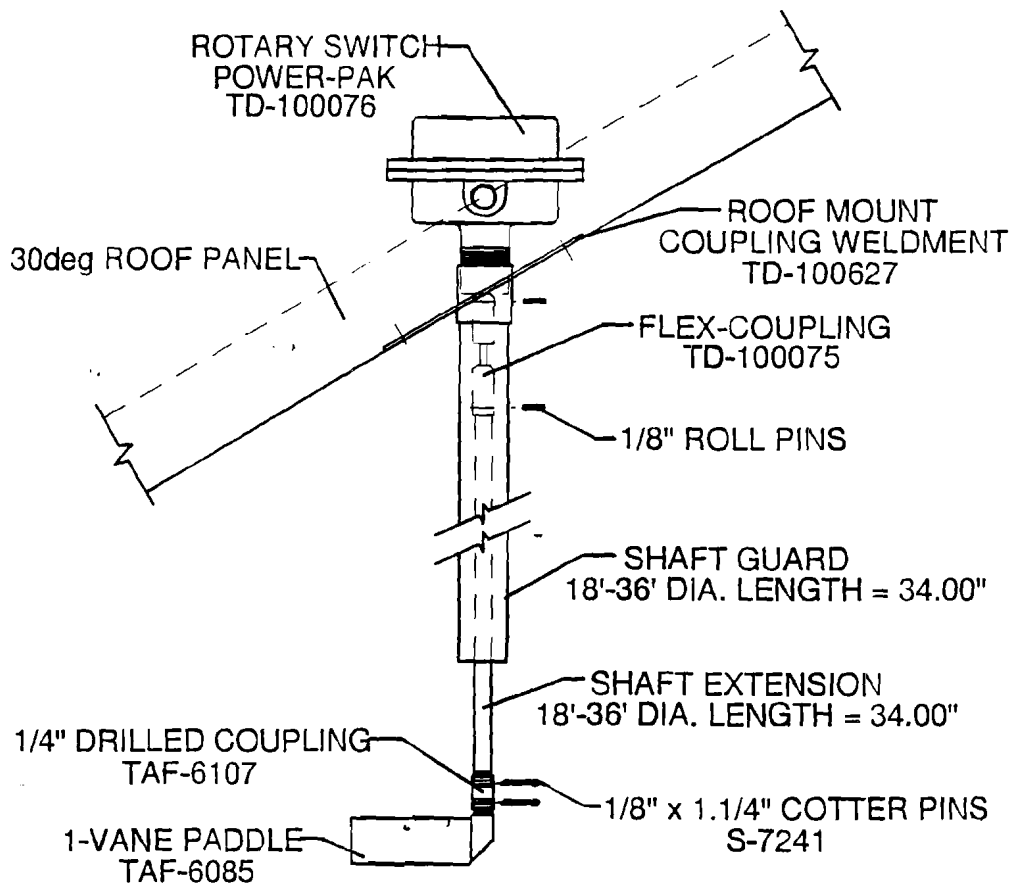
Attach shaft extension according to page 2 diagrams. Use teflon tape or pipe sealant (not included) on shaft guard (see page 2 diagrams for lengths) and thread to underside of mount plate coupling. Add 1/4" drilled coupling and paddle. (Note: single vane paddle is used on **LOW** level switch.)



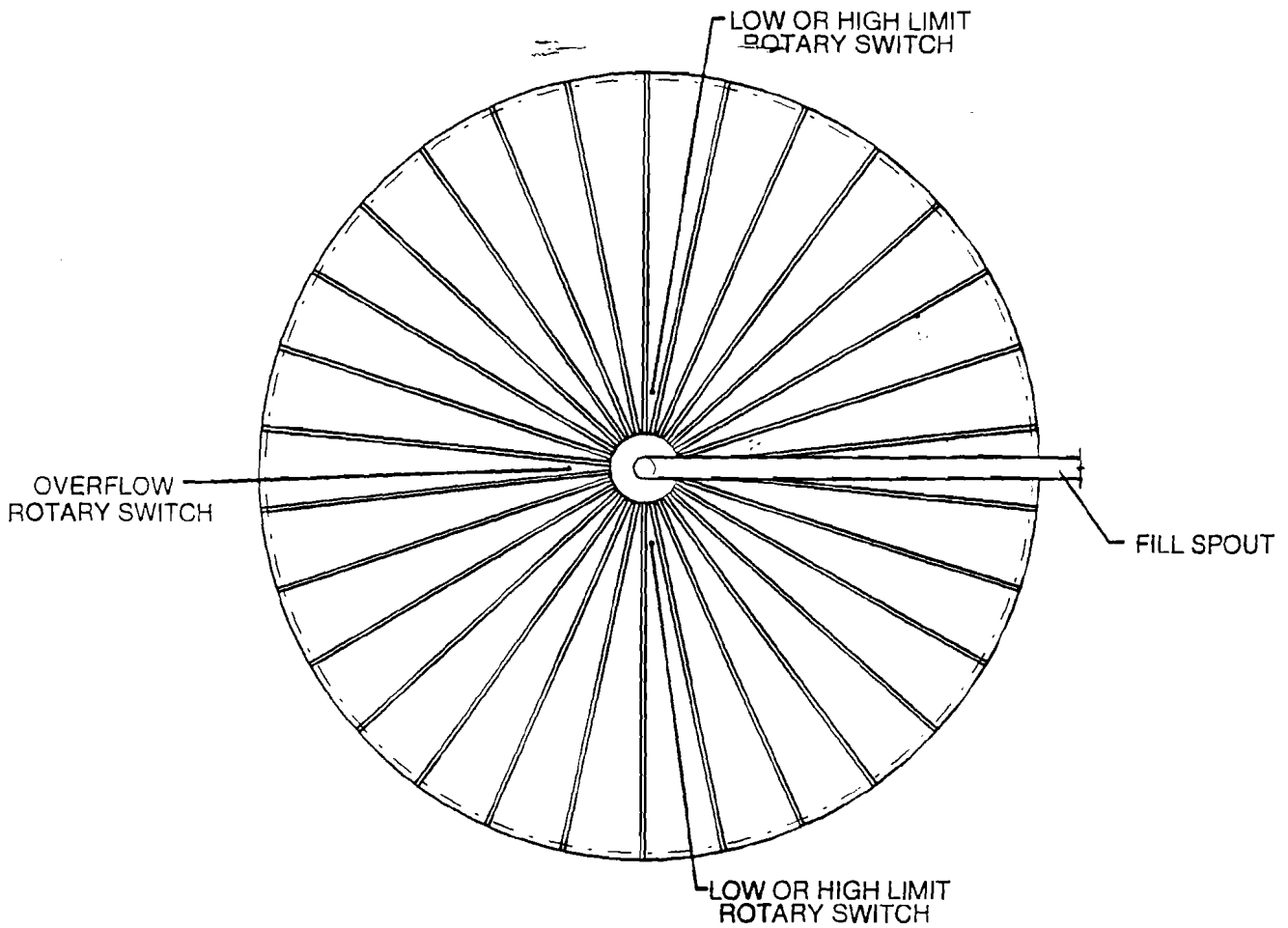
## OVERFLOW ROTARY SWITCH ASSEMBLY



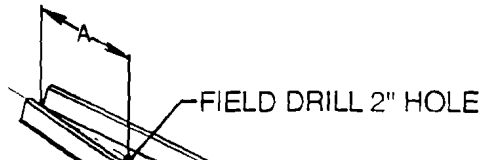
## HIGH LIMIT ROTARY SWITCH ASSEMBLY



## LOW LIMIT ROTARY SWITCH ASSEMBLY



**ROTARY SWITCH ROOF LOCATIONS**



**NOTE:** Attach the flex-coupling to the rotary switch power-pak, then thread the power-pak into the roof mount coupling before bolting the roof mount to the roof sheet!

TOPDRY BIN DIAMETER	"A"
18'-24'	23.50"
27'/30'	19.00"
36'	31.00"

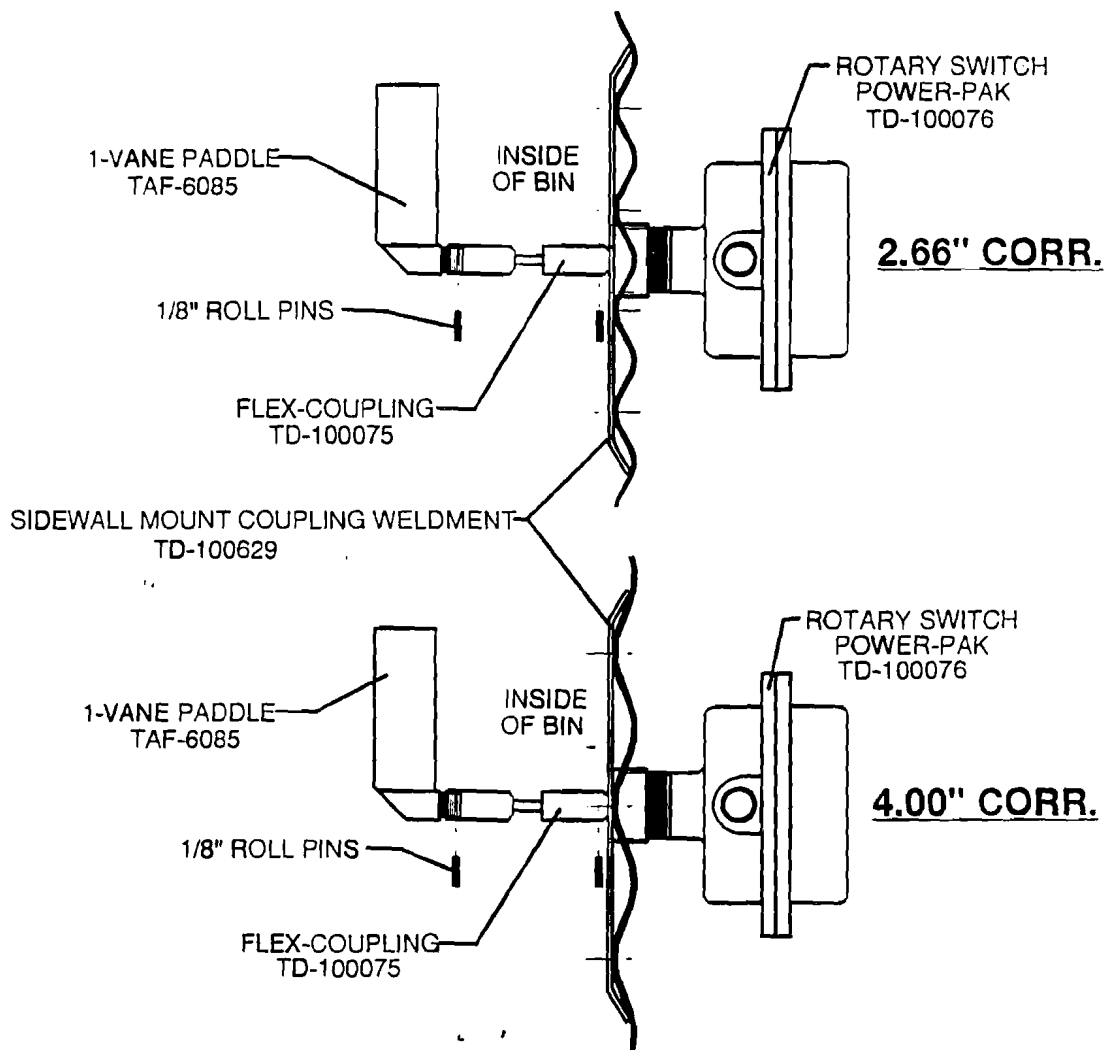
**ROTARY SWITCH PANEL LOCATION**

# INSTALLATION OF WALL MOUNTED LEVEL SWITCH

Drill 2" hole through wall at desired location. If bin is 2.66" corrugation, hole should be centered on outside hill. If bin is 4.00" corrugation, hole should be centered on outside valley.

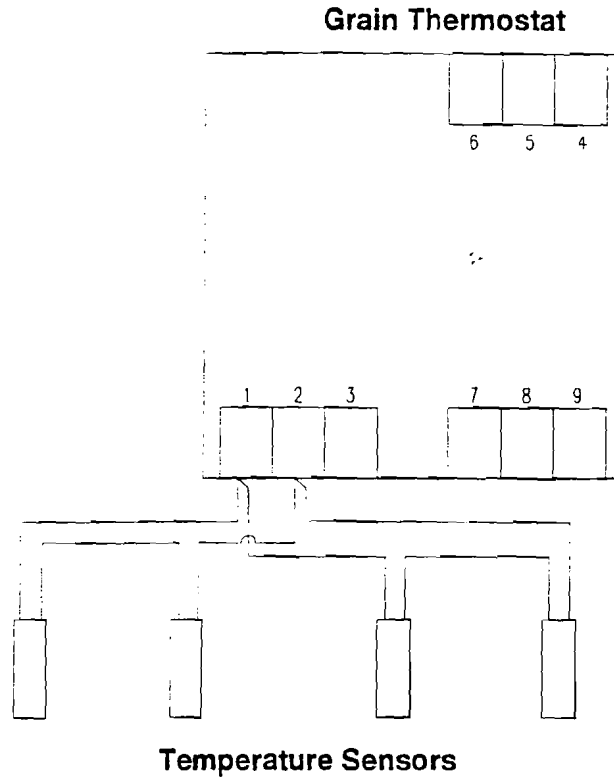
Position mount plate as desired (from inside), mark and drill 3/8" holes. Caulk coupling abundantly where it passes thru wall. Add foam weather strip around top and sides of plate then bolt to bin wall. Caulk coupling to wall seam from outside.

Attach flex coupling to power-pak. Add teflon tape or pipe sealant (not provided) to power-pak pipe threads and thread into coupling. Conduit opening should be horizontal or down. Add one-vane paddle. (Paddle may be added to flex coupling before power-pak is threaded into coupling if desired.)





1.8 Mount the temperature probes on the top of the lowest leveling band on the outermost ring. This ring would be the second out from the center on 15', 21' & 24' diameter bins, the third ring on 27' & 30' diameter bins and the fourth ring on 36' diameter bins. Four(4) probes are supplied and should be positioned in four different locations to provide a four point averaging system. Wire the probes per the diagram below.



**HEATER CONNECTION - 2 CROP DRYERS ON TOP DRY W/ AUTO-FLO**

1.9 Rewire the electrical system in each fan/heater unit to take the overload relay contact and J-wire out of the fan circuit. The coil terminal which was disconnected should be wired directly to its power supply. The wire from the overload contact is connected to terminal A12 of the Auto-Flo control box. The J-wire is connected to terminal A13 of the Auto-Flo control box.

**AUTO-FLO SYSTEMS WITH 2 FAN/HEATER UNITS**

- A. Rewire each fan to take the overload relay contacts and J-wires out of the fan circuits.
  - B. Connect each coil directly to its power supply.
  - C. The wire from the overload contact of Fan 1 is connected to terminal A12 of the Auto-Flo control box.
  - D. The J-wire of Fan 1 is connected to the overload contact of Fan 2.
  - E. The J-wire of Fan 2 is connected to terminal A13 of the Auto-Flo control box.
  - F. Run six(6) wires from terminals 1 thru 6 of Fan 1 to terminals 1 thru 6 of the Auto-Flo control box.
  - G. Run five(5) wires from terminals 1 thru 5 of Fan 2 to terminals 7 thru 11 of the Auto-Flo control box.
- NOTE: On fan/heater units other than GSI, terminal number 6 should be ran to ground in the fan/heater electrical box. Refer to Control Box Interior Wiring and Fan/Heater Safety Circuit Connection diagrams.
- H. Hi-Lo thermostat is connected to Fan 1. ( Terminals 13, 14, 15, & 16)
  - I. Plug relay into open socket of Safety Circuit Board on Fan 1.
  - J. Run 4 wires from Fan 1 to Fan 2:

<u>WIRE NO.</u>	<u>FAN 1</u>	<u>FAN 2</u>
1	21 "Control"	13 "Bin Hi-Limit"
2	22 "Control"	14 "Bin Hi-Limit"
3	23 "Cycling"	15 "Cycle"
4	24 "Cycling"	16 "Cycle"

- K. Remove jumper wires between Terminals 2 & 3 and 4 & 5 in both Control Boxes.

**1.10** Connect wires from the various level switches and the grain thermostat to the Auto-Flo control box terminals as shown on the Back Panel Interior Wiring diagram.

**1.11** The grain thermostat is not included on Auto-Flo control boxes for use with the DMC batch type moisture sensor. The 120 VAC power supply for the DMC moisture sensor may be taken from terminals B13 & B14 of the Auto-Flo control box or another source. The Common and normally open terminals of Signal Out 1 of the DMC sensor are connected to terminal 15 of the Dump Timer and to terminal 15 of the Dry Timer.

**1.12** Hook up fill auger motor.

**1.13** Run three(3) wires from the power source to the Auto-Flo control box. Two wires connect to terminals B13 & B14 and the third wire should be grounded inside the control box.

## **\*\*\*2.0 OPERATION & ADJUSTMENTS - GENERAL\*\*\***

There are two fundamental things to control with the Auto-Flo Top Dry (or any dryer); the drying rate and the grain flow rate. Drying rate is determined by the dryer size and shape, the grain to be dried, the air flow rate, and the drying air temperature. At this time we are now concerned with the only variable left that influences **Drying Rate: Drying Air Temperature**. We consider the best temperature to be the highest one where the desired grain quality is maintained. For corn to be fed the maximum recommended temperature is 180 degrees Fahrenheit. Other grains and other uses of it may well require lower drying temperatures. By selecting a drying air temperature, a drying rate is established. To achieve a desired **final grain moisture content** the grain flow rate is adjusted to match the drying rate.

## **\*\*\*3.0 INITIAL STARTUP\*\*\***

**3.1** Be sure the **Power** is **OFF**.

**3.2** Open control box inner door and adjust **Fill auger delay timer** to approximately 60 seconds. This is the amount of time the auger will run after the fill switch senses grain.

**3.3** Reclose the control box inner door.

**3.4** Be sure the **Bypass** switch is **ON**, and the **Fill auger** switch is **OFF**.

**3.5** Turn the **Power ON**, then push the **Start** button.

**3.6** Be sure the fill auger is clear. Test by turning the switch to **Manual** and then back to the **OFF** position.

**3.7** The initial settings of Grain Temperature, Dry Timer, and Dump Timer should be per the chart on the next page. **These are based on a Crop Dryer operating temperature of 160 degrees Fahrenheit.**

<u>Diameter</u>	<u>Crop Dryer</u>	<u>Moisture Change</u>	<u>Approx Dry Rate</u>	<u>Grain Thermo.</u>	<u>Dry Time (Minutes)</u>	<u>Dump Time(Sec.)</u>
24'	28"	20-15	416	105	32	28
24'	28"	25-15	217	105	62	28
24'	28"	30-15	149	105	92	28
24'	36"	20-15	555	105	24	28
24'	36"	25-15	294	105	46	28
24'	36"	30-15	204	105	66	28
30'	42"(15hp)	20-15	786	105	19	25
30'	42"(15hp)	25-15	408	105	37	25
30'	42"(15hp)	30-15	278	105	54	25
30'	(2) 36"	20-15	1000	105	15	25
30'	(2) 36"	25-15	535	105	28	25
30'	(2) 36"	30-15	365	105	41	25
36'	42"(30hp)	20-15	981	105	26	35
36'	42"(30hp)	25-15	514	105	49	35
36'	42"(30hp)	30-15	354	105	41	20*
36'	(2) 42"(30hp)	20-15	1350	105	19	35
36'	(2) 42"(30hp)	25-15	720	105	35	35
36'	(2) 42"(30hp)	30-15	490	105	29	20*

Based on a Crop Dryer temperature of 160 degrees Fahrenheit.

\*These dump times are recommended for grain at 30% moisture and higher.

**3.8** Turn the **Bypass** switch to **ON**, and turn the **Auger** switch to **AUTO**.

**3.9** After the drying chamber is filled enough that the **Low level** light comes on, turn the **Bypass** switch to **OFF**. Start the aeration fan, then start the Crop Dryer unit(s). **Be sure to start the aeration fan first!** Adjust the heater controls according to the **Crop Dryer Manual**.

**3.10** The Auto-Flo will not dump any grain until the Dry Timer has timed out and the grain has reached the setting on the Grain Thermostat. On startup, the Dry Timer should time out well before the grain comes up to temperature. On the next few cycles the grain thermostat may come up to temperature before the Dry Timer has timed out. It is advisable to take a sample from the outer area of the dryer and check the moisture content when the grain temperature is approaching the set point. Adjust the set point a few degrees if so indicated by the moisture sample.

### **\*\*\*4.0 OPERATION & ADJUSTMENTS\*\*\***

**4.1** If operating at a temperature other than 160 degrees Fahrenheit, the initial setting of the Grain Thermostat should be according to the chart below:

<u>OPERATING TEMPERATURE</u>	<u>GRAIN THERMOSTAT</u>
120-140 deg F	95 deg F
160 deg F	105 deg F
180 deg F	115 deg F

4.2 Various grains, different varieties, and different growing seasons have an effect on drying rate as well as on Grain Thermostat settings. Follow the guidelines below to increase or decrease grain flow through the dryer so final desired moisture content is reached.

A. Grain flow rate through the dryer is **Decreased** by **Increasing** the Dry timer setting **and** **Increasing** the Grain Thermostat setting. The Dump Timer setting should not exceed the settings listed in the chart. Remember that **both** the Dry Timer and the Grain Thermostat must reach their set points before the grain will be discharged. The **last** to close of either the Grain Thermostat or the Dry Timer is controlling the grain flow. We suggest that in reducing the flow rate the Grain Thermostat be adjusted first. After the final target moisture content is reached, the Dry Timer setting may be increased so that it times out a few minutes before the grain reaches the set point on the Grain Thermostat.

B. As harvest continues, the initial moisture content usually decreases, and it becomes desirable to increase the grain rate through the dryer. The grain flow rate through the dryer is **Increased** by **Decreasing** the Grain Thermostat setting and/or the Dry Timer setting. Usually the Grain Thermostat will reach its set point before the Dry Timer times out, thus the Dry timer is controlling, so the setting of the Dry Timer should be reduced. If the Dry Timer setting has been reduced to the point that it times out **before** the grain reaches the Grain Thermostat set point, the setting of the Grain Thermostat should be reduced.

**CAUTION:** Please note the time to refill the Top Dry after it has discharged. The Dry Timer setting must not be less than the time to refill, or after a few dumps the low level grain switch will be uncovered. If this condition is encountered it is necessary to reduce the **Drying Rate** by **Reducing** the operating temperature of the Crop Dryer Unit.

### **\*\*\*5.0 COMMENTS\*\*\***

5.1 A sample should be taken after 3 or 4 dumps to get an average . If the grain is too dry or too wet, adjust the grain thermostat and/or the dry timer accordingly.

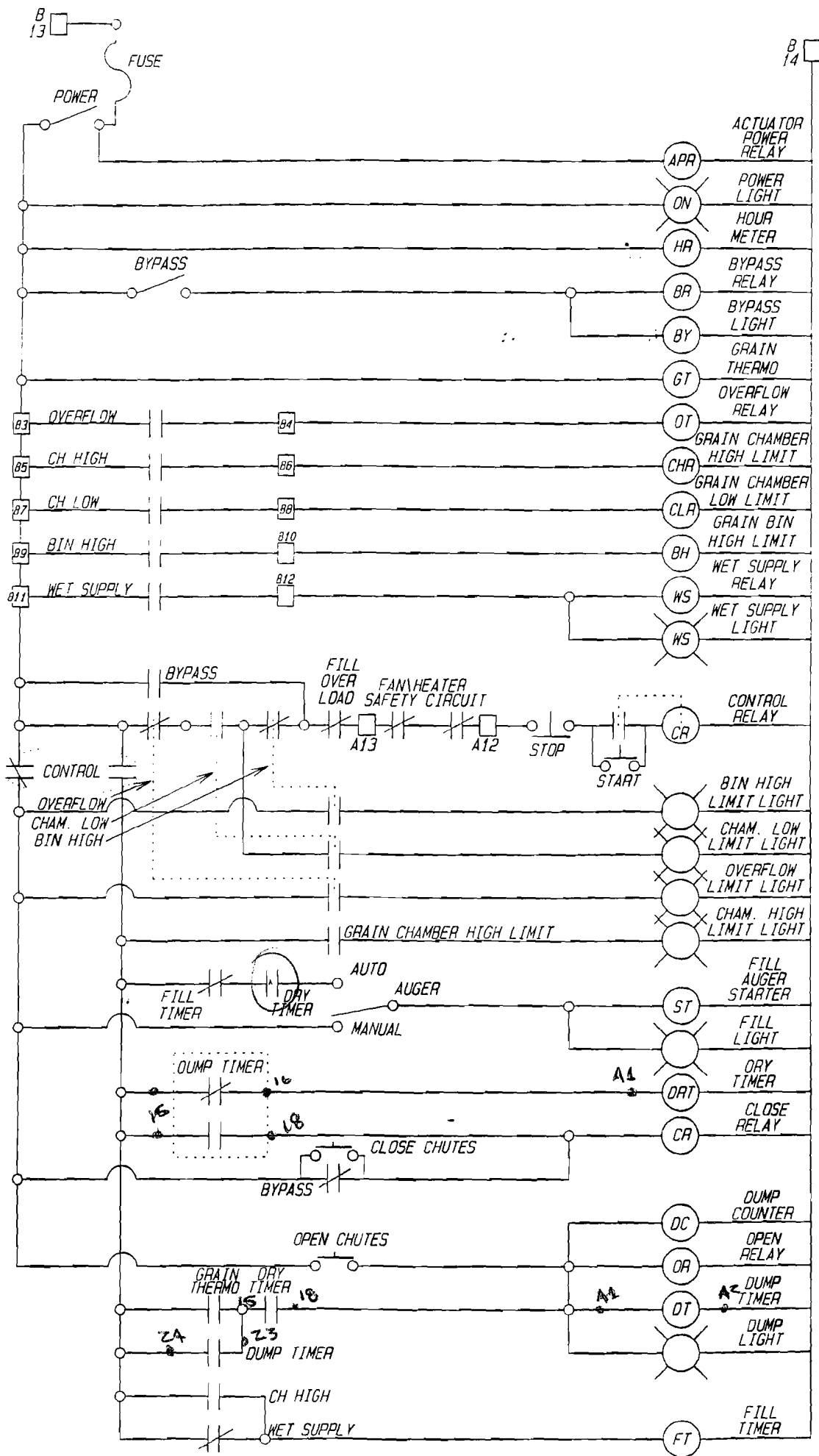
5.2 When wet supply runs out, the system will continue operating until the chamber low limit switch is uncovered.

5.3 Should the grain fill reach the overflow or bin high limit switches, the entire drying process should stop and the appropriate light should be lit.

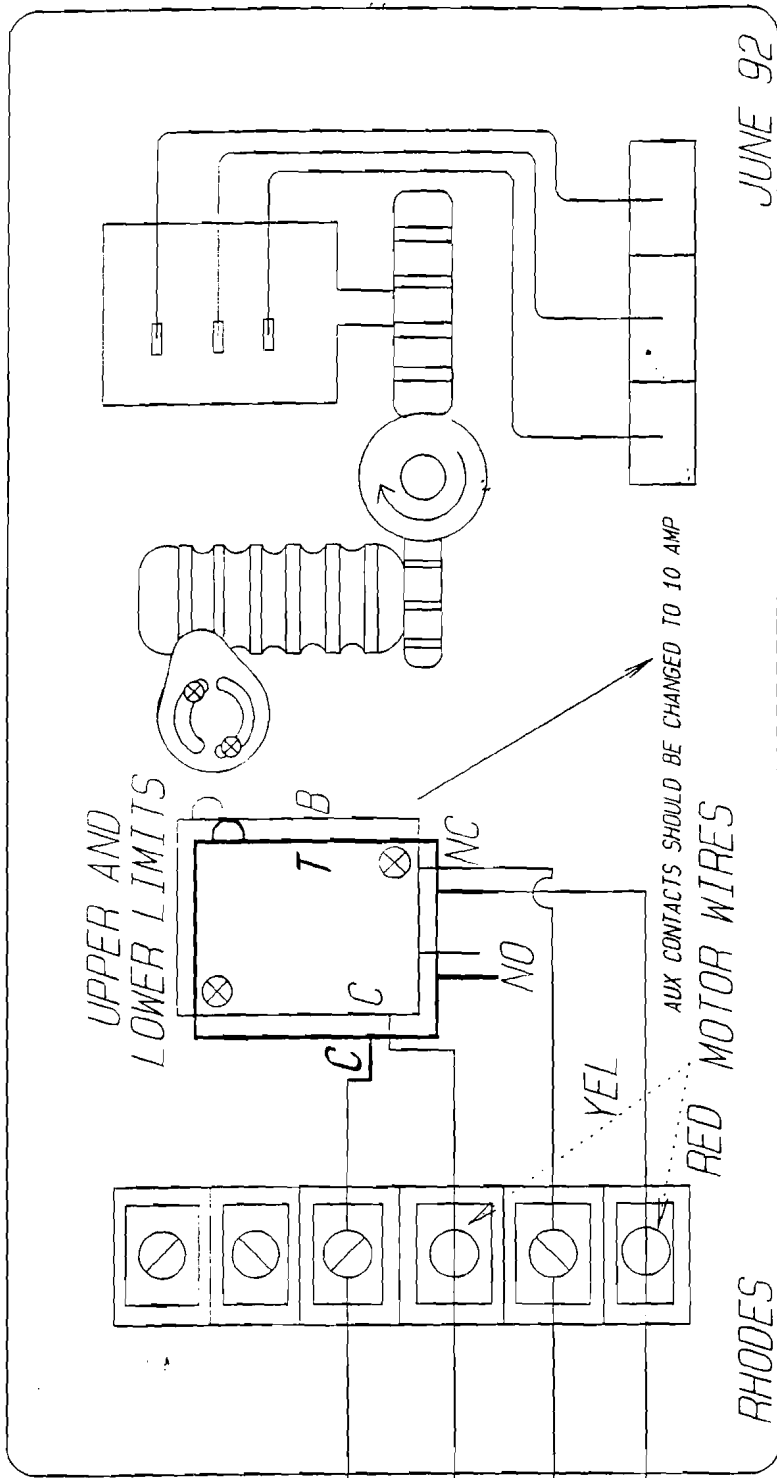
5.4 If the chamber low limit switch is uncovered, the entire drying process should stop and the appropriate light should be lit.

5.5 The bypass switch will bypass the overflow, chamber low limit and bin high limit switches if the switch is on. During normal operation, the bypass switch should not be on.

5.6 If the fill auger overload starter or the fan/heater safety circuit open, the drying process will stop.



24 VOLT DC ACTUATOR WIRING



15

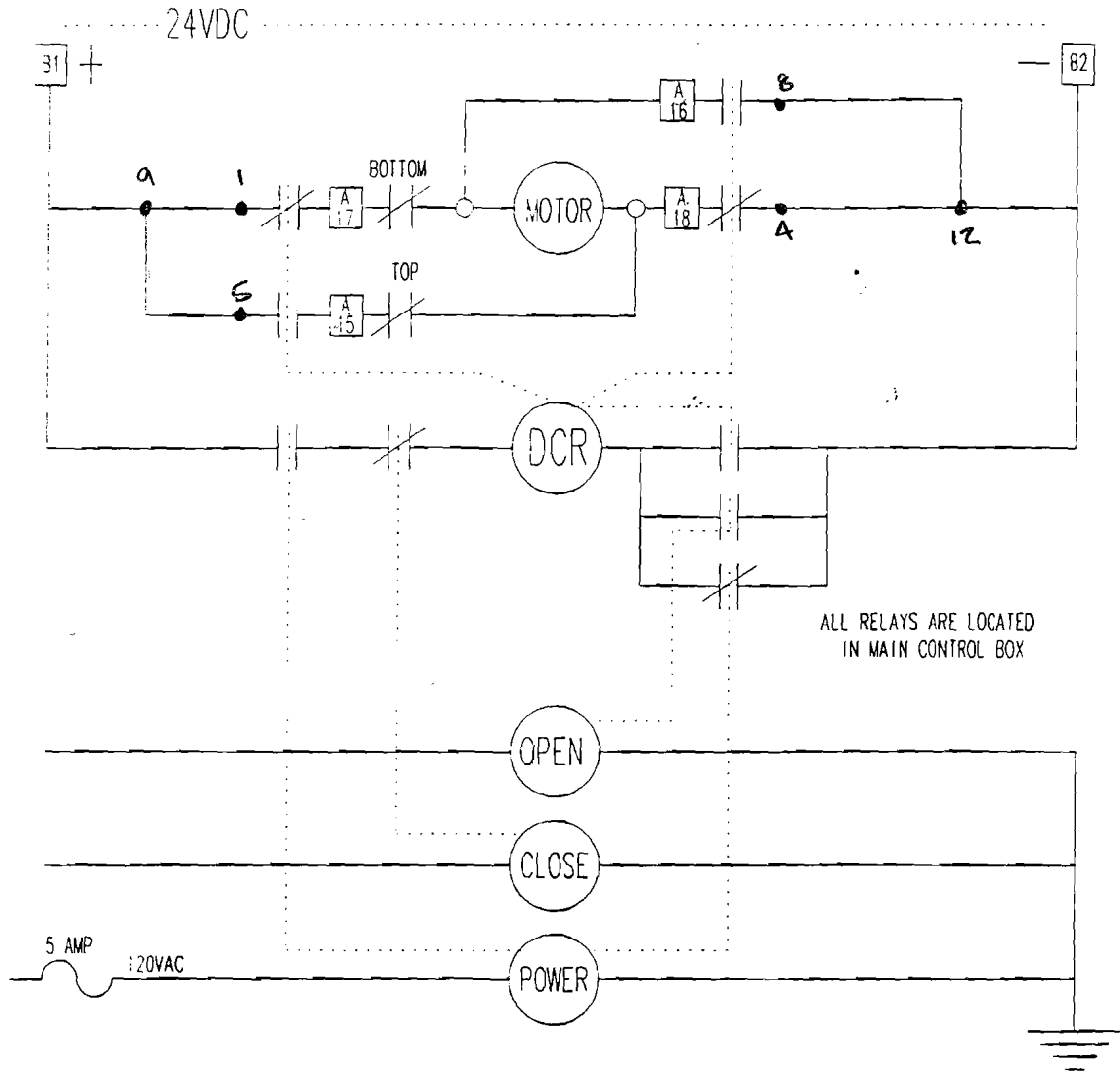
TO TERMINAL 16

STRIP A CONTACTS

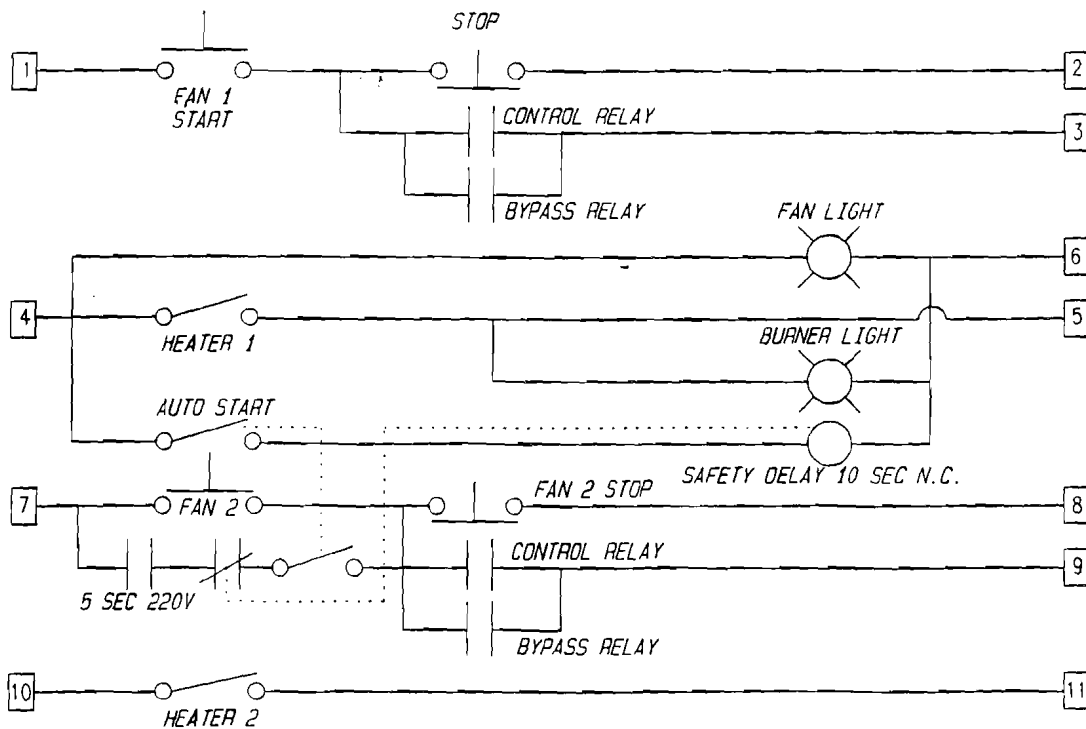
15, 16, 17, & 18 17

18

## ACTUATOR CIRCUIT SCHEMATICS



## FAN/HEATER CONTROL SCHEMATICS

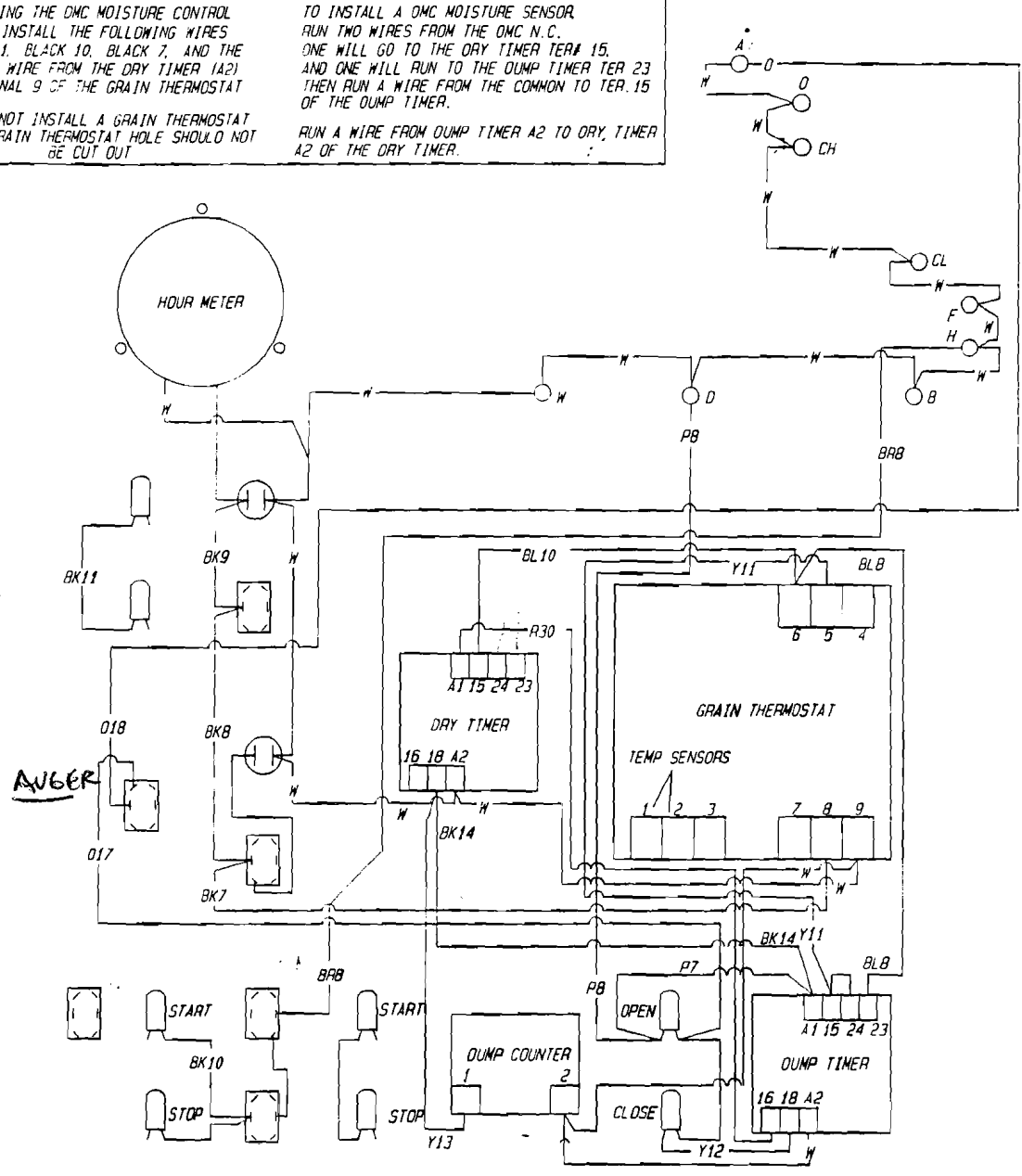


WHEN USING THE DMC MOISTURE CONTROL DO NOT INSTALL THE FOLLOWING WIRES YELLOW 11, BLACK 10, BLACK 7, AND THE NEUTRAL WIRE FROM THE DRY TIMER (A2) TO TERMINAL 9 OF THE GRAIN THERMOSTAT

ALSO DO NOT INSTALL A GRAIN THERMOSTAT AND THE GRAIN THERMOSTAT HOLE SHOULD NOT BE CUT OUT

TO INSTALL A DMC MOISTURE SENSOR, RUN TWO WIRES FROM THE DMC N.C., ONE WILL GO TO THE DRY TIMER TER# 15, AND ONE WILL RUN TO THE DUMP TIMER TER 23 THEN RUN A WIRE FROM THE COMMON TO TER. 15 OF THE DUMP TIMER.

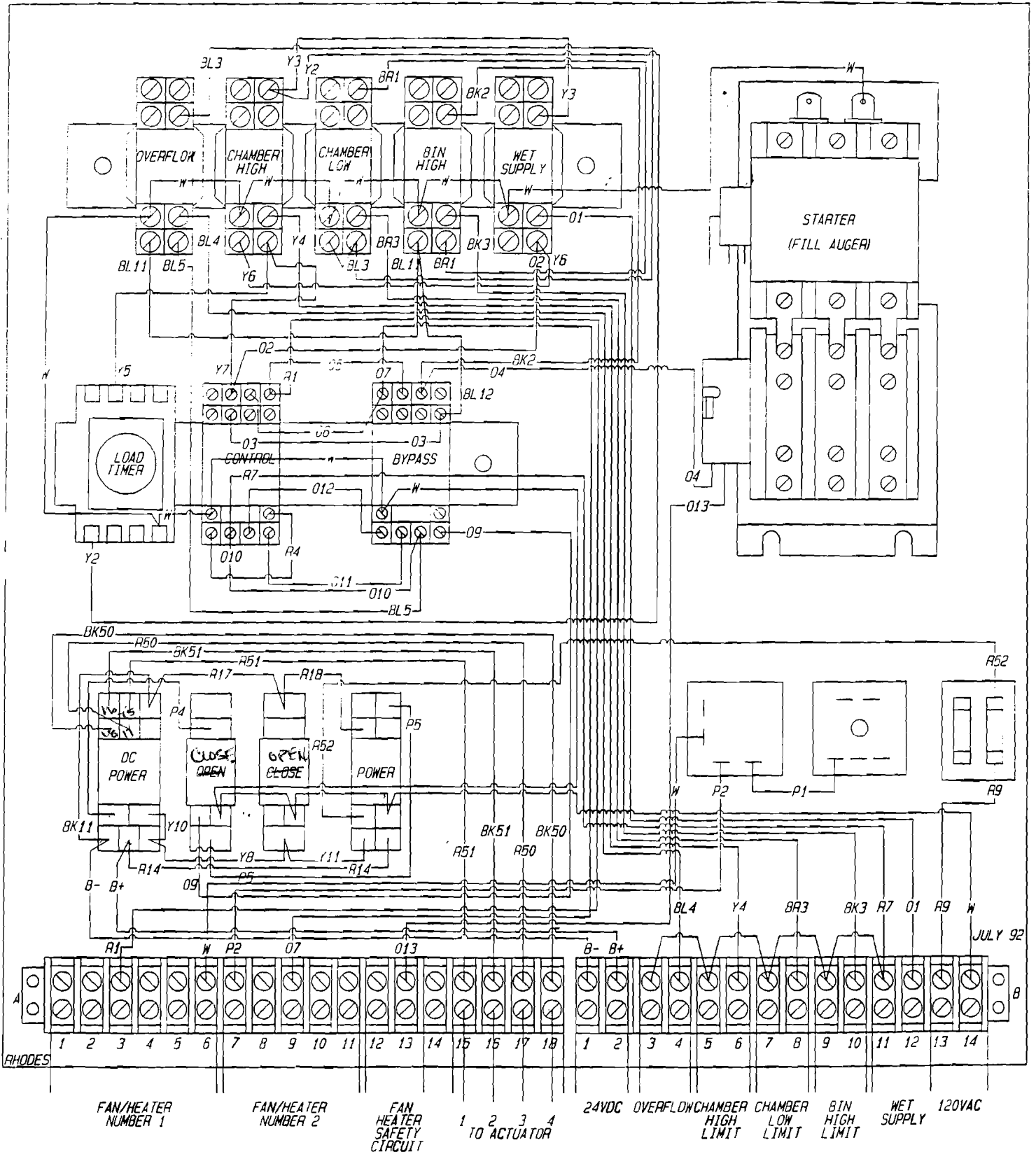
RUN A WIRE FROM DUMP TIMER A2 TO DRY TIMER A2 OF THE DRY TIMER.

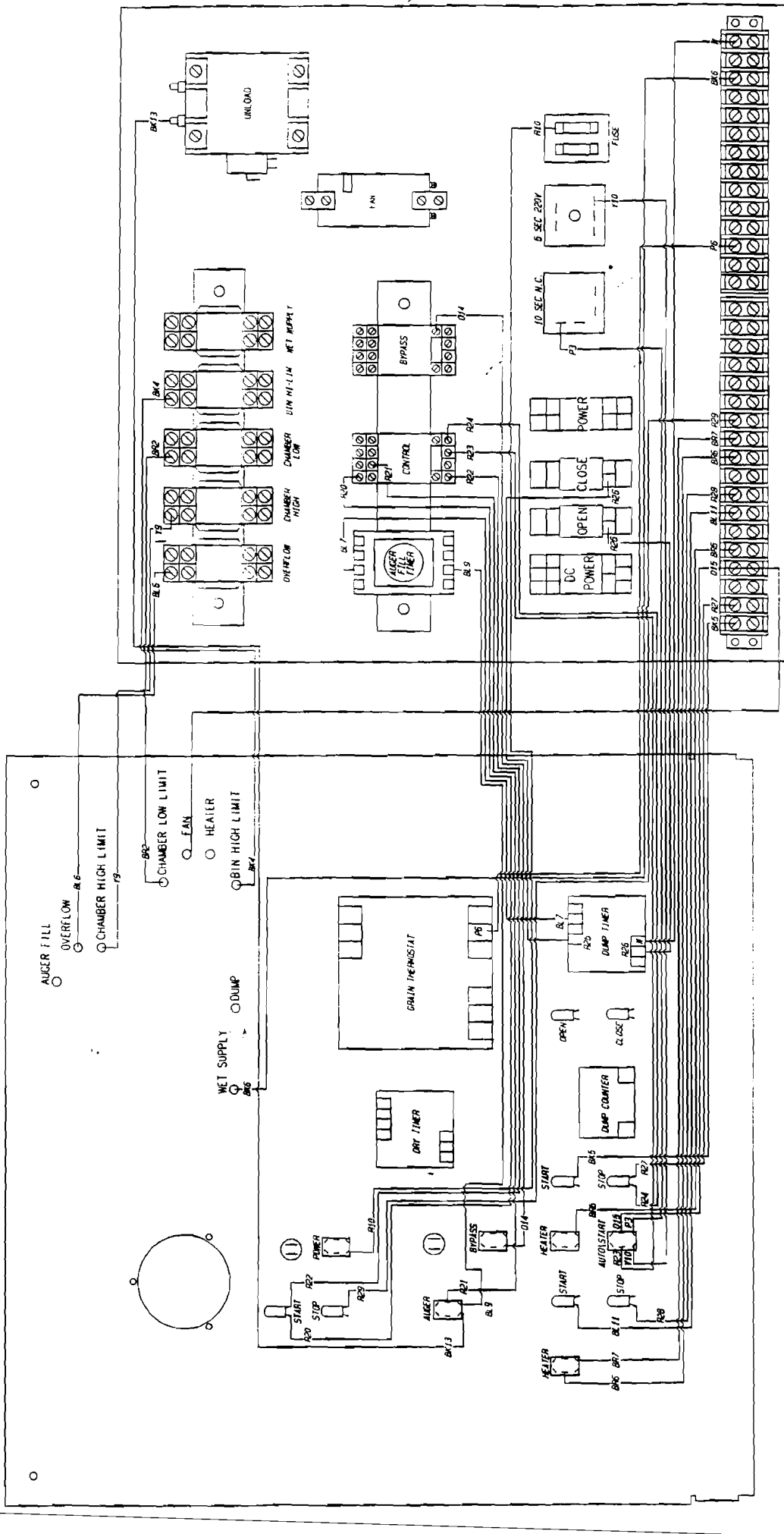


TOPDRY AUTOFLO FRONT PANEL INTERIOR WIRING



# TOPDRY AUTOFLO BACKPANEL INTERIOR WIRING







MAKERS OF TOP QUALITY  
DRYING/STORING SYSTEMS