OWNER'S MANUAL

CALC-U-DRI Moisture/Matic

Plus
Moisture/Matic for Kan-Sun
Includes Optional Baldor Inverter

DAVID MANUFACTURING CO.
1600 12th Street N.E., Mason City, Iowa USA 50401 641-424-7010

WARRANTY
for
Calc-U-Dri Moisture/Matic

The guarantee is for one year from date of installation to be free of defects in material or workmanship when properly installed and operated in accordance with instructions in this booklet. Warranted parts will be exchanged F.O.B. Mason City, Iowa without charge to the user. Damage resulting from negligence voids the warranty. Warranty does not include labor, installation or delivery of replacement parts.

Electric motors are covered by the warranties of the respective manufacturers. Electric service centers are located in all regions. Consult your dealer.

The Warranty and liability of David Manufacturing Company, its distributors, dealers and agents is limited to replacement, without charge, of defective parts, as outlined above. DMC makes no other warranties, express or implied except as stated herein, and disclaims all obligations and liabilities other than specified.

The Manufacturer reserves the right to make changes in specifications or prices without incurring obligation on previously produced merchandise.

TABLE OF CONTENTS

CAUTION

SAFETY INFORMATION PLEASE READ

WATCH FOR THIS SYMBOL!
IT POINTS OUT IMPORTANT SAFETY PRECAUTIONS.
IT MEANS ATTENTION -- "BECOME ALERT! YOUR SAFETY IS INVOLVED!"

It is recommended that you review the entire contents of this manual, paying particular attention to items preceded by this symbol.

FAILURE TO HEED THESE INSTRUCTIONS
CAN RESULT IN PERSONAL INJURY!

Operator Qualifications

Operation of this farmstead equipment shall be limited to competent and experienced persons. In addition, anyone who will operate or work around power equipment must use good common sense. In order to be qualified, he must also know and meet all other requirements, such as:

1. Some regulations specify that no one under the age of 16 may operate power machinery. This includes farmstead equipment. It is your responsibility to know what these regulations are in your own area or situation.

2. Current OSHA regulations state in part: "At the time of initial assignment and at least annually thereafter, the employer shall instruct every employee in the safe operation and servicing of all equipment with which the employee is, or will be involved."*

3. Unqualified persons are to stay out of the work area. The "Work Area" is defined as any area within the grain drying and storage complex where this equipment is installed.

4. A person who has not read and understood all operating and safety instructions is not qualified to operate the machine.

***Federal Occupational Safety & Health Standards for Agriculture Subpart D, Section 1928.57 (a) (6).**

BE A SAFE OPERATOR

1. Read and understand the Owner's Manual.
2. Disconnect all electrical power before servicing or opening control box, adjusting or lubricating the equipment.
3. All electrical hook-ups should be in accordance to the National Electrical Code
4. Ground all electrical equipment as well as bin itself.
5. Only knowledgeable and trained personnel should operate this equipment.
6. **NEVER WORK WITH BELTS OR AUGERS WITH POWER "ON"...** automatic controls may start without warning! Stay clear of motors, belts and augers.

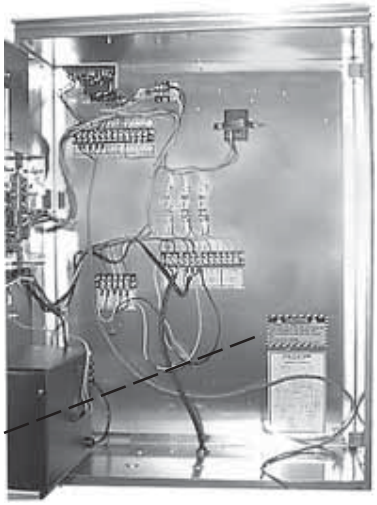
FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE.

THE DECAL SHOWN ON THIS PAGE MUST BE DISPLAYED AS SHOWN
REPLACEMENTS ARE AVAILABLE UPON REQUEST

Write to: DMC
1600 12th Street N.E.
Mason City, IA USA 50401
Or call: 641-423-6182

NOTE:

1. The decal on this page is NOT actual size.
2. Keep all decals wiped clean at all times.
3. All decals must be replaced if they are destroyed, missing, painted over, or can no longer be read.



DMC Part Number: 801L010

INTRODUCTION

(For Kan-Sun applications, see Appendix A.)

Introduction

DMC's Calc-U-Dri Moisture/Matic is a grain drying control specifically designed for continuous flow, out-of-bin grain dryers with an SCR control and a DC motor on the metering rolls.

The Calc-U-Dri Moisture/Matic will automatically increase or decrease the speed of the metering rolls to maintain a desired moisture content. The Moisture/Matic is available as a base unit or with an optional chart recorder or printer for convenient record keeping.

The metering roll speed control potentiometer in the dryer control panel is replaced by the main speed control in the Moisture/Matic. A DC voltmeter is provided to indicate the voltage applied to the metering roll motor, which will change from fast, medium or slow. The speed is selected by comparing the actual moisture of the grain being discharged from the dryer to the moisture Set Point.

As the grain moisture increases, the Moisture/Matic will slow the metering rolls down. The slower grain movement will increase the time the grain spends in the dryer, which will reduce the moisture. As the moisture nears the moisture Set Point the unit will switch from slow to main speed. As long as the grain moisture is at or near the Set Point the main speed is retained. Should the moisture start to get dryer, the unit will switch to high speed. The three speeds are adjustable to match the dryer to the grain that is being dried.

SENSOR LOCATION AND CUTOUT INSTRUCTIONS

I. Sensor Location

Locations for sensor installation are dependent on the following factors all being present for proper operation. **See Drawing A.**

A. Installation in a six (6) or eight (8) inch diameter auger or a flat bottom pan.

B. The auger can be horizontal, vertical or inclined. It is recommended that the clearance between the flighting and the tube be 5/8 inch or less.

C. The auger must have a minimum of 225 bushels per hour flow rate of grain across the sensor.

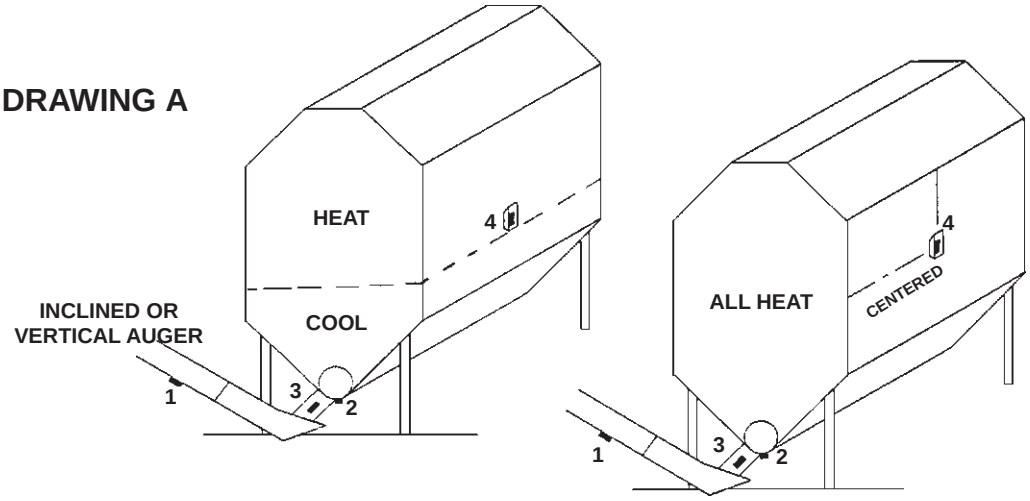
D. The auger must have one full pitch of flight before and after the sensor.

E. Avoid placing the sensor in a location that will be affected by condensation.

NOTE: If help is needed for sensor location, contact your DMC dealer.

Continuous Flow Dryers - Moisture/Matic Calc-U-Dri

DRAWING A



CONTROL SENSOR LOCATION - ORDER OF PREFERENCE

1. Take-away auger
2. Discharge auger - 1 full pitch of flighting before and after flighting. Flighting to tube clearance less than 5/8 inch. Condensation from dryer may affect sensor.
3. Discharge spout - Use a funnel-type of restrictor.
4. Column - Column sensor is usually in the lowest part of the heating section or in the highest part of the cooling section (centered if all heat). There must be no restriction in air flow near the sensor. Use column sensor bracket #602N175.

SENSOR CUTOUT INSTRUCTIONS

II. Sensor Cut-Out Instructions for Six (6) Inch and Eight (8) Inch Augers

!!CAUTION!!
DISCONNECT POWER TO THE AUGER MOTOR
BEFORE PROCEEDING ANY FURTHER!

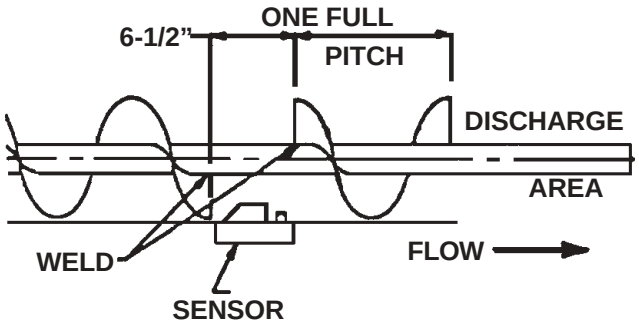
A. Look at the discharge tube and determine where the sensor can be located.

See Drawing I. There must be at least one (1) full pitch of flighting on the discharge auger before and after the sensor to move the grain over the sensor blade.

NOTE

If the unit has a connecting band, determine if it can be removed and replaced with a 12 -inch long connecting band. If it is a structural supporting connecting band, additional support may be needed during removal of the connecting band.

PHOTO 1



DRAWING I

B. Position the sensor connecting band on the discharge tube so that the rectangular hole is toward the discharge end. Mark the outline of the rectangular hole and the edges of the band on the discharge auger tube. Cut a hole in the discharge tube eight (8) inches long so the outline of the rectangular hole is removed (stay inside the total overall length marks of the band). Cut up one side of the discharge tube about one third (1/3) of the way around the tube. This extra room is for ease of removing flighting in the next step. **See Photo 1.**

C. Replace the connecting band on the discharge tube in the same position as in Step B (above) and mark the flighting at each end of the rectangular hole. Weld the discharge auger flighting to the shaft 3/8 inch beyond each of the marks. After the flight is welded at these points, cut out six and one half (6-1/2) inches of the flighting all the way to the center shaft.)

D. Smooth all the rough edges from the cut area and position the sensor hole centered over the six and one half (6-1/2) inch area, then tighten the connecting band.

E. Before installing the sensor, see **Sensor Installation on Page 7**.

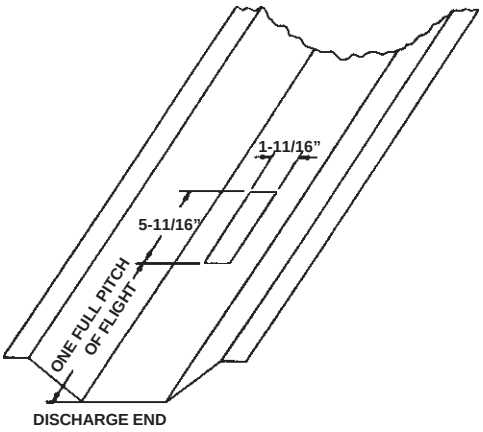
SENSOR CUTOUT INSTRUCTIONS (continued)

III. Sensor Cut-Out For Flat Bottom Discharge Units

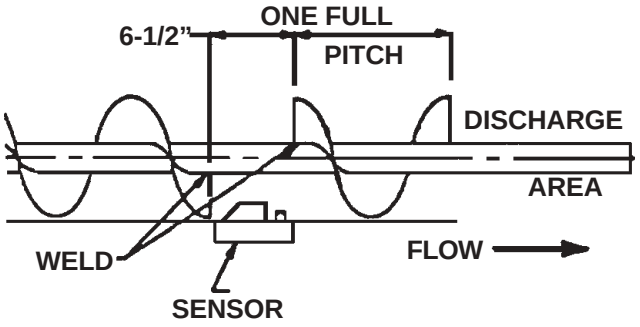
!!CAUTION!!

DISCONNECT POWER TO THE AUGER MOTOR BEFORE PROCEEDING FURTHER!

A. Determine where the sensor can be located. **See Drawing II**. There must be at least one full pitch of flight before and after the sensor. **See Drawing III**.



DRAWING II



DRAWING III

NOTE

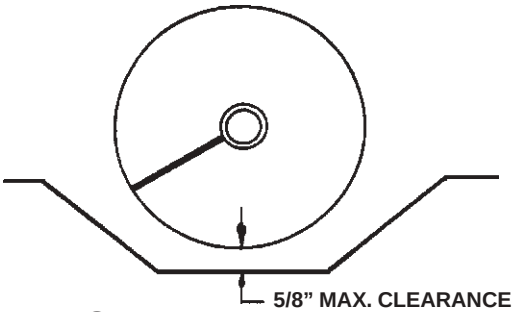
If there is more than 5/8 inch gap between the bottom pan and the outer edge of the flighting, do not use a sensor in that location. Use another location, such as a take-away auger. **See Drawing IV.**

B. Remove the flat bottom pan and mark the sensor cutout area at least one (1) pitch length of the auger from the discharge area. This allows for good pickup of the grain when it leaves the sensing area. Cut the sensor rectangle 1-11/16" x 5-11/16" with a saber saw (do not torch cut) and check so the sensor block fits into it with the stepped edge. **See Drawing II**.

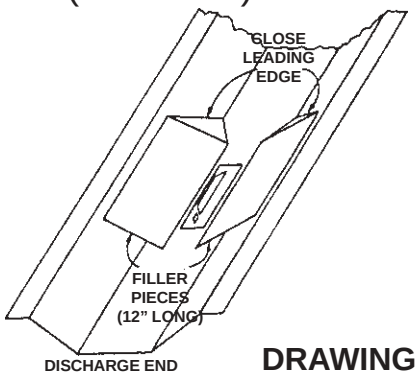
C. Hold the pan up to the unit and mark the flighting where the sensor hole is located. Remove the pan and mark the flighting about 3/8 inch away from marks just made, so the new marks are six and one half (6-1/2) inches apart. NOTE: For seven (7) inch flight or less, cut the flight to the shaft. Weld the auger flight to the shaft at each end of the six and one half (6-1/2) inch cutout marks, then cut out the six and one half (6-1/2) inches of flighting from the auger, leaving only the drive tube. For eight (8) inch or larger diameter flighting, one-half (1/2) inch of flighting can be left as a ribbon around the shaft in the cutout area. **See Drawing III.**

D. Smooth all the rough edges from the cutout area.

SENSOR CUTOUT INSTRUCTIONS (continued)



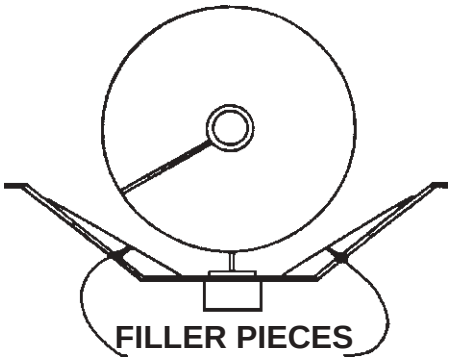
DRAWING IV



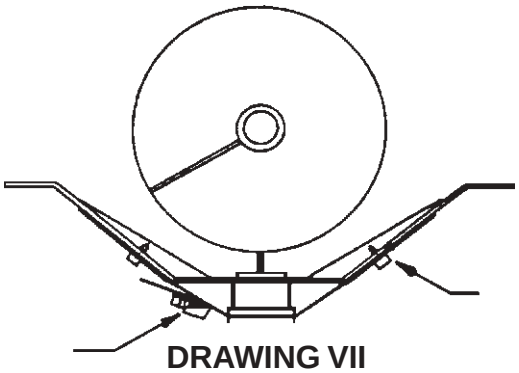
DRAWING V

E. On the flat bottom pan, make some filler pieces 12 inches long to keep the grain closer to the sensor flag. **See Drawing V, VI, and VII**. Be sure the leading edge is closed so grain cannot get under the pieces. Weld the pieces in place as shown. **See Drawing V.**

F. Remount the pan and check all the clearances and alignments. Before installing the sensor, insert the clearance gauge into the cutout. **See Drawing VI-A**.



DRAWING VI

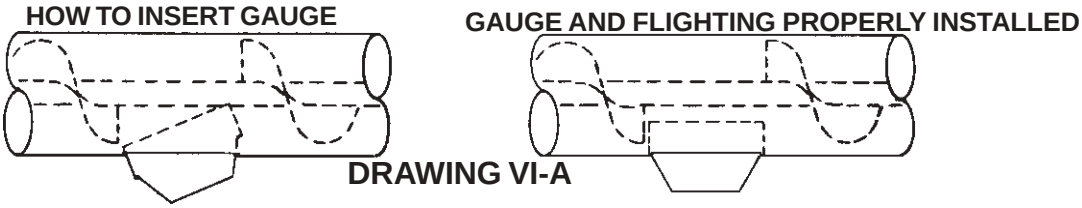


DRAWING VII

!!CAUTION!!

SLOWLY ROTATE THE AUGER BY HAND ONE COMPLETE REVOLUTION. THE FLIGHTING MUST MISS THE GAUGE COMPLETELY AND NOT RUB ON THE FILLER PIECES. IF THERE ARE AREAS OF BINDING OR HITTING, CORRECT THE SITUATION NOW.

!! DISCONNECT POWER !!



DRAWING VI-A

G. Securing the sensor to the flat pan will require modified clamps. Cut the end off the clamp and mount it with a self-drilling screw to the tapered side so the screw tip goes under the filler pieces added earlier. Attach the screw end of the clamp or the other side with a self-drilling screw. Have the length such that the screw is beside the sensor as show in **Drawing VII**.

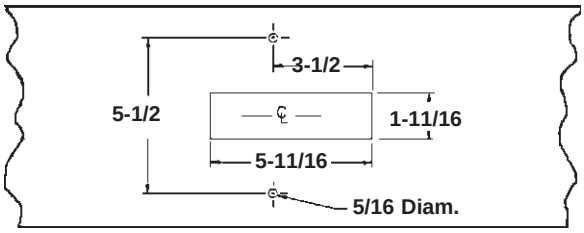
H. When installing the sensor, follow the instructions on the sensor decal for the correct direction of grain movement.

SENSOR CUTOUT INSTRUCTIONS (continued)

IV. Sensor Cut-Out For Flat Bottom Down Spout

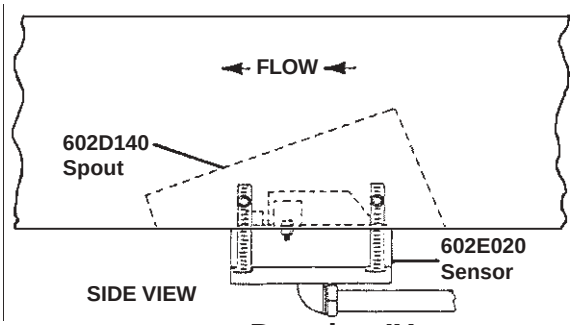
A. When using a down spout, there must be a constant density of grain flowing over the sensor for accurate readings. This flow must be independent of the total flow or velocity of the stream of grain. To do this, the installation of the restrictor spout or flats angled to create a funnel is recommended.

The sensor should be located in an accessible location, so it can be periodically inspected for trash buildup.



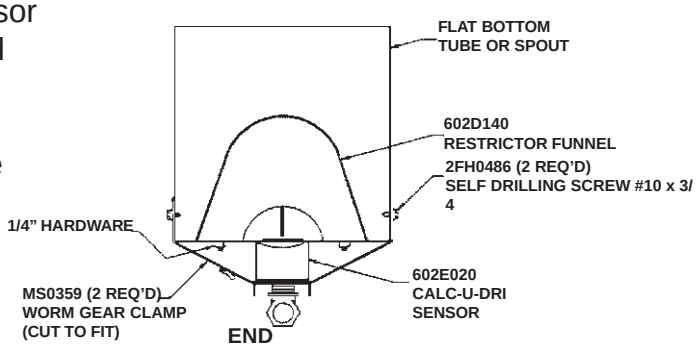
HOLE CUT-OUT
Top View
Drawing VIII

B. Cut a hole in the bottom of the spout (1-11/16" x 5-11/16") and drill two 5/16" diameter holes 3-1/2" toward the discharge end and 5-1/2" apart as shown in **Drawing VIII**. Use a saber saw for the hole, not a torch. Remove burrs and check so the sensor block fits into the stepped edge.



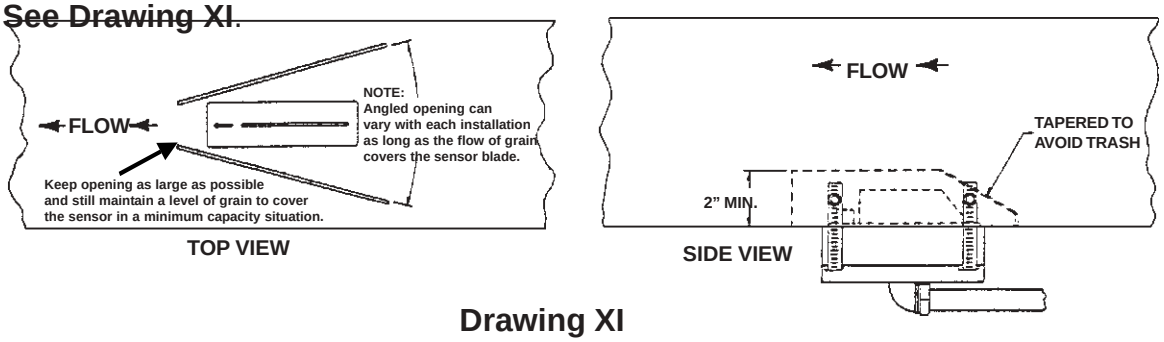
Drawing IX

C. Secure the restrictor spout to the flat bottom with 1/4" hardware. Secure the sensor by cutting the end off of the strap and mounting with a self-drilling screw to the edge of the flat spout. Attach the screw end of the clamp on the other side of the flat spout with a self-drilling screw. **See Drawing IX and X**.



Drawing X

D. For conditions where straw or chaff can accumulate in the restrictor funnel, the grain can be channeled over the sensor with angled brackets in the down spout. **See Drawing XI**.



Drawing XI

SENSOR CUTOUT INSTRUCTIONS (continued)

V. Sensor Cut-Out for Round Down Spouts

When using a sensor in a down spout, there must be a **CONSTANT** density of grain flowing over the sensor for accurate readings. This flow must be independent of the flow or velocity of the grain stream. It is recommended that a restrictor be used to slow the grain speed over the sensor such as used in Step IV. A modified open top version may have to be used.

VI. Moisture/Matic Electrical Box and Sensor Installation Instructions
(For Kan-Sun applications, Appendix A.)

ELECTRICAL BOX & SENSOR INSTALLATION INSTRUCTIONS

A. The Calc-U-Dri Moisture/Matic can be near the unit's main control box, discharge auger, or other locations that are easily accessible and of convenient height for you to observe and use. Mount the electrical box using four (4) 5/16" x 1-1/2" bolts, lock washers and nuts.

B. Included with the Calc-U-Dri Moisture/Matic are 27 feet of one-half (1/2) inch liquidtite conduit. This is to be used to protect the sensor wire between the Calc-U-Dri Moisture/Matic box and the sensor.

C. A 4 x 4 junction box, sensor wire, and liquidtite is available to extend the sensor wire up to 250 feet, if required. Determine the shortest distance from the sensor to the junction box. Use the 27 feet of one-half (1/2) inch liquidtite conduit and feed the sensor wire through it using the connector provided. There should be six (6) inches of sensor wire inside the junction box. Any excess wire or conduit may be cut off. Be sure not to cut off too much since both the conduit and the sensor wire need to be connected at the other end to the Moisture/Matic box.

D. Connect the Calc-U-Dri sensor wires in the 4 x 4 junction box to the top of the terminal strip. The leads from the Moisture/Matic box go to the bottom of the terminal block. Be careful to match the color coded wires to each other - red to red, etc. **See Photo 2**. Then attach the junction box lid.

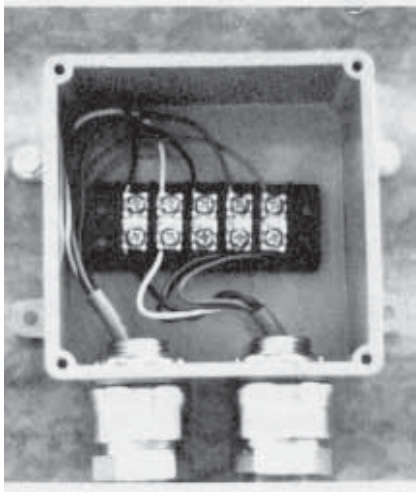


Photo 2

E. Secure the Calc-U-Dri sensor wire to the inside of the Calc-U-Dri Moisture/Matic box with the plastic "J" clips. Connect the sensor wires to the terminal strip marked "sensor". Excess sensor wire can be cut off. Be sure the sensor wire (stripped bare of insulation) is clamped in the terminal and not on the insulation.

ELECTRICAL BOX & SENSOR INSTALLATION INSTRUCTIONS (continued)

If more than one sensor is used, hook the sensor wires so that all like-color wires are under one terminal post. (All black wires on terminal number one, etc.). The correct dip switch setting for the circuit board is described on the chart on page 37. Set dip switches 9 and 10 to the correct position according to the number of sensors used.

NOTE
The top terminal strip on the back panel of the Moisture/Matic is low voltage D.C. Never hook A.C. power to this terminal strip.

F. Mount the sensor in the discharge tube by positioning the stainless steel flag toward the grain, and the copper flag toward the discharge end. The flow of grain must follow the arrows on the sensor decal. Be sure the sensor block seats fully into the rectangular hole in the discharge auger tube. Fasten to the tube with strap bands. Fasten the grounding strap from the sensor to the discharge auger tube by drilling a self-tapping screw through the connector on the ground strap and back into the discharge tube in the area where the flighting has been removed. Leave at least two (2) inches between the sensor block and the grounding screw.

ELECTRICAL HOOK-UP

VII. **Electrical Hook-up (See Drawing XIII)**
(For Kan-Sun applications, see Appendix A.)

NOTE
If you are using an electrical inverter, please **see Appendix B on pages 38-41**. Refer to the inverter you are using. Also, reference the instructions below.

A. Disconnect the AC power from your dryer and lock-out the AC power to insure that it will not start.

B. DC Voltmeter Hook-up: Use the 15 foot piece of five (5) conductor cable provided for the hook-up wire. Use liquidtite and proper fittings (not provided) to run between the Calc-U-Dri and the SCR controller. On the SCR control board locate the leads going to the DC motor.

1. Attach the black wire, one of the conductors in the cable, to the positive motor lead (A1) and the green wire to the negative motor lead (A2).

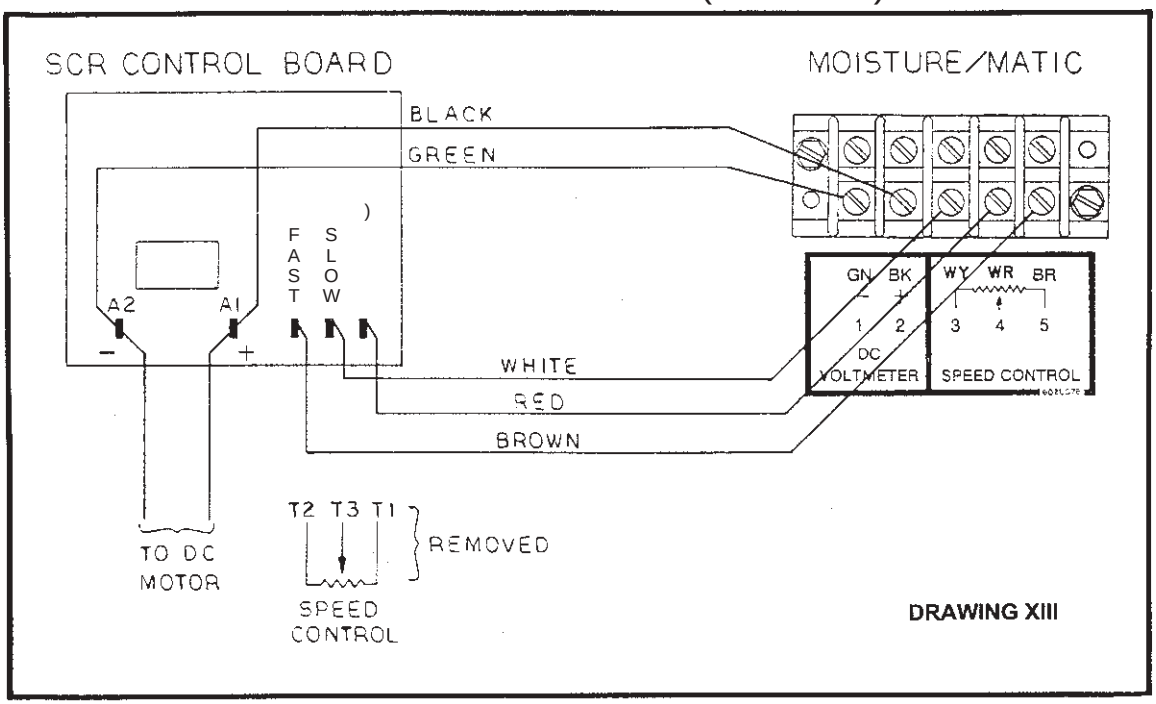
2. In the Moisture/Matic control box, locate the five (5) post terminal. This has “DC Voltmeter” written on it. The green wire should be placed on terminal one (1) and the black on terminal two (2).

C. Speed Control Hook-Up: Locate the three (3) leads on the SCR control board (in the dryer control box) that are attached to the speed control potentiometer. (**See Drawing XIII)**.

1. Mark down the wire color and terminal as you remove the three leads. This can be used for a test if problems should appear.

2. Determine the center lead from the speed control potentiometer. (This may not be the center lead on the SCR board). Remove this wire from the SCR board and replace it with the red wire in the five (5) conductor cable from the Moisture/Matic.

ELECTRICAL HOOK-UP (continued)



3. Attach the other end of this red wire to terminal four (4) as marked by the decal on the back panel in the Moisture/Matic.

4. Determine which wire is attached to the “slow” end of the speed control potentiometer. Remove this wire from the SCR board and replace it with the white wire from the Moisture/Matic.

5. Attach the other end of this white wire to terminal three (3) on the back panel of the Moisture/Matic.

6. Remove the remaining wire from the SCR board and replace it with the brown wire from the Moisture/Matic. Attach the other end of this wire to terminal five (5) on the back panel of the Moisture/Matic.

NOTE
See Appendix C for more examples on wiring.

D. 115 Volts A/C Hook-Up

1. The Calc-U-Dri Moisture/Matic requires 115 volts AC. This can be on an independent circuit or taken from a control box which would automatically turn the Calc-U-Dri on when the dryer is on.

2. The input 115 volts AC should be wired to the lower terminal strip as indicated by the decal in the Moisture/Matic box (L1, N and Gnd).

E. Additional Signal Outputs

1. Signal 1 out and signal 2 out are located on the lower terminal strip. Each “signal out” consists of ‘C’ (common), ‘NO’ (normally open), and ‘NC’ (normally closed) contacts. These signals will operate when in the ‘Automatic’ mode and when the moisture of the grain exceeds 1.3 percent over the moisture set point setting. These contacts can be used on any accessory equipment or warning device that requires less than five (5) amps at 115V AC.

F. Check to make sure that all dryer safety switches are functioning correctly after the wiring is complete.

!!CAUTION!!

NEVER APPLY AC VOLTAGE TO THE UPPER SENSOR TERMINAL STRIPS.

ALL WIRING MUST BE DONE IN ACCORDANCE WITH
THE NATIONAL ELECTRICAL CODE.

ALL WIRING SHOULD BE DONE BY A QUALIFIED ELECTRICIAN AND
SHOULD BE TO ALL CODE STANDARDS
TO AVOID POSSIBLE BODILY INJURY OR DEATH.

GRAIN BINS AND/OR DRYERS WITH ELECTRICAL EQUIPMENT IN OPERATION
MUST BE GROUNDED.

DO NOT MODIFY OR BYPASS ANY SAFETY SHUTOFFS!

START-UP AND OPERATION

VIII. Start-up and Operation (For Kan-Sun applications, see Appendix A.)

NOTE

If you are using an electrical inverter, please see Appendix B on pages 38-41. Refer to the inverter you are using. Also, reference the instructions below.

A. Place the Automatic/Monitor switch in the “Monitor” position and turn the Moisture/Matic “ON”. The power indicator light should come on; if not, check the AC power input and/or Trouble Shooting Guide.

B. Start up the dryer according to the manufacturer’s recommendations using the Main Speed Control on the Moisture/Matic to control the metering roll speed.

NOTE

Turning the knob clockwise should increase the DC motor speed [higher DC voltage on motor], and counter clockwise should decrease the DC motor speed [lower DC voltage]. If this does not happen, reverse the wires on terminal posts three (3) and five (5) in the back panel (See Electrical Hook-up, Step C).

If this does not correct the situation, see the Trouble Shooting Guide.

See Chart I, Calc-U-Dri Moisture/Matic Sampling for proper sampling procedures.

START-UP AND OPERATION (continued)

C. The Moisture/Matic may need to be calibrated to compensate for different grains and sensor configurations.* Make sure that the calibration is set at zero before comparing the displayed moisture values with the samples tested with a reliable moisture tester. **See Chart 1, Calc-U-Dri Moisture Sampling.**

1. If the displayed moisture value is less than the moisture value from a moisture tester, push the “Display Calibration” and turn the calibration adjustment knob until the display reads the difference (+Value).

2. If the displayed moisture value is more than the moisture tester value, push the “Display Calibration” and turn the calibration adjustment knob until the display reads the difference with a minus sign (-Value).

***** Push the “DISPLAY CALIBRATION” switch down and the display will show the amount added to or subtracted from the displayed moisture (-9.9 to +9.9).

D. Grain samples should be taken on a daily basis to insure that the electronic equipment is functioning correctly. Use a quality moisture tester that will provide repeatable accuracy.

To take a sample, a few simple guidelines should be followed.

!!CAUTION!!

1. USE A SAFE SAMPLING PROCEDURE. DO NOT SAMPLE FROM A HOPPER WITH AN UNGUARDED AUGER. KEEP HANDS, FEET AND CLOTHING AWAY FROM ROTATING PARTS.
2. Take a sample when the digital panel meter is not changing rapidly.

3. Watch the meter while sampling and use the average reading: i.e., record the readings of several samples, add the samples together, and divide the total by the number of readings.

4. Why take several samples? The electronics average the grain moisture and therefore it is possible to have a sample that is either wetter or dryer than the meter is reading (if the meter is changing rapidly while sampling).

5. Take samples at the discharge, not from the storage bin, when monitoring a drying operation. If you do not have a sampler at the discharge, contact your dealer and have one installed. **See the following Chart (Chart I).**

CHART I

Calc-U-Dri Moisture/Matic Sampling

The chart shows grain moisture readings (from a real situation) as they should be taken to obtain a realistic moisture value.

	Calc-U-Dri		Dole		Elevator
Time	**Temperature**	**Moisture**	**Temperature**	**Moisture**	**Moisture**
9:33 AM	112	14.4%	109	14.7%	
9:36 AM	112	14.4%	111	14.4%	
9:38 AM	108	16.0%	107	17.5%	
9:40 AM	110	14.6%	109	14.7%	
9:43 AM	108	15.9%	104	17.3%	
9:50 AM	111	14.5%	107	15.0%	
TOTAL		89.8		93.6	
AVERAGE		15.0%		15.6%	15.3

QUESTION: Where would you set the moisture offset, +0.3 or +0.6?

ANSWER: Most would want to set it to +0.3 which would make it match the point of sale's moisture reading.

E. The moisture Set Point is adjusted by turning the Set Point adjustment knob while holding the "Display Set Point" paddle switch down. Turning the knob **clockwise will increase** the moisture Set Point and **counterclockwise will decrease** the moisture Set Point (0 to 25). NOTE: The Set Point will change whenever the knob is moved.

F. Adjust the main speed adjustment knob to the desired discharge rate. This is the typical metering roll speed required to obtain the desired discharge moisture.

G. Switch the mode switch to "Automatic" and the Moisture/Matic will start to control the speed of the dryer metering rolls. The dryer will operate at "Low" speed when the moisture content displayed on the meter is wetter than 0.3 percent or more than the moisture Set Point. It will operate at "Main" speed when the moisture displayed is within +0.3 percent or -0.3 percent of the moisture Set Point, and will run at "High" speed when the moisture is 0.3 percent or more below the moisture Set Point.

H. The amount of speed change from "Main" speed to either "Low" or "High" speed can be varied by using the "Speed Adjustments" located by the indicators.

OPERATING SUGGESTIONS (continued)

A speed change of approximately 15% should give good performance under most conditions. However, some adjustments may be required to accommodate different drying situations. For example, if the moisture content of the wet, undried grain is not very consistent, then a wider speed change may be necessary.

To adjust the Low Speed or High Speed follow these steps:

1. Read the DC voltage in main speed and remember.

2. Move the moisture Set Point to force the unit into the High or Low Speed, whichever you wish to adjust. (Note red indicators).

3. Locate the correct speed adjustment potentiometer, and with a screwdriver adjust to the desired DC voltage.

Example

Want a 15 percent speed change from “Main” to “Low” Speed. Main Speed reads 50 volts. Force the unit to “Low” Speed and the voltage reads 30. Adjust the “Low” Speed potentiometer to a new value of 42 volts. Return the moisture Set Point to the original value.

H. **Note:** If the main speed is changed, some readjustment of the low & high speeds may be required to maintain the same speed change.

I. **Note:** Before leaving the dryer unattended, make sure that the output of the dryer in the “High” speed range does not exceed the capacity of the dry grain take-away equipment and that the output in the “Low” speed range provides enough grain to cover the sensor blade.

CHART RECORDER INSTALLATION

A. Disconnect all power (AC).

B. Remove the chart recorder hole cover by removing the six screws and nuts. NOTE: Save this hardware to use for mounting the chart recorder.

C. Mount the heater to the back of the control box through the two (2) inch diameter hole.

D. Attach the eight (8) inch long wires to post numbers five (5) and six (6) located on the AC power terminal block.

E. Mount the bracket to the inside door using four #8-32 screws and nuts. Open the front cover of the Chart Recorder and use the two #8-32 screws and nuts from (“Step B”) above to mount the recorder inside the control box.

F. Plug the green wire into the negative (-) receptacle and the orange wire into the positive (+) receptacle on the back of the Chart Recorder.

G. Fasten the other end of the green wire to post number six (6) and the orange wire to post number seven (7) at the terminal block located below the power supply unit in the upper left-hand corner of the back panel.

CHART RECORDER INSTALLATION (continued)

H. Connect the power to the Chart Recorder by connecting the power leads to the terminal block located in the center of the back panel. Connect the ground wire (green) to terminal number four (4), line one to terminal number five (5), and neutral to terminal number six (6).

I. Check to make sure that the switch on the back of the Chart Recorder is in the "ON" position (UP).

J. The control board has dip switches that need to be set. Please refer to the dip switch chart (Page 37) switch number 7 and 8.

CHART RECORDER OPERATING SUGGESTIONS

NOTE

The Chart Recorder is set to be used in the "tear-off" mode. To use it in the "re-roll" mode, go to the paper replacement paragraph - **Item XI.**

A. In the tear-off mode, the chart paper is run behind the front panel. To view the last few hours, lift the hinge above the recorder and pull the paper out, then push it back behind the door when done viewing. In this mode, the paper must be torn off every 30 hours to avoid the paper bunching up.

B. In the "re-roll" mode, the paper can be viewed by unscrewing the thumbscrew in the upper left-hand corner and opening the door. To unroll the paper for analysis, lift the left retaining clip and set the roll into the top notch. Unroll as needed. Rewind the paper with the brass gear, then reset the roller into the bottom notch. Lock the retaining clip.

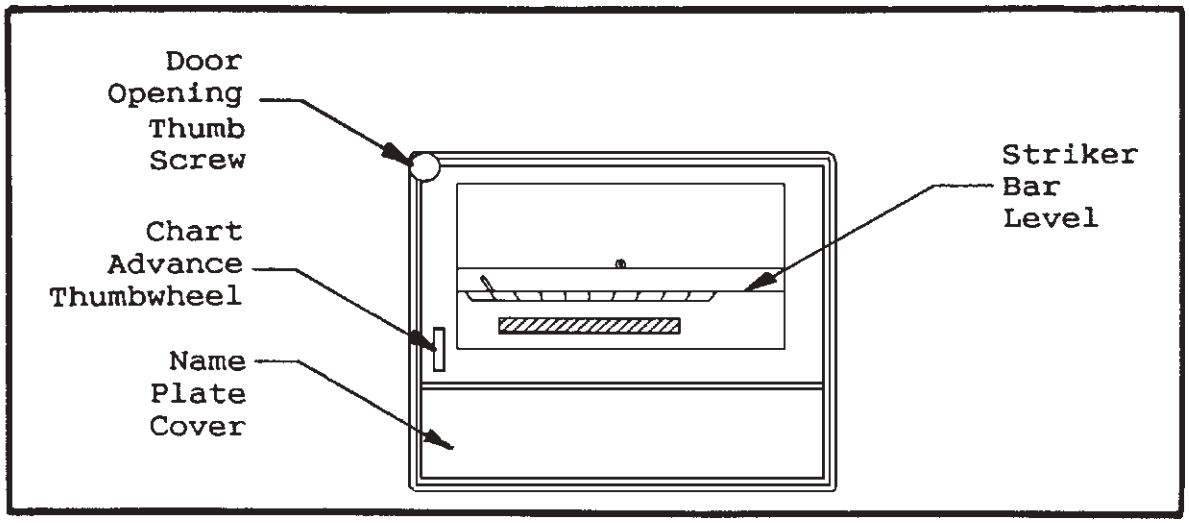
C. The Chart Recorder paper can be set to the time desired. To set the paper to the correct time, press in and roll down the Chart Advance Thumbwheel. Always set the time to the bottom of the window where the trace is printed, never to the top of the stylus.

D. The paper advances at one (1) inch per hour. There are 63 feet of paper in each roll. A red line appears when it is time to add a new roll of paper.

E. The Chart Recorder paper is pressure sensitive, so that you can make notations on the paper with any object. The larger numbers on the right edge are spaced for one (1) hour increments. The numbers run from 1 to 12 so you can get the paper to a specific time of day.

There are smaller numbers going across the paper for the moisture readings. Each increment line is 0.5 percent.

CHART RECORDER PAPER REPLACEMENT



XI. Chart Recorder Paper Replacement - (DMC part # MS0350)

A. Re-Roll Mode

1. Turn power “OFF” before loading paper.

2. Open recorder by loosening the thumbscrew at the upper left of the front panel. Lower the recorder front panel.

3. Unlatch the paper retaining clips located on each side of the chart recorder drive.

4. Open the plastic panel to the chassis latch located on the right-hand side plate.

5. Remove both the “supply” and “take-up” rolls. If the paper is being removed while it is still attached to the supply roll, carefully slide the paper out from between the front panel and chart drive, being careful not to pull the paper backwards through the recorder. This may damage the pointer.

6. Set the new roll of paper, perforated end, up on a flat surface and push the supply roller into the roll. This is done to lessen the chance of extruding the roll of paper in the process of sliding the spool into the roll. Be sure to slide the roll all the way to the roller shoulder.

7. Unroll about a foot of paper, and holding the roll in one hand and the loose end in the other, slide the paper between the panel and side plate sprocket holes first. Keep the paper taut and close to the drive drum in order not to snag the stylus.

8. Engage the supply roller shaft in the seating notches and check to be sure that the sprockets mate with the sprocket holes.

9. Slide the cardboard sleeve onto the take-up roller.

CHART RECORDER PAPER REPLACEMENT (continued)

10. Butt the paper against the disc on the take-up roll and tape the paper to the sleeve, printed side out. Wrap one or two revolutions to be sure the paper is started out straight and true to the spool.

11. Continue rolling the paper and place the take-up roll into the notches.

12. Close the retaining clips, close the panel to the chassis latch and close the recorder front panel. Tighten the thumbscrew.

B. Tear-Off

1. Turn the power “OFF” before loading chart paper.

2. Open the recorder by loosening the thumbscrew at the upper left of the front panel. Lower the recorder front panel.

3. Unlatch the paper retaining clips located on each side of the recorder chart drive.

4. Open the panel to the chassis latch located on the right-hand side plate.

5. Slide the rubber drive belts out of the chamfered grooves and to the center of the top roller in order to release pressure on the paper.

6. Remove the supply roll. If the paper is being removed while still attached to the supply rolls, carefully slide the paper out from between the front panel and chart drive, being careful not to pull the paper backwards through the recorder. This may damage the pointer.

7. Set the new roll of paper, perforated end up, on a flat surface and push the supply roller into the roll. This is done to lessen the chance of extruding the roll of paper in the process of sliding the spool into the roll. Be sure to slide the roll all the way to the roller shoulder.

8. Unroll about a foot of paper. Holding the roll in one hand and the loose end of the paper in the other, slide the paper between the panel and side plate, sprocket holes first. Keep the paper taut and close to the drive drum in order not to snag the stylus.

9. Engage the supply roller shafts in the seating notches and check to be sure that the sprockets mate with the sprocket holes.

10. Close the retaining clips. Close the panel to the chassis latch.

11. Pull drive belts back into the chamfered grooves on the top roller.

12. Advance the paper with the Chart Recorder advance wheel to assure that thepaper drives through the recorder smoothly. Note that the drive belts are in the chamfered grooves and do not have any tendency to walk out.

13. Close the recorder front panel. Tighten the thumbscrew.

CHART RECORDER PAPER REPLACEMENT (continued)

XII. Converting the Chart Recorder from "Tear-Off" Mode to "Re-Roll" Mode

A. Turn the power "OFF".

B. Open the recorder by loosening the thumbscrew at the upper left of the front panel, and open the door.

C. Loosen the screw on the right side that holds the small shaft with the rubber drive bolts.

NOTE

There is a small plastic washer on the end of the shaft, DO NOT LOSE IT. Spread the frame enough to remove the small shaft.

D. Slide the shaft out of the rubber drive belts and reinsert into the frame with the plastic washer on the right. Tighten the frame screw on the right.

E. Unlatch the retaining clips and remove the take-up roll. Remove the rubber drive belts and save them. (See Step I).

F. Tape the chart paper to the take-up roll so it is butted against the left disc. Wrap up two revolutions of paper on the roll.

G. Place the roll into the first of the two notches on the left side. Use the thumb roller to take up any slack on the roll, then place the roll in the second notch and close the retaining clips.

H. Close the door and tighten the outside thumbscrew.

I. Remove the lower name plate cover using a small screwdriver and prying on the left side of the cover. On the inside there are two oval slots in casting above the adjusting screws. Place one rubber drive belt in each of these slots for storage. Replace the cover.

CHART RECORDER CALIBRATION

XIII. Recalibration

A. The Chart Recorders are calibrated at the factory, but can be adjusted if they do not accurately record the readings from the digital panel meter. These adjustments can only be done accurately with the DMC blue calibration box. (See your dealer).

B. Steps to recalibrate:

1. Remove the lower nameplate cover by lightly prying the left side until the cover pops out.

2. Connect the blue calibration box to terminal strip marked "sensor".

3. Turn on power and adjust the calibration box until the moisture reads 10 percent.

4. While advancing paper with the thumb wheel, adjust the left (zero) potentiometer until the stylus indicates 10 percent moisture on the paper.

CHART RECORDER CALIBRATION (continued)

5. Adjust the blue calibration box until the moisture reads 20 percent on the panel meter.

6. While advancing paper, adjust the right (span) potentiometer until the stylus indicates 20 percent on the paper.

7. Repeat Steps three (3) through six (6) until the stylus records correctly at both 10 percent and 20 percent on the paper.

8. Replace the nameplate cover.

C. Other trouble shooting and repair hints are found in the Rustrak owner's manual, last page.

PRINTER INSTALLATION

IV. Printer Installation (Optional)

A. Disconnect all power (AC).

B. Remove the hole cover by removing the six (6) #8-32 screws holding it in.

C. Install the printer wiring decal 602L065 on the back of the inside door.

D. Remove the DMC 18 control board and open the dip switches 7 and 8 for your application. See the dip switch chart on page 37. Install the control board.

E. Install the black card guides (1EL0850) into the card holder. This is to hold the new card in place.

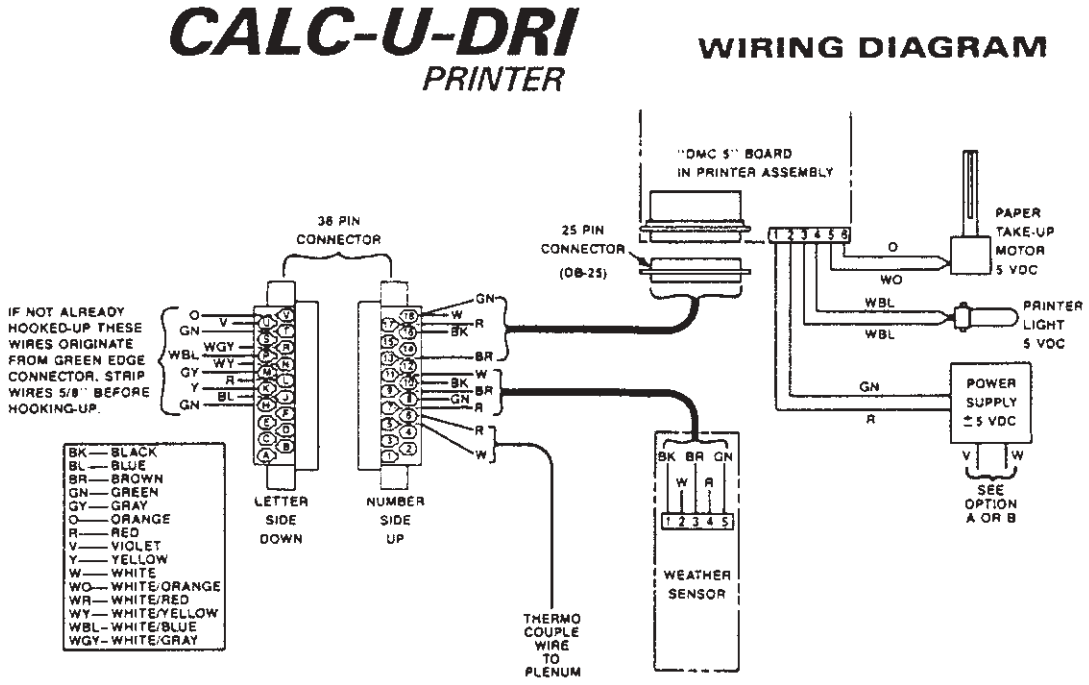
F. Connect the wires coming from the green card connector to the black card connector (1EL0854). There is a total of 11 wires. Refer to the decal 602L065 mounted on the Calc-U-Dri door and Drawing XV. Note colors and pin letters. This must be done correctly.

G. Mount the black card connector using two (2) 4 x 40 5/8" bolts, 4 x 40 nuts and star washer. The numbered side of this connector will be visible when mounted correctly.

H. Connect the printer control cable to the black card connector. This cable will have a 25 pin connector on one end. Refer to Drawing XV.

I. Install the five (5) volt power supply using two (2) 8 x 32 x 1/2" bolts. The locations is the upper right of the back panel. The red and green wires will be coming out of the left edge of the supply. Attach the violet and white wires to the two (2) post terminal two (2) inches to the left of the supply. Violet on the V terminal and white on the W terminal.

J. Attach the printer to the front panel with the five (5) #8-32 screws and nuts.



DRAWING XV

L. Plug in the printer control cable to the printer assembly.

M. Wire the printer power supply wire to the printer assembly. Connect the red wire to #1, green wire to #2. See decal by connector.

N. To mount the plenum thermocouple, cut a hole in the plenum 1-1/4" diameter within fifty (50) feet of the control box. Secure the liquidtite and thermocouple using conduit clamps. Wire the sensor into the back connector pin #5 to white, pin #6 to red. **See Drawing XV.**

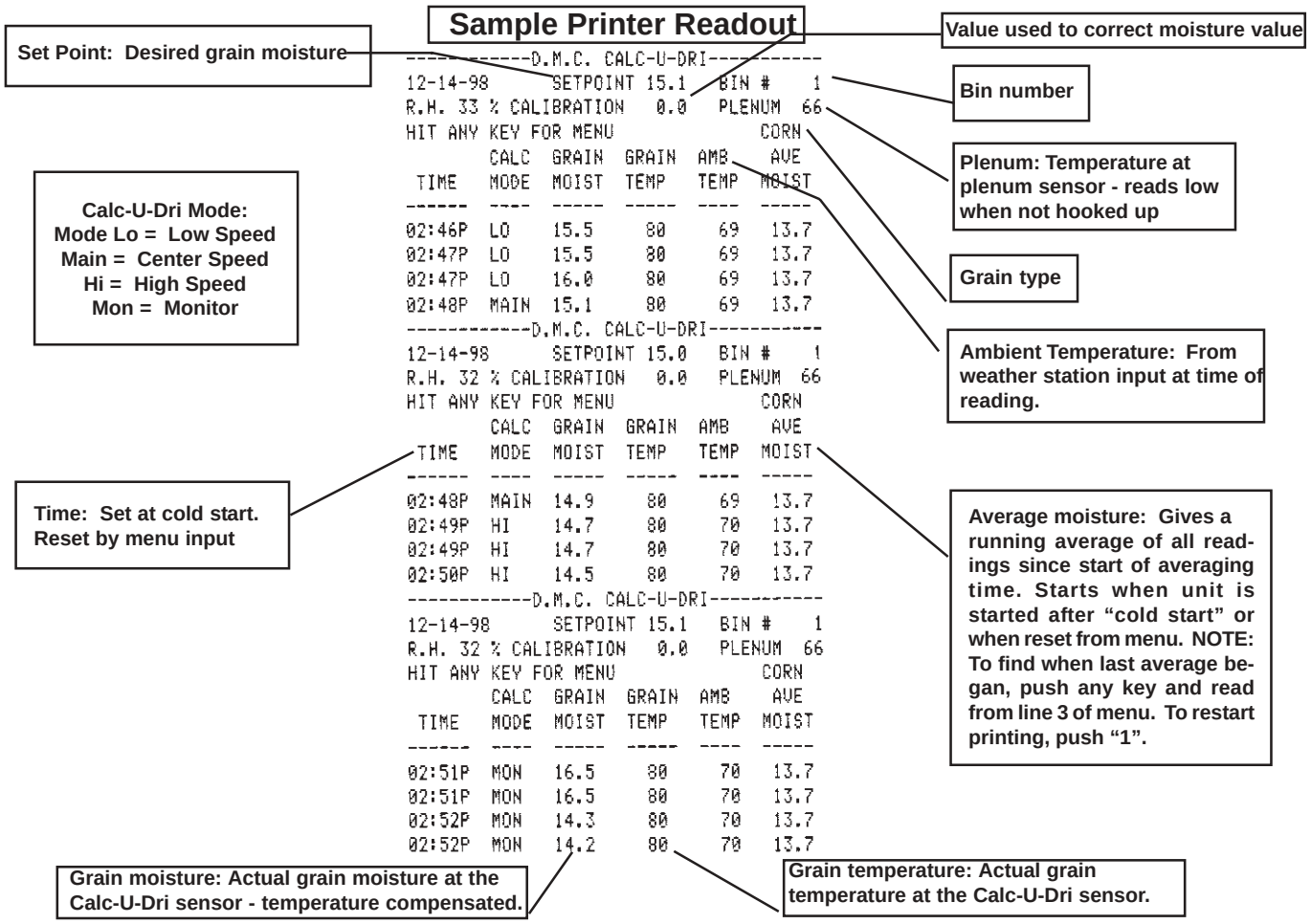
O. To mount the weather sensor, feed the cable through the 1-3/32 inch diameter hole in the bottom of the control box and secure with the electrical screw bushing. Have the sensor on the outside of the control box. Wire the cable to the black 36 pin connector, pins 7 through 11. **See Drawing XV.**

P. Put cable ties approximately every four (4) inches to hold all the loose wires and cables in place. Do not tie any of these wires to the AC leads. Cut off the cable tie ends.

Q. Remove the printer interface card DMC4 from its shipping box and install it in the new card slot with the black connector to the bottom. DO NOT lay this control card on any steel or conductive material.

R. Remove the shipping tape from the printer paper and spool.

Sample Printer Readout




```
------------D.M.C. CALC-U-DRI-----------
12-14-98      SETPOINT 15.1   BIN #    1
R.H. 33 % CALIBRATION   0.0   PLENUM  66
HIT ANY KEY FOR MENU                CORN
        CALC  GRAIN  GRAIN  AMB     AVE
 TIME   MODE  MOIST  TEMP   TEMP   MOIST
------  ----  -----  -----  ----   -----
02:46P  LO    15.5     80     69    13.7
02:47P  LO    15.5     80     69    13.7
02:47P  LO    16.0     80     69    13.7
02:48P  MAIN  15.1     80     69    13.7
------------D.M.C. CALC-U-DRI-----------
12-14-98      SETPOINT 15.0   BIN #    1
R.H. 32 % CALIBRATION   0.0   PLENUM  66
HIT ANY KEY FOR MENU                CORN
        CALC  GRAIN  GRAIN  AMB     AVE
 TIME   MODE  MOIST  TEMP   TEMP   MOIST
------  ----  -----  -----  ----   -----
02:48P  MAIN  14.9     80     69    13.7
02:49P  HI    14.7     80     70    13.7
02:49P  HI    14.7     80     70    13.7
02:50P  HI    14.5     80     70    13.7
------------D.M.C. CALC-U-DRI-----------
12-14-98      SETPOINT 15.1   BIN #    1
R.H. 32 % CALIBRATION   0.0   PLENUM  66
HIT ANY KEY FOR MENU                CORN
        CALC  GRAIN  GRAIN  AMB     AVE
 TIME   MODE  MOIST  TEMP   TEMP   MOIST
------  ----  -----  -----  ----   -----
02:51P  MON   16.5     80     70    13.7
02:51P  MON   16.5     80     70    13.7
02:52P  MON   14.3     80     70    13.7
02:52P  MON   14.2     80     70    13.7
```

SERVICE FOR MODULAR PRINTER ASSEMBLY

XVII. Service for Modular Printer Assembly

If removal of the circuit board is necessary, follow these steps.

A. Disconnect AC power to the control box.

B. Carefully pull the circuit board straight out of the guides. This sometimes requires a little extra force. Do not use pliers or another tool to pull or pry this circuit board.

C. If the circuit board is to be replaced, return it in the packaging in which you received your replacement circuit board.

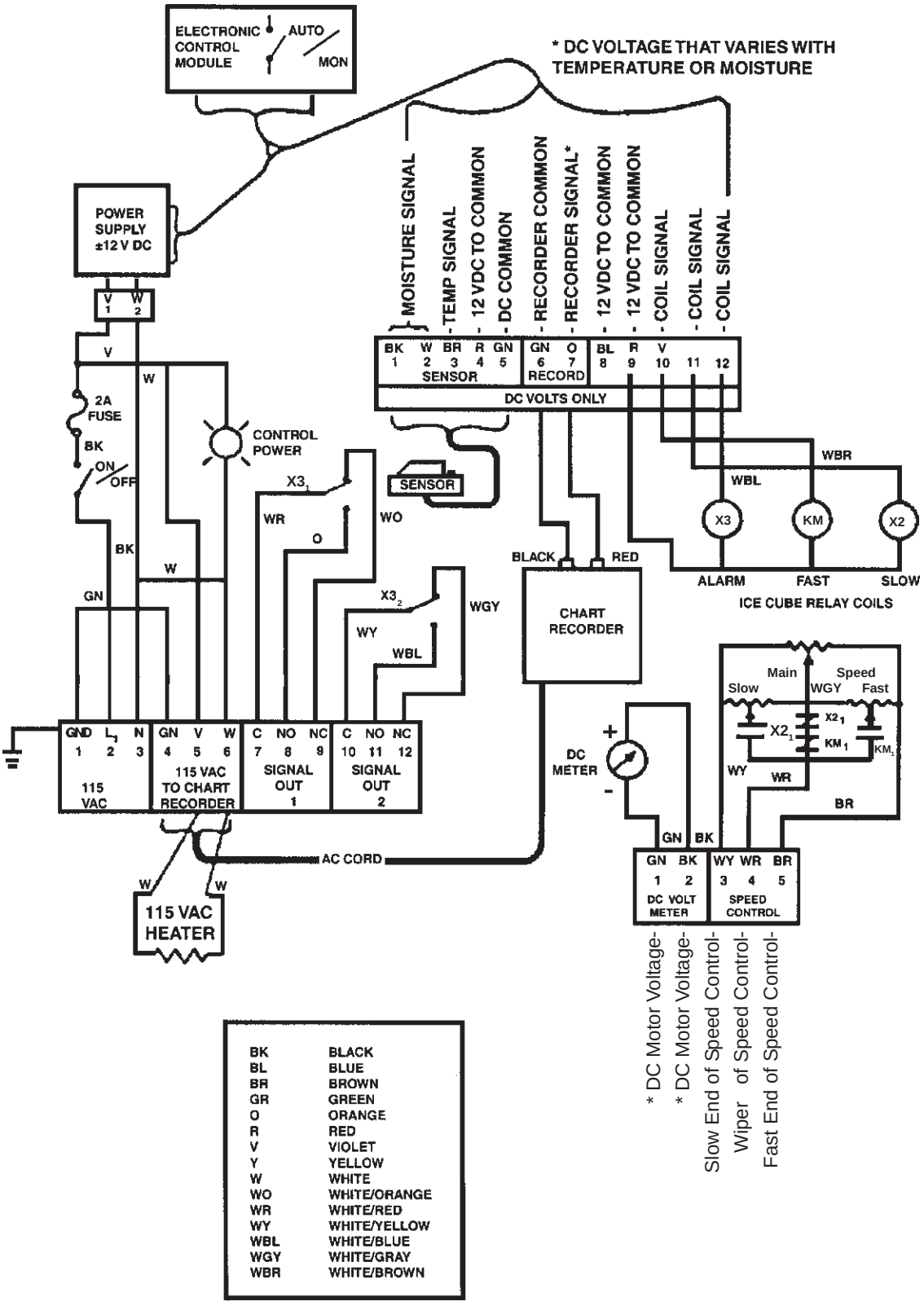
D. Install the circuit board with the component side away from the door. Slide into guides and push firmly until it is seated in the circuit board jack.

E. Apply power to the unit and switch on. If digital panel is blank, it is possible the circuit board is not seated properly. Disconnect power and repeat Step D.

F. The printer control board contains two (2) alkaline AA batteries. They require replacement every year.

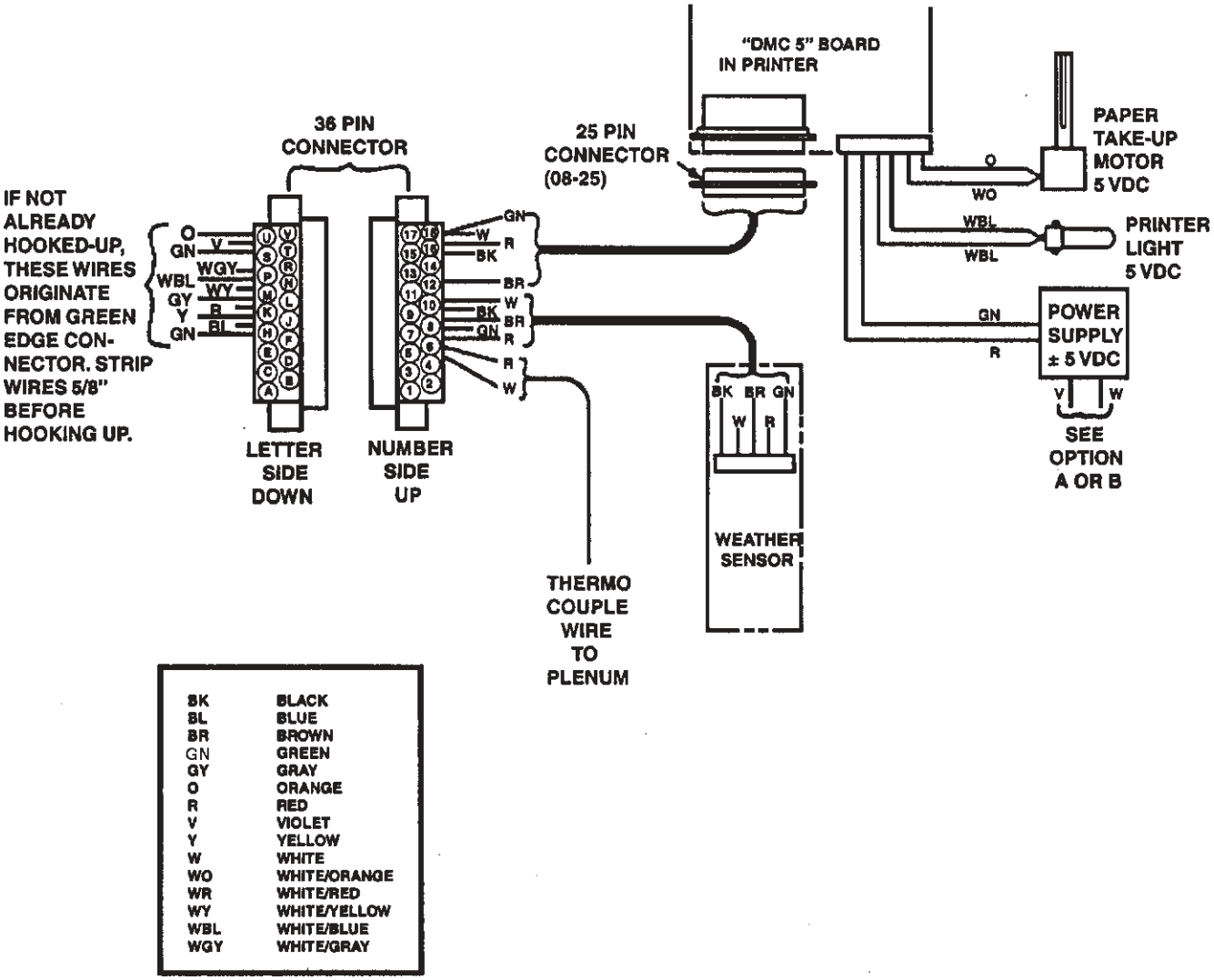
If the printer requires service, unplug the 25 pin jack and remove all the wires from the orange terminal. Remove the four (4) bolts that secure the printer mounting plate. This will be serviced as a complete module. Reinstall the new unit and wire up the orange terminal as per the decal. Plug in the DB25 five (5) conductor cable.

WIRING DIAGRAM FOR MOISTURE/MATIC



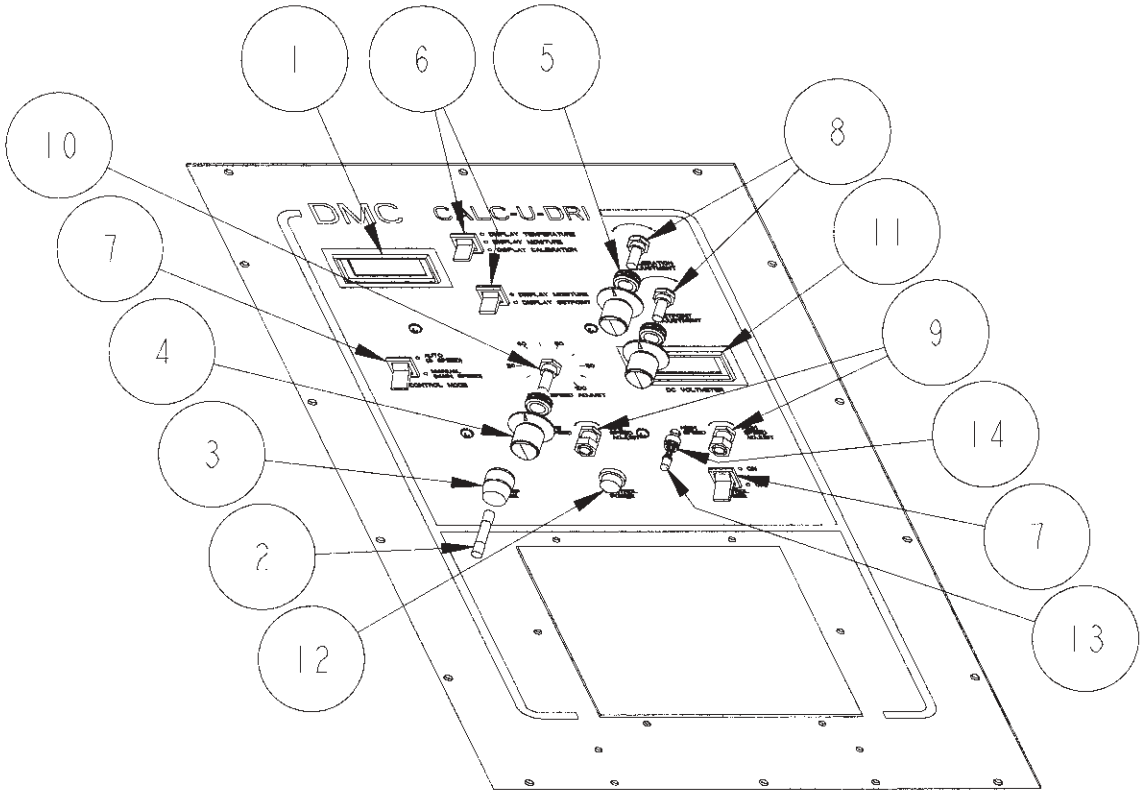
Standard Moisture/Matic

WIRING DIAGRAM FOR MOISTURE/MATIC PRINTER



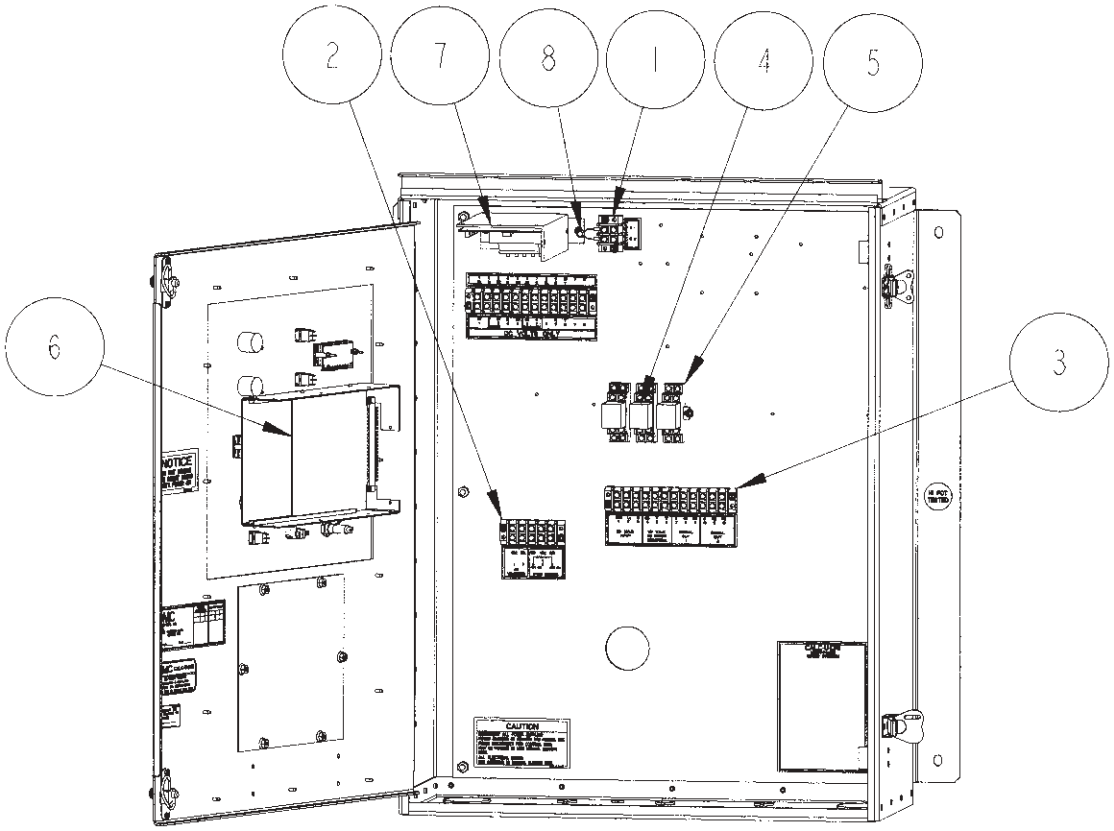
Moisture/Matic Printer

MOISTURE/MATIC MODULE SUBASSEMBLY



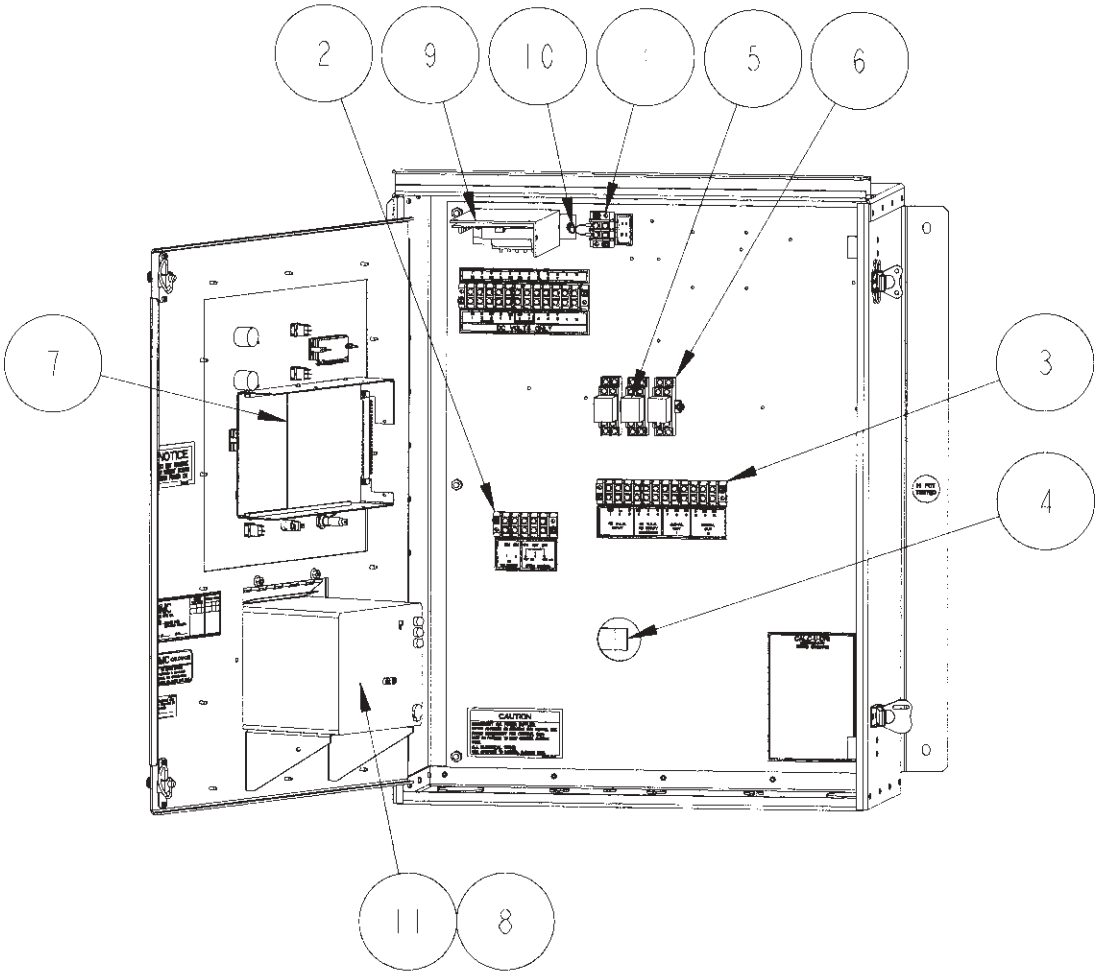
Reference Number	Part Number	Description	Quantity Needed
1	5041198	Digital Panel Meter Kit Includes Wires	1
2	1EL0719	Fuse - AGC, 2 Amp, 250 Volt	1
3	1EL0826	Fuseholder	1
4	1EL0921	Knob - Control, Black 1/4 Shaft	3
5	1EL2042	Grommet - Rubber	3
6	2EL0658	Switch - Momentary 3-position, SPDT	2
7	2EL0659	Switch, 3-position, SPDT	2
8	2EL0672	Potentiometer - 10K OHM	2
9	2EL0674	Potentiometer - 10K OHM	2
10	2EL0675	Potentiometer - 10K OHM	1
11	2EL0690	Digital Panel Meter - 200 Volt	1
12	2EL1161	Light - Indicator, Red - 115Volt	1
13	2EL1163	Light - LED, Red	2
14	2EL1164	Clip & Ring	2

MOISTURE/MATIC CONTROL BOX (PLAIN)



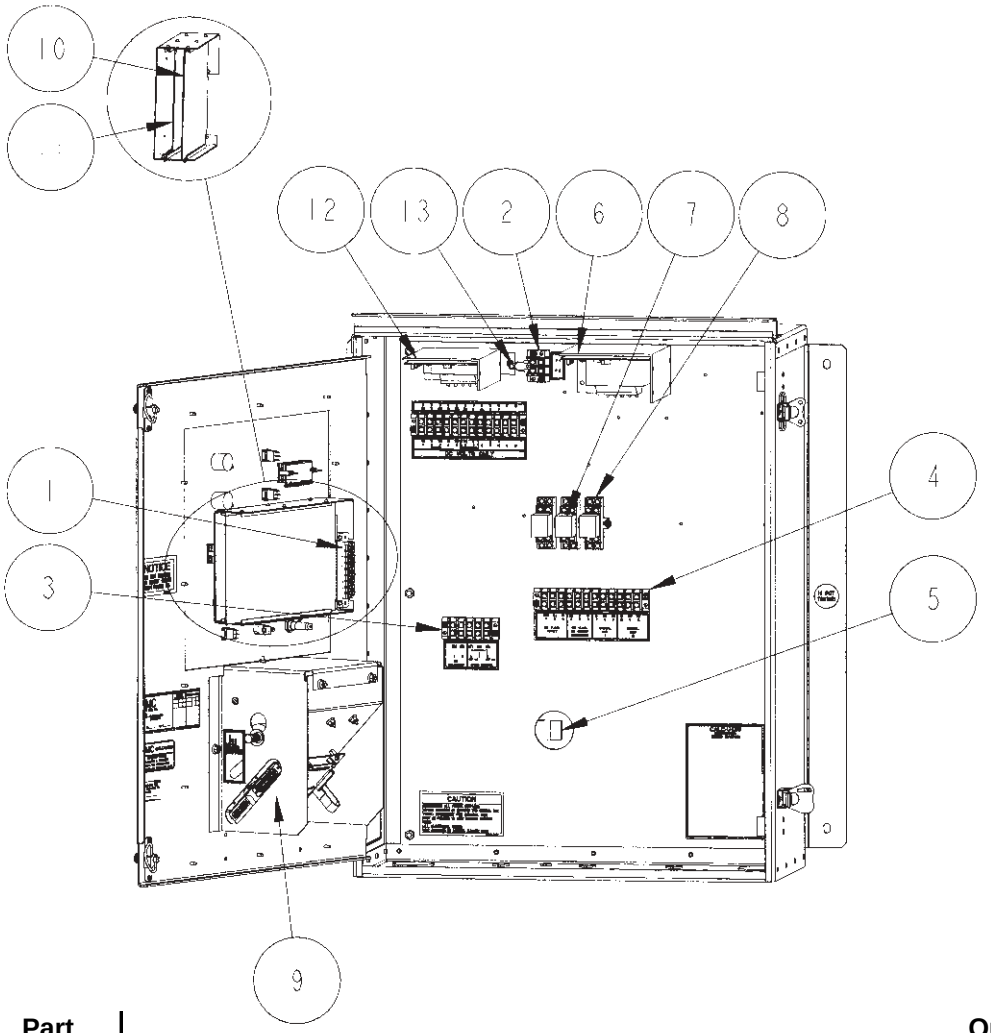
Reference Number	Part Number	Description	Quantity Needed
1	1EL0879	Terminal Block - 2 Term, 30 Amp, 250V	1
2	1EL0898	Terminal Block - 5 Term, 30 Amp, 250V	1
3	1EL0900	Terminal Block - 12 Term, 30 Amp, 250V	2
4	2EL2074	Relay - Gen. Purpose DPDT, 12 VDC	3
5	2EL0275	Relay - Socket	3
6	602E460	Circuit Board - DMC 18	1
7	602E340	Power Supply	1
8	602E430	Surge Absorber - Assembly With Terminals	1

MOISTURE MATIC CONTROL BOX (CHART RECORDER)



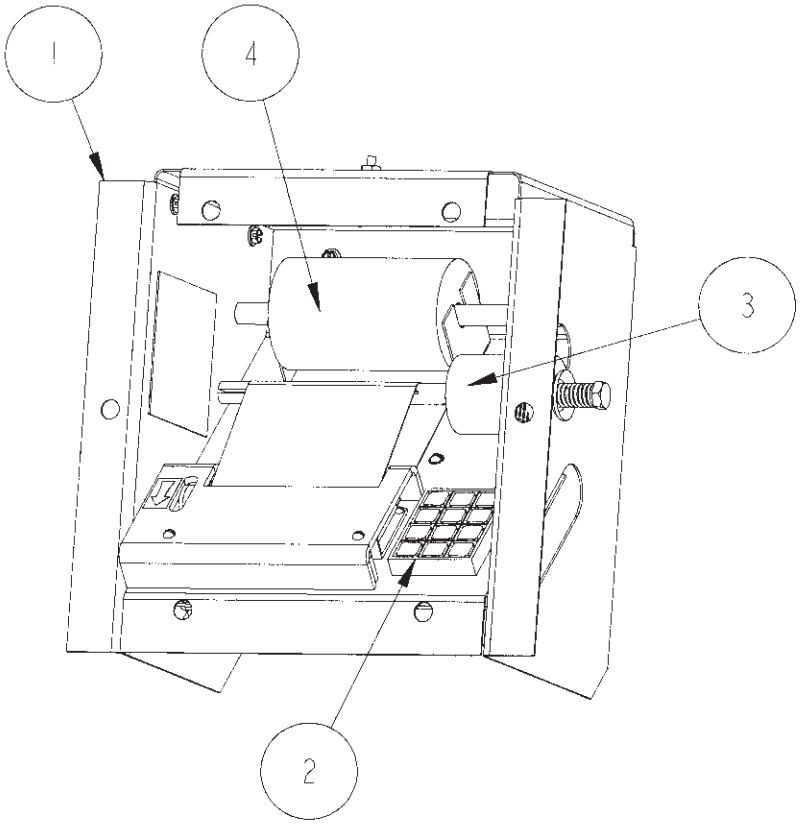
Reference Number	Part Number	Description	Quantity Needed
1	1EL0879	Terminal Block - 2 Term, 30 Amp, 250V	1
2	1EL0898	Terminal Block - 5 Term, 30 Amp, 250V	1
3	1EL0900	Terminal Block - 12 Term, 30 Amp, 250V	2
4	1EL1525	Heater Strip - 1" x 3" .15W, 120 V	1
5	2EL2074	Relay - Gen. Purpose DPDT, 12 VDC	3
6	2EL0275	Relay - Socket	3
7	602E460	Circuit Board - DMC 18	1
8	602E112	Chart Recorder - w/ paper Assembly	1
9	602E340	Power Supply	1
10	602E430	Surge Absorber - Assembly With Terminals	1
11	MS0650	Paper - Chart Recorder 63 Ft. Roll	1

MOISTURE/MATIC CONTROL BOX (PRINTER)



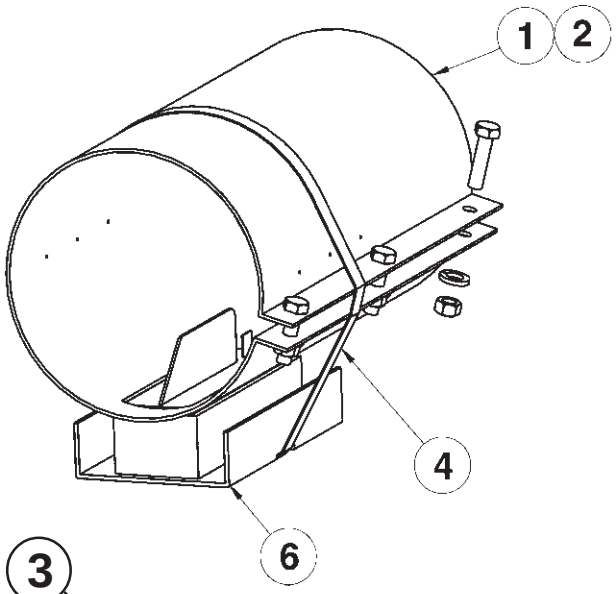
Reference Number	Part Number	Description	Quantity Needed
1	1EL0854	Connector - Circuit Board 36 Circuits	1
2	1EL0879	Terminal Block - 2 Term, 30 Amp, 250V	1
3	1EL0898	Terminal Block - 5 Term, 30 Amp, 250V	1
4	1EL0900	Terminal Block - 12 Term, 30 Amp, 250V	2
5	1EL1525	Heater Strip - 1" x 3" .15W, 120 V	1
6	5041435	Power Supply - Moisture/Matic Assembly (Printer)	1
7	2EL2074	Relay - Gen. Purpose DPDT, 12 VDC	3
8	2EL0275	Relay - Socket	3
9	602E184	Printer Module	1
10	602E230	Circuit Board - MM, Printer (DMC 4) (with batteries)	1
11	602E460	Circuit Board - DMC 18	1
12	602E340	Power Supply	1
13	602E430	Surge Absorber - Assembly With Terminals	1

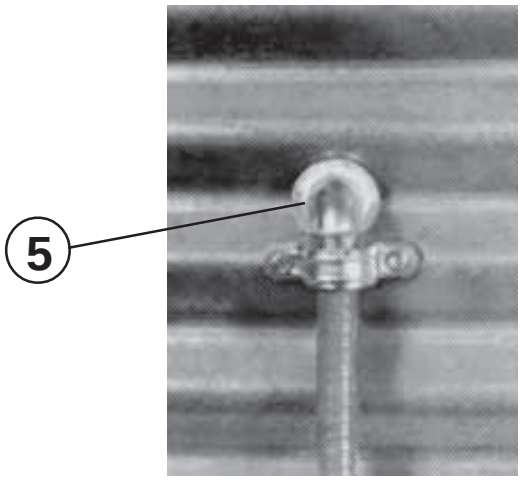
PRINTER MODULE SUBASSEMBLY

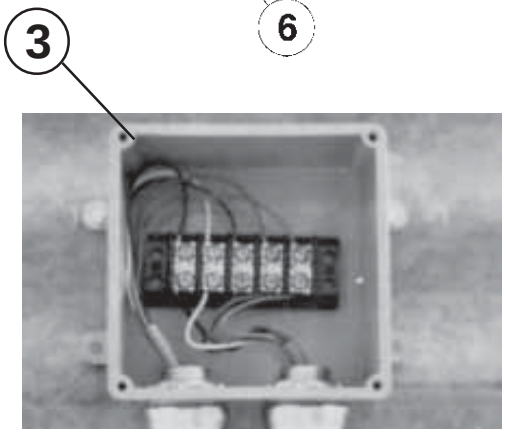


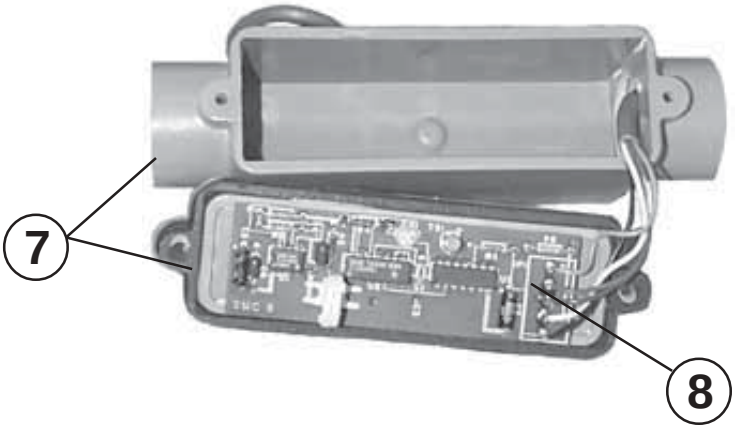
Reference Number	Part Number	Description	Quantity Needed
1	602E184	Printer Module	1
2	2EL0299	Keyboard - 12 Button	1
3	602E155	Printer - Paper Take-Up Assembly	1
4	MS0306	Paper - Printer (Thermal)	1

CALC-U-DRI MOISTURE/MATIC PARTS









Reference Number	Part Number	Description	Quantity Needed
1	602C040	6" OD Calc-U-Dri Connecting Band	1
2	603C021	8" OD Calc-U-Dri Connecting Band	1
3	602N117	Calc-U-Dri Cable Extension Kit	1
4	MS0359	Worm Gear Clamp, 32" Long	2
5	602E181	Thermal Couple Wire Assembly (50') - (Less Conduit Clamps)	1
6	602E020	Calc-U-Dri Sensor Complete	1
7	602E148	Weather Sensor Assembly	1
8	6023151	"DMC 6" Weather Sensor Circuit Board	1
	1EL3045	1/2" Liquidtite Conduit (Not Pictured)	

TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	SOLUTION
Digital readout dead	1. Main AC power off. 2. Main fuse(s) or control fuse blown 3. Circuit board not plugged in 4. Bad circuit board 5. Power supply not working	1. Turn on. 2. Replace fuse(s) 3. Plug in 4. Replace circuit board 5. Put in new power supply
Digital readout is not lit. All control functions are working	1. Digital panel meter bad 2. Open or loose wire feeding the digital panel meter 3. Circuit board trouble	1. Replace the DPM 2. Repair 3. Replace circuit board
Moisture readings are very high - grain checks dry	1. Moisture on sensor blade 2. Foreign object jammed on sensor 3. Water in circuit board jack 4. Calibration accidentally set too high 5. Sensor not grounded to the tube 6. Bad circuit board 7. Bad sensor 8. Circuit board dip switches set wrong	1. Dry off the sensor 2. Remove object 3. Dry off 4. Reset 5. Secure ground strap 6. Replace circuit board 7. Replace sensor 8. Set switches using did switch chart- Page 37.
Erratic operation after replacing the control card	1. Dip switches on new card are not set correctly	1. Refer to illustration on Page 37.
Moisture readings do not change, temperature readings are high negative.	1. Sensor leads are broken or not hooked into the terminal 2. Sensor trouble.	1. Tighten terminal screws or replace the sensor. 2. Replace sensor.
Moisture readings are intermittently high then low.	1. Check for the sensor ground strap not hooked up. 2. Sensor cable leads broken 3. Loose terminal leads where sensor is hooked.	1. Hook up strap. 2. Replace sensor. 3. Tighten screws.
Moisture readings are consistently high or low	1. Correct by calibration adjustment, refer to Page 11.	1. Adjust
Blowing control fuses	1. Check for loose or shorted wires. 2. Surge absorber shorted 3. Any component that is bad can cause this - check by isolating one component at a time.	1. Isolate and correct. 2. Replace if it looks bad. 3. Replace bad component.

TROUBLE SHOOTING GUIDE (continued)

PROBLEM	PROBABLE CAUSE	SOLUTION
Chart Recorder does not work.	1. Power switch "OFF" on Chart Recorder 2. Signal leads crossed. 3. Defective Recorder.	1. Push the power switch up on the back of the Chart Recorder. 2. Replug correctly. 3. Replace
Chart Recorder paper jams.	1. Paper is moist due to heater strip not working. 2. Paper installed incorrectly.	1. Replace paper and replace heater strip. 2. Reference recorder manual on paper changing.
Chart Recorder pegs the needle to the left.	1. Signal wires to recorder are crossed.	1. Switch banana plugs on the rear.
Chart Recorder pegs the needle to the right.	1. Control card dip switches set wrong.	1. Refer to the dip switch chart. Switches 7 & 8 on Page 37.
Printer spaces several lines but nothing is printed.	1. Paper installed with the wrong side up or the wrong type paper. 2. Print head is unplugged or bad.	1. Turn over paper or install the correct paper MS0306. 2. Plug in or replace printer.
Printer spaces one line, nothing more.	1. Computer control card not making connection or bad card. 2. Five (5) conductor cable loose or installed in error. 3. Low printer power supply. 4. Printer module failed.	1. Insert the computer card or replace card. (DMC 4) 2. Refer to the decal for correct wiring at the computer jack. Insert the 25 pin jack at the printer. 3. Five (5) volt supply must be set at 5.0 to 5.2 volts. 4. Replace module or have repaired.
Printer does not space, no night light and the paper take-up motor not working.	1. No DC power or no AC power or not hooked up.	1. If 5 V DC is missing replace the power supply. 2. Repair loose or broken power leads (red and green) or (white and violet.)
Printer doesn't space, but has night light.	1. Printer motor not plugged in.	1. Plug in the flat, gray cable on the printer and check if broken.
Prints characters that are unintelligible.	1. Computer not working.	1. Replace computer card (DMC 4.)

TROUBLE SHOOTING GUIDE (continued)

PROBLEM	PROBABLE CAUSE	SOLUTION
Moisture and temperature are printed at half the value displayed on the DPM.	1. Dip switches are not set correctly.	1. Reference the Dip Switch Chart and correct dip switches 7 & 8, Page 37.
Top part of the characters are missing.	1. Plastic guard too close.	1. Raise the plastic shield.
Part of each character is missing.	1. Head cable loose or print head bad. 2. Dirt build-up on the platen.	1. Reseat the flat bottom cable or replace the printer. 2. Clean the black bar under the paper that the head goes over.
Paper take-up not rolling up the paper.	1. Loss of power or bad motor or aluminum shaft binding against the motor.	1. The orange and orange/ white wire loose or broken. Retighten or replace the assembly or adjust the aluminum shaft by loosening the Allen screw.

NOTE

1. Never unplug or plug in the circuit board with power “ON”.
2. Do not make field adjustments on the circuit board. This is a factory adjustment only.
3. Contact your dealer or DMC if you have any questions on the service of your Calc-U-Dri Moisture/Matic.

TAKE TIME FOR PROPER INSTALLATION
IT SAVES SERVICE CALLS

Appendix A
Calc-U-Dri Moisture/Matic For Kan-Sun Dryers

INTRODUCTION & INSTALLATION INSTRUCTIONS

I. Introduction to Moisture/Matic for Kan-Sun Dryers

A. The Calc-U-Dri Moisture/Matic for Kan-Sun is a grain drying control unit that is specifically designed for use on Kan-Sun grain dryers. This unit will automatically control the rate of grain being discharged from a Kan-Sun dryer to enable an operator to select and maintain a desired moisture content.

B. The grain discharge rate is changed from fast, main, or slow depending on the relationship between the desired moisture content and the actual moisture of the grain. When the grain moisture is **wetter** than desired moisture, the Moisture/Matic will slow the discharge rate to allow more drying time. It will speed up the discharge rate when the grain moisture is **drier** than desired moisture. When the discharge moisture is near or at the desired moisture, it will then run in main speed. All of these adjustments are done automatically based on actual grain moisture content.

C. Use the Moisture/Matic manual for instructions and installation procedures not covered by this supplement.

II. Installation of Moisture/Matic for Kan-Sun

NOTE

Make sure that the Kan-Sun control panel functions correctly. The Calc-U-Dri Moisture/Matic will not work if the Kan-Sun control circuit board is bad.

A. Disconnect the AC power from the Kan-Sun dryer and lock-out to insure that the dryer will not start while you are installing the Moisture/Matic.

B. Mount the Calc-U-Dri control box in a location that will be convenient to observe and adjust. **NOTE:** The sensor lead is 27' in length.

C. Determine the sensor location. Best results are obtained with the sensor in the discharge auger (**See Illustration 1 on Page 34).**

D. Route the five (5) wire sensor cable through the 1/2 inch liquidtite conduit to the Calc-U-Dri control box. Attach the sensor wires to the back of the box. Connect each wire to match the color indicated on the decal. Secure the cable to the side of the box with the plastic clip provided.

NOTE

The top terminal strip is low voltage DC. **NEVER** connect AC power to this strip.

INSTALLATION INSTRUCTIONS (continued)

E. The Calc-U-Dri control requires 115 volts AC to operate. Bring AC power in on the right side of the control box and connect it to the terminals identified by the decal (L1, N, and GND).

F. Open the Kan-Sun control box and locate the two blue wires coming from the thermistors in the dryer. One of these wires will be attached to the control circuit board and the other will be connected to a terminal strip. Disconnect both of these wires.

G. Open the Calc-U-Dri control box and locate the two (2) terminals marked T1 & T2 by the Speed Control Decal on the left side of the back panel.

H. Use two (2) wires (not provided) to connect from terminals T1 and T2 in the Calc-U-Dri control box to where the blue thermistor wires were removed. (Refer to 'F' above).

I. High moisture output signals are available on the terminal marked Signal Out 1 and Signal Out 2 in the lower right corner of the control box. Each signal consists of "C" (Common), "NO" (Normally Open), and "NC" (Normally Closed) contacts. These signals will operate when the moisture content of the grain is more than 1.3 percent over the Set Point. They can be used on any accessory equipment that requires less than five (5) amps at 115 VAC.

!!CAUTION!!

NEVER APPLY AC VOLTAGE TO THE UPPER SENSOR TERMINAL STRIPS.

ALL WIRING MUST BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

ALL WIRING SHOULD BE DONE BY A QUALIFIED ELECTRICIAN AND SHOULD BE TO ALL CODE STANDARDS TO AVOID POSSIBLE BODILY INJURY OR DEATH.

GRAIN BINS AND/OR DRYERS WITH ELECTRICAL EQUIPMENT IN OPERATION MUST BE GROUNDED.

DO NOT MODIFY OR BYPASS ANY SAFETY SHUTOFFS!

SENSOR INSTALLATION START-UP & OPERATION INSTRUCTIONS

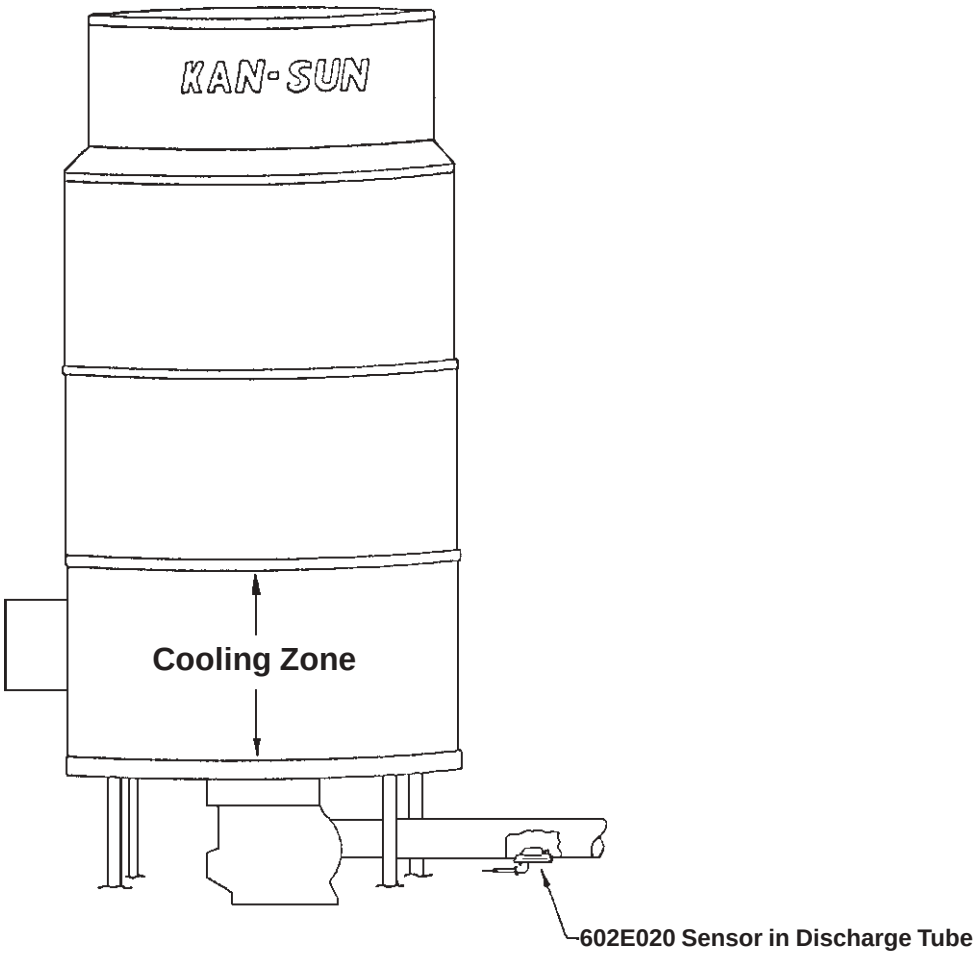


Illustration 1 - Sensor Mounting for Kan-Sun Dryers

III. Sensor Installation for Kan-Sun Dryers

A. Follow the procedures outlined in Section I and II, pages one, two, and three of the Moisture/Matic Manual. Also **See Illustration 1.**

IV. Start Up & Operation for Kan-Sun Dryers

A. Fill the dryer with grain and start the drying process according to the manufacturer's recommendations.

B. Turn the Calc-U-Dri "ON" and select the "MONITOR" mode.

C. Make sure that the calibration adjustment is set at 0.

D. Switch the Kan-Sun control to "Automatic".

SENSOR START-UP & OPERATION INSTRUCTIONS (continued)

E. Adjust the output speed of the dryer in the normal way using the Kan-Sun moisture control "MICRODIAL" until grain is being discharged at the desired moisture content. (Sample the grain as it is being discharged to obtain an average moisture content using a reliable moisture tester.*) Let the dryer run until it has stabilized and observe the moisture value that is displayed in the Calc-U-Dri control box. Use this displayed value as the moisture set point if the sampled grain is still at the desired moisture content.

* By a "reliable moisture tester", we are referring to a quality moisture tester, similar in quality to a sale point (elevator) moisture tester. DO NOT use a hand-held tester.

1. Observe the moisture display and take a sample at the same time in each discharge cycle for the best results. For example, take a sample and read the meter when the drag arm of the Kan-Sun dryer is passing under the same area of the dryer.

2. Calibrate per pages 11-12, Sections C and D.

F. Enter this Set Point value by turning the Set Point Adjusting Knob while holding the "Display Set Point" button down.

Switch the Calc-U-Dri from the "MANUAL" to "AUTO" mode and the Calc-U-Dri will start to control the discharge rate of the dryer. The dryer will operate at "LOW" speed when the moisture value displayed is 0.3 percent or more wetter than the Set Point. It will run at "MAIN" speed when the displayed value is within +0.3 percent or -0.3 percent of the Set Point, and it will run at "HIGH" speed when the displayed value is 0.3 percent or more dryer than the Set Point.

G. The amount of speed change from that set on the Kan-Sun "MICRODIAL" to either "LOW" or "HIGH" speed can be varied by using the "SPEED CHANGE ADJUSTMENTS" located on the front panel on the Calc-U-Dri.

1. Use a screwdriver to adjust the high or low speed as desired.

2. These adjustments should be set to provide an approximate speed change of one alphabet letter from the main speed to high speed and the main speed to low speed, which should provide good performance under most conditions.

3. The speed changes from "LOW" to "MAIN" and "MAIN" to "HIGH" can be observed on the speed indicator on the Kan-Sun.

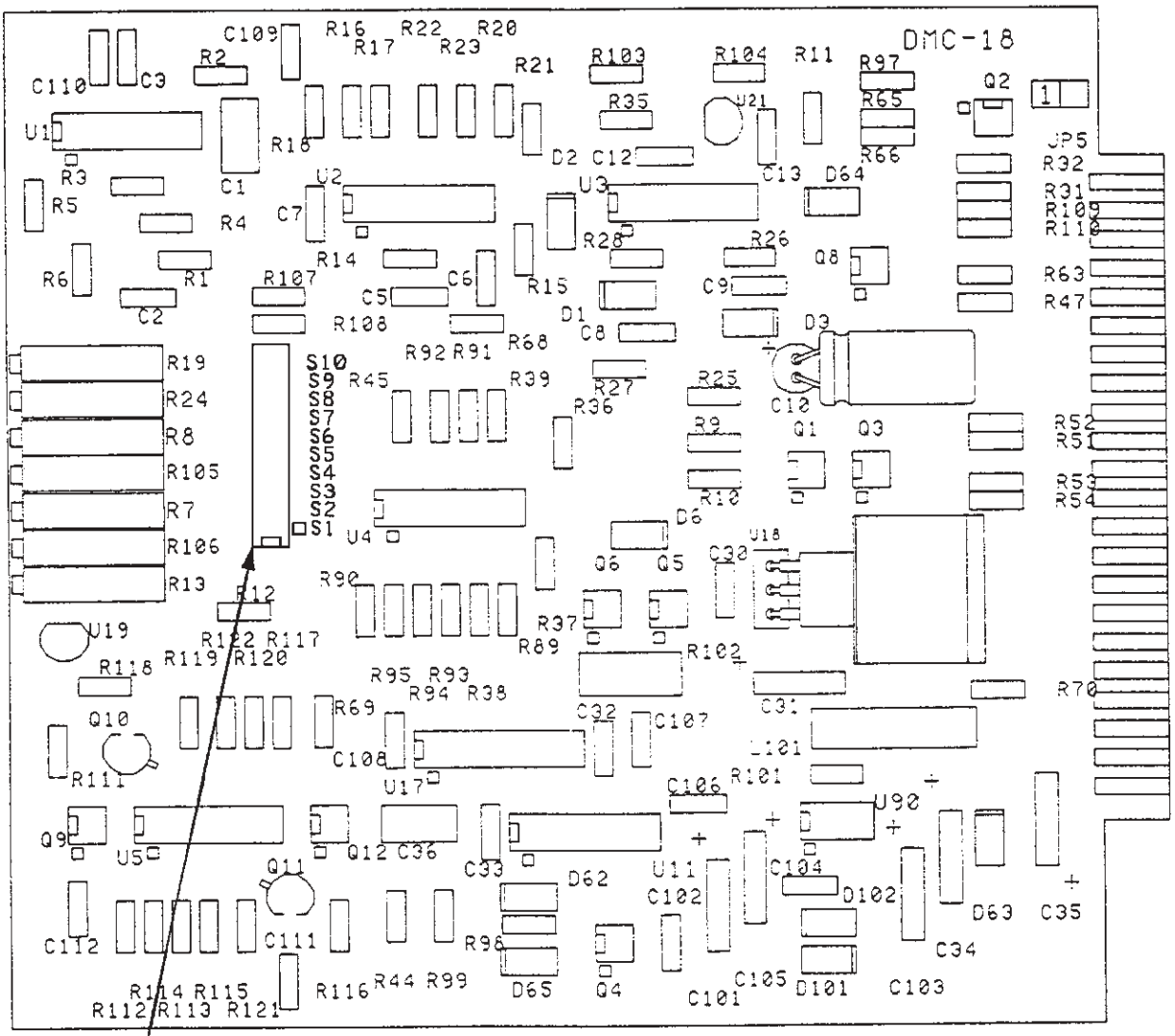
NOTE

Before leaving the dryer unattended, make sure that the output of the dryer in the "HIGH" speed range does not exceed the capacity of the dry grain take-away equipment and that the output of the "LOW" speed range provides enough grain to cover the sensor blade.

!!DANGER!!

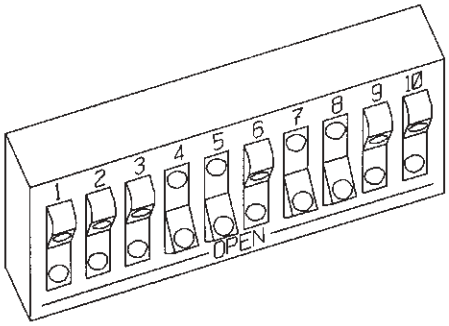
115 VOLTS AC ARE PRESENT INSIDE OF THE CONTROL BOX!

DMC 18 CIRCUIT BOARD (602E460)



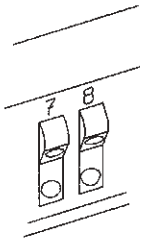
MOISTURE MATIC BOX DIP SWITCH SETTINGS FOR 602E460 DMC - 18 BOARD

WITH ONE SENSOR
WITH OR WITHOUT
CHART RECORDER



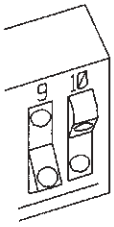
1 - OPEN
2 - OPEN
3 - OPEN
4 - CLOSED
5 - CLOSED
6 - OPEN
7 - CLOSED
8 - CLOSED
9 - OPEN
10 - OPEN

WITH PRINTER



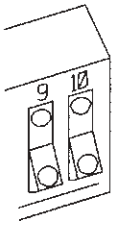
7 - OPEN
8 - OPEN

WITH TWO SENSORS
(WILL AVERAGE MOISTURE AND
TEMPERATURE OF BOTH SENSORS)



9 - CLOSED
10 - OPEN

WITH THREE SENSORS
(WILL AVERAGE MOISTURE AND
TEMPERATURE OF ALL THREE SENSORS)



9 - CLOSED
10 - CLOSED

Appendix B
Baldor
Inverter Drive - Series 15

INSTALLATION OF BALDOR INVERTER DRIVE

I. Installation of Baldor Inverter Drive for use on Dryers with A.C. Motors on the Metering Rolls

A. The Baldor inverter drive allows the Moisture/Matic to control dryers that use A.C. motors. The inverter drive requires the drive motor to be three (3) phase. Replace the single phase motor if necessary.

B. The inverter drive may need to be sized larger if single phase power is used to supply the inverter. **See Table 1** "230 VAC Single-Phase Power Supply."

TABLE 1
230 VAC Single Phase Power Supply

THREE PHASE MOTOR	RECOMMENDED INVERTER
1 HP	1 HP*
2 HP	2 HP*
3 HP	5 HP
5 HP	10 HP

* No derating is required for 1 and 2 HP inverters

C. Mount the inverter drive following the instructions in the Baldor Manual.

D. Remove cover and follow wiring instructions in **Drawing 3.**

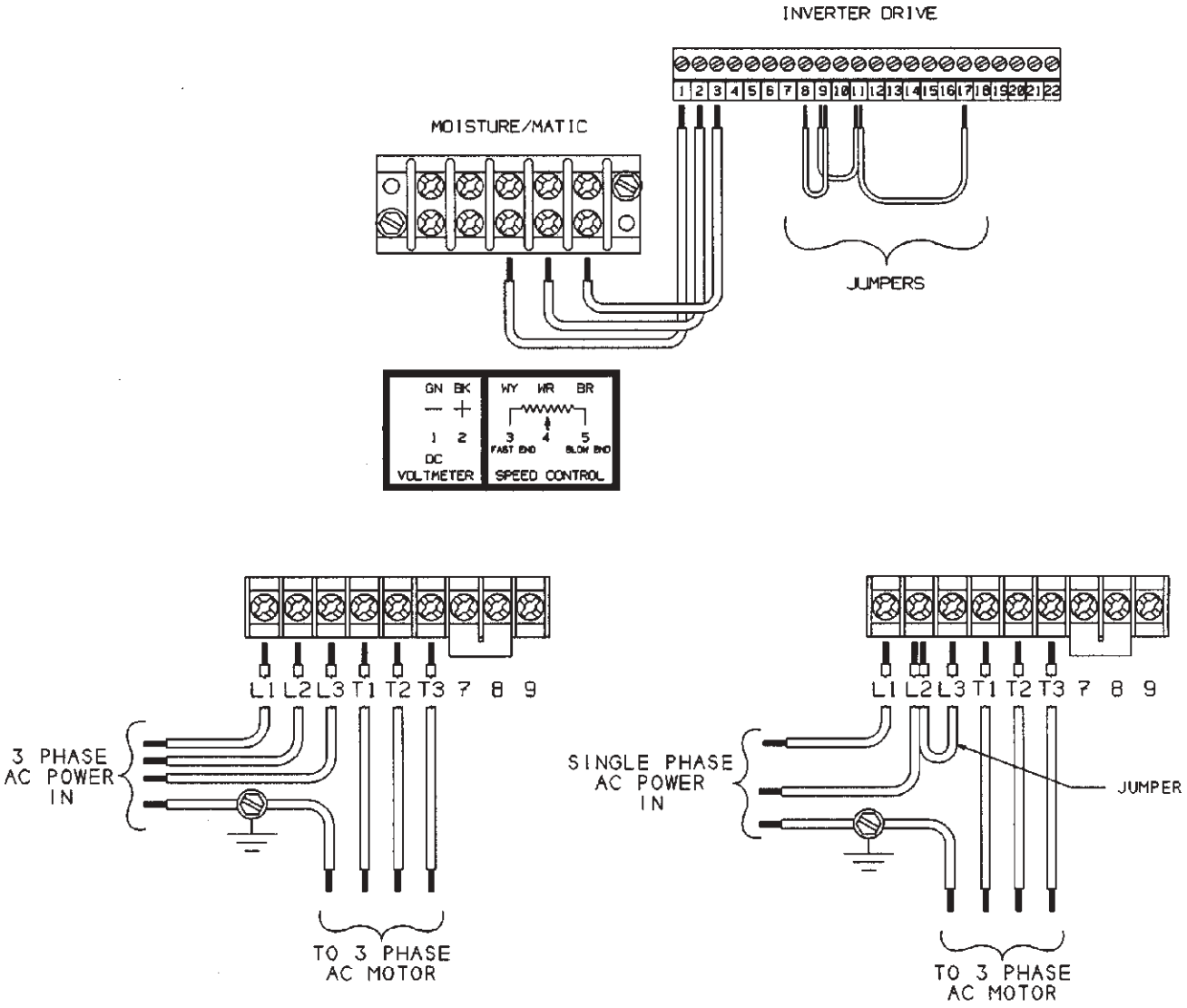
E. Connect wires between terminals one (1), two (2) and three (3) on the control terminal strip in the inverter drive to terminals three (3), four (4), and five (5) located above the speed control decal on the back panel of the Moisture/Matic. It is important that terminal two (2) in the inverter is connected to terminal four (4) in the Moisture/Matic. If the speed control operates backward when the unit is started, the wires from three (3) and five (5) should be reversed in the Moisture/Matic. **See Drawing 3.**

F. Connect the power leads from three (3) phase motor to terminal T1, T2, and T3 on the power terminal strip. Attach the ground wire to the ground screw.

G. Connect three (3) phase A.C. power to the inverter drive by attaching the input wires to terminal L1, L2 and L3 on the power terminal strip. Connect single phase A.C. power to L1 and L2. Connect a jumper between L2 and L3. Connect the ground wire to the ground screw. **See Drawing 3.**

BALDOR SERIES 15H INVERTER DRIVE INSTRUCTIONS

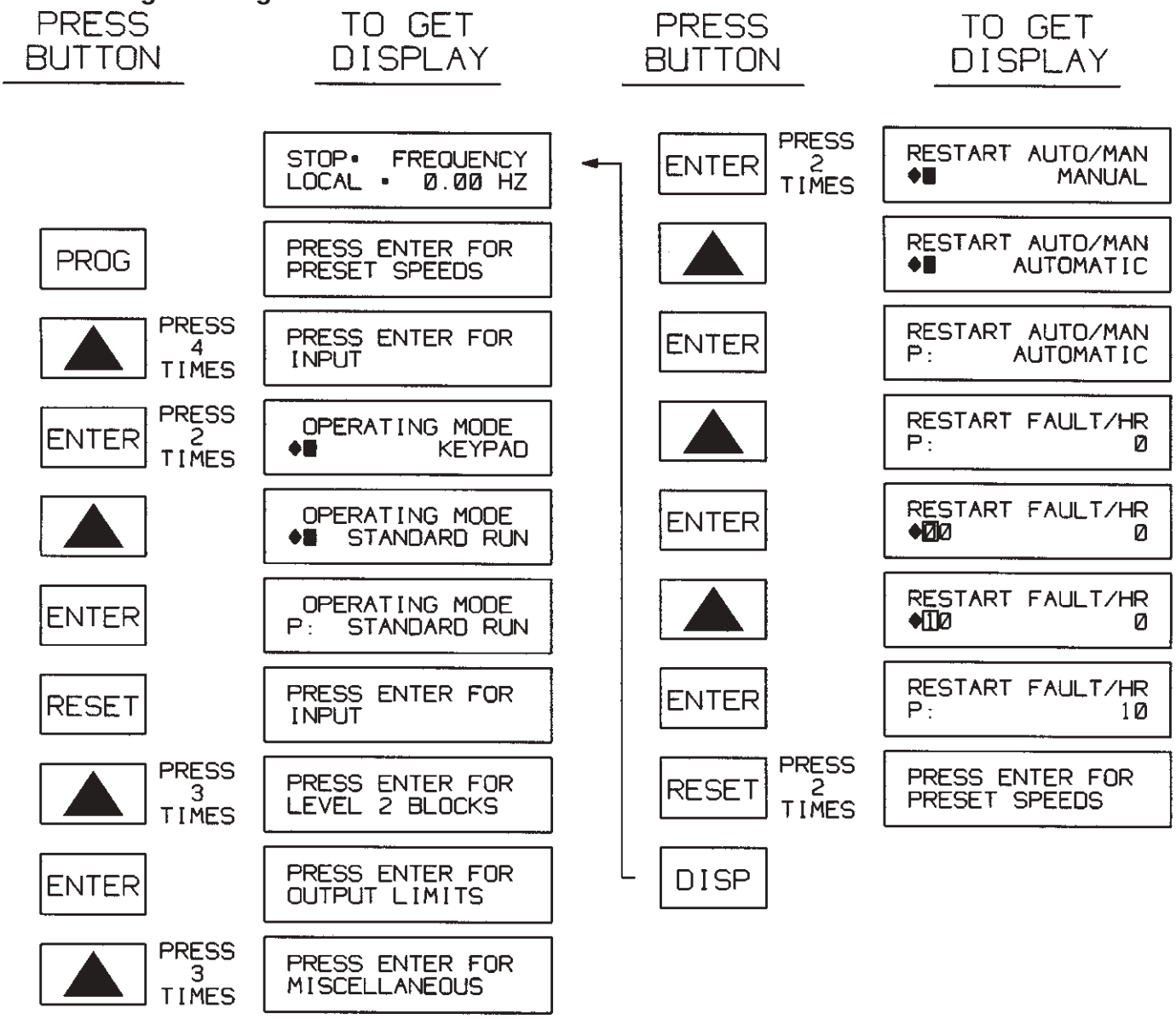
H. The Baldor inverter may not be set up from the factory to be controlled by the Calc-U-Dri Moisture/Matic on start-up or after power interruptions. In this case, parameter changes are required. This procedure is shown in **Drawing 4.** After parameter changes are finished, push “LOCAL” to start motor. Press “STOP” or shut off power to stop motor.



Drawing 3

BALDOR SERIES 15 INVERTER DRIVE INSTRUCTIONS
DRAWING 4

Programming The Baldor Series 15H Inverter For the Calc-U-Dri Moisture/Matic



When finished programming, push “LOCAL” to start the motor. This transfers control from local (keyboard) to remote (Moisture/Matic.)

MOTOR CAN BE STOPPED BY ONE OF THREE WAYS

1. Removing Input Power to Inverter. The Inverter will automatically restart upon return of power.

2. Pressing the “STOP” button. You must press “LOCAL” to restart.

3. Sending a “STOP” command by way of an external switch. See connection diagrams in operating manual.

START-UP AND OPERATION OF BALDOR INVERTER DRIVE

NOTE
Motor overload protection should be installed after the inverter.
Refer to Baldor owner's manual.

II. Start-Up & Operation of the Inverter Drive and Moisture/Matic

A. Read the Baldor operator's manual provided with each inverter drive.

B. Follow the procedures outlined in section VIII, pages 10 through 13 of the Moisture/Matic owner's manual for start-up and operation. Turning the Main Speed Control on the Moisture/Matic control panel will change the output frequency of the inverter and the speed of the three (3) phase motor driving the metering roll. This frequency change is displayed on the display in the Baldor inverter. Note that the inverter can only be controlled from the Moisture/Matic box.

NOTE
The three (3) phase AC motor should NOT run at less than 30 HZ!

Make sure that when the Moisture/Matic is in "LOW" speed, the frequency does not drop below 30 HZ.

C. The inverter drive is not intended for outdoor installation. It should be mounted inside or in a weather resistant enclosure.

!!CAUTION!!

NEVER APPLY AC VOLTAGE TO THE UPPER SENSOR TERMINAL STRIPS.

ALL WIRING MUST BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

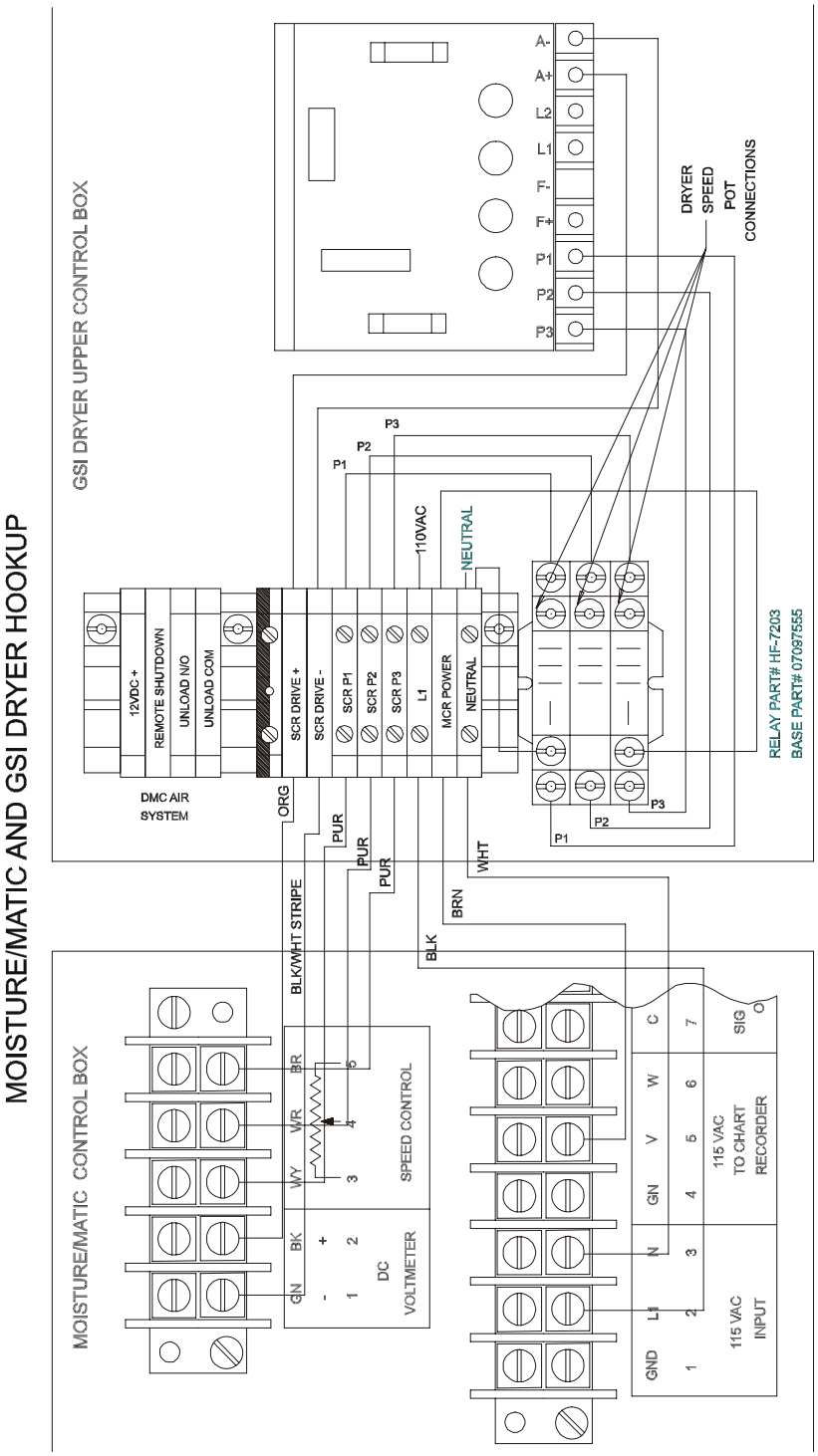
ALL WIRING SHOULD BE DONE BY A QUALIFIED ELECTRICIAN AND SHOULD BE TO ALL CODE STANDARDS TO AVOID POSSIBLE BODILY INJURY OR DEATH.

GRAIN BINS AND/OR DRYERS WITH ELECTRICAL EQUIPMENT IN OPERATION MUST BE GROUNDED.

DO NOT MODIFY OR BYPASS ANY SAFETY SHUTOFFS!

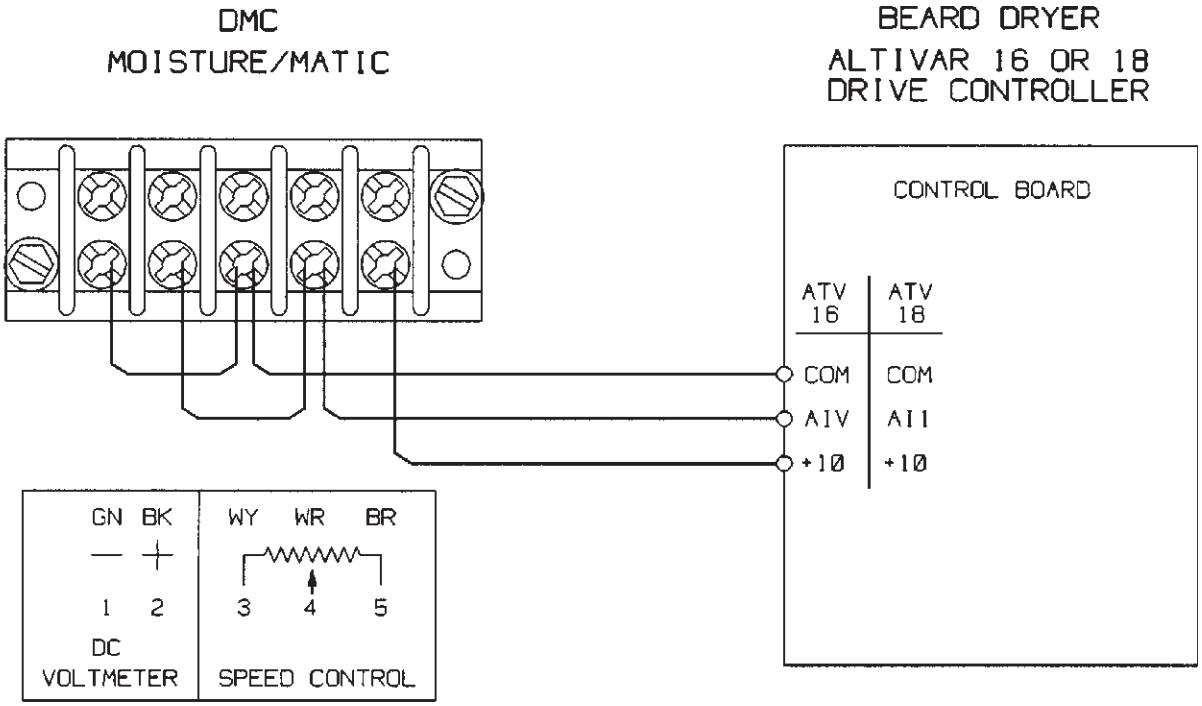
Appendix C
Wiring Examples

Hooking Up A Moisture/Matic Control Box To A DMC or GSI Portable Dryer



Notes:
1. Connect wires to bottom section of terminal strip located in the upper control box.
2. When Moisture/Matic is powered, the GSI Moisture controls and speed pots will have no effect on grain output.

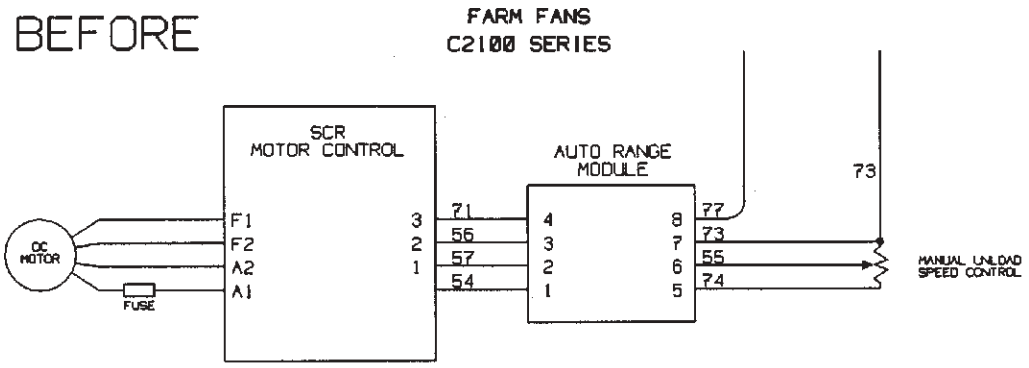
Hooking Up A Moisture/Matic Control Box To A Beard Dryer With An Altivar Drive

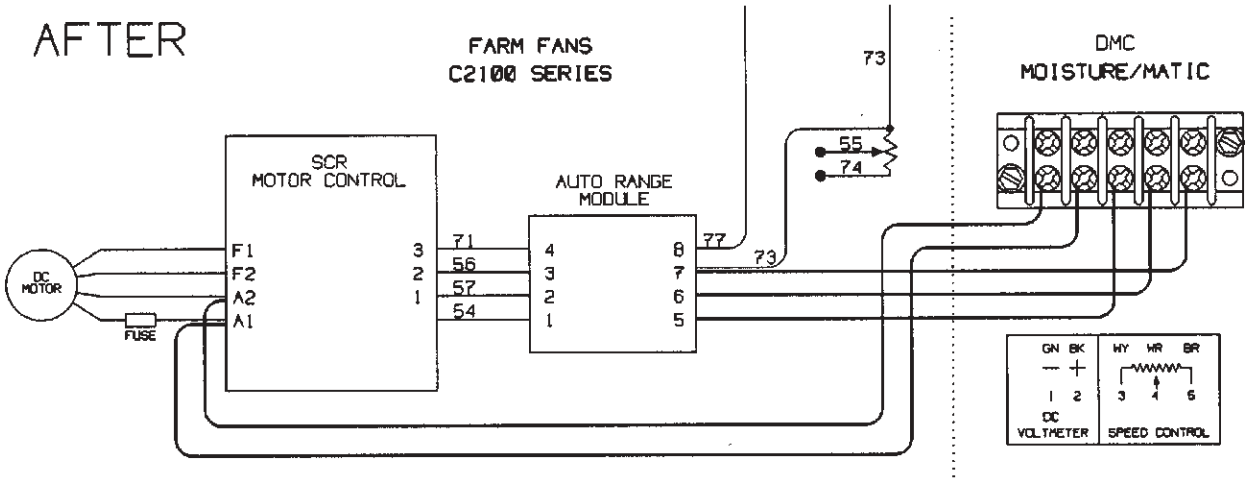


1. REMOVE AND TAPE OFF THE WIRES FROM THE MANUAL SPEED CONTROL AND THE SPEED METER. THIS SHOULD BE DONE ON THE BACK SIDE OF THE SPEED CONTROL AND METER IN THE BEARD DRYER
2. ADD WIRE FROM "COM" TO TERMINAL 3.
3. ADD WIRE FROM "AIV" ("AI1") TO TERMINAL 4.
4. ADD WIRE FROM "+10V" TO TERMINAL 5.
5. CONNECT JUMPER WIRE FROM TERMINAL 1 TO TERMINAL 3.
6. CONNECT JUMPER WIRE FROM TERMINAL 2 TO TERMINAL 4.

OPERATION: THE MANUAL/AUTOMATIC SWITCH ON THE DRYER MUST BE IN THE MANUAL POSITION. THE METERING ROLL SPEED IS CONTROLLED FROM THE CALC-U-DRI CONTROL BOX. THE SPEED IS DISPLAYED (FROM 0 TO 10) IN THE CALC-U-DRI CONTROL BOX.

Hooking Up A Moisture/Matic Control Box To A Farm Fans Series 2100 Dryer





REMOVE AND TAPE OFF THE FOLLOWING TWO WIRES FROM THE AUTO RANGE MODULE:

1. WIRE #55 FROM TERMINAL "6"
2. WIRE #74 FROM TERMINAL "5"

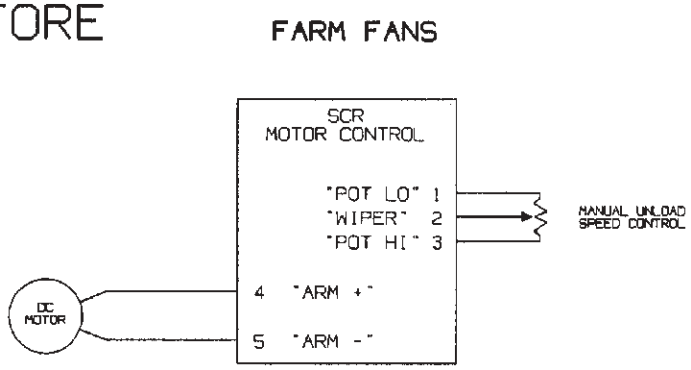
MAKE THE FOLLOWING WIRE CONNECTIONS:

1. DMC TERMINAL "1" TO FARM FANS TERMINAL "A2" ON SCR
2. DMC TERMINAL "2" TO FARM FANS TERMINAL "A1" ON SCR
3. DMC TERMINAL "3" TO FARM FANS TERMINAL "5" ON AUTO RANGE MODULE
4. DMC TERMINAL "4" TO FARM FANS TERMINAL "6" ON AUTO RANGE MODULE
5. DMC TERMINAL "5" TO FARM FANS TERMINAL "7" ON AUTO RANGE MODULE

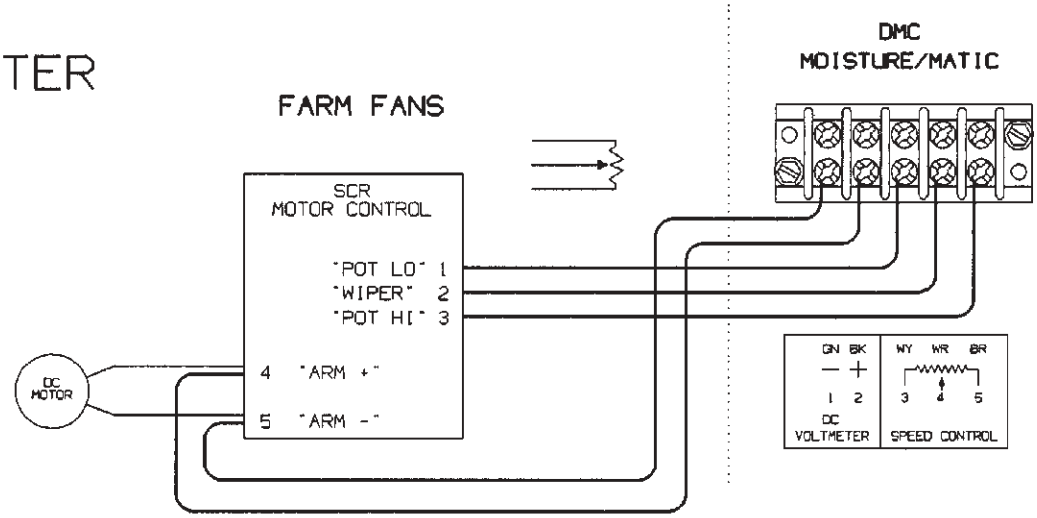
RUN FARM FANS DRYER IN MANUAL MODE

Hooking Up A Moisture/Matic Control Box To A Farm Fans Series CFS-SA 410 Dryer

BEFORE



AFTER



REMOVE THE THREE WIRES ON TERMINALS "1", "2", AND "3" ON THE SCR

MAKE THE FOLLOWING WIRE CONNECTIONS:

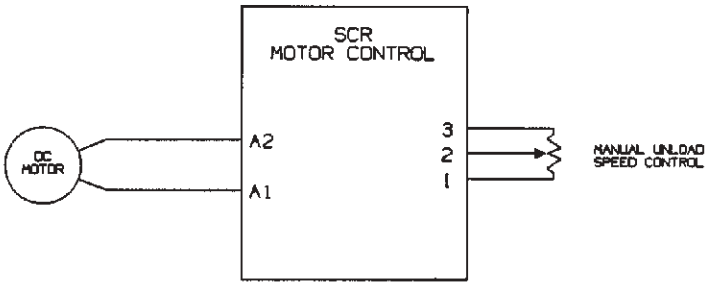
1. DMC TERMINAL "1" TO FARM FANS TERMINAL "5" ON SCR
2. DMC TERMINAL "2" TO FARM FANS TERMINAL "4" ON SCR
3. DMC TERMINAL "3" TO FARM FANS TERMINAL "1" ON SCR
4. DMC TERMINAL "4" TO FARM FANS TERMINAL "2" ON SCR
5. DMC TERMINAL "5" TO FARM FANS TERMINAL "3" ON SCR

RUN FARM FANS DRYER IN CF MODE

Hooking Up A Moisture/Matic Control Box To A Farm Fans Series CF/AB 270 & 320 Dryer

BEFORE

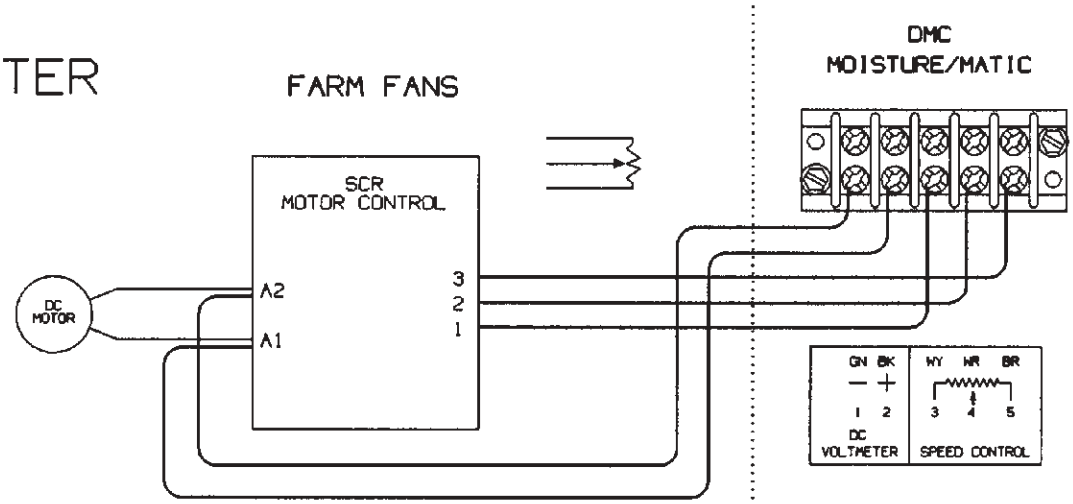
FARM FANS



AFTER

FARM FANS

DMC
MOISTURE/MATIC



REMOVE THE THREE WIRES ON TERMINALS "1", "2", AND "3" ON THE SCR

MAKE THE FOLLOWING WIRE CONNECTIONS:

1. DMC TERMINAL "1" TO FARM FANS TERMINAL "A2" ON SCR
2. DMC TERMINAL "2" TO FARM FANS TERMINAL "A1" ON SCR
3. DMC TERMINAL "3" TO FARM FANS TERMINAL "1" ON SCR
4. DMC TERMINAL "4" TO FARM FANS TERMINAL "2" ON SCR
5. DMC TERMINAL "5" TO FARM FANS TERMINAL "3" ON SCR

RUN FARM FANS DRYER IN CF MODE

CALC-U-DRI MOISTURE/MATIC

DMC markets across the U.S. and around the world.

For more information, contact the DMC Distribution Center nearest you.

DMC's Corporate Headquarters, Factory and North Central Sales Center
1600 12th Street N.E.
Mason City, Iowa 50401
Phone: 641-424-7010
FAX: 877-362-8238

Dakota Distribution Center
3520 Ninth Avenue S.W.
Watertown, South Dakota 57201
Phone: 605-882-3210
FAX: 877-362-8031

Ft. Wayne Distribution Center
310 North Taylor Road
P.O. Box 30
Garrett, Indiana 46738-0030
Phone: 219-357-5767
FAX: 877-362-8032

Illiana Distribution Center
515 West Main
P.O. Box 557
Oakland, Illinois 61943-0557
Phone: 217-346-3116
FAX: 877-362-8033

Southern Distribution Center
11523 Highway 70
Proctor, Arkansas 72376
Phone: 870-732-4962
FAX: 877-362-8034

Nebraska Distribution Center
210 South First Street
P.O. Box 217
Hampton, Nebraska 68843
Phone: 402-725-3511
FAX: 877-362-8035

PRINTED IN USA

PNEG-1153
REV 02/03
PRINTED 02/03