



CALC-U-DRI MOISTURE/MATIC/MANAGER

Owner's Manual

PNEG-1153

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GSI GROUP



PNEG-1153

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1. 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.



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 O.S.H.A. 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).

3. SAFETY DECALS

⚠ BE A SAFE OPERATOR ⚠

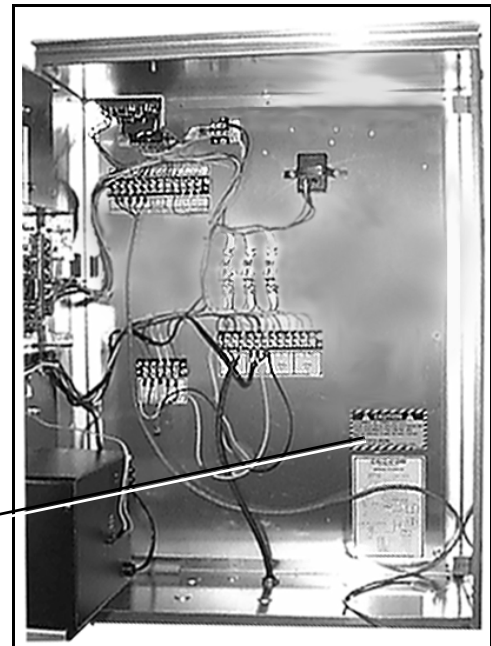
1. Read and understand the Owner's Manual.
2. Disconnect all electrical power before servicing or opening control box, adjusting or lubricating the equipment.
3. All electrical hook-ups should be in accordance to the National Electrical Code.
4. Ground all electrical equipment as well as bin itself.
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**

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.



Contact:

WRITE TO: DMC

**1600 12th street N.E
MASON CITY, IA, USA 50401**

OR CALL: 641-423-6182

DMC Part Number: 801L010

Sensor Location and Cutout Instructions

Sensor Location

Locations for sensor installation are dependent on the following factors all being present for proper operation. (See Figure 4A).

1. Installation in a six (6) or eight (8)" diameter auger or a flat bottom pan.
2. The auger can be horizontal, vertical or inclined. It is recommended that the clearance between the flighting and the tube be 5/8" or less.
3. The auger must have a minimum of 225 bushels per hour flow rate of grain across the sensor.
4. The auger must have one full pitch of flight before and after the sensor.
5. 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.

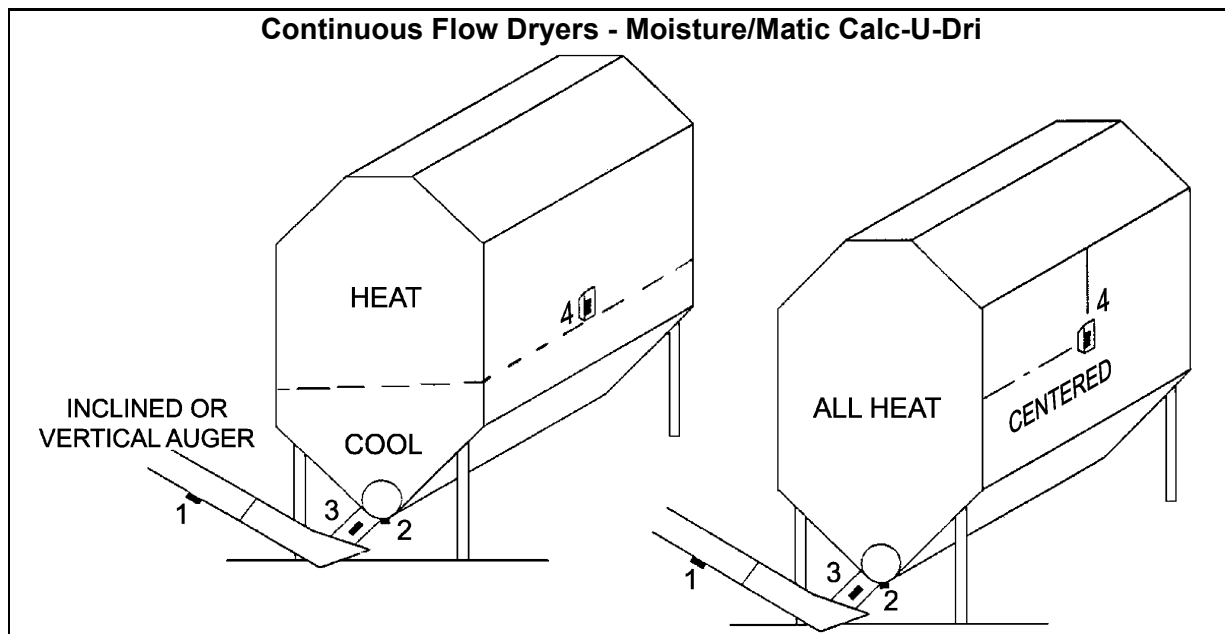


Figure 4A Control Sensor Location - Order of Preference

- a. Take-away auger.
- b. Discharge auger - 1 full pitch of flighting before and after flighting. Flighting to tube clearance less than 5/8". Condensation from dryer may affect sensor.
- c. Discharge spout - Use a funnel-type of restrictor.
- d. 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.

4. INSTALLATION

Sensor Cutout Instructions

Sensor Cut-Out Instructions for Six (6)" and Eight (8)" Augers

⚠ CAUTION ⚠

DISCONNECT POWER TO THE AUGER MOTOR BEFORE PROCEEDING ANY FURTHER!

1. Look at the discharge tube and determine where the sensor can be located.
(See Figure 4C). 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" long connecting band. If it is a structural supporting connecting band, additional support may be needed during removal of the connecting band.

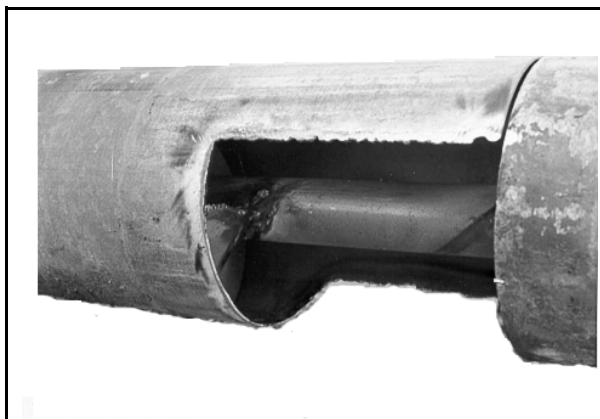


Figure 4B

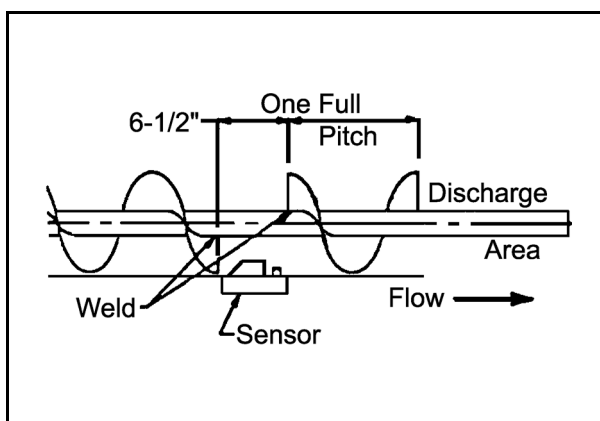


Figure 4C

4. INSTALLATION

2. 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)" 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 [Figure 4B](#)).
3. Replace the connecting band on the discharge tube in the same position as in [Step 2](#) (above) and mark the flighting at each end of the rectangular hole. Weld the discharge auger flighting to the shaft 3/8" beyond each of the marks. After the flight is welded at these points, cut out six and one half (6-1/2)" of the flighting all the way to the center shaft.
4. Smooth all the rough edges from the cut area and position the sensor hole centered over the six and one half (6-1/2)" area, then tighten the connecting band.
5. Before installing the sensor, see Sensor Installation [page 14](#).

Sensor Cut-Out for Flat Bottom Discharge Units

⚠ CAUTION ⚠

DISCONNECT POWER TO THE AUGER MOTOR BEFORE PROCEEDING ANY FURTHER!

1. Determine where the sensor can be located. (See [Figure 4D](#)). There must be at least one full pitch of flight before and after the sensor. (See [Figure 4E](#)).

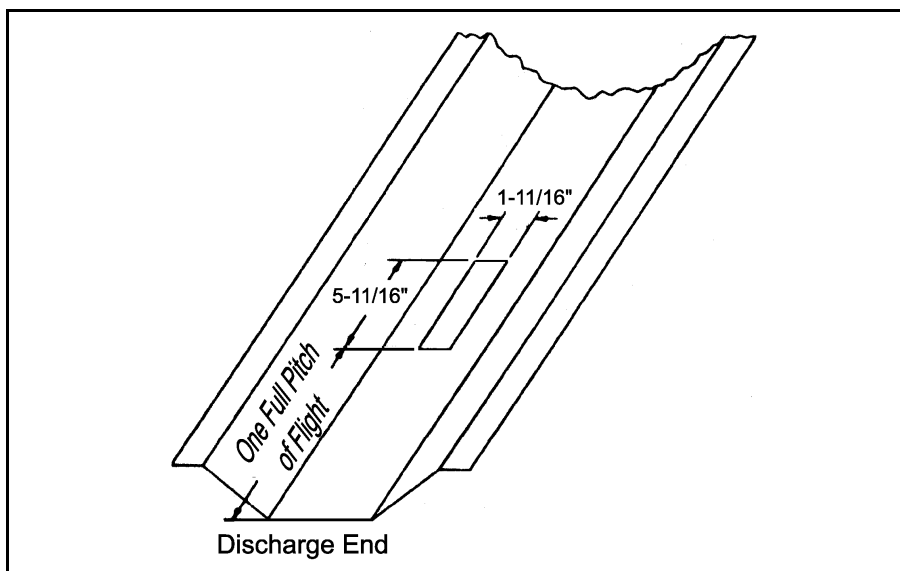


Figure 4D

4. INSTALLATION

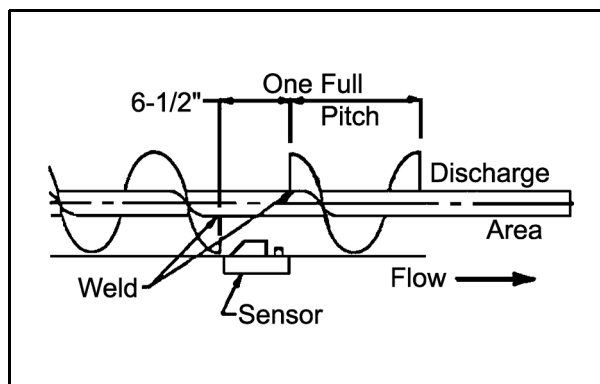


Figure 4E

Note: If there is more than 5/8" 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 Figure 4F).

2. 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 Figure 4D).
3. 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" away from marks just made, so the new marks are six and one half (6-1/2)" apart.

Note: For seven (7)" 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)" cutout marks, then cut out the six and one half (6-1/2)" of flighting from the auger, leaving only the drive tube. For eight (8)" or larger diameter flighting, one-half (1/2)" of flighting can be left as a ribbon around the shaft in the cutout area. (See Figure 4E).

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

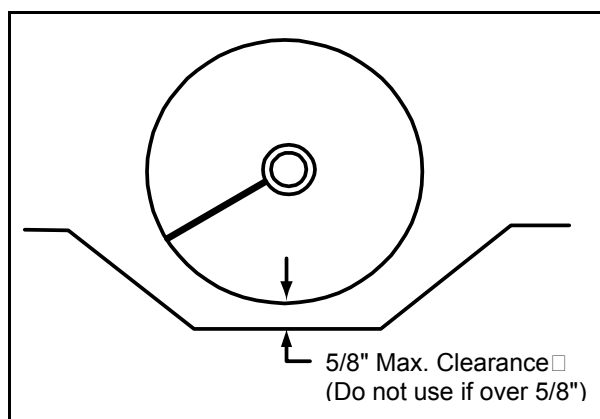


Figure 4F

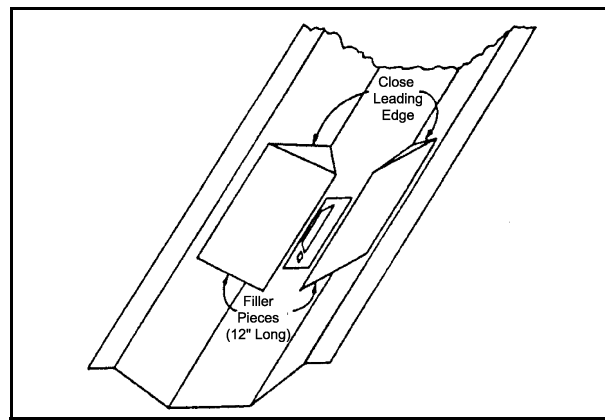


Figure 4G

5. On the flat bottom pan, make some filler pieces 12" long to keep the grain closer to the sensor flag. *See Figure 4G*, *See Figure 4H*, and *See Figure 4I*. Be sure the leading edge is closed so grain cannot get under the pieces. Weld the pieces in place as shown. (*See Figure 4G*).
6. Remount the pan and check all the clearances and alignments. Before installing the sensor, insert the clearance gauge into the cutout. (*See Figure 4J*).

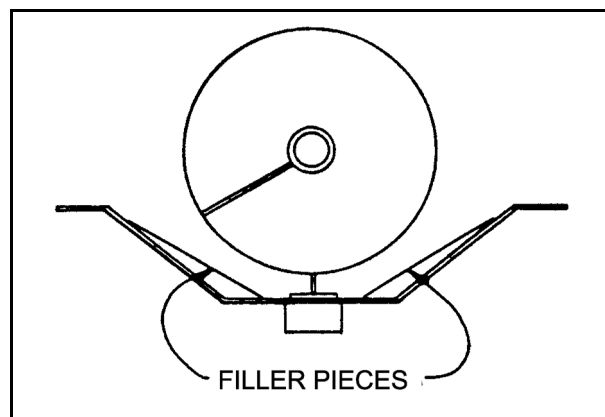


Figure 4H

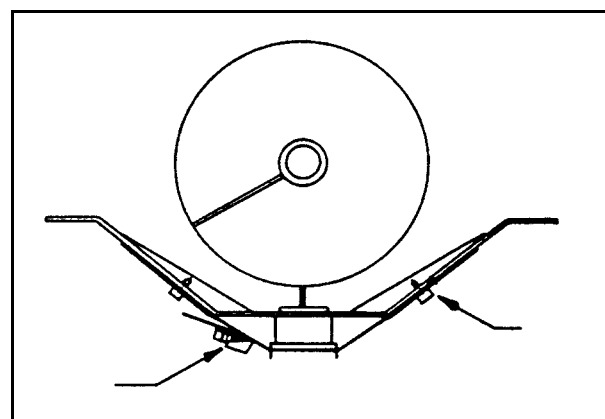


Figure 4I

4. INSTALLATION

⚠ 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 !!

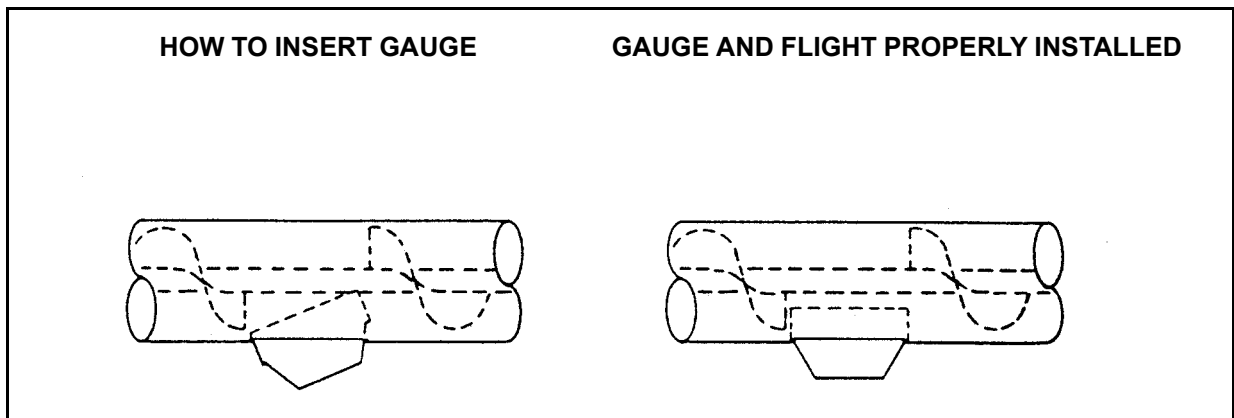


Figure 4J

7. 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 on the other side with a self-drilling screw. Have the length such that the screw is beside the sensor as show in [Figure 4I](#).
8. When installing the sensor, follow the instructions on the sensor decal for the correct direction of grain movement.

Sensor Cut-Out for Flat Bottom Down Spout

1. 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.

2. 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 [Figure 4K](#). Use a saber saw for the hole, not a torch. Remove burrs and check so the sensor block fits into the stepped edge.

4. INSTALLATION

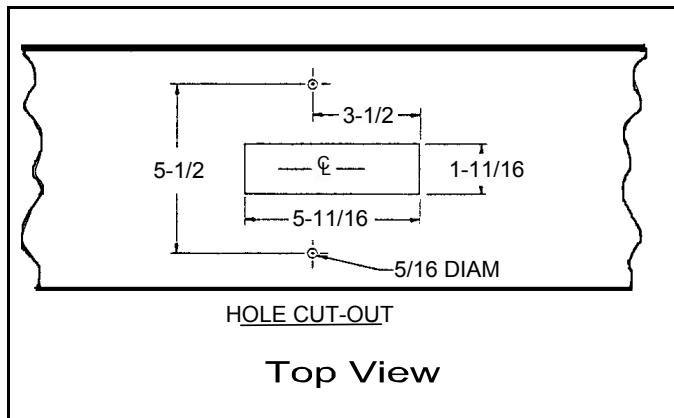


Figure 4K

3. 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 Figure 4L). and (See Figure 4M).

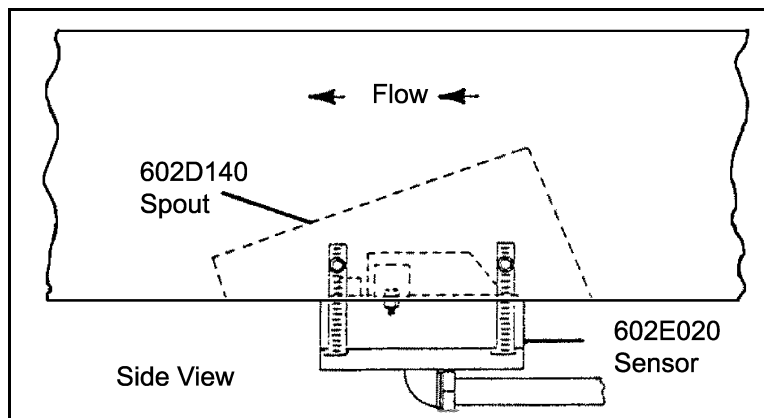


Figure 4L

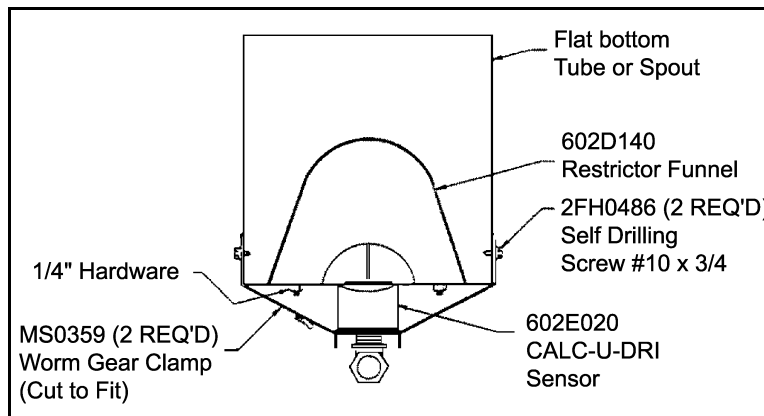


Figure 4M

4. INSTALLATION

4. 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 Figure 4N).

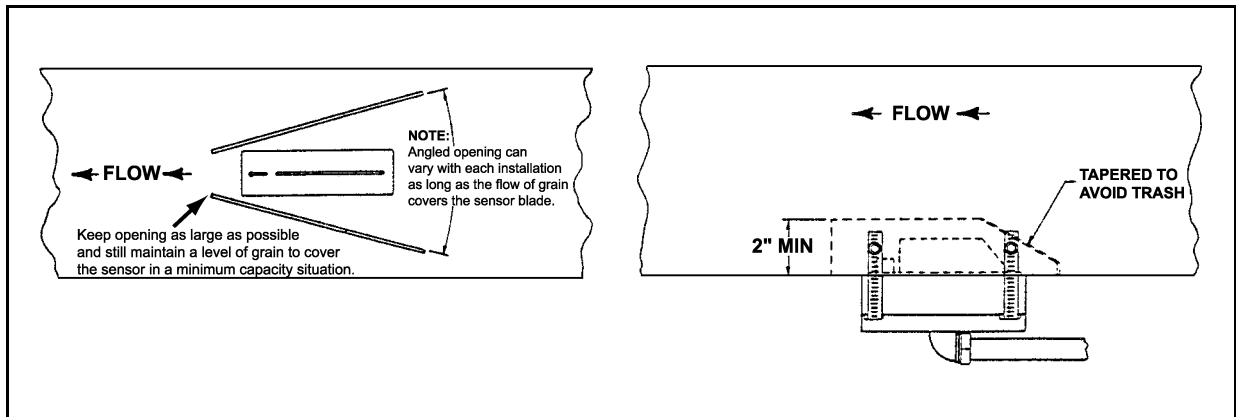


Figure 4N

Sensor Cut-Out for Round Down Spouts

1. 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 . A modified open top version may have to be used.

Moisture/Matic Electrical Box and Sensor Installation Instructions

1. 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.
2. Included with the Calc-U-Dri Moisture/Matic are 27 feet of one-half (1/2)" liquidtite conduit. This is to be used to protect the sensor wire between the Calc-U-Dri Moisture/Matic box and the sensor.
3. 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)" liquidtite conduit and feed the sensor wire through it using the connector provided. There should be six (6)" 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.
4. 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 Figure 4O). Then attach the junction box lid.

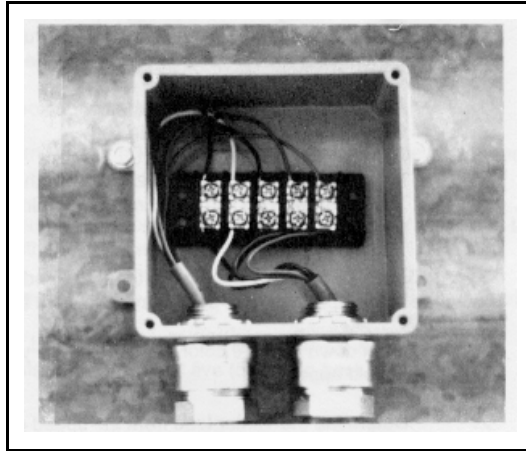


Figure 40

5. 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.

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 45. 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.*

6. 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 flanging has been removed. Leave at least two (2)“ between the sensor block and the grounding screw.

Electrical Hook-up (See Figure 4P).

1. Disconnect the AC power from your dryer and lock-out the AC power to insure that it will not start.
2. DC Voltmeter Hook-up: Use the 15 foot piece of five (5) conductor cable provided for the hookup wire. Use liquidtight 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.
 - a. 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).

4. INSTALLATION

- b. 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).
3. 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 Figure 4P).
 - a. Mark down the wire color and terminal as you remove the three leads. This can be used for a test if problems should appear.
 - b. 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.

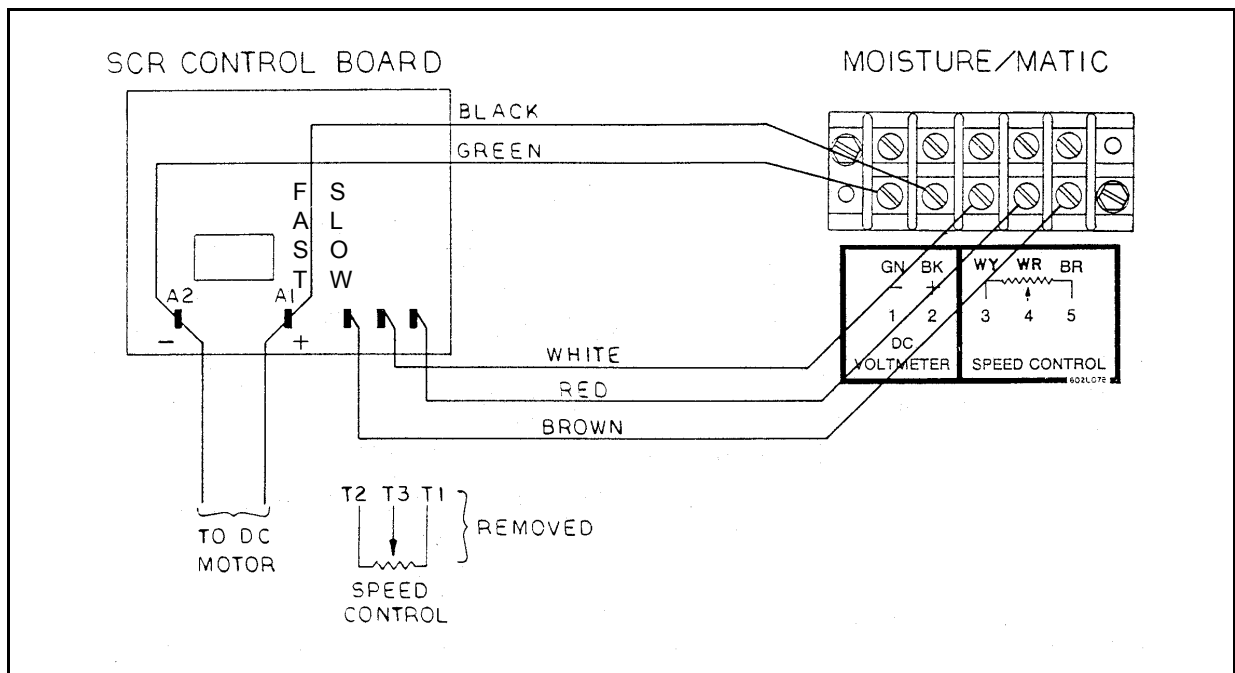


Figure 4P

- c. 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.
- d. 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.
- e. Attach the other end of this white wire to terminal three (3) on the back panel of the Moisture/Matic.
- f. 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 B for more examples on wiring.

4. 115 Volts A/C Hook-Up

- a. 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.
- b. 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).

5. Additional Signal Outputs

- a. 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 115 V AC.
6. The MCR relay output sends 110 VAC signal when the control power switch is set to “control”. This allows for switching between the CUD and the “Dryer Control”. When the control switch is in “Monitor” the MCR signal will not be present. This will allow monitoring when using temperature based control or batch control.
7. The unload monitor will allow the printer to print only when the dryer is unloading. Terminal 6 on the unload monitor needs too have 110 VAC to enable the printer to print. If a dry contact, such as in AUX is used, power may be used from terminal 5. If this feature is not required, jumper may be placed between unload monitor terminals 5 and 6.
8. 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!

5. START-UP AND OPERATION

1. 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. Place the control power switch to "Control". The printer switch may be in print or off.
2. 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 3*

If this does not correct the situation, see the [Troubleshooting Guide](#).

See [Calcu-U-Dri Moisture/Matic Sampling Chart](#), for proper sampling procedures.

3. 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 [Calcu-U-Dri Moisture/Matic Sampling Chart](#)).
 - a. 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).
 - b. 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).
4. 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.

CAUTION

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

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

5. START-UP AND OPERATION

- d. 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).
- e. 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 ([Calcu-U-Dri Moisture/Matic Sampling Chart](#)).

Calcu-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.

Time	Calcu-U-Dri		Dole		Elevator
	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.

5. 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.

6. 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.
7. 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.

5. START-UP AND OPERATION

8. 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.

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:

- a. Read the DC voltage in main speed and remember.
- b. Move the moisture Set Point to force the unit into the High or Low Speed, whichever you wish to adjust. (Note red indicators).
- c. Locate the correct speed adjustment potentiometer, and with a screwdriver adjust to the desired DC voltage.

Example

Want a 15% 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.

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

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.

6. PRINTER INSTALLATION (OPTIONAL)

1. Disconnect all power (AC).
2. Remove the hole cover by removing the six (6) #8-32 screws holding it in.
3. Install the printer Wiring Decal 602L065 on the back of the inside door.
4. Remove the DMC 18 control board and open the dip switches 7 and 8 for your application. See the dip switch chart on [Page 45](#). Install the control board.
5. Install the black card guides (1EL0850) into the card holder. This is to hold the new card in place.
6. 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 [Figure 6A](#). Note colors and pin letters. This must be done correctly.
7. 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.
8. Connect the printer control cable to the black card connector. This cable will have a 25 pin connector on one end. Refer to [Figure 6A](#).
9. 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)" to the left of the supply. Violet on the V terminal and white on the W terminal.
10. Attach the printer to the front panel with the five (5) #8-32 screws and nuts.

6. PRINTER INSTALLATION (OPTIONAL)

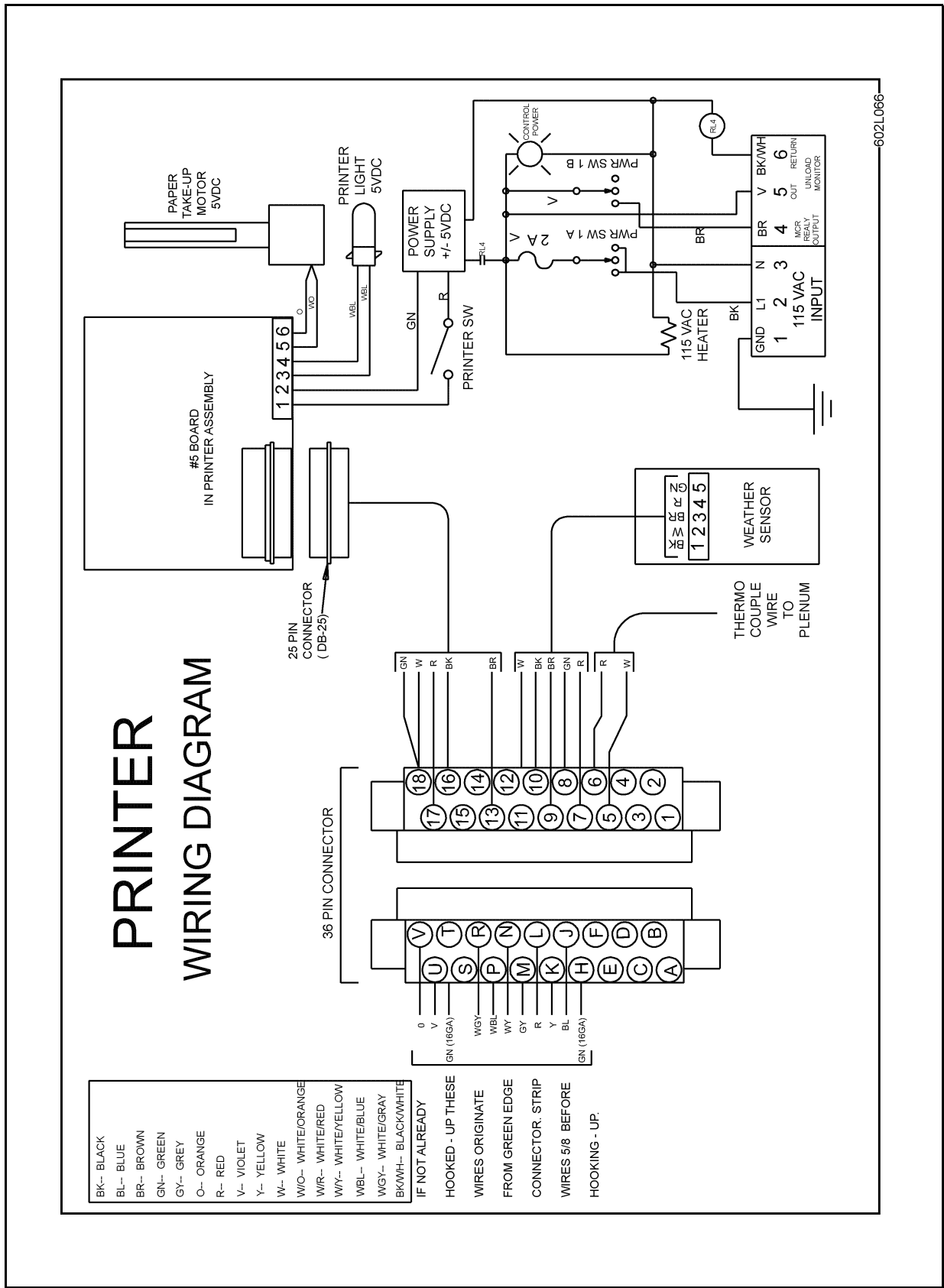


Figure 6A

6. PRINTER INSTALLATION (OPTIONAL)

11. Plug in the printer control cable to the printer assembly.
12. Wire the printer power supply wire to the printer assembly. Connect the red wire to #1, green wire to #2. See [Decals](#) by connector.
13. 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 liquidtight and thermocouple using conduit clamps. Wire the sensor into the back connector pin #5 to white, pin #6 to red. See [Figure 6A](#).
14. To mount the weather sensor, feed the cable through the 1-3/32" 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 Figure 6A](#)).
15. Put cable ties approximately every four (4)" 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.
16. 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.
17. Remove the shipping tape from the printer paper and spool.

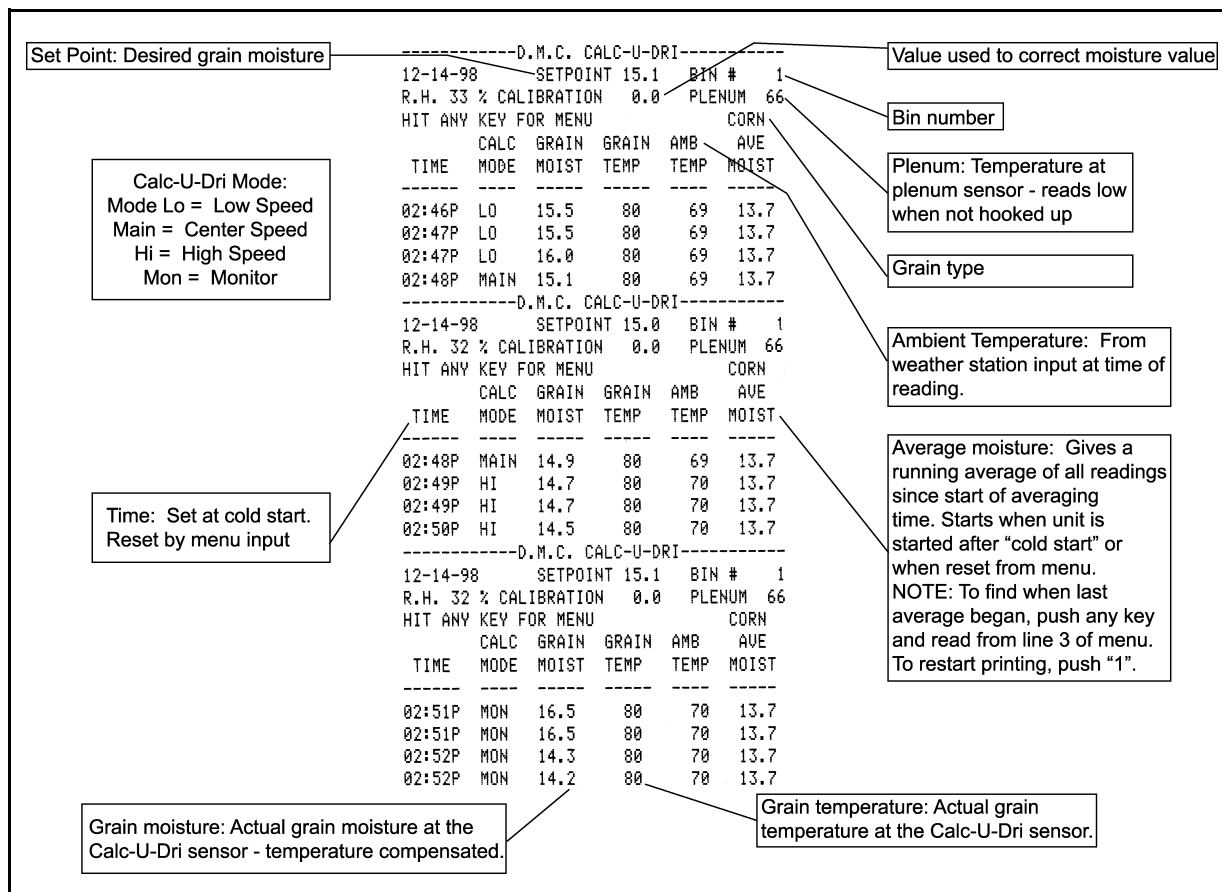


Figure 6B Sample Printer Readout

6. PRINTER INSTALLATION (OPTIONAL)

Service for Modular Printer Assembly

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

1. Disconnect AC power to the control box.
2. 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.
3. If the circuit board is to be replaced, return it in the packaging in which you received your replacement circuit board.
4. 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.
5. 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 4](#).
6. 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

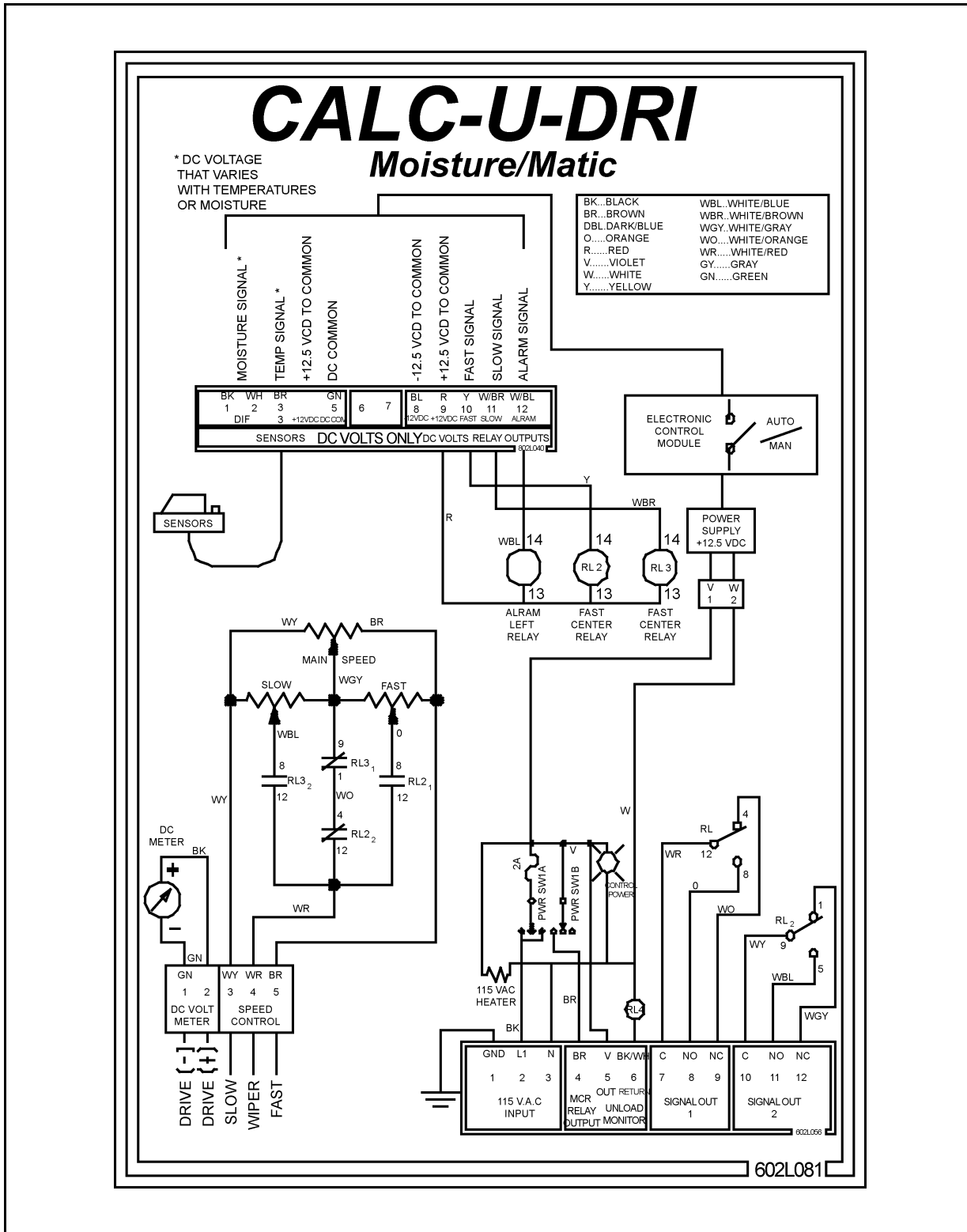


Figure 7A

7. WIRING DIAGRAMS

Wiring Diagram for Moisture/Matic Printer

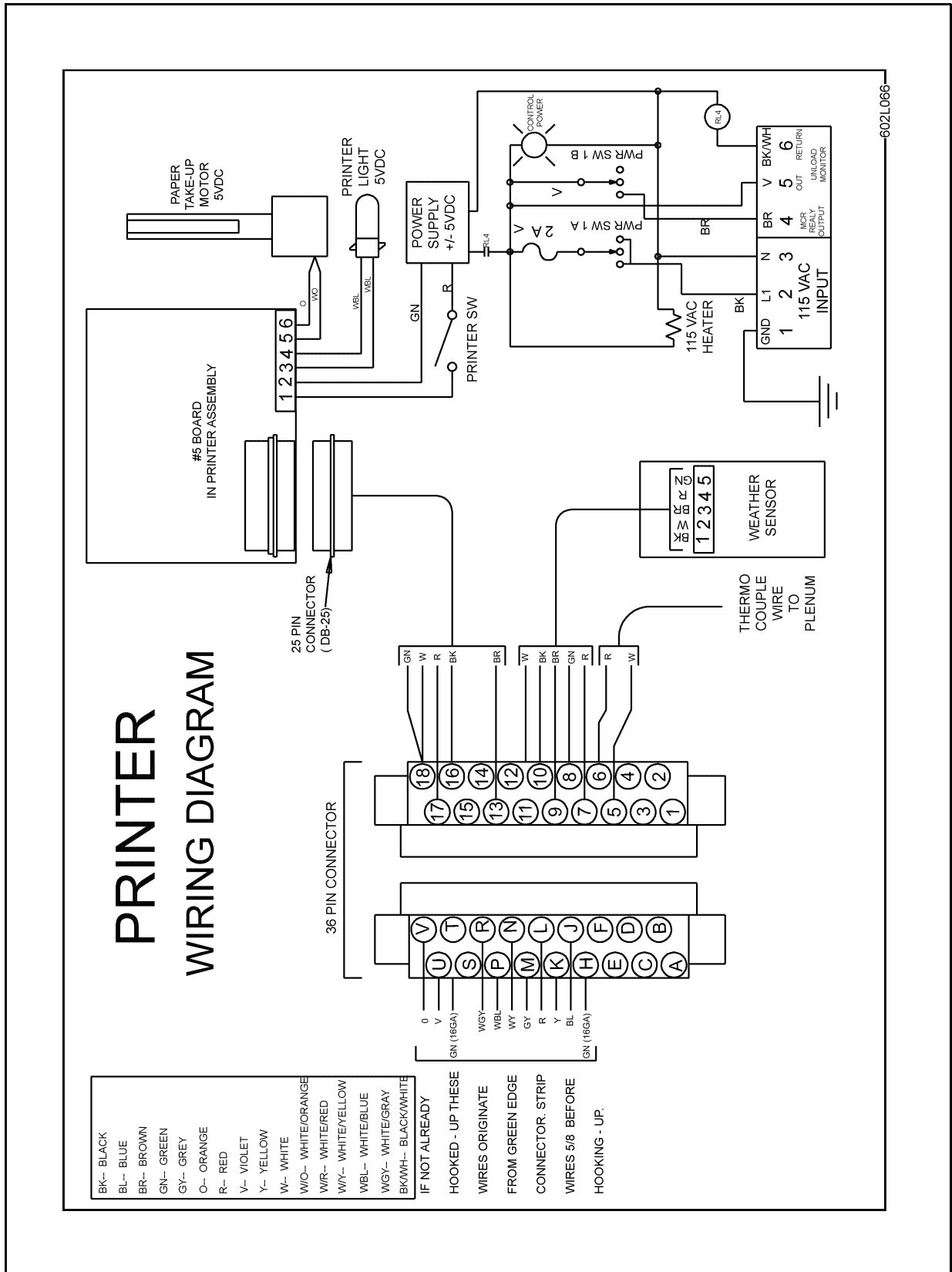
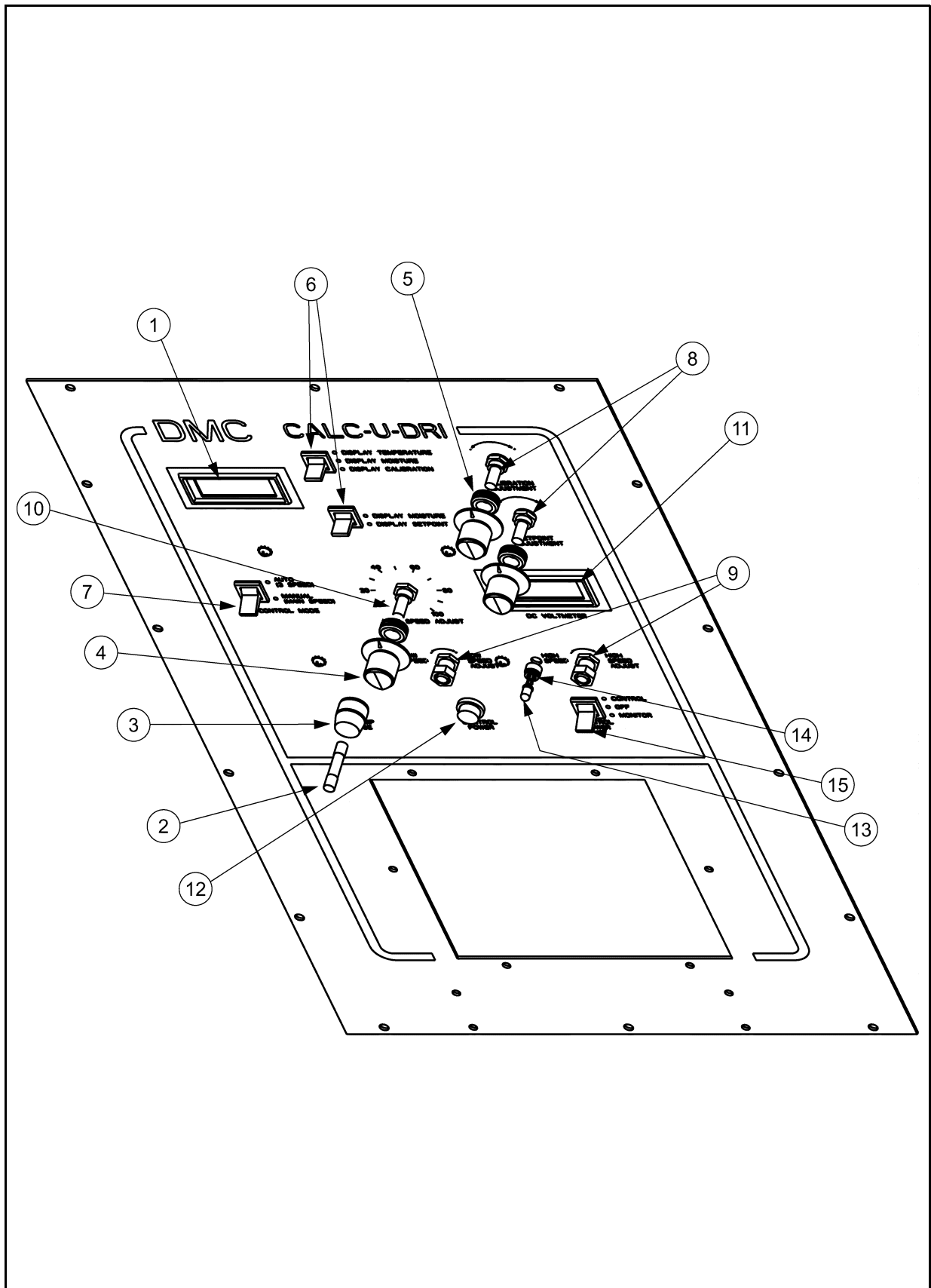


Figure 7B

1. **Moisture/Matic/Manager Module Subassembly**
2. **Moisture/Matic/Manager Control Box (Plain)**
3. **Moisture/Matic/Manager Control Box (Printer)**
4. **Printer Module Subassembly**
5. **Calc-U-Dri Moisture/Matic/Manager Parts**

8. PARTS LIST

Moisture/Matic/Manager Module Subassembly



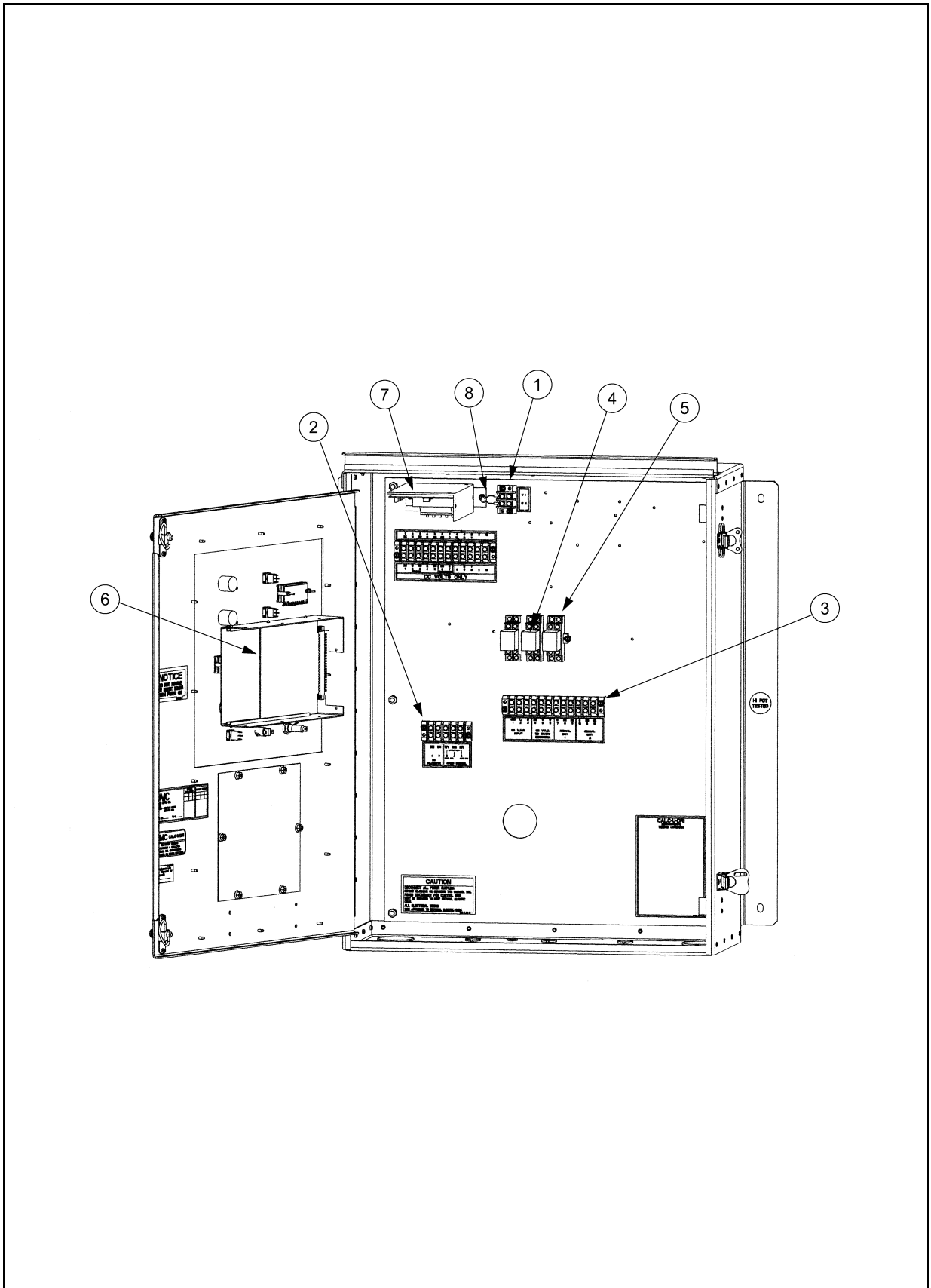
8. PARTS LIST

Moisture/Matic/Manager Module Subassembly

Ref #	Part #	Qty	Description
1	5041198	1	Digital Panel Meter Kit Includes Wires
2	1EL0719	1	Fuse - AGC, 2 Amp, 250 Volt
3	1EL0826	1	Fuseholder
4	1EL0921	3	Knob - Control, Black 1/4 Shaft
5	1EL2042	3	Grommet - Rubber
6	2EL0658	2	Switch - Momentary 3-position, SPDT
7	2EL0669	2	Switch, 2-Position, DPDT
8	2EL0672	2	Potentiometer - 10 K OHM
9	2EL0674	2	Potentiometer - 10 K OHM
10	2EL0675	1	Potentiometer - 10 K OHM
11	2EL0690	1	Digital Panel Meter - 200 Volt
12	2EL1161	1	Light - Indicator, Red - 115 Volt
13	2EL1163	2	Light - LED, Red
14	2EL1164	2	Clip & Ring
15	2EL0669	1	Switch, 3-Position, DPDT

8. PARTS LIST

Moisture/Matic/Manager Control Box (Plain)

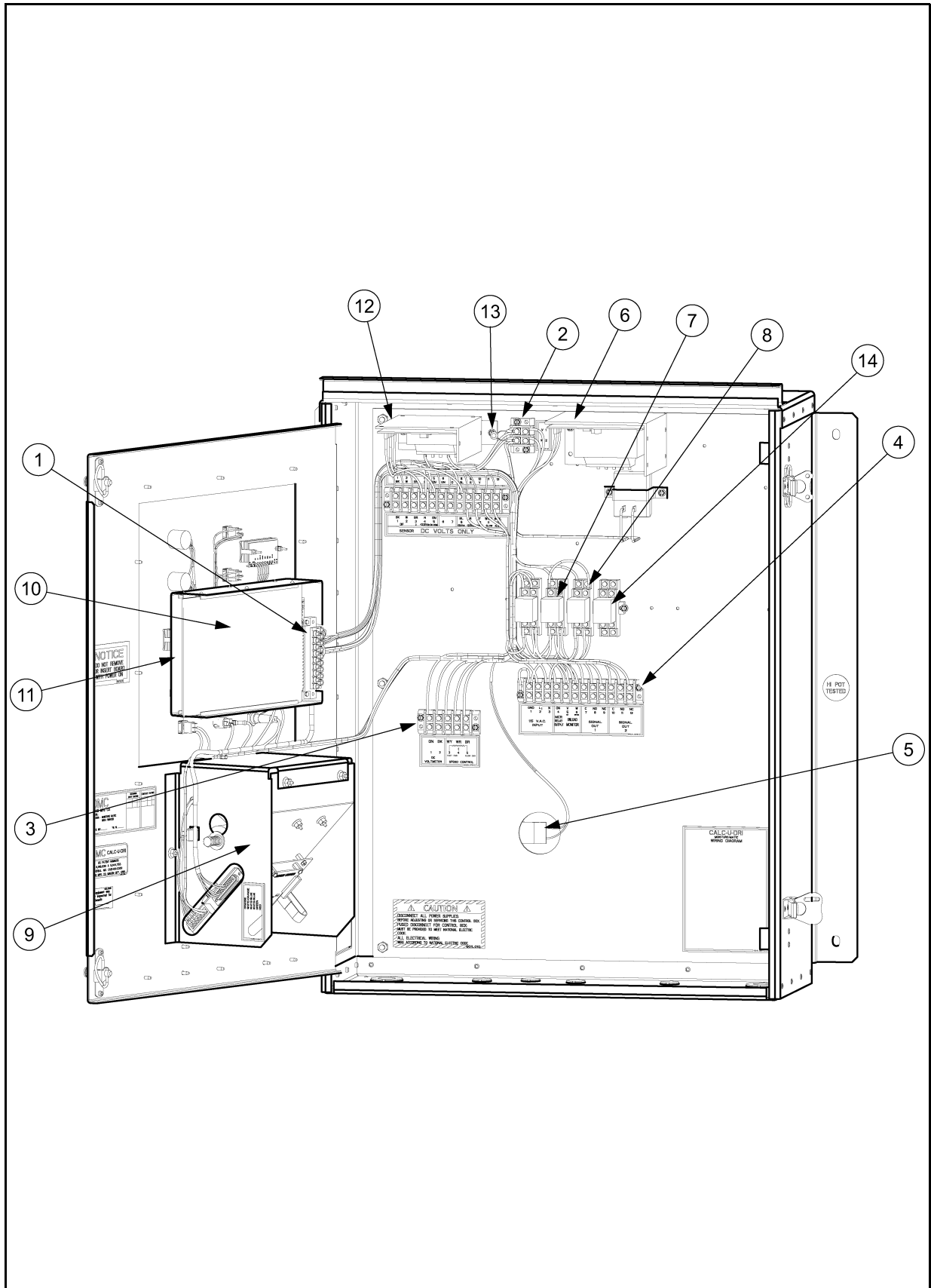


Moisture/Matic/Manager Control Box (Plain)

Ref #	Part #	Qty	Description
1	1EL0879	1	Terminal Block - 2 Term, 30 Amp, 250 Volt
2	1EL0898	1	Terminal Block - 5 Term, 30 Amp, 250 Volt
3	1EL0900	2	Terminal Block - 12 Term, 30 Amp, 250 Volt
4	2EL0274	3	Relay - Gen. Purpose DPDT, 12 VDC
5	2EL0275	3	Relay - Socket
6	602E460	1	Circuit Board - DMC 18
7	602E340	1	Power Supply
8	602E430	1	Surge Absorber - Assembly with Terminals

8. PARTS LIST

Moisture/Matic/Manager Control Box (Printer)

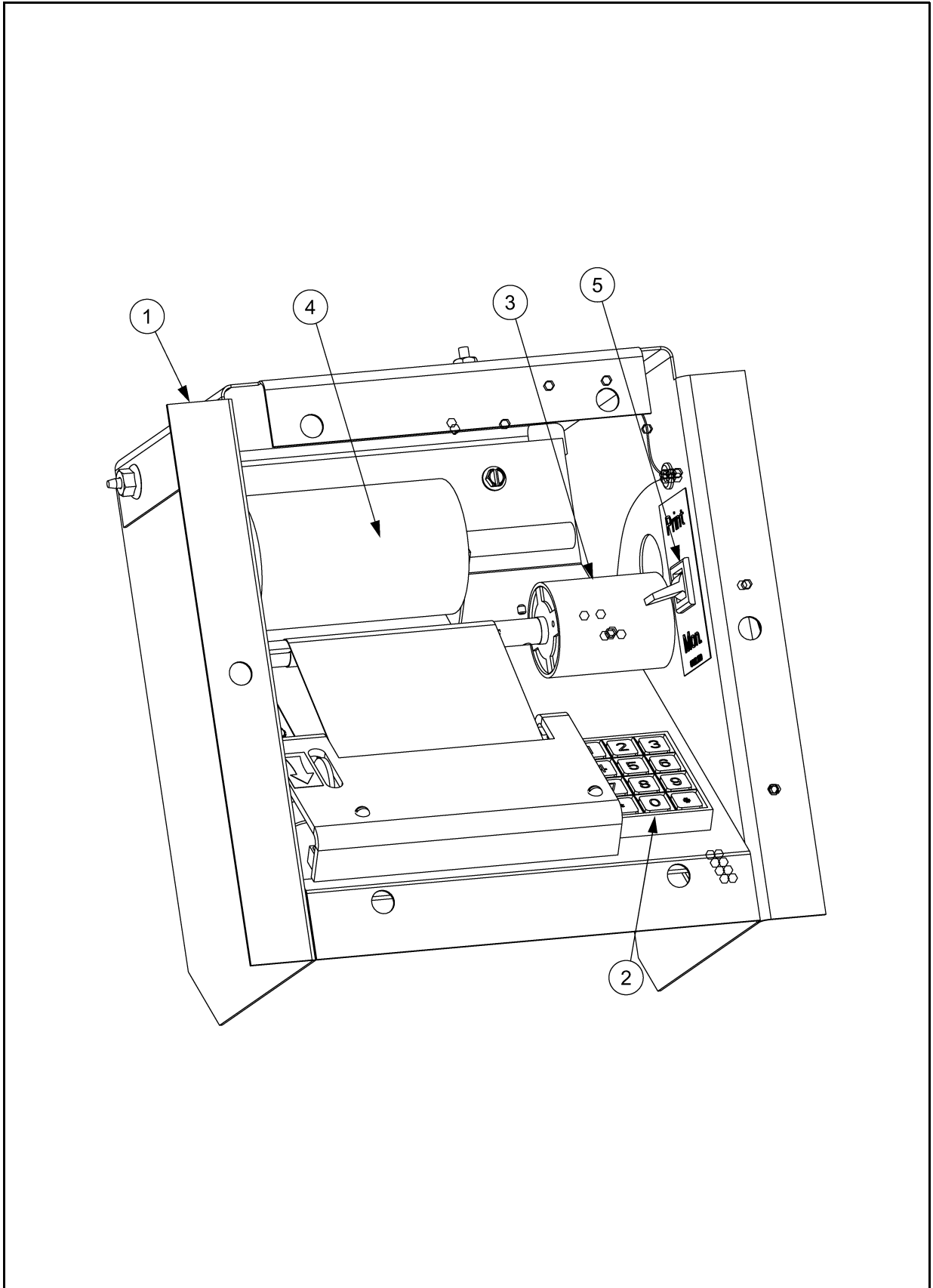


Moisture/Matic/Manager Control Box (Printer)

Ref #	Part #	Qty	Description
1	1EL0854	1	Connector - Circuit Board 36 Circuits
2	1EL0879	1	Terminal Block - 2 Term, 30 Amp, 250 Volt
3	1EL0898	1	Terminal Block - 5 Term, 30 Amp, 250 Volt
4	1EL0900	2	Terminal Block - 12 Term, 30 Amp, 250 Volt
5	1EL1525	1	Heater Strip - 1" x 3" 15W, 120 Volt
6	5041435	1	Power Supply - Moisture/Matic Assembly (Printer)
7	2EL0274	3	Relay - Gen. Purpose DPDT, 12 VDC
8	2EL0275	3	Relay - Socket
9	602E184	1	Printer Module
10	602E230	1	Circuit Board - MM, Printer (DMC 4) (with batteries)
11	602E460	1	Circuit Board - DMC 18
12	602E340	1	Power Supply
13	602E430	1	Surge Absorber - Assembly with Terminals
14	TD-100300	1	Relay - General Purpose DPDT, 110 VAC

8. PARTS LIST

Printer Module Subassembly

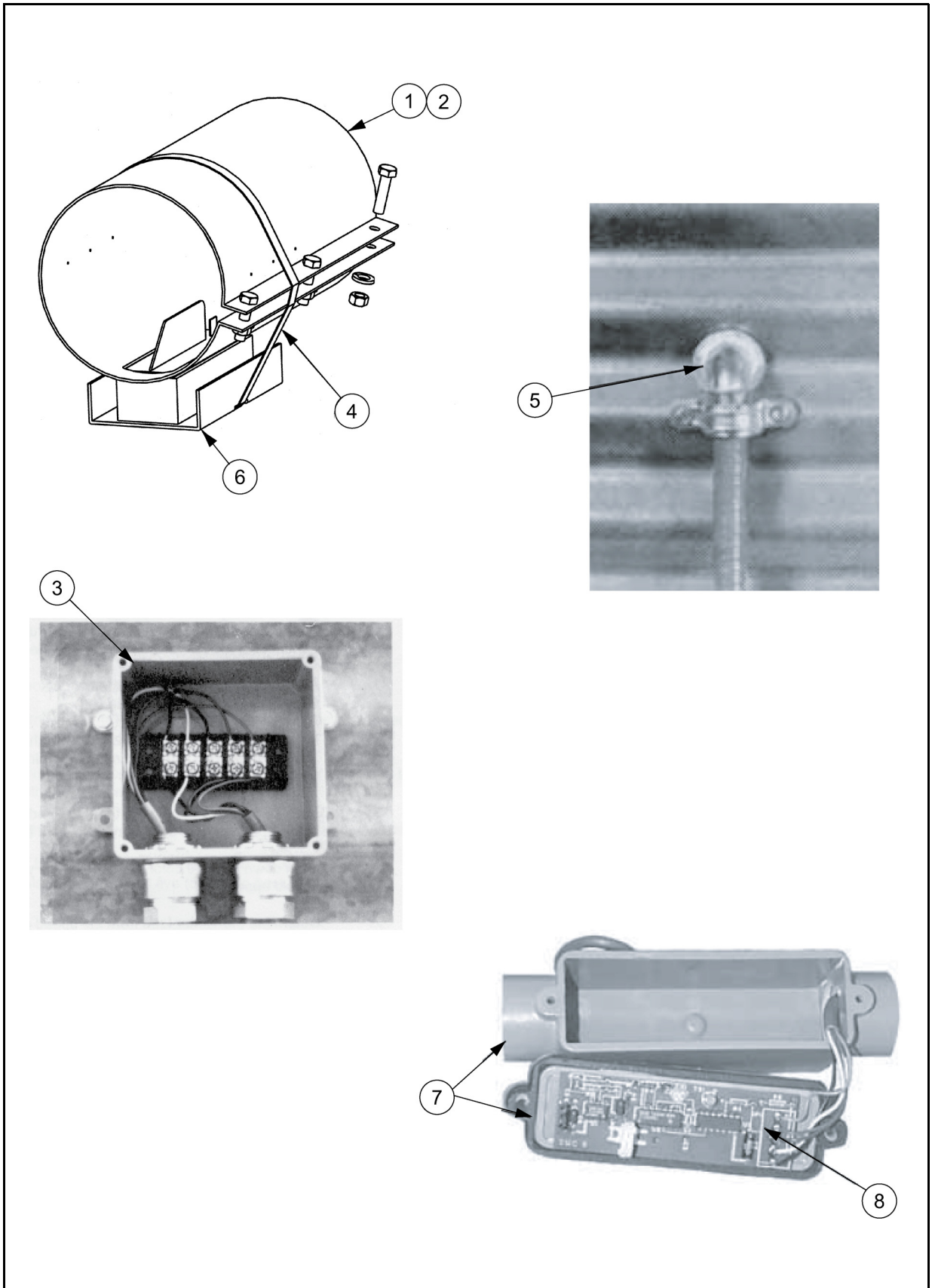


Printer Module Subassembly

Ref #	Part #	Qty	Description
1	602E184	1	Printer Module
2	2EL0299	1	Keyboard - 12 Button
3	602E155	1	Printer - Paper Take-Up
4	MS0306	1	Printer - Paper
5	2EL0659	1	Printer ON OFF Switch

8. PARTS LIST

Calc-U-Dri Moisture/Matic/Manager Parts



Calc-U-Dri Moisture/Matic/Manager Parts

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

9. TROUBLESHOOTING GUIDE

Problem	Possible Cause	Solution
1. Digital readout dead.	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Turn ON. 2. Replace fuse(s). 3. Plug in. 4. Replace circuit board. 5. Put in new power supply.
2. Digital readout is not lit. All control functions are working.	<ol style="list-style-type: none"> 1. Digital panel meter bad. 2. Open or loose wire feeding the digital panel meter. 3. Circuit board trouble. 	<ol style="list-style-type: none"> 1. Replace the DPM. 2. Repair. 3. Replace circuit board.
3. Moisture readings are very high - grain checks dry.	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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 45.
4. Erratic operation after replacing the control card.	<ol style="list-style-type: none"> 1. Dip switches on new card are not see correctly. 	<ol style="list-style-type: none"> 1. Refer to illustration on page 45.
5. Moisture readings do not change, temperature readings are high negative.	<ol style="list-style-type: none"> 1. Sensor leads are broken or not hooked into the terminal. 2. Sensor trouble. 	<ol style="list-style-type: none"> 1. Tighten terminal screws or replace the sensor. 2. Replace sensor.
6. Moisture readings are intermittently high then low.	<ol style="list-style-type: none"> 1. Check for the sensor ground strap not hooked up. 2. Sensor cable leads broken. 3. Loose terminal leads where sensor is hooked. 	<ol style="list-style-type: none"> 1. Hook up strap. 2. Replace sensor. 3. Tighten screws.
7. Moisture readings are consistently high or low.	<ol style="list-style-type: none"> 1. Correct by calibration adjustment, refer to Page 18. 	<ol style="list-style-type: none"> 1. Adjust.
8. Blowing control fuses.	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Isolate and correct. 2. Replace if it looks bad. 3. Replace bad component.

9. TROUBLESHOOTING GUIDE

Problem	Possible Cause	Solution
9. Printer spaces several lines but nothing is printed.	<ol style="list-style-type: none"> 1. Paper installed with the wrong side up or the wrong type paper. 2. Print head is unplugged or bad. 	<ol style="list-style-type: none"> 1. Turn over paper or install the correct paper MS0306. 2. Plug in or replace printer.
10. Printer spaces one line, nothing more.	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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.
11. Printer does not space, no night light and the paper take-up motor not working.	<ol style="list-style-type: none"> 1. No DC power or no AC power or not hooked up. 	<ol style="list-style-type: none"> 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).
12. Printer doesn't space, but has night light.	<ol style="list-style-type: none"> 1. Printer motor not plugged in. 	<ol style="list-style-type: none"> 1. Plug in the flat, gray cable on the printer and check if broken.
13. Prints characters that are unintelligible.	<ol style="list-style-type: none"> 1. Computer not working. 	<ol style="list-style-type: none"> 1. Replace computer card (DMC 4).
14. Moisture and temperature are printed at half the value displayed on the DPM.	<ol style="list-style-type: none"> 1. Dip switches are not set correctly. 	<ol style="list-style-type: none"> 1. Reference the Dip Switch Chart and correct dip switches 7 & 8, page 45.
15. Top part of the characters are missing.	<ol style="list-style-type: none"> 1. Plastic guard too close. 	<ol style="list-style-type: none"> 1. Raise the plastic shield.
16. Part of each character is missing.	<ol style="list-style-type: none"> 1. Head cable loose or print head bad. 2. Dirt build-up on the platen. 	<ol style="list-style-type: none"> 1. Reseat the flat bottom cable or replace the printer. 2. Clean the black bar under the paper that the head goes over.
17. Paper take-up not rolling up the paper.	<ol style="list-style-type: none"> 1. Loss of power or bad motor or aluminum shaft binding against the motor. 	<ol style="list-style-type: none"> 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".

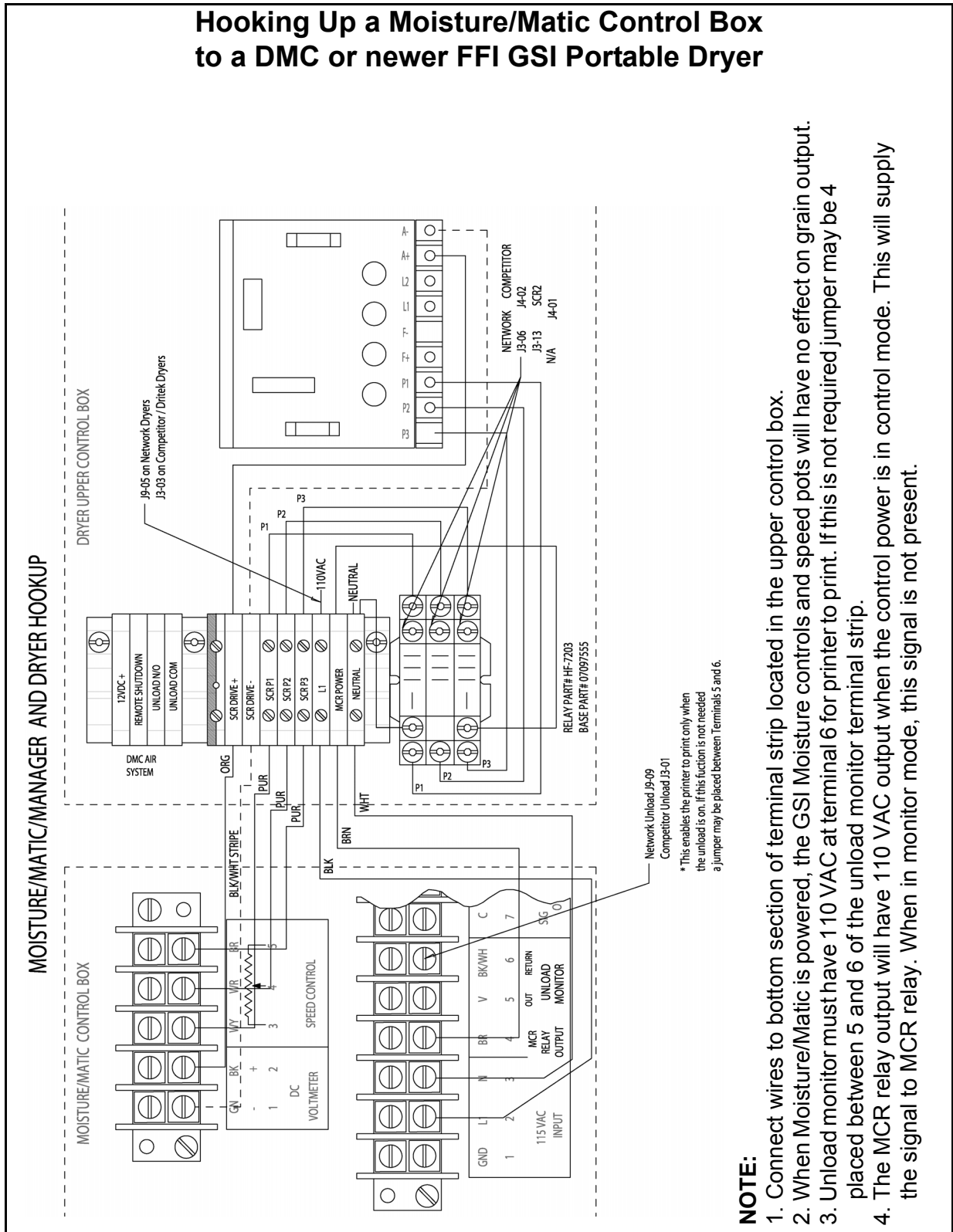
2. Do not make field adjustments on the circuit board. This is a factory adjustment only.

3. Contact your dealer or DMC if you have any questions on the service of your Calc-U-Dri Moisture/Matic.

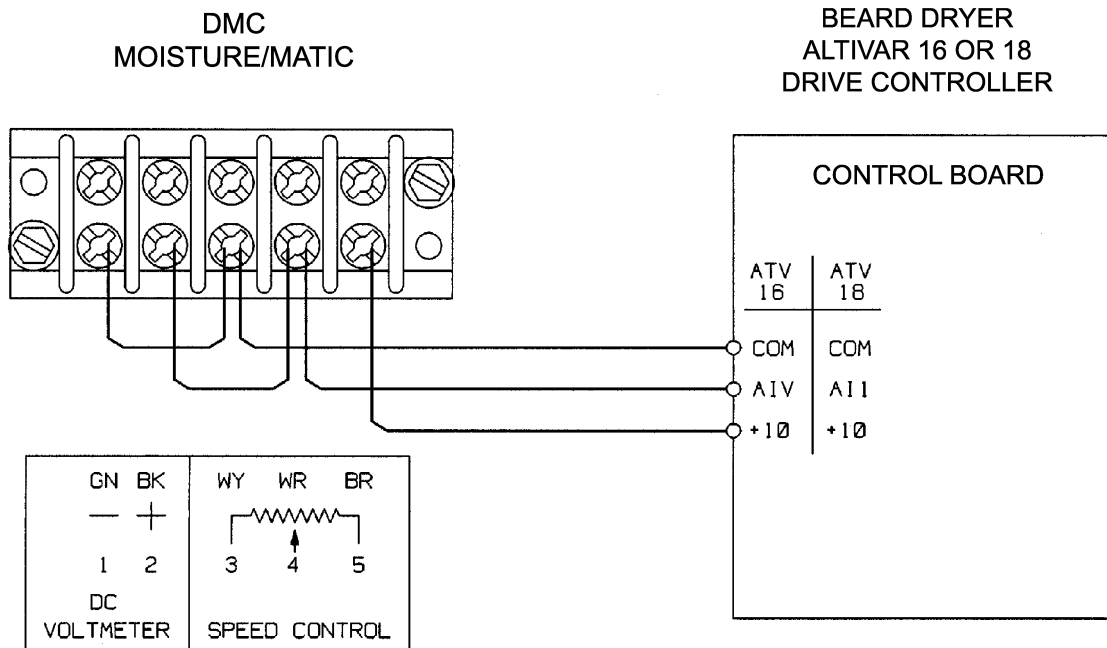
TAKE TIME FOR PROPER INSTALLATION IT SAVES SERVICE CALLS.

APPENDIX B

Hooking Up a Moisture/Matic Control Box to a DMC or newer FFI GSI Portable Dryer



Hooking Up a Moisture/Matic Control Box to a Beard Dryer with an Altivar Drive



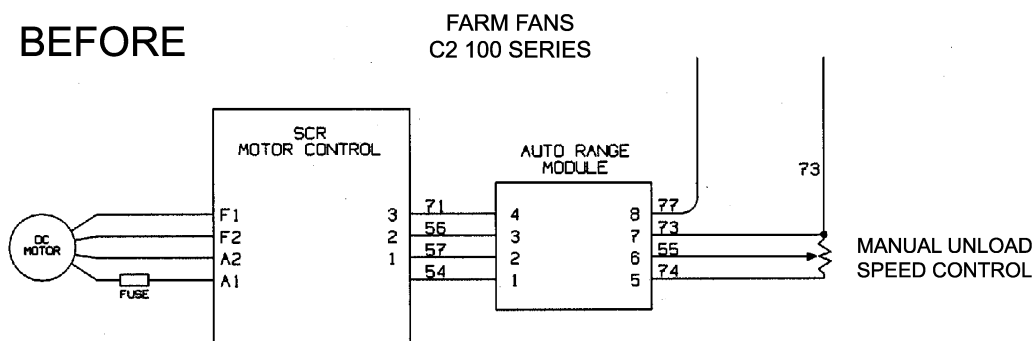
1. REMOVE AND TAPE OFF THE WIRES FROM THE MANUAL SPEED CONTROL AND THE SPED METER. THIS SHOULD BE DONE ON THE BACK SIDE OF THE SPEED CONTROL AND METER IN THE BEARD DRYER
2. ADD WIRE FROM "COM" TO TERMINAL 3.
3. ADD WIRE FROM "AIV" ("ALL") TO TERMINAL 4.
4. ADD WIRE FROM "+10 V" TO TERMINAL 5.
5. CONNECT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

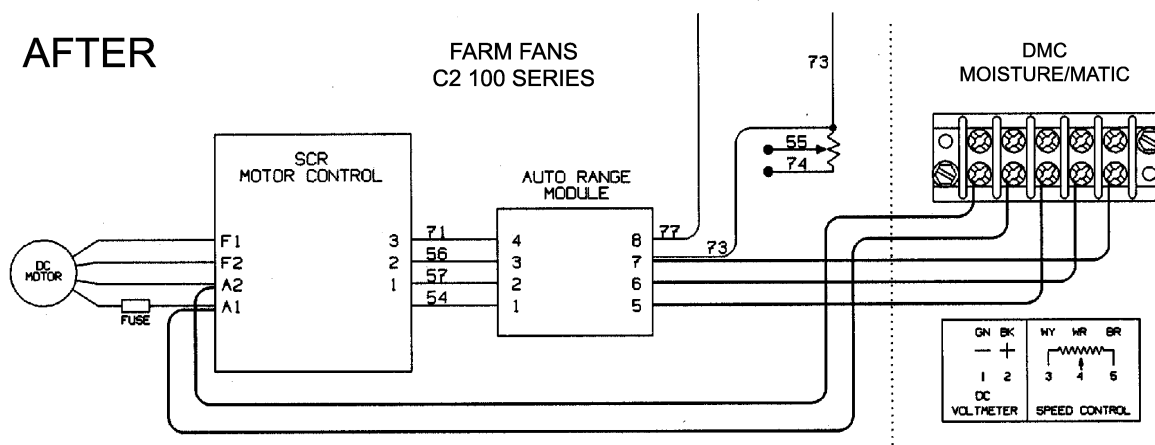
10. WIRING EXAMPLES

Hooking Up a Moisture/Matic Control Box to a Farm Fans Series 2100 Dryer

BEFORE



AFTER



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"

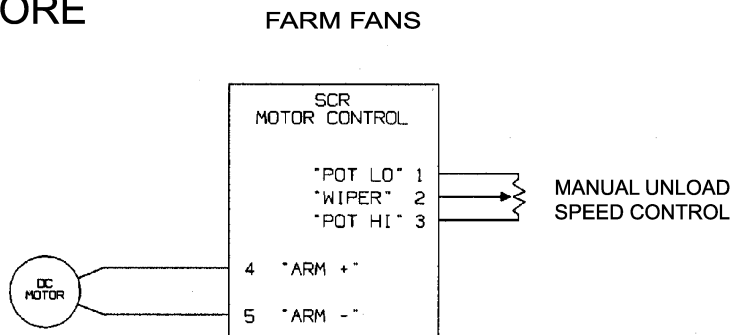
MAKE THE FOLLOWING WIRE CONNECTIONS:

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

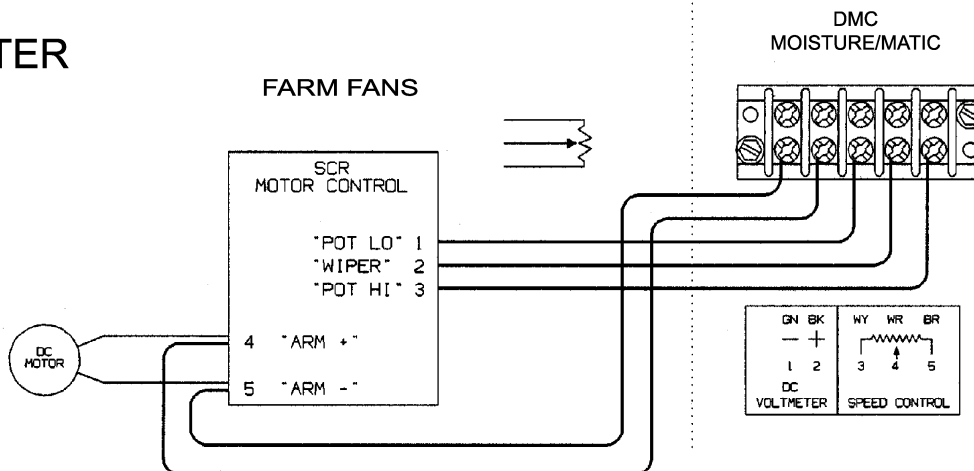
RUN FARM FANS DRYER IN MANUAL MODE

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:

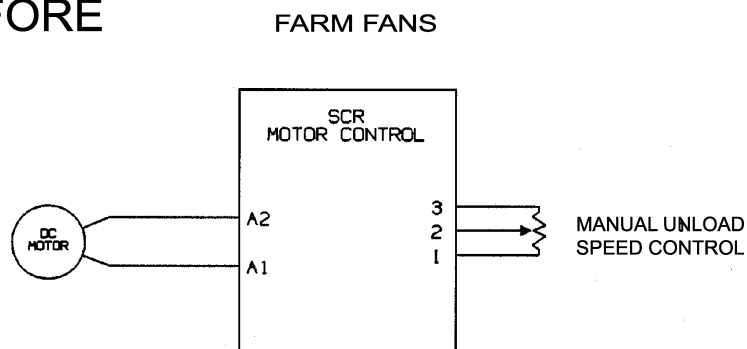
1. DMC TERMINAL "1" TO FARM FANS TERMINAL "5" ON SCR
2. DMC TERMINAL "2" TO FARM FANS TERMINAL "4" ON SCR
3. DMC TERMINAL "3" TO FARM FANS TERMINAL "1" ON SCR
4. DMC TERMINAL "4" TO FARM FANS TERMINAL "2" ON SCR
5. DMC TERMINAL "5" TO FARM FANS TERMINAL "3" ON SCR

RUN FARM FANS DRYER IN OF MODE

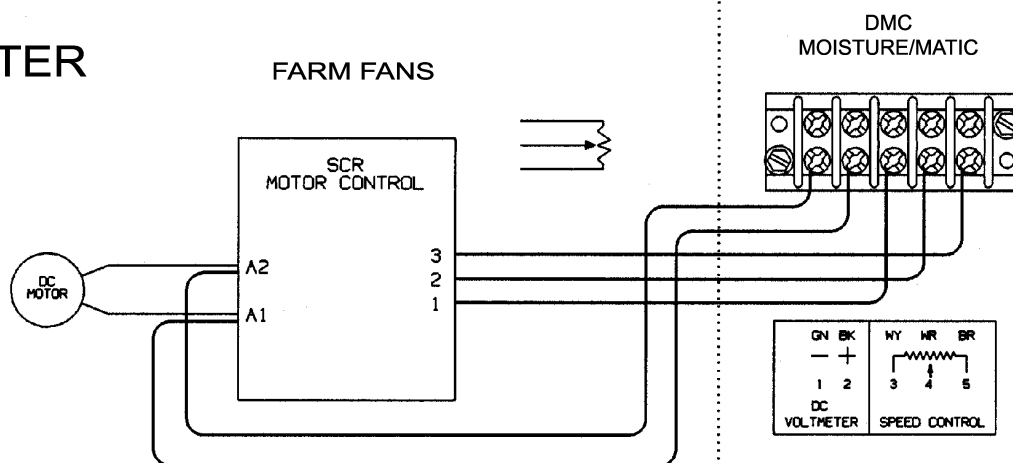
10. WIRING EXAMPLES

Hooking Up a Moisture/Matic Control Box to a Farm Fans Series CF/AB 270 & 320 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 "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

11. WARRANTY

THE GSI GROUP, INC. (GSI) WARRANTS ALL PRODUCTS WHICH IT MANUFACTURES TO BE FREE OF DEFECTS IN MATERIAL AND WORKMANSHIP UNDER NORMAL USAGE AND CONDITIONS FOR A PERIOD OF 12 MONTHS AFTER RETAIL SALE TO THE ORIGINAL END USER. THE PURCHASER'S SOLE REMEDY AND GSI'S ONLY OBLIGATION SHALL BE TO REPAIR OR REPLACE, AT GSI'S OPTION AND EXPENSE, PRODUCTS THAT, IN GSI'S SOLE JUDGMENT, CONTAIN A MATERIAL DEFECT DUE TO MATERIALS OR WORKMANSHIP. ALL DELIVERY AND SHIPMENT CHARGES TO AND FROM GSI'S FACTORY WILL BE PURCHASER'S RESPONSIBILITY. EXPENSES INCURRED BY OR ON BEHALF OF THE PURCHASER WITHOUT PRIOR WRITTEN AUTHORIZATION FROM AN AUTHORIZED EMPLOYEE OF GSI SHALL BE THE SOLE RESPONSIBILITY OF THE PURCHASER.

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(revised December 2005)

This equipment shall be installed in accordance with the current installation codes and applicable regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

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