

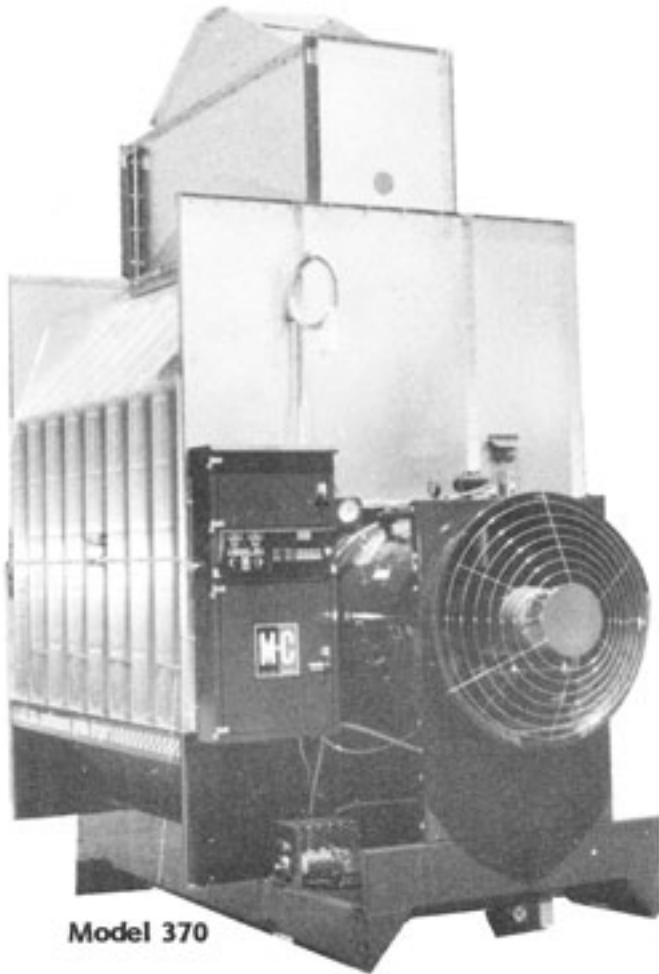


# Model 370 & 570

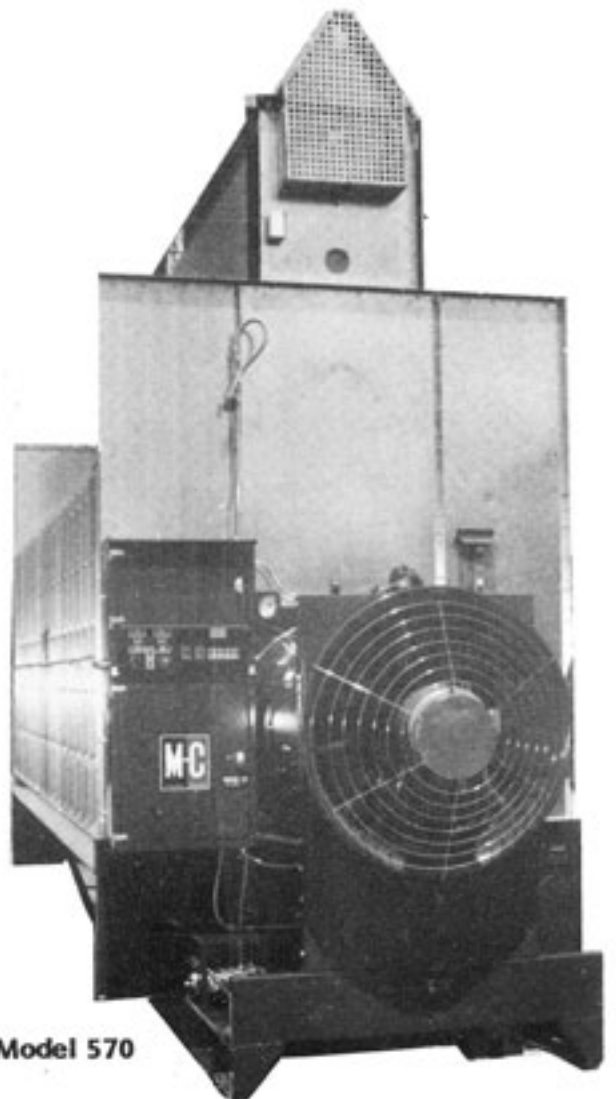
(EM and EMS)

## Continuous Flow Grain Dryers

(Starting w/Serial No. 55079)



Model 370



Model 570

# OPERATOR'S MANUAL

Form No. D 334 June 1996

**Mathews Company/** 500 Industrial Ave., Crystal Lake, IL 60012, U.S.A.  
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## NOTES

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# INTRODUCTION

## To The Owner-Operator

This manual was prepared to provide owners and operator's of M-C Model 370 and 570 Grain Dryers (starting with serial number 55079) with Operating Instructions and Maintenance Information that will enable them to keep their M-C Grain Dryer operating at peak efficiency.

Before operating your Grain Dryer read the Start-Up and Operating instructions. Check each item referred to and become familiar with the controls, adjustments and settings required to obtain efficient operation.

To keep the dryer operating at peak efficiency it is suggested that it be cleaned, lubricated, belt tension adjusted and the ignition system, level auger and unloading system be tested each year prior to the dryer season. Refer to "Pre-Season Check" in the Maintenance section. The pre-season check can be made when the dryer is empty. Any necessary repairs or adjustments can be made so that the dryer will be ready to operate before the drying season.

## Safety Precautions



This symbol is used to call your attention to instructions concerning your personal safety. Be sure to observe and follow these instructions.

A safe operator is the best insurance against accidents. The precautions listed below must be observed at all times.

- Do not allow children or bystanders to be near the Grain Dryer or grain handling machinery while it is operating.
- Do not operate the Grain Dryer without all safety shields in place and secure.

**NOTE:** To provide clear illustrations some of the covers, guards and shields were removed.

## Warranty Registration

It is important to send in your warranty registration card as soon as your new Grain Dryer is delivered. Not only does the card validate your grain dryer warranty, but it is also our way of knowing who has purchased M-C equipment so that we can keep in touch with you.

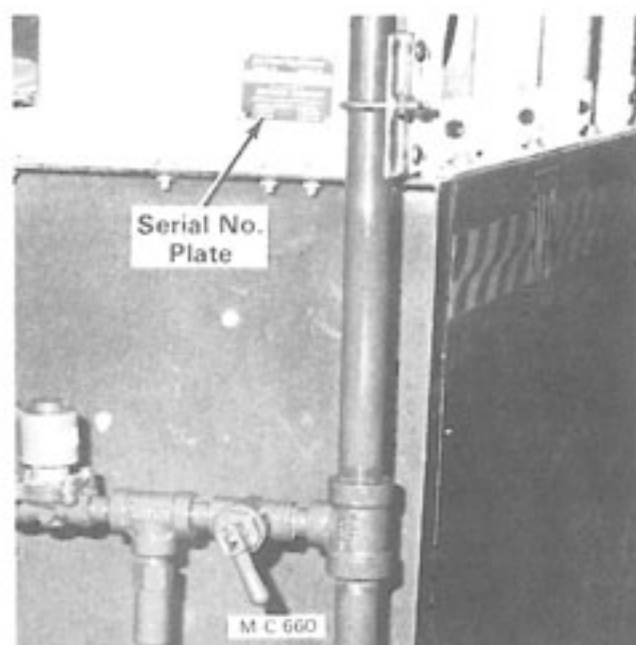


Figure A

M-C FARM EQUIPMENT	
MODEL NO.	SERIAL NO.
MANUFACTURED BY	
<b>MATHEWS COMPANY</b>	
CRYSTAL LAKE, ILLINOIS, U.S.A.	
OTHER PATENTS PENDING	
3,129,073	3,313,040
4,020,561	4,217,701

M-C 189

Figure B

## Model and Serial Number Location




The model and serial number of your Grain Dryer are stamped on a plate located on the left front end panel, see Figure A. On late production dryers, the plate is on the dryer front base panel just below the location shown in Figure A. For future reference record the model and serial number in the blank spaces in Figure B.

## Capscrew Grade Identification

There are four grades of hex-head capscrews. Grade 1 and 2 are common capscrews, grade 5 and grade 8 are used when greater strength is required. Each grade can be identified by the marking on the head of the capscrew, see chart.

When servicing the Dryer and/or replacing capscrews, be sure to use the correct size and grade.

**CAPSCREW GRADE IDENTIFICATION CHART**

S.A.E. Grade	Description	Capscrew Head Marking*
1	WILL HAVE A PLAIN HEAD - NO RADIAL LINES	
2	Low or Medium Carbon Steel Not Heat Treated	
5	WILL HAVE 3 RADIAL LINES Quenched and Tempered Medium Carbon Steel	
8	WILL HAVE 6 RADIAL LINES Quenched and Tempered Special Carbon or Alloy Steel	

\*The center marking identifies the capscrew manufacturer.

## Metric (SI) Measurements

### (English Units & Metric (SI) Equivalents)

#### Area

1 square inch = 6.4516 square centimeters  
 1 square foot = 0.0929 square meters  
 1 square yard = 0.8361 square meters  
 1 acre = 4047 square meters  
 1 acre = 0.4047 hectare

#### Force

1 pound (force) = 4.45 newtons

#### Length

1 inch = 25.4 millimeters  
 1 inch = 2.54 centimeters  
 1 foot = 304.8 millimeters  
 1 foot = 30.5 centimeters  
 1 foot = 0.305 meters  
 1 yard = 0.9144 meters  
 1 mile = 1.6093 kilometers

#### Mass

1 ounce = 28.35 grams  
 1 pound = 0.454 kilograms  
 1 ton = 907.1848 kilograms

#### Power

1 horsepower = 0.7457 kilowatts

#### Pressure

1 psi = 6.89 kilopascals  
 1 psi = 0.00689 megapascals  
 1 inch of mercury = 3.377 kilopascals

#### Temperature

1 degree Fahrenheit ( $^{\circ}\text{F} - 32$ )  $\div$  1.8 =  $^{\circ}\text{Celsius}$

#### Torque

1 inch pound = 0.113 newton meters  
 1 foot pound = 1.356 newton meters

#### Velocity

1 mile per hour = 1.61 kilometers per hour

#### Volume

1 bushel = 35.24 liters  
 1 bushel = 0.0352 cubic meters  
 1 pint = 0.4731 liters  
 1 quart = 0.9464 liters  
 1 gallon = 3.7854 liters  
 1 cubic inch = 16.387 cubic centimeters  
 1 cubic foot = 0.0283 cubic meters  
 1 cubic yard = 0.7646 cubic meters

**NOTE:** The Mathews Company reserves the right to incorporate any changes in design without obligation to make these changes on units previously sold.

# SET-UP INSTRUCTIONS

## General

Check to make sure that the parts and hardware listed on the packing list have been received. Make claims for any shortages immediately.

The fan end of the dryer is the FRONT. LEFT and RIGHT is determined by standing at the rear of the dryer looking at the rear doors. LEFT and RIGHT of the control cabinet is determined by looking from the inside out through the control cabinet doors.

**IMPORTANT:** When setting up the dryer avoid dropping nuts, bolts or parts down the grain columns. If anything is accidentally dropped, it must be removed before filling the dryer with grain.

## Canadian Requirements

Dryers to be operated in Canada must comply with the following:

1. "The equipment shall be installed in accordance with the current installation Code for Gas-Fired Equipment for Drying Farm Crops CAN/CGA-3.8-M86 and/or applicable Provincial Regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made."
2. "All electrical connections are to be made in accordance with CSA C22.1 Canadian Electrical Code Part 1 and/or Local Codes."

## Permanent Installation

The dryer must be installed on a level concrete foundation designed to carry the weight of the dryer when full of grain. The foundation must be engineered locally for ground and weather conditions to prevent settling and frost upheaval.

**Don't forget to place a support under the front of each fan housing mount channel.**

**IMPORTANT:** The dryer must be a minimum of 13 inches above the ground to provide clearance to open the quick clean unload auger pans. If the dryer is set on concrete piers perpendicular to the dryer skids, they must be notched to provide the minimum 13 inch clearance. Refer to the dryer base dimension drawing at the back of this manual.

A dryer dimension drawing and an electrical and gas piping entrance drawing are at the back of this manual.

A vibration damper (treated wood planks, flat belting, etc.) should be used between the skids and the top of the piers. Be sure to anchor the dryer base to the foundation.

Lift the dryer onto the piers with four slings - two on each side. Attach the slings to or around the skids just behind the fan housings and approximately one third in from the rear of the dryer. Use spreader bars across the top to avoid damage when lifting.

**NOTE:** The top of each pier must be level. If they are not, shim between the top of the pier and the vibration damper.

## Dryer Weight (Approx. in pounds)

**NOTE:** Weights include hopper and level auger (570 only).

MODEL	EMPTY	FILLED w/No. 2 Corn (Maize)
370	5,000	16,800
570	6,250	27,250

## Portable or Temporary Installation

Place timbers or railroad ties under the skids (parallel). The dryer must be a minimum of 13 inches above the ground to provide clearance to open the quick clean unload auger pans.

**Don't forget to place a support under the front of each fan housing mount channel.**

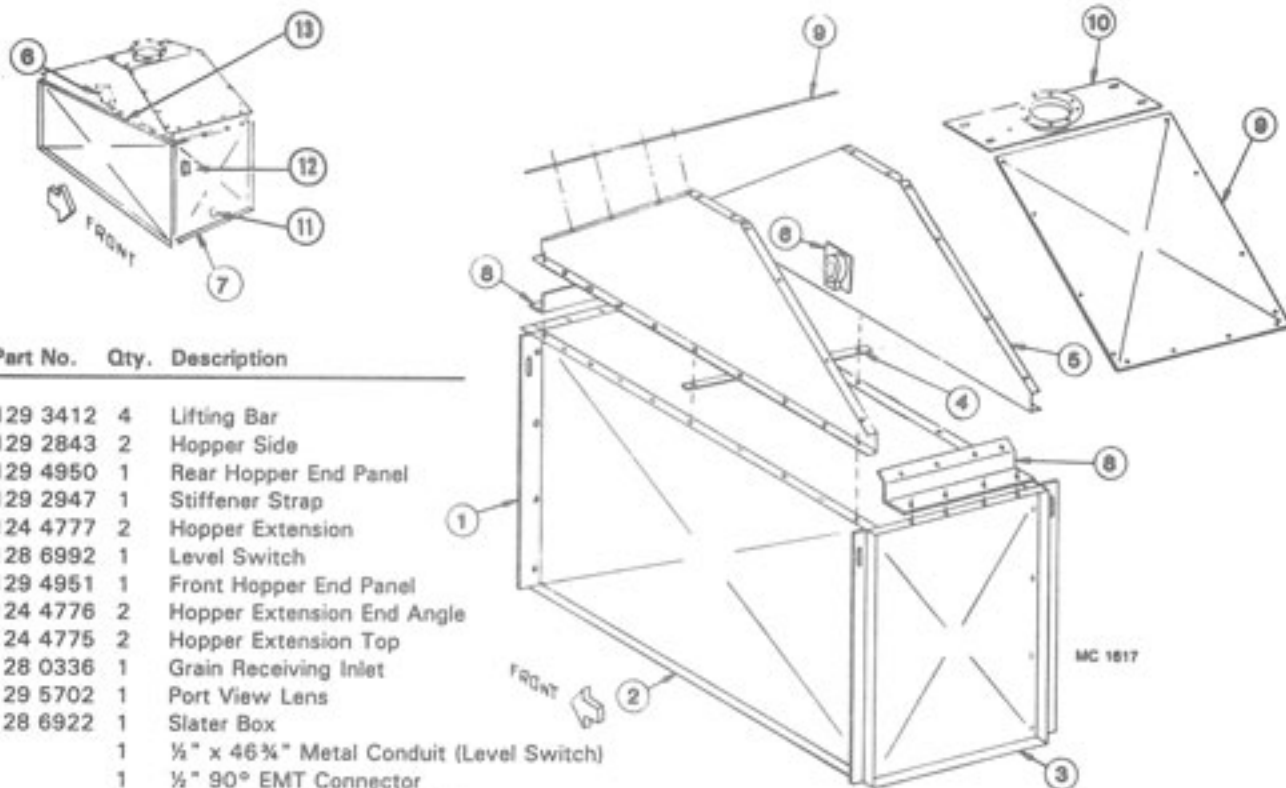
A dryer dimension drawing and an electrical and gas piping entrance drawing are at the back of this manual.

## Anchoring the Dryer

Immediately after installation, anchor the base of the dryer to the foundation. The dryer should also be guy wired in locations where the possibility of "blow-over" from wind exists.

All anchoring material and cable are to be supplied and installed by the customer.





Ref.	Part No.	Qty.	Description
1	129 3412	4	Lifting Bar
2	129 2843	2	Hopper Side
3	129 4950	1	Rear Hopper End Panel
4	129 2947	1	Stiffener Strap
5	124 4777	2	Hopper Extension
6	128 6992	1	Level Switch
7	129 4951	1	Front Hopper End Panel
8	124 4776	2	Hopper Extension End Angle
9	124 4775	2	Hopper Extension Top
10	128 0336	1	Grain Receiving Inlet
11	129 5702	1	Port View Lens
12	128 6922	1	Slater Box
13		1	$\frac{1}{2}$ " x 46 $\frac{3}{4}$ " Metal Conduit (Level Switch)
		1	$\frac{1}{2}$ " 90° EMT Connector
		1	$\frac{1}{2}$ " Straight EMT Connector

Figure 1 - Model 370EM Wet Grain Hopper and Level Switch

### Assembly of 370EM Wet Grain Hopper and Level Switch (See Figure 1)

**NOTE:** The Hopper can be assembled on the dryer screen section or on the ground and then lifted onto the dryer screen section. If hopper is assembled on the dryer screen section, be sure to place a 28" Stiffener Strap #1292947 across the center of the screen section top connecting both mount angles that are bolted to the top of the outer screens. See Figure 5.

**IMPORTANT:** The Model 370EM dryer does not have a level auger. Customer's filling equipment will function in place of level auger when wired into dryer Level Switch.

If Hopper is to be assembled on the ground, proceed as follows:

1. Bolt the Hopper Sides and End Panels together with  $\frac{3}{8}$ -16 x  $\frac{3}{4}$ " capscrews and flanged whiz locknuts (#0018210 and 0008168). Be sure to place (1) #1293412 Lifting Bar at each end of the Hopper Sides so that there will be (1) bar at each corner of the Hopper. See Figure 1.
2. Attach Slater Box #1286922 to the top right outside corner of the front hopper end

panel (when viewed from the front of dryer) with a  $\frac{1}{2}$ " straight connector. Use  $\frac{1}{2}$ " locknut to secure connector to front end panel. A  $\frac{1}{2}$ " x 46 $\frac{3}{4}$ " metal conduit will be placed between the Slater Box and the level switch to hold the (2) yellow wires for the level switch. Also install Port View Lens in lower center of front end panel using (4)  $\frac{1}{4}$ -20 x  $\frac{1}{2}$ " round truss head bolts and  $\frac{1}{4}$ "-20 flanged whiz locknuts (#0008212 and 0008167).

3. Turn the 90° EMT Elbow Connector threads into the bottom of the Level Switch making sure that the connector faces Slater Box.
4. Bolt Level Switch to the inside lower center of the Hopper Extension Panel that will be bolted to the Right Hopper Side (when viewed from rear to front). Use (4)  $\frac{1}{4}$ -20 x  $\frac{1}{2}$ " round truss head bolts and flanged whiz locknuts (#0008212 and 0008167).
5. Remove the (7) Phillips Head Screws that hold the Level Switch Housing to its mount plate. There are (2) yellow wires, one marked TB24-LSW-C and the other LSW-NC-LASW that will have to be connected to the level switch. Pull the (2) wires



through the 90° EMT Elbow at the bottom of the switch housing and up to the switch. Trim a small piece of insulation from the end of each wire and attach a Fork Connector. Connect TB24-LSW-C to the COMMON terminal of the switch and LSW-NC-LASW to the NORMALLY CLOSED terminal. Now place the level switch housing back onto its mount plate with the (7) Phillips Head Screws.

6. Bolt Hopper Extensions #1244777 to hopper sides with  $\frac{3}{8}$ -16 x  $\frac{3}{4}$ " capscrews and flanged whiz locknuts. Don't forget to place (1) 28" Stiffener Strap #1292947 between the hopper sides and the hopper extensions at the 5th bolt hole in from the end of the hopper side. See Figure 1. Be sure that the  $\frac{1}{2}$ " x 46 $\frac{3}{4}$ " metal conduit is placed into the 90° elbow in the level switch. Don't forget that the (2) yellow wires must be pulled through the conduit before it is placed into the 90° elbow. These (2) wires must also be pushed through the straight connector in the Slater Box before the conduit can be installed. The slope bend in the conduit is close to the Slater Box.
7. Bolt the Hopper Extension End Angles #1244776 to the top of the front and rear hopper end panels with the same bolts and nuts used in #6.

8. Bolt the (2) Hopper Extension Top Panels #1244775 to the sloping flanges of the hopper extensions with the same bolts and nuts used in #6.
9. Place #1280336 Grain Receiving Inlet with 10" (25.4cm.) angle ring onto top of hopper extensions and secure with  $\frac{3}{8}$  x 16 x  $\frac{3}{4}$ " capscrews and flanged whiz locknuts.

### **Installation of 370EM Hopper (Assembled on Ground)**

1. Place a 28" Stiffener Strap #1292947 across the center of the screen section top connecting the mount angles that are bolted to the top of the outer screens. See Figure 5.
2. Attach cables to the (4) Lifting Bars bolted to the hopper sides. Use spreader bars between the cables and lift hopper assembly onto the top of the screen section. Check position of the Stiffener Strap so it lines up with holes in hopper sides and hopper mount angles. Hopper Assembly weighs about 180 lbs.
3. Bolt Hopper Assembly to Hopper Mount Angles with  $\frac{3}{8}$ -16 x  $\frac{3}{4}$ " capscrews and flanged whiz nuts.

# 570 HOPPER AND LEVEL AUGER

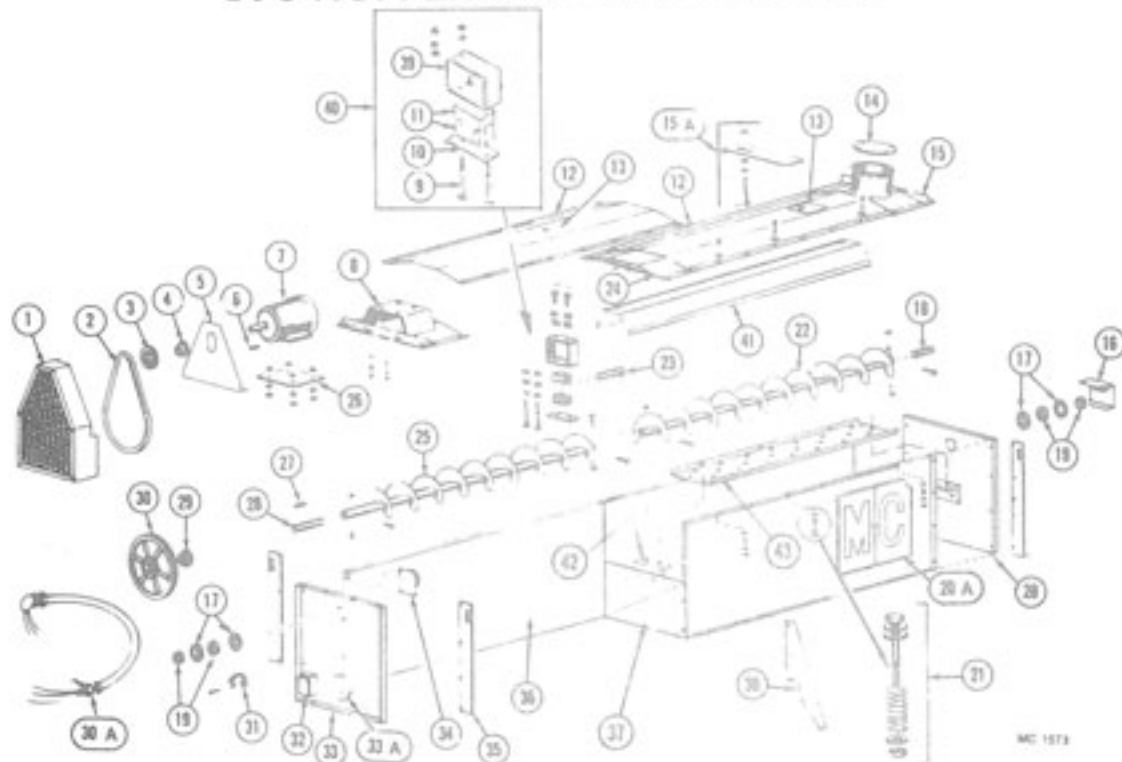


Figure 1A - Model 570 Hopper and Level Auger

Ref.	Part No.	Qty.	Description	Ref.	Part No.	Qty.	Description
1	129 0003	1	Level Auger Guard	22	128 0122	1	Level Auger (93% RH fighting,
2	128 6103	1	Level Auger Belt	23	128 5050	1	Level Auger Center Shaft
3	-----	-	128 6104 in matched set of two	24	129 0000	1	Level Auger Support
	128 6207	1	Level Auger Motor Sheave "SH"	25	128 0317	1	Level Auger (82% RH fighting)
	128 6220	1	3V/3.65 x 2 Groove 60 Cycle	26	129 4202	1	Level Auger Motor Mt. Plate
4	128 6214	1	3V/4.50 x 2 Groove 50 Cycle		000 8161	4	Level Auger Motor Mt. Plate
			Level Auger Motor Bushing - 1 1/2" SH		000 8170	4	1/2-13 x 3 1/2" Capscrew (Full thread)
			Bushing for 3HP & 5HP motor		000 8163	8	1/2-13 Flanged Locknut
			(Incl. capscrews & lockwashers)	27	001 5120	1	1/2-13 Hex Nut
5	129 4944	1	Level Auger Guard Back		001 5120	1	Key - 1/4" x 1 1/2"
6	001 5119	-	Level Auger Guard Back	28	128 5051	1	Key - 1/4" x 1 1/2"
7	128 6818	1	Key - 1/4" x 2" (3HP motor)	28	128 5051	1	Level Auger Front Shaft (1 1/4" x 10")
8	129 0001	1	230/460V 3HP 3Ø Motor	29	121 6241	1	Level Auger Front Shaft (1 1/4" x 10")
9	001 8287	2	Level Auger Motor Mt.				1 1/4" SK Bushing (Incl. capscrews &
	001 8139	2	1/2-16 x 3 1/2" Capscrew - Grd. 5				lockwashers)
	000 8162	8	1/2" Lockwasher	30	128 6208	-	Level Auger Sheave "SK"
10	128 3415	2	1/2-16 Hex Nut				3V/19.0 x 2 Grv.
11	128 6021	1	Bearing Hanger Bar	30A	128 1960	1	Flexible Conduit w/Wires
12	129 2945	2	Wood Bearing - 1 1/2" (2 halves)	31	128 8951	1	Rubber Strap w/Hook
13	128 8355	2	Hopper Cover - Front & Rear (76")	32	128 6922	1	Slatter Box (1/2")
14	129 4204	1	Warning Decal	33	129 2835	1	Upper End Panel - Front
15	129 0002	1	Receiving Tube Cover	33A	129 5702	1	Port View Lens
15A	129 4205	1	Receiving Hopper	34	128 6992	1	Level Switch
	129 5703	1	Flow Restrictor	35	129 3412	4	Lifting Bar
	000 8168	3	Position & Locking Bolt	36	129 2838	4	Hopper Side
16	129 4947	1	1/2-16 Flanged Locknut	37	129 2715	1	Hopper Sectional Panel
17	001 6004	4	Stub Guard	38	129 2603	6	Hopper Brace
18	128 5052	1	Bearing Flangette 1 1/2"	39	128 0292	1	Level Auger Brg. Support
19	001 6003	2	Level Auger Rear Shaft (1 1/4" x 8")		001 8135	2	Level Auger Brg. Support
20	129 2834	1	Bedring w/Lock Collar - 1 1/4"		001 8139	2	1/2-16 x 1" Capscrew - Grd. 5
20A	121 8343	2	Upper End Panel - Rear		000 8162	2	1/2" Lockwasher
21	000 8101	12	M-C Decal (26 1/2" x 23")	40	122 1008	1	1/2-16 Hex Nut
	131 8708	12	Level Auger Brg. Kit				(Incl. Ref. 9, 10, 11, & 39 in
	000 8172	36	(Incl. Ref. 9, 10, 11, & 39 in quantities reqd. for one brg.)	41	129 2838	1	Auger Cover Short
	000 8210	12	1/2-20 x 2" Capscrew	42	128 2780	2	Auger Pan Support Bracket
			1/2-20 Spring (1/2" OD x 1 1/4")	43	128 2761	1	Pan Under Auger
			1/2" Flatwasher				
			1/2-20 Two-Way Locknut				

## Assembly of 570EM Wet Grain Hopper with Level Auger (See Page 7)

**NOTE:** The Hopper and Level Auger can be assembled on the dryer screen section or on a hard flat level surface and then lifted onto the dryer screen section. If hopper and level auger is assembled on the dryer screen section, be sure to place a 28" Stiffener Strap #1292947 across the centers of each 8 ft. screen section top connecting mount angles that are bolted to the top of the outer screens. See Figure 5.

If Hopper and Level Auger are to be assembled on the ground, proceed as follows:

1. Bolt the hopper sides and end panels together with  $\frac{3}{8}$ -16 x  $\frac{3}{4}$ " (9.5 x 19mm) hex capscrews and flanged locknuts. Place the hopper sectional panel between the hopper side panels. Be sure to bolt (1) auger pan support bracket to the rear hopper end panel and (1) to the sectional panel. These brackets will support the slotted pan under the rear level auger section. Use  $\frac{3}{8}$ " x  $\frac{3}{4}$ " capscrews where bracket is bolted to end and sectional panels and  $\frac{3}{8}$ " x  $\frac{3}{4}$ " round truss head screws where pan is bolted to support brackets (round head towards auger). Install (1) #1293412 Lifting Bar at each corner of the hopper.
2. Bolt level auger bearing assembly to level auger bearing support bracket and then to the level auger support. Do not forget to place the auger cover between the level auger support and the level auger bearing support bracket. See Figures 1A and 4. **DO NOT** put pressure on the wood bearings by over tightening the  $\frac{3}{8}$ -16 x  $3\frac{3}{4}$ " bearing bolts.
3. Install a  $1\frac{1}{4}$ " bearing with lock collar and flangettes in each hopper end panel. Secure with  $\frac{3}{8}$ -16 x  $\frac{3}{4}$ " carriage bolts and flanged locknuts.
4. Install the level auger front shaft (10" long with key way) and a center shaft (10 $\frac{1}{4}$ " long) into the front auger (82 $\frac{3}{8}$ " flighting). Bolt the shafts to the auger with two  $\frac{3}{8}$ -16 x 2" capscrews (grade 5) and two-way locknuts in each shaft.
5. Insert the auger front shaft through the bearing in the front end panel. Do not tighten the bearing lock collar.

6. Slide the level auger support assembly onto the center shaft and bolt the level auger support to the hopper sides with  $\frac{3}{8}$ -16 x  $\frac{3}{4}$ " capscrews and flanged locknuts.
7. Slide the rear auger (93 $\frac{1}{2}$ " flighting) onto the center auger shaft and support the rear of auger by sliding the 8" level auger rear shaft through the bearing in the rear end panel and into the rear auger. Do not tighten the bearing lock collar. Align the flighting and bolt the rear auger to the center and rear auger shafts with  $\frac{3}{8}$ -16 x 2" capscrews #0018137 (grade 5) and two-way locknuts #0018149.
8. Rotate the level auger by hand and check alignment. Tighten both bearing lock collars and set screws.
9. Bolt the receiving hopper and level auger motor mount to the top of the hopper with  $\frac{3}{8}$ -16 x  $\frac{3}{4}$ " capscrews, flatwashers and flanged locknuts. Bolt the stub guard to the top of the rear end panel.
10. Install the hopper covers. The front and rear covers are 76" long. Bolt the covers to the left side of hopper with  $\frac{1}{4}$ -20 x 2" capscrews, flatwashers, springs, and two-way locknuts as shown on page 8. Use the end holes and two middle holes only. One flatwasher is to be placed under the bolt head, one at the top of the spring and one at the bottom of the spring next to the locknut. These bolt assemblies are to act as a hinge so that the hopper cover can be lifted by just removing the  $\frac{3}{8}$ -16 x  $\frac{3}{4}$ " bolts, flatwashers and whiz nuts on the right side of the cover.

## Level Auger Motor (570)

1. Bolt the level auger motor to the motor mount plate using  $5/16$ -18x $\frac{3}{4}$ " capscrews and flanged locknuts.
2. Put four  $\frac{1}{2}$ -13 x  $3\frac{1}{2}$ " full thread capscrews in the level auger motor mount and lock in place with flanged locknuts. Thread a  $\frac{1}{2}$ -13 hex nut onto each capscrew and install the motor mount plate with motor. See Figure 3.
3. Install the level auger guard back as shown in Figure 3. Install a  $\frac{1}{4}$  x  $\frac{1}{4}$  x  $1\frac{1}{2}$ " key in the level auger shaft and a  $\frac{1}{4}$  x  $\frac{1}{4}$  x  $1\frac{3}{4}$ " key in the 3HP motor shaft.

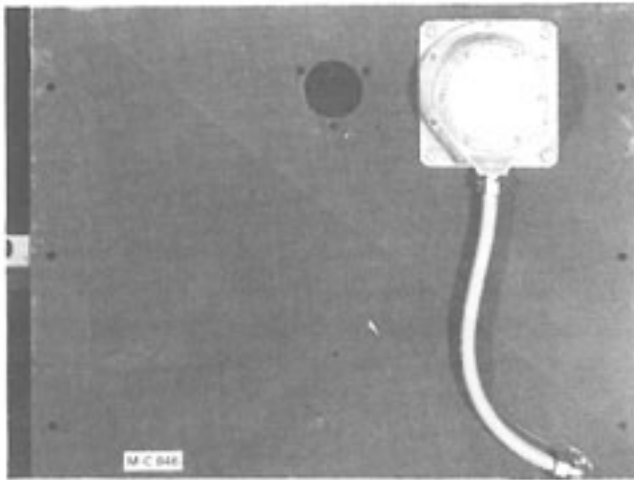


Figure 2 - Level Switch (Inside Hopper View)

4. The level auger pulley and motor pulley are held on the shafts with tapered bushings. Before installing the pulleys and bushings, thoroughly inspect the tapered surface of the bushings. Any paint, dirt, oil or grease must be removed.
5. Place the SK bushing (1 ¼" bore) into the level auger pulley and the SH bushing (1 ½" bore) into the motor pulley. The bushing and the bore of the pulley are tapered. Be sure to install the bushing into the large ID of the pulley tapered bore. If the bushing is installed into the small ID of the pulley, the pulley hub will crack when the mounting capscrews are tightened.
6. Place the three capscrews through the open holes in the bushing and thread them into the pulley by hand. **DO NOT** tighten the capscrews.

**IMPORTANT:** The capscrews and pulley threads must be clean and dry. Do not lubricate.

7. Slide the pulleys and bushings onto the shafts. If the bushings are too tight on the shaft, wedge a screwdriver blade into the saw cut in the flanged (not the tapered surface) to spread the bushing.
8. Install the belt and adjust the position of the pulleys to align the belt.
9. Tighten the three capscrews in the bushings evenly and progressively. Torque motor bushing capscrews to 9 ft. lbs. and level auger pulley bushing capscrews to 15 ft. lbs.

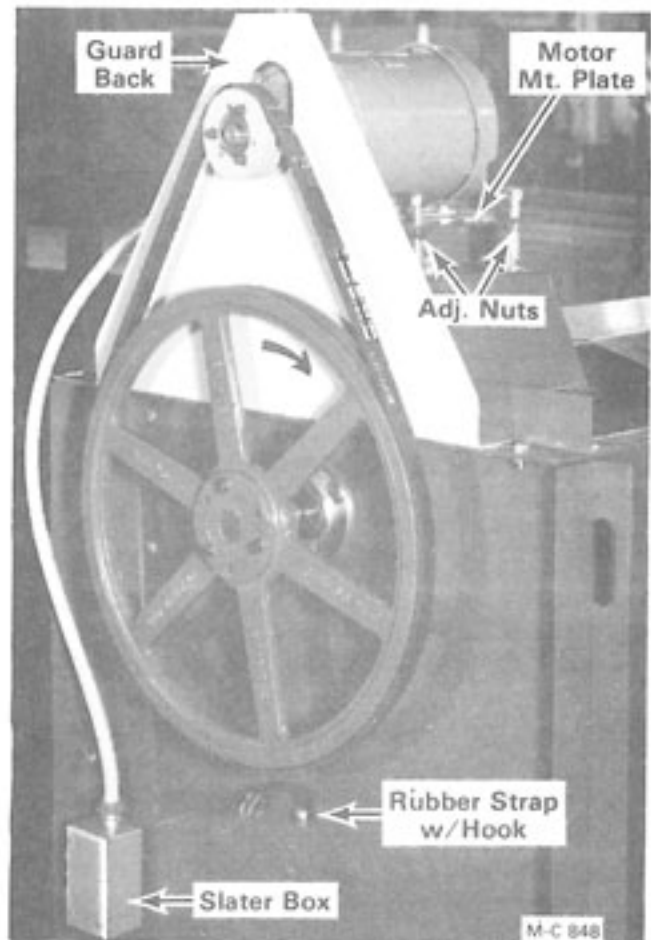


Figure 3

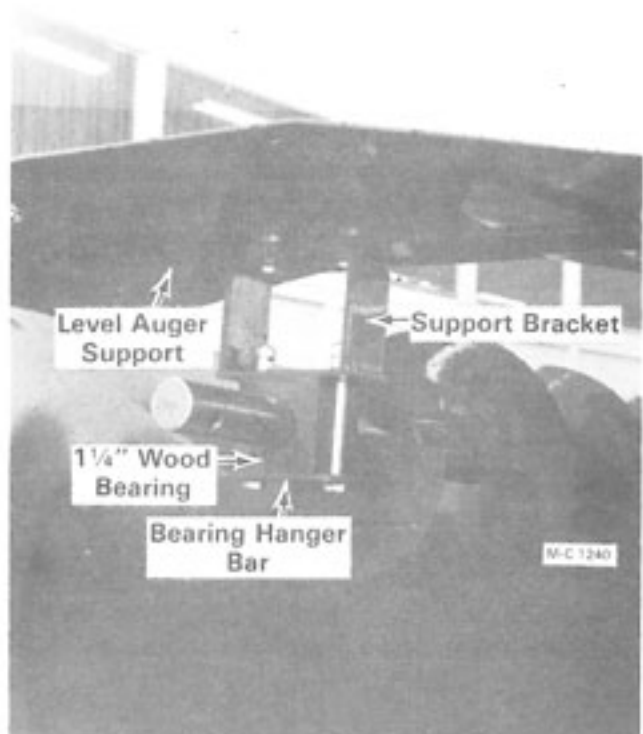


Figure 4 - Level Auger Bearing

**IMPORTANT:** The tightening force on the three capscrews is multiplied many times by the wedging action of the bushing tapered surface. Do not exceed the specified torque or use a lubricant on the capscrew threads. To do so may create bursting pressures in the hub of the pulley.

**NOTE:** There should be a  $\frac{1}{8}$ " to  $\frac{1}{4}$ " gap between the pulley hub and the flange of the bushing. If the gap is closed, the shaft is undersize.

- Adjust the belt tension by loosening the locknuts and raising the motor mount plate evenly with the four adjusting nuts, then tighten the locknuts.
- Install the rubber strap with hook to the front end panel as shown in Figure 3. Hook the level auger guard over the top of the guard back and secure with rubber strap and hook.
- Remove the level auger motor junction box cover and the Slater junction box cover. Connect the flexible conduit wire assembly (36" long) to the motor and Slater box.
- Three phase motor** - Connect the wires in the level auger motor junction box to the terminals on the motor as follows:  
Connect the red wire to terminal T1, blue wire to terminal T2, black wire to terminal T3 and green wire to ground lug.
- Single phase motor** - Refer to the wiring diagram on the inside of the level auger motor junction box cover. The level auger pulley **MUST** turn clockwise when viewed from the front of the dryer. Determine correct motor rotation and connect the red and black wires to the motor terminals specified on the diagram. Connect the green wire to ground lug.

### Installation of 570EM Hopper (Assembled on Ground)

- Place a stiffener strap #1292947 (28" long) across the centers of each 8 ft. screen section top connecting mount angles that are bolted to the top of the outer screens. See Figure 5.
- Attach cables to the lift bars on the hopper. Use spreader bars between the cables and lift hopper onto the top of the screen

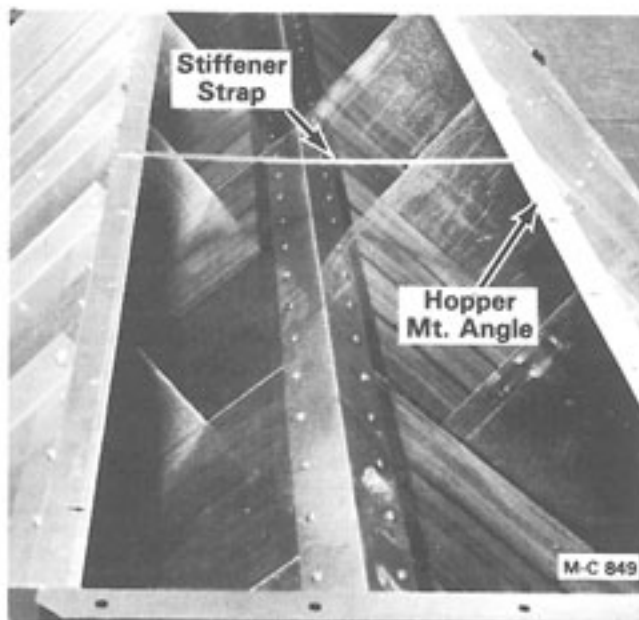


Figure 5

section. The hopper and level auger weighs about 450 lbs.

- Bolt the hopper to the hopper mount angles with  $\frac{3}{8}$ -16 x  $\frac{3}{4}$ " capscrews and flanged whiz locknuts.

### Level Auger Motor and Level Switch Wiring

**NOTE:** The level auger wire assembly consists of a length of  $\frac{1}{2}$ " flexible gray liquatite conduit.

- Connect the flexible conduit to the bottom of the Slater junction box mounted on the hopper front end panel. See Figure 1 and 3. The 570 has the Slater box mounted in a lower position than the 370.
- Connect the wires in Slater box with wire nuts and tape all connections.
  - Connect the (2) yellow wires for the Level Switch marked TB24 → LSWC together and connect the (2) wires marked LSW-NC → LASW together. These are the only (2) wires to be connected in the Slater box on the 370 model.
  - On 570 models connect the Level Auger Motor wires: (2) black, (2) red and (2) blue together (blue used with three phase power only). Be sure to connect the (2) green motor ground wires.



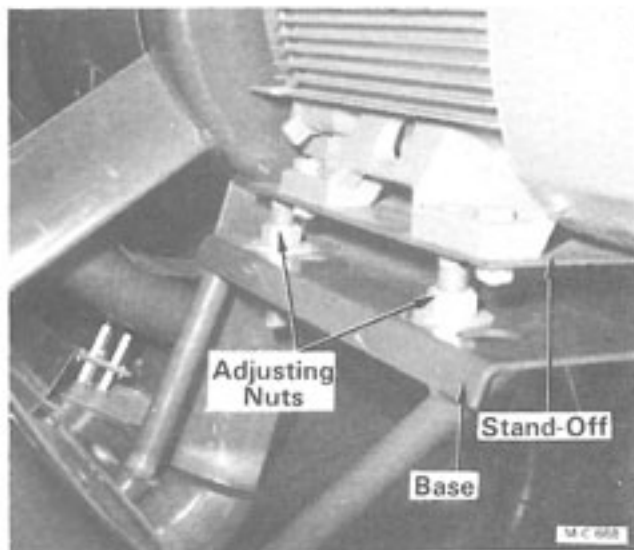


Figure 6

### Fan Clearance

1. Check for clearance between fan and fan housing. The fit between fan and housing is very close. Some shifting may have occurred during shipping. Clearance can be checked by turning fan by hand.



**CAUTION:** Do not touch any part of the fan while it is in motion -- even when turned by hand.

2. To adjust fan clearances, loosen the four locknuts under the motor base and turn the adjusting nuts on top to raise or lower the motor. See Figure 6. The holes in the base are slotted to allow for side to side adjustment. Tighten locknuts after adjustment has been completed.
3. Install the fan guard.



**CAUTION:** If fan guard has been removed, reinstall it at this time. DO NOT TURN THE ELECTRIC POWER ON UNTIL ALL GUARDS ARE INSTALLED.

### Filling Equipment (Customer Supplied)

1. There are two general methods used to fill the dryer - downspouting from an overhead wet bin or with an auger from the wet bin.
2. Be sure that the system used has the grain moving capacity to fill the dryer faster than the grain shrinks and dries. If it does not, the Grain Flow Timer will shut the dryer down when the grain level in the hopper is low.

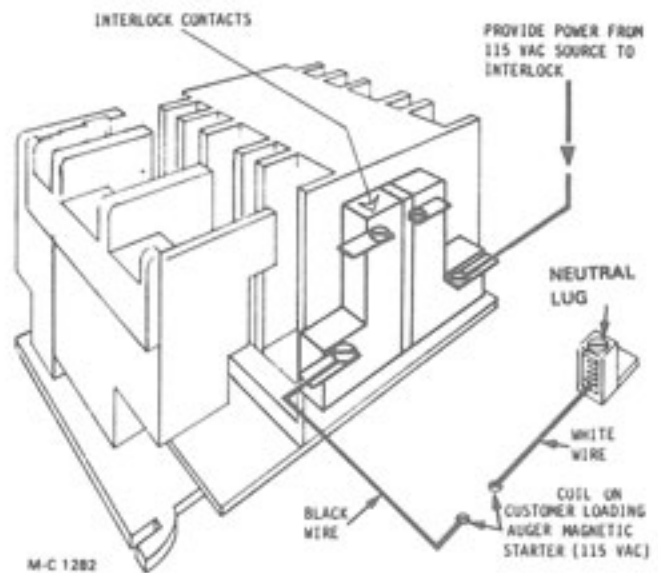


Figure 7 - Level Auger and Unload Auger Magnetic Starter

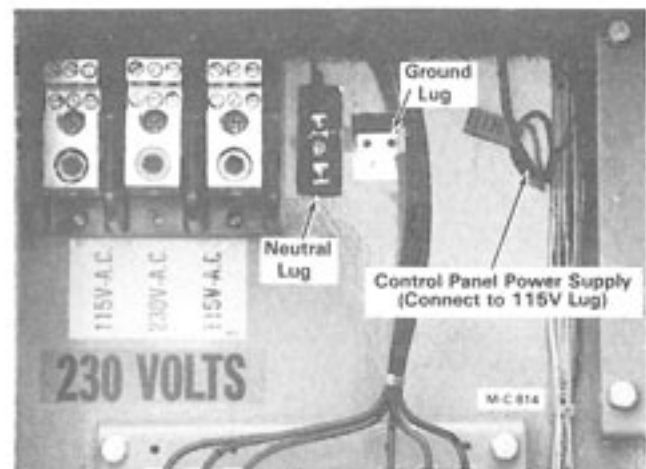


Figure 8

3. **Gravity Filling System** - To prevent overloading the level auger, a slide gate must be installed in the downspout to regulate the flow of grain to the level auger.

### Loading Augers and Take Away Equipment

1. Customer supplied loading augers **MUST** be controlled by the dryer. The take away equipment can be controlled by the dryer or by a separate source.

**IMPORTANT:** The control power to the loading auger must come from the auxiliary contact in the dryer level auger magnetic starter. If the dryer controls the take away equipment, it must be controlled by the auxiliary contact in the dryer unload auger magnetic starter.



The jumper wire(s) supplying power to the 115 volt coil on customer supplied magnetic starters must be removed before attaching any wires to the auxiliary contact in the dryer level and unload auger magnetic starter.

Follow the magnetic starter manufacturer's instructions showing jumper wire(s) to be removed when a separate 115 volt coil voltage source is used.

2. **Loading Auger** - Connect the black wire (line) from the customer supplied magnetic starter 115 volt coil to the dryer level auger magnetic starter auxiliary contact terminal and the white wire (neutral) to neutral lug. See Figure 7.
3. **Take Away Equipment** - Connect the black wire (line) from the customer supplied magnetic starter 115 volt coil to the dryer unload auger magnetic starter auxiliary contact terminal and the white wire (neutral) to neutral lug. See Figure 7.

## Electric Power Supply

1. It is the customer's responsibility to provide the power source to the control cabinet that meets all requirements of the local electrical codes. The power source must be adequately fused and have a main disconnect. It is suggested that a qualified electrician be consulted for all electrical work needed.
2. Connect the power supply to the lugs on the splitter block in the bottom control cabinet. See Figure 8.
3. Connect the incoming power supply neutral wire to the neutral lug provided in the magnetic starter portion of the control cabinet (next to splitter block).
4. The dryer must be grounded to the ground rod that is provided with the dryer. Connect the ground rod to the ground lug mounted in the magnetic starter cabinet with at least a number 10 wire.

**IMPORTANT:** The dryer controls operate on 50/60 cycle single phase 110/115V power. On 230V three phase models, the 230V power supply wire must be connected to the center lug of the splitter block as shown in Figure 8. If the 230V power supply is connected to a 115V lug and the 115V wire that supplies power to the

dryer controls is connected to this lug, the dryer controls will be damaged.

5. For this reason, the 115V power supply wire to the dryer control panel is not connected to the splitter block at the factory. There is a loose black wire close to the splitter block with an orange tag attached that reads "115 VOLTS." See Figure 8. Connect this wire to one of the 115 volt lugs.

On 380, 460 and 575 volt power supplies, a step-down transformer is installed and wired to provide the 110/115 volt electricity for the dryer controls.

## Gas Supply and Connections

### LP Gas

1. Advise your LP Gas supplier that the dryer burner requires liquid propane from the LP tank (not vapor).

**IMPORTANT:** Do not store liquid propane in tanks that have contained anhydrous ammonia. Mixing liquid propane and anhydrous ammonia produces an extremely caustic solution that will damage the dryer controls. It is recommended that only clean LP Gas equipment be used.

2. An Excess Flow valve must be installed on the LP tank. One is furnished with the dryer. **NEVER** have two Excess Flow tank valves installed on the same LP Gas line.
3. The burner requires 12 to 20 lbs. (less in mild weather) of gas pressure at the gauge in the manifold when operating. Always operate dryer with the lowest gas pressure possible that still maintains the selected drying temperature!
4. Consult the LP Gas supplier for gas line size required from the supply tank to the dryer that will provide the amount of fuel to meet the dryer BTU/Hr. requirement at the required operating pressure. See the Gas Consumption (BTU/Hr.) chart.

**IMPORTANT:** Use type of supply line specified by Local Codes.

5. Connect the LP Gas line from the tank valve to the short flexible LP Gas inlet hose at the front of the dryer on the left side. (Hose not used on dryers operated in Canada).



**CAUTION:** Before starting the dryer test for any gas leaks. Turn the gas supply on and apply soap water to ALL pipe joints and unions, including pipes assembled on the site and those assembled at the factory.

#### Natural Gas

1. Each burner requires 5 to 10 lbs. of gas pressure at the gauge in the manifold when operating.
2. Consult the gas company for gas supply line size required to the dryer that will provide an adequate volume of gas to meet the dryer BTU/Hr. requirement at the required operating pressure. See Gas Consumption (BTU/Hr.) chart.

**IMPORTANT:** Use type of supply line specified by Local Codes.



**CAUTION:** Before starting the dryer test for any gas leaks. Turn the gas supply on and apply soap water to ALL pipe joints and unions, including pipes assembled on the site and those assembled at the factory.

Gas Consumption (BTU/Hr.) See note.		
MODEL	DRY & COOL	ALL HEAT
370	1,400,000	2,000,000
570	2,300,000	3,515,600

**NOTE:** BTU/Hr. based on normal drying temperatures (at 50°F) drying shelled corn (maize).

#### Fan Rotation

**IMPORTANT:** Before checking fan rotation, inspect for and remove any foreign material (nuts, bolts, tools, parts etc.) from the hopper, grain columns, metering rolls, unload auger and heat chambers.

1. Check the fan rotation from the front of the dryer. Fan must turn counter-clockwise.



**CAUTION:** Do not turn the electric power on until the fan guard has been installed.

2. Flip all switches on the control panel OFF. Turn on the electric power supply to the dryer. The 115V POWER ON light will be on.

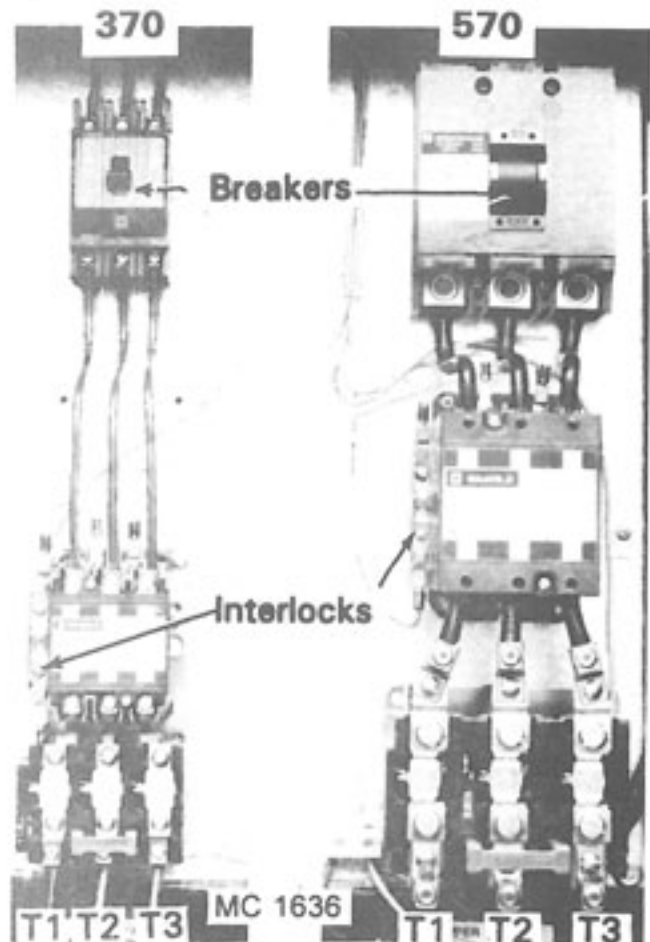


Figure 10 - Fan Magnetic Starters-3 Phase, 230V

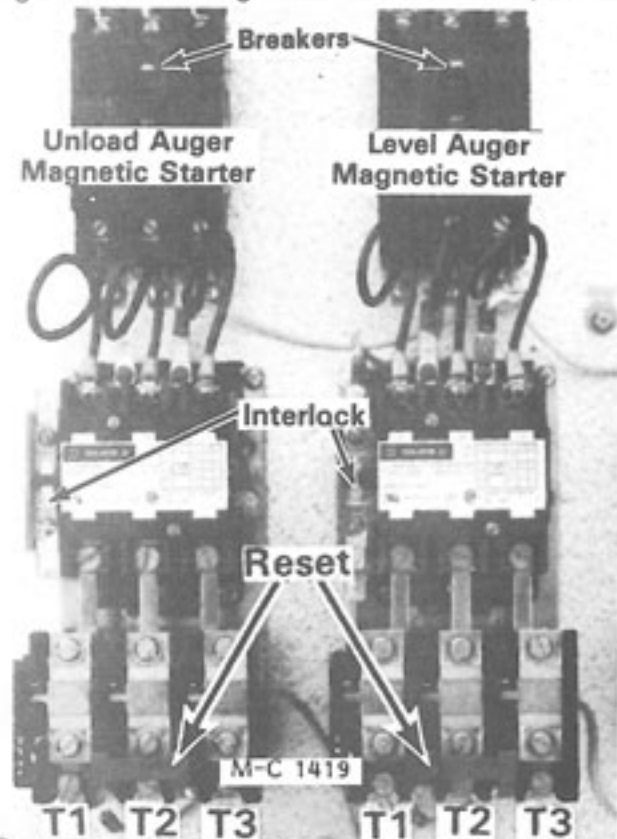


Figure 11 - Level and Unload Auger Magnetic Starters - 3 Phase, 230V

3. Flip the control circuit toggle switch ON. The control circuit ON light and high limit light will be on. If the high limit light is not on, push the reset button on the high limit switch.
4. Push the spring loaded control circuit toggle switch up to the START position and release it. The READY light and LEVEL AUGER light will be on.
5. With everyone clear of the fan, push the fan start button. Immediately push the stop button, check fan rotation and be sure the fan is not rubbing the housing.
6. If fan rotation is not correct, it can be changed as follows:



**CAUTION:** Turn off and lock the electric power supply to the dryer.

- A. **Three phase motors** - Move the wire from terminal T1 to T3 and T3 to T1 on the fan magnetic starter in the lower control cabinet. See Figure 10.
- B. **Single phase motors** - Refer to the wiring information on the inside of the fan motor junction box cover.

### Level and Unload Auger Rotation

1. Looking at the front of the dryer, the level auger pulley (570) **MUST** turn clockwise and the unload auger pulley **MUST** turn counter-clockwise. If rotation is not correct, it can be changed as follows:



**CAUTION:** Turn off and lock the electric power supply to the dryer.

- A. **Three phase motors** - Move the wire from terminal T1 to T3 and T3 to T1 on the magnetic starter in the lower control cabinet. See Figure 11.
- B. **Single phase motors** - Refer to the wiring information on the inside of the motor junction box cover.

# CONTROL PANEL LIGHTS, SWITCHES & CONTROLS

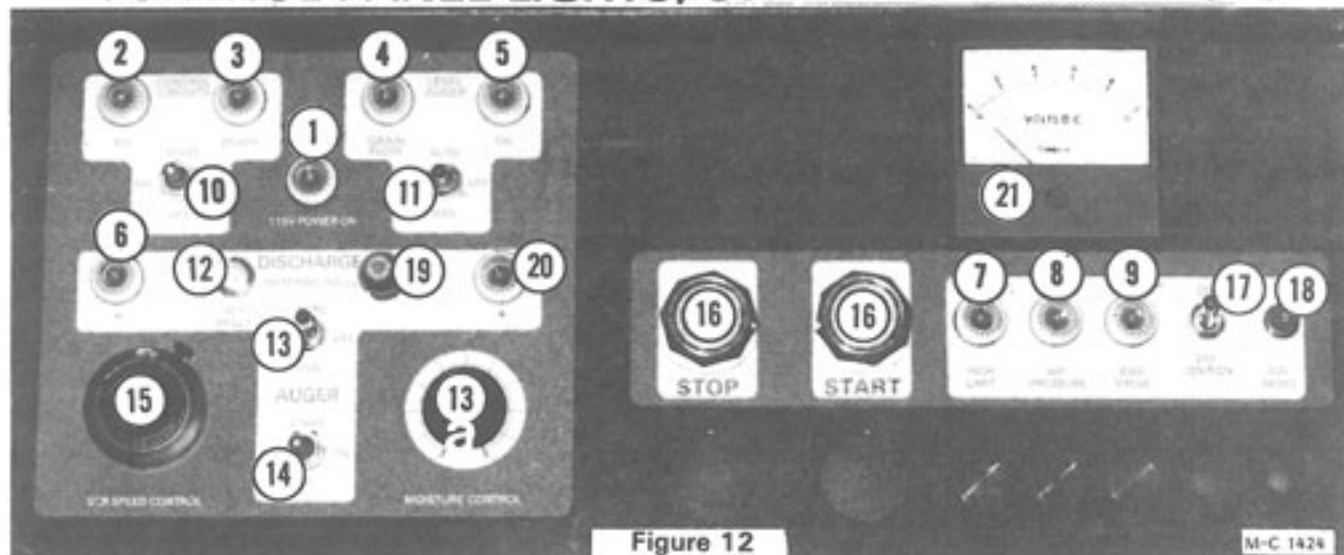


Figure 12

M-C 1424

## Control Panel Lights (see Figure 12)

### Ref. 1 - 115V Power On Light

Indicates that 115 Volt electric power to the dryer control panel is on.

### Ref. 2 - Control Circuit On Light

Indicates that the control circuit toggle switch is in the on position, the rear discharge overload door is closed and all motor magnetic starter overload relay blocks are closed.

### Ref. 3 - Control Circuit Ready Light

Indicates that the control circuit toggle switch has been pushed up to the start position and the dryer is ready to be started.

### Ref. 4 - Grain Flow Light

Indicates low grain level in the hopper. The dryer will shut down when this light comes on.

### Ref. 5 - Level Auger Light

Indicates that the grain level in the hopper is low and the level auger switch in the hopper has closed, activating the level auger circuit.

### Ref. 6 - (-) Light

Indicates that the discharge rate is slowing down if Moisture-Matic® is in automatic.

### Ref. 7 - High Limit Light

Indicates that the high limit switch is closed and the temperature in the plenum chamber has not exceeded the high limit setting.

### Ref. 8 - Air Pressure Light

Indicates that the air pressure switch is closed and the fan motor magnetic starter is engaged.

(Dryer must be full of grain and fan running.)

### Ref. 9 - Gas Valve Light

Indicates that the ignition board has supplied power to the gas solenoid valves.

### Ref. 10 - Control Circuit Switch

When the switch is in the on position, the control circuit on light will be on if the rear discharge overload door is closed and all magnetic starter overload relay blocks are closed. High limit lights will be on. If they are not, push the reset button on the high limit switches.

When the switch is pushed up to the start position, the ready light will be on if both high limit lights are on. When the ready light is on, the dryer can be started.

**NOTE:** If there is a momentary loss of electric power, the dryer will shut down. When the power comes back on, the 115V POWER ON light will be on. The dryer will have to be restarted. This feature prevents an unattended dryer restarting.

### Ref. 11 - Level Auger Switch

When the switch is in the manual position, the level auger of a 570EM or the customer's fill system for a 370EM (if wired to switch) will start immediately when the level auger switch in the hopper is closed and stops when the hopper is full and the switch is opened.

When the switch is in the automatic position, the grain flow timing circuit is activated.

**NOTE:** The operation of the level auger circuit is explained in detail under "Level Auger Operation" on page 22.

#### Ref. 12 - SCR Drive Reset Button

The SCR drive reset button (8 amp. circuit breaker) protects the SCR drive control board.

#### Ref. 13 - Discharge Metering Roll Switch

When the switch is in the automatic position, the Moisture-Matic® will speed up and slow down the SCR drive motor automatically. Unloading starts when the moisture content of the grain is reduced to the level that the moisture control is set for and slows down or stops when the moisture content is above this setting.

When the switch is in the manual position, the SCR drive motor will run continuously. The operation of the moisture control is explained under "Operation of the Discharge System" on page 23.

#### Ref. 13A - Moisture-Matic® Balance Knob

When the discharge metering roll switch is in the automatic position, the Moisture-Matic® will control the SCR drive motor to maintain the moisture content of discharge grain.

#### Ref. 14 - Discharge Auger Switch

This switch starts and stops the discharge auger. Push this spring loaded switch up to start the unload auger and release it. It will move down to the on position.

#### Ref. 15 - Manual SCR Drive Speed Control

This manual speed control is used to adjust the speed of the DC motor that drives the grain metering rolls and changes discharge speed when metering rolls switch is in the manual position.

#### Ref. 16 - Fan Start-Stop Buttons

Green button starts and red button stops the fan.

#### Ref. 17 - Ignition Switch

Flip this switch on to light the burner. After a ten second delay the gas valve light will come on and the burner will light. If the burner does not light in 5 seconds (after the gas valve light comes on) the ignition board will "lock out" closing the gas solenoid valves.

#### Ref. 18 - Ignition Reset Button

The ignition reset button (0.1 amp. circuit breaker) protects the ignition board from heat build up due to repeated ignition attempts.

#### Ref. 19 - Moisture-Matic® Fuse

#### Ref. 20 - (+) Light

Indicates that the discharge rate is speeding up if Moisture-Matic® is in automatic.

#### Ref. 21 - Discharge Meter

Indicates the rate of discharge in manual and automatic.

### BURNER AND FLOOR CONFIGURATIONS



Figure 12 A

#### Dry and Cool Operation

1. Close hand gas valves on the 3 burner lead tubes that supply gas to the 3 lower burners.
2. Install the floor extension to divide the fan housing.
3. Install the heat chamber door in the floor.

#### All Heat Operation

1. Open the hand gas valves on the 3 burner lead tubes that supply gas to the 3 lower burners.
2. Remove the floor extension that divides the fan housing.
3. Remove the heat chamber door in the floor.



# INITIAL START-UP INSTRUCTIONS

## General

**IMPORTANT:** Inspect for and remove any foreign material (nuts, bolts, tools, parts, etc.) from the hopper, grain columns, metering rolls, unload auger and heat chambers before filling the dryer with grain.

1. Flip all of the toggle switches on the control panel to the CFF position.
2. **LP Gas** - Close the liquid line flip valve for burner (handle down), see Figure 13.
3. Close the gas main hand valve for burner (handle 90° to the piping), see Figure 14.
4. Check the modulating valve in gas manifold to be sure the "T" handle has not been turned all the way in to the wide open position, see Figure 14. The "T" handle should be halfway between the closed and fully open position.
5. Turn on the electric power supply to the dryer. The 115V POWER ON light will be on.
6. Flip the control circuit toggle switch ON. The control circuit ON light and high limit light will be on. If the high limit light is not on, push the reset button on the high limit switch, see Figure 15.
7. Push the spring loaded control circuit toggle switch up to the START position and release it. The READY light and LEVEL AUGER light will be on.

## Filling the Dryer

**CAUTION:** Do not allow anyone to be in the hopper when filling the dryer.

**Always** turn off and lock the electric power supply to the control cabinet before allowing anyone to work in the hopper.

1. Flip the level auger toggle switch to the MANUAL position. The level auger (570) will start immediately and the level auger light on the control panel will be ON.
2. When the dryer is full, the grain will open the level auger switch in the hopper. The level auger will stop and the LEVEL AUGER light will be out.

## High Limit Switch

Adjust high limit 30° to 50° above operating temperature. This will avoid nuisance shut-downs during start up.

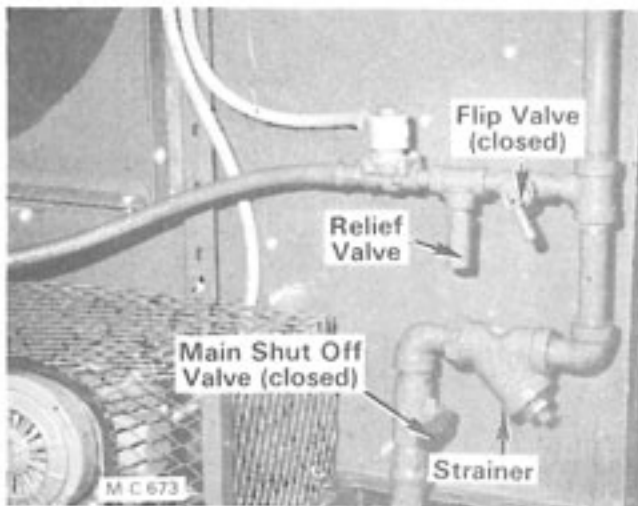


Figure 13

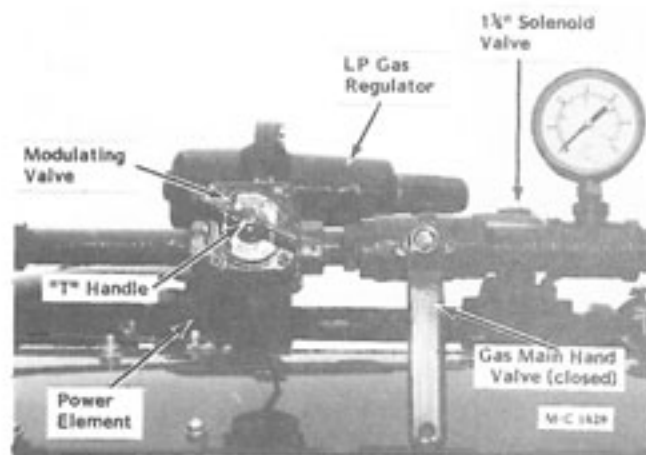


Figure 14

## Air Pressure Switch

### General

1. There is an air pressure switch for the heat chamber, see Figure 15. The air pressure switch senses the static air pressure in the heat chamber when the dryer is full of grain and the fan is running. If the static air pressure drops because of fan failure, the air pressure switch opens stopping current flow to the ignition switch. The gas solenoid valves will close and the burner will shut down.
2. The air pressure switch is designed to protect the dryer from fire that may result from fan (air flow) failure while the burner is ignited and flame is present.



**CAUTION:** This safety feature is for your protection and protection of the dryer. The air pressure switch should



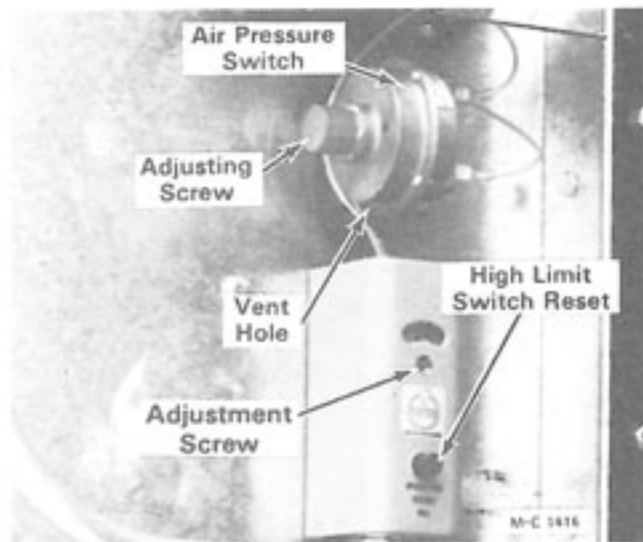


Figure 15

be checked for correct operation at the start of the drying season and periodically during the season.

#### Checking

1. After the dryer has been filled and before the burner is started, the operation of the air pressure switch **MUST** be checked. Be sure the rear doors are closed.
2. Start the fan.

**NOTE:** The magnetic starters are wired in series. If one magnetic starter overload relay trips, the dryer will shut down. All lights except the **POWER ON** light will be out. When the overload relay is reset the control circuit **ON** and high limit lights will be on.

Flip the control circuit switch up to the start position and release it, the **READY** light will be on. Flip the ignition switch **OFF** and restart the fan, burner and discharge auger.

3. The air pressure light on the control panel will come **ON** as the fan comes up to speed.
4. If the light does not come **ON** or comes **ON** too soon (before the fan comes up to speed) the air pressure switch must be adjusted.

**NOTE:** If the light does not come on, remove the air pressure switch and check to be sure the  $\frac{1}{8}$ " vent hole in the bottom of the air pressure switch is open, see Figure 15. Also check for an obstruction in the air pressure tube and filter, see Figure 15.

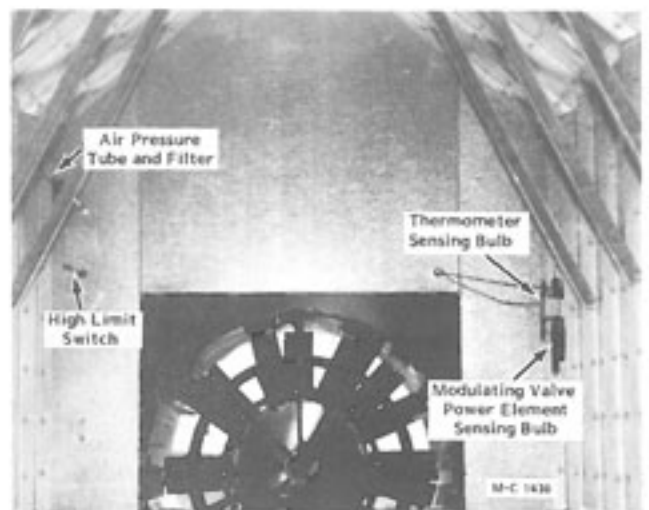


Figure 16

#### Adjusting

**NOTE:** The fan must be running before the air pressure switch can be accurately adjusted.

1. Remove the plastic cap on the air pressure switch. The slotted screw is the adjusting screw, see Figure 15.
2. Turn the adjusting screw in (clockwise) until the air pressure light goes out.
3. Turn the adjusting screw out (counter-clockwise) until the air pressure light comes **ON**. After the air pressure light comes **ON**, turn the adjusting screw out an additional  $\frac{1}{2}$  turn to allow for normal changes in static pressure.
4. Shut off the fan. The air pressure light will go out when the fan stop button is pushed. These dryers are wired so that the power flows from the fan start button to the air pressure switch.
5. If all air pressure switch adjustment is used and the air pressure light does not come on, the air pressure switch is defective and must be replaced. Check the operation of the new air pressure switch. Adjust if necessary.
6. If the air pressure light is blinking, turn the adjusting screw out a small amount.

#### Starting the Burner

1. **LP Gas** - Open the supply valve at the tank, the hand valve at the LP Gas inlet hose and open (lift up) the liquid line flip valve on the burner, see Figure 13. The flip valve is open when the handle is  $90^\circ$  to the piping.

**Natural Gas** - Open the supply valve.

2. Start the fan.
3. Open the gas main hand valve (Figure 14)  $\frac{1}{4}$  of the way. Flip the burner ignition switch ON. After a ten (10) second delay the gas valve light will be ON and the burner will light.

**NOTE:** The ten second delay before ignition is a safety feature that allows the fan to purge the heat chamber of any unburned gas that may remain after a burner has been shut down for any reason.

4. After the flame is established, slowly open the burner gas main hand valve all the way (handle parallel to the piping).

**NOTE:** Opening the gas main hand valve slowly will prevent possible freezing of the LP gas line and also prevent the temperature from rising too fast. If the temperature rises too fast, the high limit switch will trip out and the dryer will shut down.

5. If the LP gas line freezes, close the gas main hand valve and flip the ignition switch OFF. After the gas line thaws out repeat steps 3 and 4, but open the gas main hand valve slower.

**NOTE:** The ignition board is electronically timed so that the ignition system will continue to spark and hold the solenoid gas valves open for a "trial ignition" period (about 5 seconds). If the burner does not light, the system will "lock out" (after the 5 second trial period) closing the solenoid gas valves. The gas valve light will be out.

6. Flip the ignition switch OFF then ON again. The gas valve light will come ON after the ten second delay and another trial for ignition period (5 seconds) will start.
7. If after several attempts for ignition there is still no flame, push the 0.1 (1/10th) amp. ignition reset button (circuit breaker) on the control panel, see Figure 17. This circuit breaker protects the ignition board from heat build up due to repeated ignition attempts.

**NOTE:** If the burner fails to light, check the electrode, 10 second delay and ignition board as explained under "Direct Spark Ignition System," page 32.

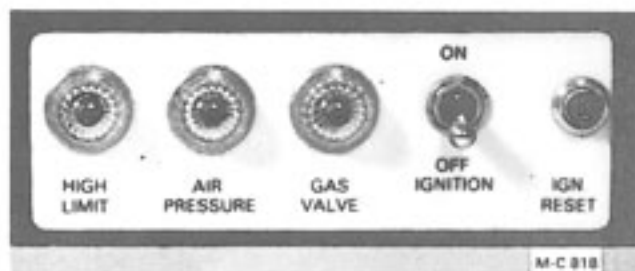


Figure 17

8. If the high limit switch trips out, close the gas main hand valve and flip the ignition switch OFF. Push the reset button on the high limit switch to reset it, see Figure 15. Adjust high limit  $30^{\circ}$  to  $50^{\circ}$  above operating temperature. This will avoid nuisance shutdowns during start up.

**NOTE:** When a high limit switch trips out, the dryer will shut down. Fan and burner will have to be restarted.

9. Push the control circuit switch up to the START position and release it. Restart the fan. Repeat steps 3 and 4, but open the gas main hand valve slower to prevent the temperature from rising too fast.
10. **LP Gas Only** - When the flame is established, the heat causes the LP gas to vaporize. After the burner has been running for 10 minutes check the vaporizer coil as follows:
  - A. Check the LP gas line coming out of the fan housing from the vaporizer coil to the pressure regulator carefully with your hand, see Figure 18.



**CAUTION:** The line may be very hot.

- B. When the vaporizer coil is positioned correctly in the flame, the LP gas line coming out of the fan housing from the vaporizer coil to the pressure regulator should feel very warm, but not so hot that you cannot hold your hand on it.
- C. If it feels cool, the vaporizer coil is not close enough to the flame. If it is very hot, the vaporizer coil is too close to the flame.
- D. Shut off the burner and fan.



**CAUTION:** Turn off and lock the electric power supply to the control cabinet.

- E. Go into the plenum chamber and move the coil closer to or away from the flame, see Figure 19.
- F. After the adjustment has been made, turn on the electric power supply. Restart the fan and burner, and recheck temperature.
11. **LP Gas Only** - With the burner operating, check the reading on the gas pressure gauge in the manifold, see Figure 18. It should be approximately 12 to 20 pounds (less in mild weather). If not, remove plastic cover and loosen the locknut on the pressure regulator adjusting screw, see Figure 18. Turn the adjusting screw IN to increase and OUT to decrease pressure.

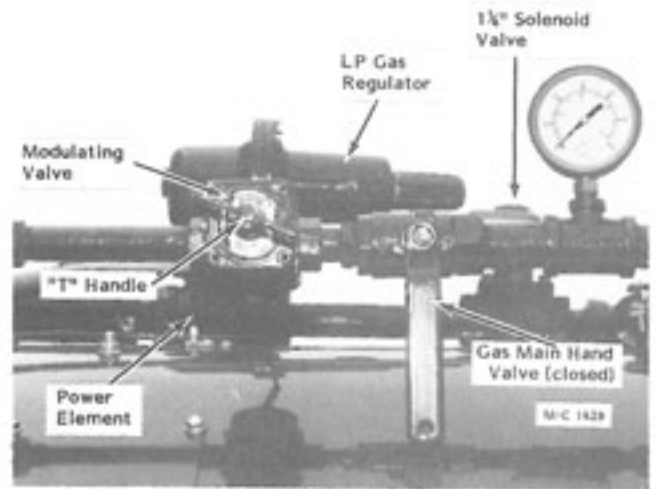


Figure 18 - LP Gas

**NOTE:** After the dryer has been operating for several hours, check the gas pressure gauge and make any corrections. Always operate the dryer with the lowest gas pressure possible that maintains the selected dryer temperature.

### Setting Burner Operating Temperature

**NOTE:** Refer to the "Suggested Burner Operating Temperature Setting Chart." See Figure 20. Temperatures shown are initial settings and may have to be adjusted for local crop and weather conditions.

1. With the burner operating, set the operating temperature by adjusting the modulating valve.
2. Turn the "T" handle on the modulating valve IN to INCREASE temperature and OUT to DECREASE temperature. See Figure 18. There is a temperature gauge on the side of the control cabinet for the burner.
3. After the burner operating temperature has been set, close the gas main hand valve, flip the ignition switch off and turn off the fan.

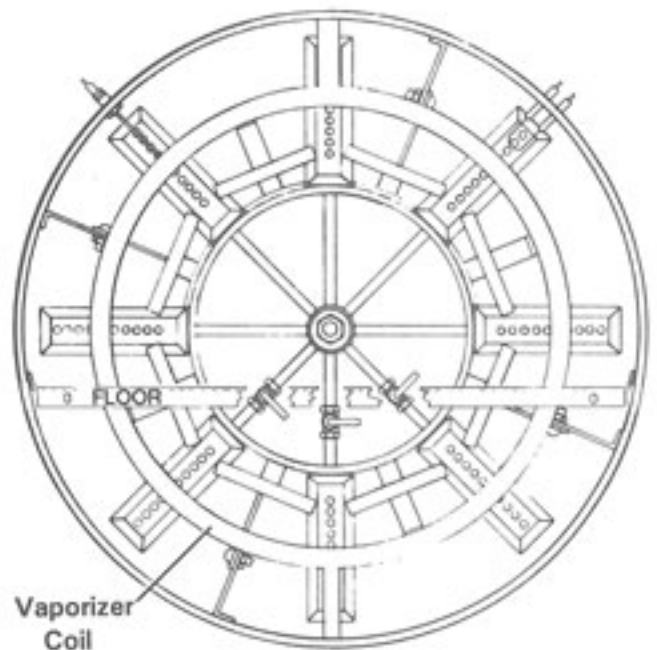


Figure 19 - LP Gas

**NOTE:** Once grain drying has started and the dryer has been operating for several hours, the modulating valve should maintain the drying temperature selected. It will not be necessary to adjust the valve on future start-ups unless the drying temperature is to be changed.

### Suggested Burner Operating Temperature Settings °F (°C)

**IMPORTANT:** Use this chart as a starting point for drying the crops listed. Depending on the condition of the crop, you may have to increase or decrease the temperature shown. When drying seed grain, use lower temperatures.

DRYER MODEL	MAIZE (CORN)		SORGHUM & WHEAT		SUNFLOWERS, OATS, BARLEY, SOYBEANS	
	DRY & COOL	ALL HEAT	DRY & COOL	ALL HEAT	DRY & COOL	ALL HEAT
370 & 570	230 (110)	235 (113)	170 (77)	170 (77)	140 (60)	140 (60)
	COOL		COOL		COOL	

Figure 20

# OPERATING INSTRUCTIONS

## Level Auger Operation

### Description

There is an adjustable .1 to 8 minute delay in the level auger circuit. See Figure 21. It is activated when the level auger switch is in the AUTOMATIC position and the level auger light is signaling for grain.

This delay prevents nuisance starting and stopping of the customer supplied fill auger on the 370 and the level auger on the 570. If the level auger switch is flipped to OFF and back to the AUTOMATIC position, the delay will recycle.

The Grain Flow Timer, Figure 21, will shut the dryer down if there is an insufficient grain supply to fill the hopper. When the level auger starts, the Grain Flow Timer will be activated. When the timer counts down to zero, the dryer will shut down and the Grain Flow light will come on.

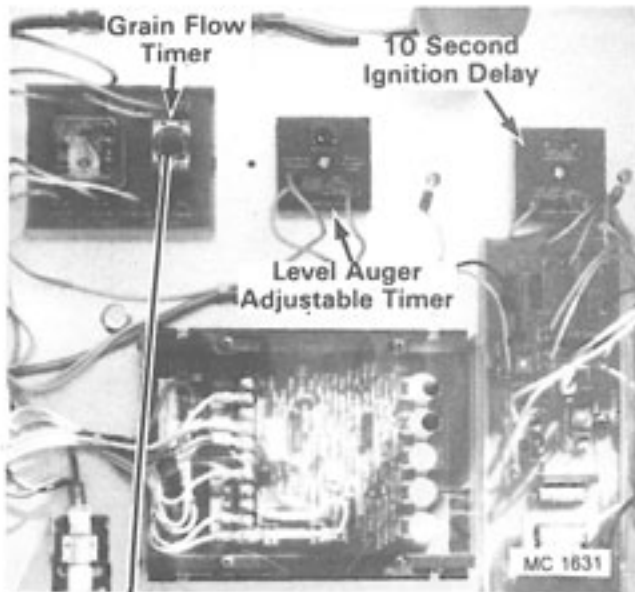
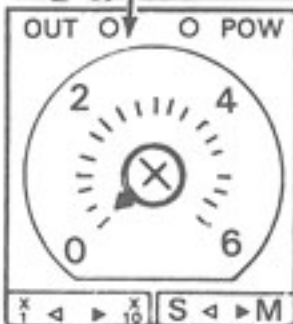


Figure 21



NOTE:  
SET TIMER FOR X 10 AND  
MINUTES. ADJUST FROM  
UNDERSIDE OF TIMER.

### Setting the Grain Flow Timer

**IMPORTANT:** If the timer has not been set, the dryer will shut down when the level auger toggle switch is flipped from MANUAL TO AUTOMATIC.

1. Set the adjustable level auger delay, Figure 21, for time desired (.1 to 8 minutes).
2. Set the Grain Flow Timer arrows at the bottom of the timer face to X10 (times ten) and to M (minutes). It may be necessary to remove the timer from its socket to make this adjustment. Now turn the timer control knob to 3 (3x10) or 30 minutes and flip the level auger switch to AUTOMATIC. The level auger will start after the .1 to 8 minute delay if the level auger light is on signaling for grain.
3. Check the wet hopper refill time a minimum of 6 times. The level auger light will come ON when the level auger switch in the hopper signals for grain and will go OUT when the hopper is full. The length of time that the level auger light is on is the refill time (including the .1 to 8 minute delay).
4. Average the 6 refill times and reset the Grain Flow Timer, Figure 21, to run 5 minutes longer. For example, if it takes the level auger an average of 5 minutes to refill the wet hopper, set the Grain Flow Timer to run 10 minutes.

**NOTE:** The timer does not operate when the level auger toggle switch is in the MANUAL or OFF position.

### Grain Flow Timer Operation

With the Grain Flow Timer set to run 5 minutes longer than the wet hopper refilling time, the timer will work as follows:

1. The timer will start when the level auger starts. The red light on the face of the timer will be on and the timer will start to count down to zero.
2. After the level auger refills the hopper and shuts off, the level auger light will go out and the timer will automatically reset. The red light on the face of the timer will be out.



3. If there is an insufficient grain supply, the level auger will continue to run beyond the 5 minute refilling period. When the level auger has run the length of time that the Grain Flow Timer has been set, the dryer will shut down.
4. The grain flow, high limit, control circuit ON, 115V power ON and the two red lights at the top of the Grain Flow Timer will be on. Flip the level auger switch OFF.

**NOTE:** When the Grain Flow Timer shuts the dryer down, determine the problem.



**CAUTION:** Turn off and lock the electric power supply to the dryer before any service work is performed.

5. When the problem has been corrected, flip the control circuit switch OFF, then up to the START position and release it. The READY light will go on and the Grain Flow Timer will be reset.
6. Flip the level auger switch to MANUAL. Restart the fan, burner and discharge auger. Flip the level auger switch to the AUTOMATIC position. The level auger .1 to 8 minute delay will be activated if the level auger panel light is on signaling for grain.



**CAUTION:** Do not allow anyone to be in the hopper as the level auger will start automatically.

## Operation of the Discharge System

(See Figure 22 thru 25)

The unload (discharge) auger and metering rolls are used to unload grain from the dryer. The unload auger operates at a constant speed while the metering roll speed can vary depending upon the speed of the DC motor that drives the metering rolls.

1. The discharge auger spring loaded toggle switch must be pushed up to the START position and released so that it will move to the ON position and start the auger before the metering roll switch is activated. This prevents the metering rolls from dumping grain onto a stopped discharge auger. If the electricity to the dryer is interrupted for any reason, the discharge auger toggle switch will lock out and must be pushed down to the OFF position and then back up to the START position to restart the discharge auger and metering rolls.
2. The grain metering rolls are driven by a 1/3HP direct current motor and gearbox. The speed of the motor when the metering roll switch is in MANUAL is controlled by a potentiometer (SCR drive speed control) located on the control door. The speed control dial is graduated from 0 (slow) to 10 (fast). Set Maximum speed as described on page 37.

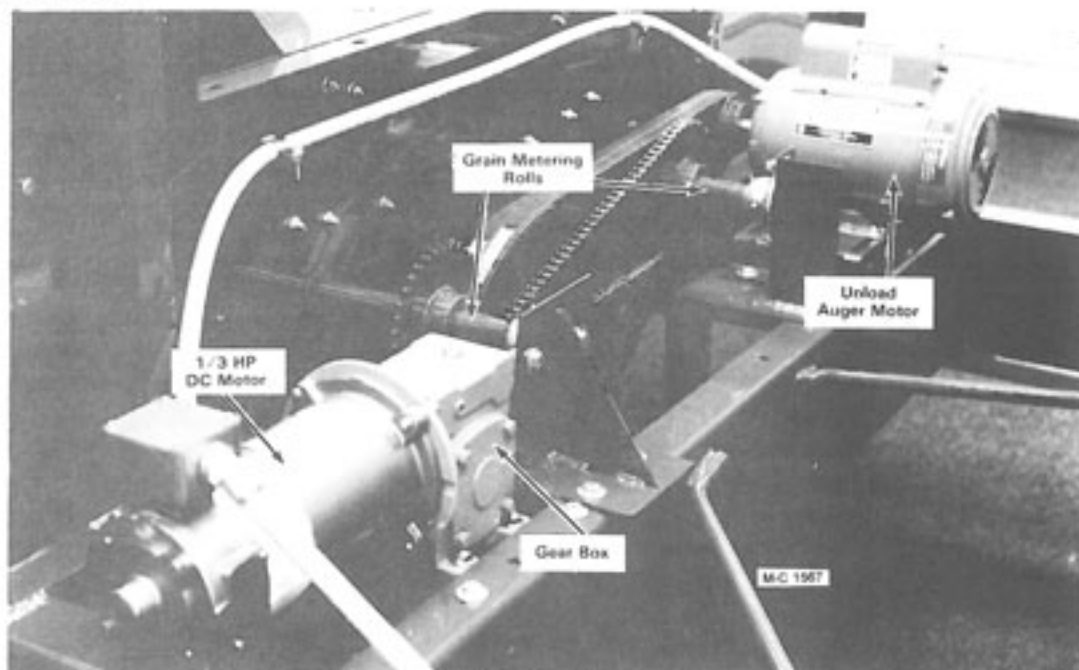


Figure 22

- When the discharge metering roll switch is in the AUTOMATIC position, the Moisture Control System determines the speed of the 1/3HP DC drive motor and the discharge metering rolls in response to grain temperature changes.
- A rear discharge overload door at the top rear of the discharge auger is provided in case the customer supplied grain take-away system fails. If such a failure occurs, the dryer will continue to discharge grain until the rear discharge overload door is raised by the excess grain.

When the overload door rises, the unload switch opens, the dryer shuts down, and all of the indicator lights except the 115V POWER ON light will be out. The grain flow timer will automatically reset. When the problem has been corrected and the rear discharge overload door closes, the control circuit ON and high limit lights will be on. Flip the control circuit switch up to the start position and release it, the READY light will be on. The level auger delay will also be activated if the level auger toggle switch is in the AUTOMATIC position and the level switch in the hopper is signaling for grain.



**CAUTION:** Do not allow anyone to be in the hopper as the level auger will start automatically.

Flip the ignition switches OFF and restart the fans, burners and discharge auger.

## Automatic Moisture Control System

There is a direct relationship between grain temperature and grain moisture. Any change in grain temperature will mean a change in grain moisture. If the temperature of the grain goes down, the moisture content will have increased. If the temperature of the grain goes up, the moisture content will have gone down.

The automatic moisture control on M-C Dryers maintains uniform moisture content of the grain being discharged from the dryer by changing the unloading speed of the dryer.

The moisture control is sensing grain temperature and reacting to it by slowing down or speeding up the unload rate of the metering rolls.

## Cold Grain Shut-Down Timer (Starting with Serial Number 56052)

This 0 to 60 minute timer is provided to limit the time that the dryer will discharge grain after the burner unexpectedly goes out (lack of fuel, etc.).

The timer is only activated when the Discharge Metering Roll Switch is in the automatic position and the Moisture Control System reduces the speed of the metering rolls. At this time one of the red lights on the face of the timer will be on and the timer will start to move to zero.

If the speed of the metering rolls is not increased before the time selected on the timer is reached, the dryer will be shut down and only the 115V power ON, control circuit ON, and high limit lights will be on.

Set the timer arrows at the bottom of the timer face to X10 (times ten) and to M (minutes). Now turn the time control knob to 3 (3x10) or 30 minutes for a starting point.

## Drying Grain

- Flip all of the toggle switches on the control panels to the OFF position.
- Turn on the electric power supply to the dryer. The 115V POWER ON light will be on.
- Flip the Control Circuit Switch ON. The control circuit ON light and high limit light will be on.
- Push the Control Circuit Switch up to the START position and release it. The READY light will be on. The level auger light will be on if the dryer is not full of grain.
- Flip the Level Auger Switch to the MANUAL position. Set the Grain Flow Timer as explained under "Level Auger Operation" on page 21.
- With the dryer full of grain, flip the Level Auger Switch to AUTOMATIC and start the fan.

**NOTE:** If the dryer is to be operated "Dry and Cool," it will be necessary to recycle the wet grain in the cooling section back through the heat section after drying the first load.



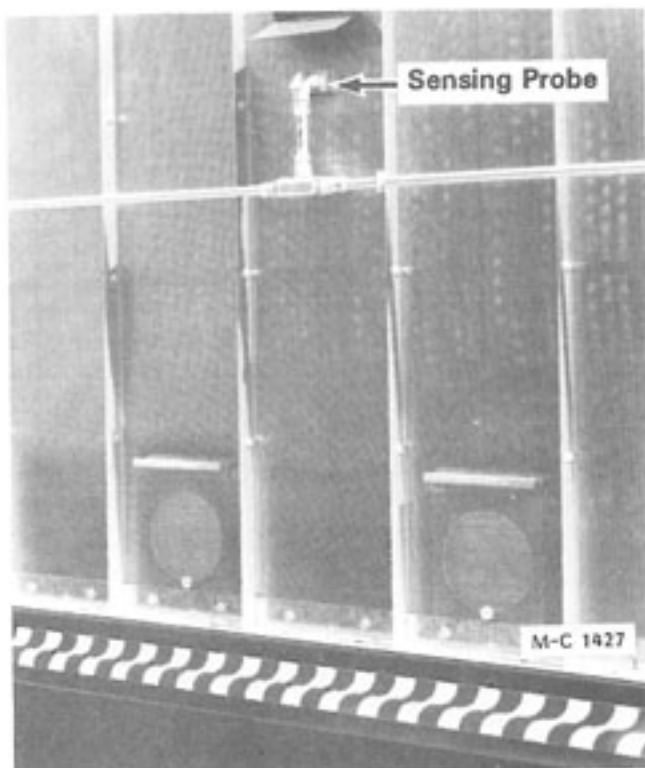


Figure 23 - Moisture-Matic Sensing Probe - 570

7. Start the burner.
8. Running on continuous heat, it will take approximately 6 minutes per point of moisture being removed to dry the first load.
9. When the first load is dry, push the Discharge Auger Spring Loaded Toggle Switch up to the START position and release it. It will move down to the ON position.
10. Flip the Discharge Metering Roll Switch to the MANUAL position. The SCR drive motor will start and the dryer will begin unloading grain.  
If the SCR drive motor does not start, push the SCR drive circuit breaker reset button in, see Figure 12, Ref. 12.
11. The SCR Drive Speed Control Dial, Figure 12, Ref. 15, is graduated from 0 (slow) to 10 (fast). Use the Start-Up SCR Manual Drive Speed Setting Chart, Figure 24, as a guide to set the SCR Drive Speed Control when starting to dry for the first time.
12. Test the moisture content of the grain being discharged every 15 minutes until it stabilizes.

#### Start-Up SCR Manual Drive Speed Settings

**NOTE:** These dial settings are not final and are based on normal drying temperature (see page 21). Exact settings will vary with outside temperatures, humidity, crop maturity, variety, cleanliness of grain, test weight, drying temperatures, etc. All values based on 70 volts as SCR maximum voltage. Under 0.5 setting of SCR dial, voltage to SCR motor may become inadequate to properly turn loaded feed rolls. Care should be taken when operating at these low speeds.

(Sprocket Gear Ratio 266:1)

CROP	DRYING MODE	MOISTURE REMOVAL	SCR SETTING MODEL	
			370	570
Corn	Dry & Cool	20% - 15%	4.2	3.6
Corn	Dry & Cool	25% - 15%	2.4	2.1
Corn	All Heat	22% - 17.5%	6.8	6.0
Corn	All Heat	25% - 17.5%	4.4	4.4
Wheat	Dry & Cool	17% - 12%	4.7	3.9
Sorghum	Dry & Cool	20% - 15%	4.2	3.5

Figure 24

13. If the moisture content is too high after it stabilizes, turn the SCR Drive Speed Control down to a lower number to decrease the unloading speed. If it is too low, turn the speed control up to a higher number to increase the unloading speed.

#### Switching from Manual to Automatic

1. Before placing the discharge metering roll switch into the automatic position, the dryer must be operated in the MANUAL position. Set the manual SCR speed control to establish a discharge rate that will unload dry grain at the desired moisture content. See Figure 24. When the moisture content of the discharged grain has been consistent for two or more hours, it is time to switch up to AUTOMATIC.
2. While the discharge metering roll switch is in MANUAL, turn the moisture control dial to balance the Moisture Control System to the point that both the (-) and (+) lights are off. At that point the Moisture Control System is calibrated to the moisture content established in the MANUAL setting.
3. Now flip the metering roll switch up to the AUTOMATIC position.

Now the manual SCR speed control is OFF and the discharge rate is being controlled by the Moisture Control System board and the thermistor (sensing probe).

The unloading speed on the discharge meter should be the same as when the switch was in MANUAL, but the meter will begin to change automatically.

When the moisture content of the incoming grain changes (wetter or drier), the discharge rate will change automatically. If the speed slows down because the incoming grain is wetter, the (-) light will come on and the discharge meter indicator will drop until the unload speed is automatically adjusted. When the adjustment is completed, the (-) light will go out and the discharge meter indicator and the unload speed will remain constant until another change is required.

If the discharge speed increases because the incoming grain is drier, the (+) light will come on and the discharge meter indicator will move up until the unload speed is automatically adjusted. When the adjustment is completed, the (+) light will go out and the discharge meter indicator and the unload speed will remain constant until another change is required.

The system will automatically change speed (+) or (-) to keep the discharge grain at the moisture content that was selected when the metering roll switch was in the MANUAL position.

## Moisture Control Setting and Adjustment When in Automatic

The discharge rate will change to keep moisture content the same as when in manual. However, if you want to change the discharge moisture content when operating in automatic, simply turn the moisture control dial up to a higher number for drier grain or down to a lower number for wetter grain. When you turn the dial either the (+) light or the (-) light will come on and you will see the discharge meter indicator change to reflect the change in speed.

## End of Day Shutdown

1. To shut off the dryer, close the liquid propane gas supply valve at the tank or close the natural gas supply valve. Operate burner until the flame goes out then turn off ignition switch.
2. Close gas main hand valve and liquid line flip valve on dryers equipped with a liquid propane (LP) burner.

3. Place the Discharge Metering Roll and Level Auger Switches into the OFF position. After at least one (1) minute place the Discharge Auger Switch into the OFF position.
4. Operate fan about 15 to 20 minutes to cool grain in dryer, then turn off fan and flip the Control Circuit Toggle Switch to the OFF position.
5. Turn off and lock the electric power supply to the dryer.

## Next Day Start-Up

1. Turn on electrical power to dryer, flip Control Circuit Switch up to START, place Level Auger Switch into AUTOMATIC, and start fan.
2. Open liquid propane gas supply valve at tank or natural gas supply valve and liquid line flip valve on dryers equipped with a liquid propane burner.
3. Open gas main hand valve  $\frac{1}{4}$  of the way and flip the Burner Ignition Switch ON. After flame is established, slowly open burner gas hand valve all the way.
4. Allow grain to warm up for 10 to 15 minutes before placing Discharge Auger Switch into the ON position and Discharge Metering Roll Switch into AUTOMATIC.

## Going Back to Manual

You can switch back to manual at any time. Just flip the metering roll switch down to the MANUAL position. At this time the Moisture Control System will be off and the discharge metering roll speed will be controlled by the manual SCR drive speed control. The discharge meter will indicate the manual speed setting. If you want to unload at the same speed in manual as automatic, adjust the SCR drive speed control until the discharge meter indicator is at the same reading as in automatic.

When operating in manual the (+) and (-) lights may be lit. However, they are only indicating what would happen if you were in automatic based on the set point of the moisture control knob. When in manual, you can balance the (+) and (-) lights. However, unless you go to the automatic position nothing will change. In the manual position the discharge rate can only be changed by adjusting the SCR speed control dial.

## Rear Discharge Overload Door

1. If the customer supplied grain take away system fails, the dryer will continue to discharge grain until the rear discharge overload door, Figure 25, is raised by the grain.
2. When the overload door rises, the dryer will shut down and all of the lights except the 115V POWER ON light will be out. The Grain Flow Timer will automatically reset.
3. When the problem has been corrected and the rear discharge overload door closes, the control circuit ON and the high limit light will be on. Flip the control circuit switch up to the start position and release it, the READY light will be on.
4. The level auger delay will be activated if the level auger switch is in the AUTOMATIC position and the level auger switch in the hopper is calling for grain.



**CAUTION:** Do not allow anyone to be in the hopper as the level auger will start automatically.

5. Flip the ignition switch OFF and restart the fan, burner and discharge auger.

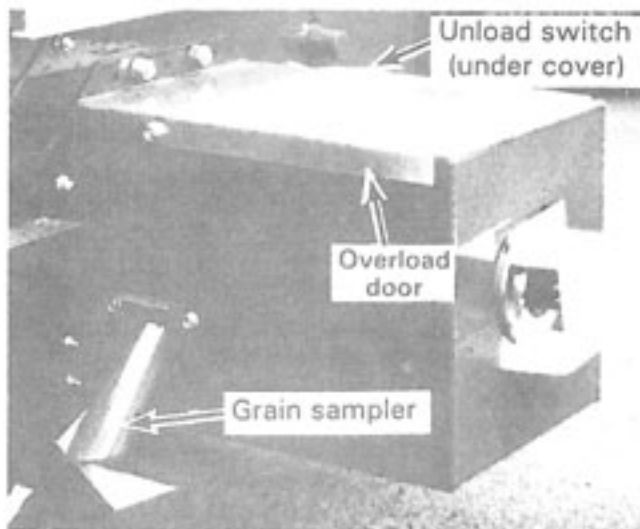


Figure 25

## Control Cabinet Heat Bulb

1. The heat bulb in the upper control cabinet, Figure 26, will always be on when the electric power supply to the dryer is on. It does not have an ON-OFF switch.
2. The bulb supplies heat to help keep the electrical components in the cabinet dry.

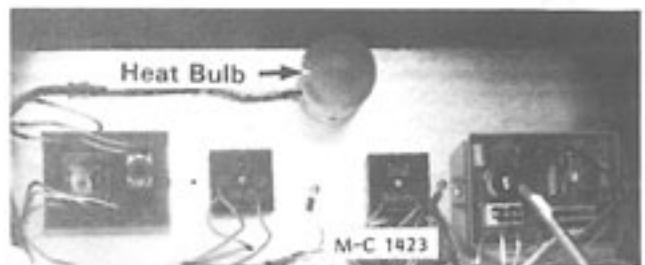


Figure 26

## Temporary Shut Down

1. Close the LP Gas supply valve at the tank or close the natural gas supply valve. Operate the burner until the flame goes out. Flip the ignition switch OFF.
2. Close the gas main hand valve ((handle 90° to the piping).
3. LP Gas - Close the liquid line flip valve for burner (handle down) and the hand valve at the LP Gas inlet hose.
4. Flip the discharge metering roll, level auger and discharge auger toggle switches OFF.
5. Run the fan approximately 20 minutes to cool the grain in the dryer, then turn off fan. Flip the control circuit toggle switch OFF.
6. Turn off and lock the electric power supply to the dryer.

**NOTE:** Do not turn the 115V electric power supply off if the heat bulb in the control cabinet is to remain on.

## Restarts



**CAUTION:** If the outside temperature dropped below freezing (32°F) after the dryer was shut down, check to be sure that the grain in the lower part of the grain drying columns or in the metering rolls is not frozen. Frozen grain would prevent the dryer from unloading, which could possibly result in a fire.

If the grain is frozen, operate the dryer as All Heat until the grain is thawed. See page 17. Be careful not to operate the burner more than 5 to 10 minutes at a time to avoid exposing dry grain to excessive heat and the chance of fire.

1. Flip all of the toggle switches on the control panel to the OFF position. Turn on the electric power supply to the dryer.

2. **LP Gas** - Open the tank supply valve, hand valve at the LP gas inlet hose and the liquid line flip valve for burner.
3. **Natural Gas** - Open the gas supply valve.
4. Flip the control circuit switch ON. Then push it up to the START position and release it.
5. Start the fan.
6. Start the burner. Flip the level auger switch to AUTOMATIC.
7. Push the discharge auger spring loaded toggle switch up and release it. It will move down to the ON position.
8. Flip the discharge metering roll switch to the AUTOMATIC position to begin discharging grain.
9. The moisture control will automatically control the metering rolls to maintain the desired moisture content.

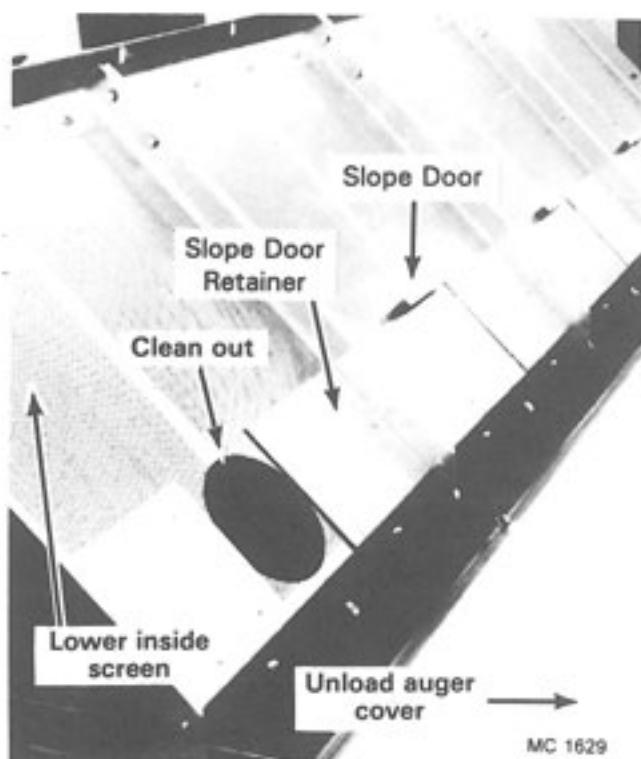


Figure 27

## Final Shut Down

When finishing a crop or at the end of the season all of the grain in the dryer must be dry before the dryer is completely unloaded.

1. When wet grain level is below sight glass, flip the discharge metering roll switch OFF.
2. Run the burner until all the grain is at the desired moisture content (approx. 5 minutes per point of moisture to be removed).
3. When the grain is dry, close the LP Gas supply valve at the tank or close the natural gas supply valve. Operate the burner until the flame goes out. Flip the ignition switch OFF.
4. Close the gas main hand valve (handle 90° to the piping).
5. **LP Gas** - Close the liquid line flip valve for burner (handle down) and the hand valve at the LP Gas inlet hose.
6. Run the fan approximately 20 minutes to cool the grain in the dryer, then turn off fan.
7. Flip the discharge metering roll toggle switch to the MANUAL position and start the discharge auger to unload all of the grain. When the dryer is empty, flip the discharge metering roll and discharge auger toggle switches OFF. Flip the control circuit toggle switch OFF.



**CAUTION:** Before continuing to the next step, turn off and lock the electric power supply to the dryer. Flip all of the circuit breakers in the bottom cabinet OFF and lock the control cabinet doors.

8. Clean out the unload auger and the grain metering rolls. Each unload auger pan is hinged on the left side and secured on the right side with two overcenter latches. Push the handle on the latches down to open the pans and pull them up overcenter to lock the pans.
9. Clean the fan, burner, and heat chambers.
10. Clean all of the screens.
11. Lubricate all bearings with a hand grease gun, see "Lubrication". Do not over lubricate. Too much grease may damage the bearing seals. Lubricate the SCR drive chain and sprockets with engine oil.
12. Loosen the level auger and unload auger drive belts.



# MAINTENANCE



**CAUTION:** Do not allow children or bystanders near the dryer while it is being adjusted and/or serviced.

## Lubrication



**CAUTION:** To prevent accidental starting of the motor during lubrication, turn off and lock the electric power supply to the dryer. Flip all of the circuit breakers in the bottom cabinet OFF and lock the control cabinet doors.

**NOTE:** Use a hand grease gun to lubricate bearings. Use a good grade of bearing grease and do not over lubricate. Too much grease may damage the bearing seals. Avoid getting grease on any of the belts.

Change the oil in the SCR drive gear box after the first two weeks of operation. Use Mobil SHC 634 oil or equivalent. Gear box capacity is  $\frac{3}{4}$  pint. Also change the oil at the start of each drying season.

### Every 100 Hours

1. Lubricate the unloading auger front bearing and the front bearing on each grain metering roll, see Figure 28.

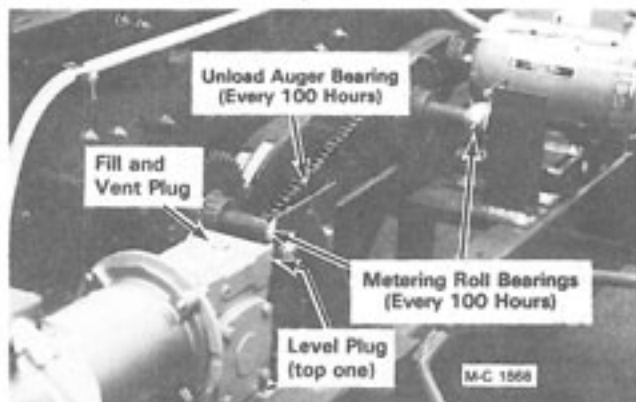


Figure 28

2. All other bearings used on the dryer are prelubricated and require no further lubrication.

### Periodically

1. Remove the oil level plug (top one) on the end of the SCR drive gear box, see Figure 28. The oil level should be even with the bottom of the hole. If not, remove the vent plug on top of the gear box and add Mobil SHC 634 oil or equivalent until it just runs out. Install the level and vent plug.

2. Oil SCR drive sprockets and chain with engine oil. Be careful not to get oil on the belts.

## Screens

**NOTE:** Be sure to keep the inside screens and heat chambers as clean as possible to reduce the possibility of fire. Also, a clean dryer works better than a dirty one.

1. Check the exterior screens periodically and clean as necessary.
2. Clean the inside screens and heat chambers every 8 to 10 hours.

**NOTE:** Under some drying conditions, the inside screens may have to be cleaned more often.

## Belt Adjustment

### General

1. After approximately 24 hours of operation the belts will seat themselves in the pulley grooves and the tension may have to be readjusted. If the belts squeal when the motor starts they are not tight enough.
2. Never apply belt dressing as this will damage the belt and cause early belt failure.

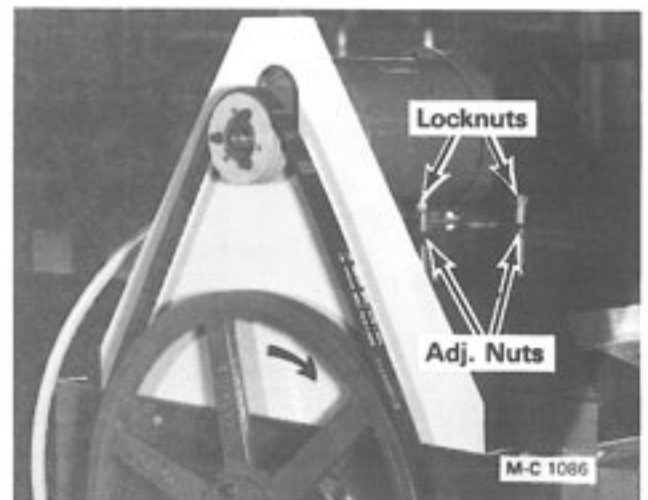


Figure 29

### Discharge Auger

Loosen the unload auger motor mounting locknuts. Turn the locknut on the "J" bolt to adjust tension.

## Level Auger

Adjust the belt tension by loosening the locknuts and raising the motor mount plate evenly with the four adjusting nuts, then tighten the locknuts, see Figure 29.

## Pre-Season Check

All of the following tests and adjustments can be made when the dryer is empty. The air pressure switch, burner primary and secondary air, modulating valve and vaporizer coil (LP Gas) adjustments can only be made when the dryer is full of grain. These adjustments are covered under "Initial Start-Up Instructions" on page 18.



**CAUTION:** The gas and electric power supply to the dryer **MUST** be off when performing steps 1 thru 7. Flip all of the circuit breakers in the lower cabinet(s) OFF. Lock the main electric supply to the dryer so that the power cannot be accidentally turned on.

### General

1. Lubricate all bearings, chains and sprockets. Check the oil level in all gear boxes. Refer to "Lubrication" on page 29.
2. Check and adjust all belts. Refer to "Belt Adjustment" on page 29.
3. Tighten all electrical connections in the lower control cabinet(s). Check the ground connection in the cabinet to be sure it is clean and tight. Also check the ground connection from the dryer base to the grounding rod.
4. Clean out the unload auger and grain metering rolls. Each unload auger pan is hinged on the left side and secured on the right side with two overcenter latches. Push the handle on the latches down to open the pans and pull them up overcenter to lock the pans.
5. Clean all of the screens, fans, burners and heat chambers.
6. Remove the air pressure switches and clean the tube and filter, see Figure 30. Be sure the  $\frac{1}{8}$ " vent hole in the bottom of the air pressure switch is open, see Figure 31.
7. **LP Gas** - Remove the plug at the end of each strainer, see Figure 38. Remove and clean the screen in each strainer. Check flexible LP

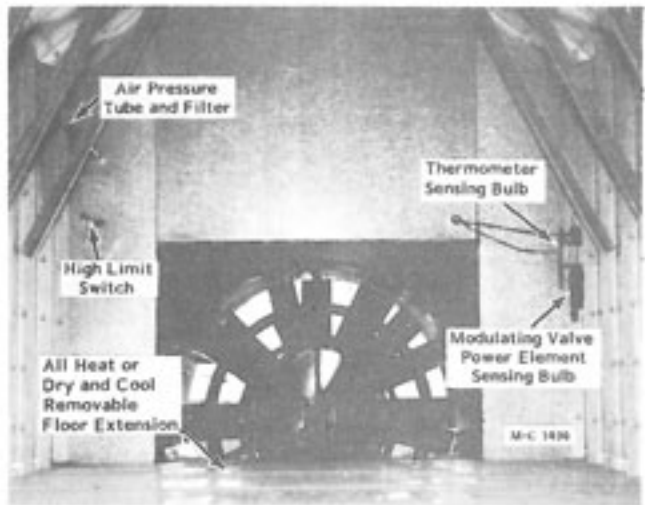


Figure 30

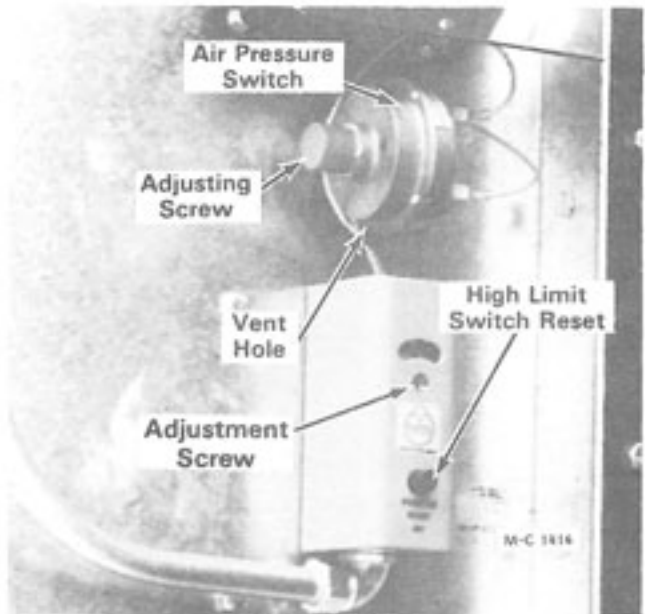


Figure 31

hoses for signs of fatigue, replace as necessary.

### Level Auger and Discharge System

1. Flip all of the toggle switches on the control panel(s) to the OFF position. Flip all of the circuit breakers in the lower cabinet(s) ON. Turn the electric power supply to the dryer ON.
2. Flip the control circuit toggle switch ON. Then push it up to the START position and release it. The READY light will be on.
3. Check the level auger. Flip the level auger toggle switch to the MANUAL position. The level auger will start immediately.
4. Push the discharge auger toggle switch up to the START position and release it. The discharge auger will start.



- Flip the discharge metering roll toggle switch to the MANUAL position. The SCR drive motor will start. Turn the SCR speed control to change speed.
- Check the SCR motor minimum and maximum speeds. Refer to SCR Board Trim Pot Adjustment Procedure on page 38.

**NOTE:** To perform the balance of the discharge system check the outside air temperature must be above 50°F.

- Set the SCR speed control to mid-range and lock in place. Turn the moisture control to balance the lights.
- Flip the discharge metering roll switch to AUTOMATIC. The SCR drive motor will run at the speed selected in step 7.
- Turn the moisture control balance up until (-) light goes on. The SCR motor speed will decrease.
- Turn the moisture control balance down until the (+) light goes on. The SCR motor will increase.

#### Fan and Burner

- Turn off the electric power supply to the dryer. Flip all of the toggle switches on the control panel(s) to the OFF position.
  - Close the gas main hand valve for burner (handle 90° to the piping), see Figure 32.
  - LP Gas** - Open the supply valve at the tank and open (lift up) the liquid line flip valve for burner. See Figure 33.
- Natural Gas** - Open the supply valve. Close hand valve. See Figure 32.
- Disconnect the two wires at the back of the air pressure switch. See Figure 31. Connect the two wires together with a short jumper wire. Do not allow the jumper wire to come in contact with any metal. This will by-pass the air pressure switch.

**CAUTION:** This is only a temporary procedure for checking the burner. When drying grain **NEVER** operate the dryer with the air pressure switch disconnected or by-passed. This safety air pressure switch is for your protection and the protection of the dryer.

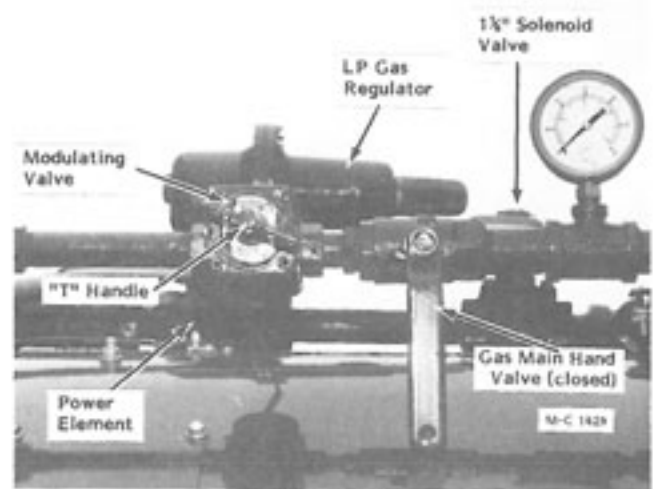


Figure 32

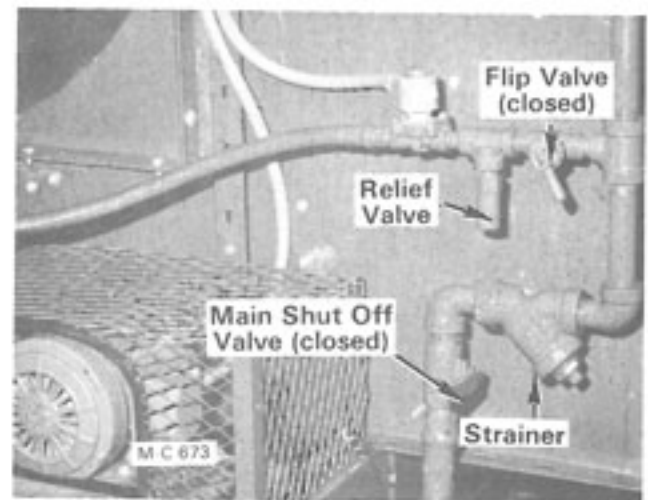


Figure 33

- Turn on the electric power supply to the dryer. Flip the control circuit toggle switch ON. The control circuit ON light and high limit light will be on.
- Push the control circuit toggle switch up to the START position and release it. The READY and LEVEL AUGER lights will be on.
- Start the burner fan; the air pressure light will be ON. When the fan comes up to speed, open the gas main hand valve 1/4 of the way. Flip the ignition switch ON. After a 10 second delay the gas valve light will be ON and the burner will light.

**NOTE:** The ignition board is electronically timed so that the ignition system will continue to spark and hold the solenoid gas valves open for a "trial ignition" period (about 5 seconds). If the burner does not light the system will "lock out" (after the

5 second trial period) closing the solenoid gas valves. The gas valve light will be out. Flip the ignition switch OFF, then ON again for another "trial ignition" period.

8. If after several attempts for ignition there is still no flame, push the 0.1 (1/10th) amp. ignition reset button (circuit breaker) on the control panel, see Figure 34. This circuit breaker protects the ignition board from heat build up due to repeated ignition attempts.
9. If the burner fails to light, check the electrode and ignition board as explained under "Direct Spark Ignition System" below.
10. If the ignition system is good, check the Gas Solenoid Valves as explained on page 35. They may be defective stopping gas flow to the burner.
11. After the burner lights, close the gas main hand valve. Run the fan until the burner goes out, then turn the fan off.



**CAUTION:** Be sure to remove the jumper wire on the air pressure switch and reconnect the two wires that were removed.

12. After fan and burner have been checked, turn off the gas supply to the dryer. Turn off and lock the electric power supply. Lock all of the control cabinet doors.

## Direct Spark Ignition System

### Operation

The direct spark ignition system consists of an electronic ignition board, a direct spark ignition electrode and remote sensor (Figure 44) for each burner. For ignition to occur, the dryer must be running and the High Limit and Air Pressure lights on the control panel must be on.

The dryer is wired so that the current flow from the control cabinet goes to the High Limit Switch, Fan Start-Stop Button, Fan Magnetic Starter, Air Pressure Switch, Ignition Switch, 10 second delay and then to the Ignition Board. This is a safety feature that prevents ignition if the heat chamber temperature is too high or there is insufficient air flow.

The 10 second delay before ignition is also a safety feature that allows the fan to purge the

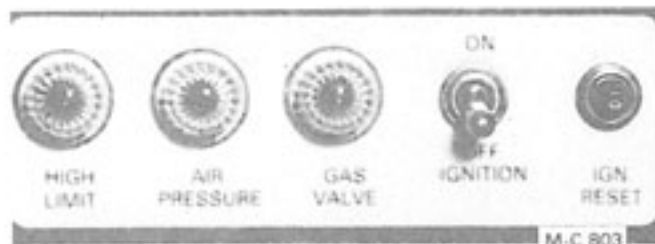


Figure 34

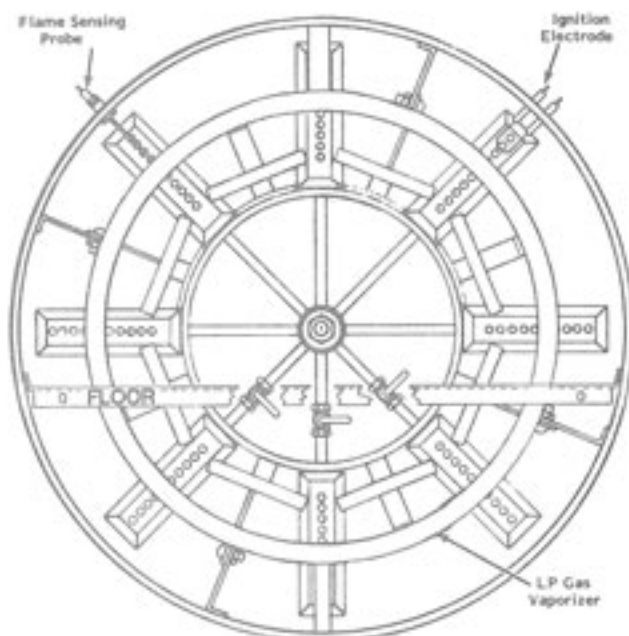


Figure 35

heat chamber of any unburned gas that may remain after a burner has been shut down for any reason.

When the ignition switch is flipped on, the ignition board is energized (after the 10 second delay) and generates a high voltage spark between the tips of the electrode and opens the gas solenoid valves at the same time. The gas valve light on the control panel will be on.

The electrode provides the spark for ignition and the remote sensor senses the presence of the flame. A small amount of electrical current passes from the remote sensor to the flame completing the electrical circuit. If the flame is not present, the circuit will be broken and the ignition system will "lock out".

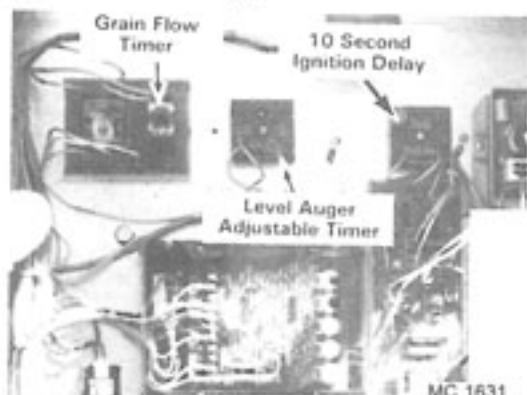
The ignition board is electronically timed so that when the ignition switch is flipped ON, the electrode will continue to spark and the gas solenoid valves will be held open for a "trial ignition" period (about 5 seconds) — after the 10 second delay.

When ignition occurs and a flame is present, the ignition system will continue to operate (spark shuts off). If ignition fails, flame is not present, the ignition system will "lock out" (after the 5 second trial period) closing the gas solenoid valves. The gas valve light on the control panel will be out. Flip the ignition switch OFF, then ON for another "trial ignition" period.

### Testing

If after several attempts for ignition there is still no flame, turn the fan off and check the ignition system as follows:

1. Push the ignition reset button (0.1 (1/10th) amp., circuit breaker) on the control panel in, see Figure 34. The circuit breaker protects the ignition board from heat build up due to repeated ignition attempts.
2. The ignition board may have absorbed some moisture during periods of continued rain, fog or blowing snow which would cause the ignition board not to function properly. Carefully dry the ignition board with warm air. Also check the electrode to be sure it is dry.
3. Look for loose, burned or broken wires, poor or corroded connections. Check the 10 second delay, Figure 36, and the ignition switch with a voltage tester.



124 6831 10 Second Ignition Timer

Figure 36

4. Check for spark at the electrode. Turn off the electric power supply to the dryer. Flip all of the toggle switches on the control panel(s) to the OFF position. Turn off the fan motor circuit breaker.
5. Close the burner gas main hand valve (handle 90° to the piping).
6. Disconnect the two wires at the back of the air pressure switch and connect them together with a short jumper wire. Do not allow the

jumper wire to come in contact with any metal. This will by-pass the air pressure switch.



**CAUTION:** This is only a temporary test procedure. Do not run the fan and burner with the air pressure switch disconnected or by-passed.

7. Turn on the electric power supply to the dryer. Flip the control circuit toggle switch ON, then push it up to the START position and release it.
8. Push the fan start button. The air pressure light will be on.
9. Flip the ignition switch ON. After the 10 second delay observe the electrode during the "trial ignition" period. In some cases the spark can be heard.



**CAUTION:** There may be a small amount of gas in the line that could ignite. Flip the ignition switch on and off for several "trial ignition" periods before entering the dryer to observe the electrode.

10. If there is no spark, the ignition board must be tested. The ignition board does not have to be removed for this test. Proceed as follows:



Figure 37 - Ignition Board

- A. Flip the ignition switch OFF. Remove the electrode wires from terminals E-1 and E-2 on the ignition board, see Figure 37 and 38.
- B. Using a new properly gapped electrode ( $\frac{1}{8}$  inch) or an automotive spark plug gapped to ( $\frac{1}{8}$  inch), connect terminals E-1 and E-2 on the ignition board to the test electrode or spark plug with jumper wires, see Figure 39.



**CAUTION: HIGH VOLTAGE** - to prevent severe electrical shock, hold the test electrode or spark plug with an insulated device during the test and keep the wires away from the control cabinet to prevent arcing.

- C. Flip the ignition switch ON and check for spark at the test electrode or spark plug. Spark should occur after the 10 second delay. If a spark does not occur, the ignition board is defective and must be replaced.

11. If there is a spark on the test electrode or spark plug, the electrode on the dryer or the electrode lead wires are defective.

- A. Check the condition of the electrode lead wires. The wires must be replaced if they are found to be non-conductive or shorted.
- B. Examine the electrode in the dryer for damage or improper gap. The gap must be  $\frac{1}{8}$  inch. Also check for porous or cracked ceramic insulator(s) that could hold moisture. The electrode cannot be repaired. If it is damaged or defective, it must be replaced.



**CAUTION:** After completing tests or repairs, be sure to remove the jumper wire on the air pressure switch and reconnect the two wires that were removed before starting the dryer.

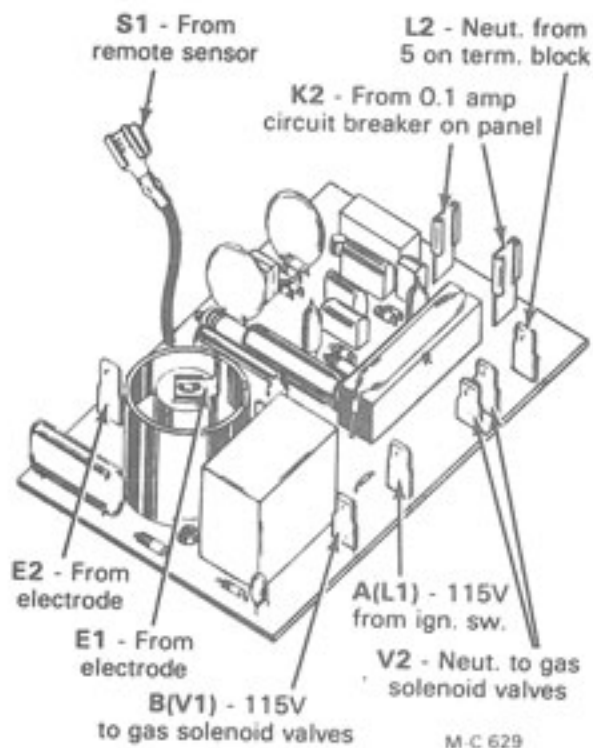


Figure 38 - Ignition Board

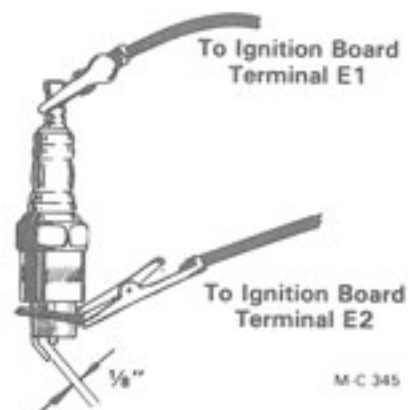
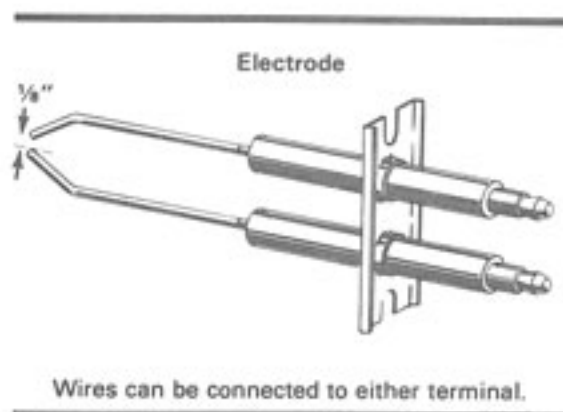



Figure 39



## Checking Gas Solenoid Valves

1. Close the gas main hand valve in the control cabinet. Turn off the electric power to the dryer. Flip all of the toggle switches on the control panel to the OFF position. Turn off the fan motor circuit breaker.
  2. Disconnect the two wires at the back of the air pressure switch and connect them together with a short jumper wire. Do not allow the jumper wire to come in contact with any metal. This will by-pass the air pressure switch.
-  **CAUTION:** This is only a temporary test procedure. Do not run the fan and burner with the air pressure switch disconnected or by-passed. This safety air pressure switch is for your protection and the protection of the dryer.
3. Turn on the electric power supply to the dryer. Flip the control circuit toggle switch ON, then push it up to the START position and release it.
  4. Push the fan start button. The air pressure light will be on.
  5. Check to be sure that there is 115V power to the ignition board. Connect a voltmeter between terminal A (L1) and L2 on the ignition board, see Figure 37 and 38.
  6. Flip the ignition switch ON. After the 10 second delay the voltmeter should read 115V.
  7. If the voltmeter does not read 115V, check the 10 second delay and the ignition switch with a voltage tester. Also check for loose or broken wires from the ignition switch to the ignition board.
  8. If there is 115V between terminal A (L1) and L2 check for 115V at terminal B (V1) on the ignition board, see Figure 37 and 38.

Connect a voltmeter between terminal V2 and B (V1) on the ignition board.

9. Flip the ignition switch OFF then ON. After the 10 second delay the voltmeter should read 115V. If not, the ignition board is defective and must be replaced.

**NOTE:** The voltmeter will show a reading during the "trial ignition" period only, (5 seconds). To check again, flip the ignition switch OFF then ON. The 5 second "trial ignition" period starts after the 10 second delay.


10. If there is 115V at terminal B (V1) check to be sure that both solenoid valves are working. To do this, remove the red cap on top of the solenoid valve. Hold a screwdriver near the coil and flip the ignition switch OFF then ON. If the coil is working, a magnetic attraction will be felt (after the 10 second delay).

Instructions for replacing the coil are included with the replacement coil.

11. If the solenoid coil is working but the solenoid valve is not opening or closing, shut off the gas supply, open the gas main hand valve and turn off the electric power supply. Loosen a union in the gas line to relieve gas pressure. Carefully disassemble the valve.

**NOTE:** Before disassembly, index the housings for correct reassembly. Pay particular attention to the position of the diaphragm.

12. Check for foreign material inside of the valve. Check the diaphragm to be sure it is not cracked or ruptured. A diaphragm repair kit is available. Installation instructions are included in the kit.

 **CAUTION:** After completing tests or repairs, the jumper wire on the air pressure switch must be removed before starting the dryer.

## NOTES

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## Discharge System



Figure 40 - Approximate Trim Pot Settings

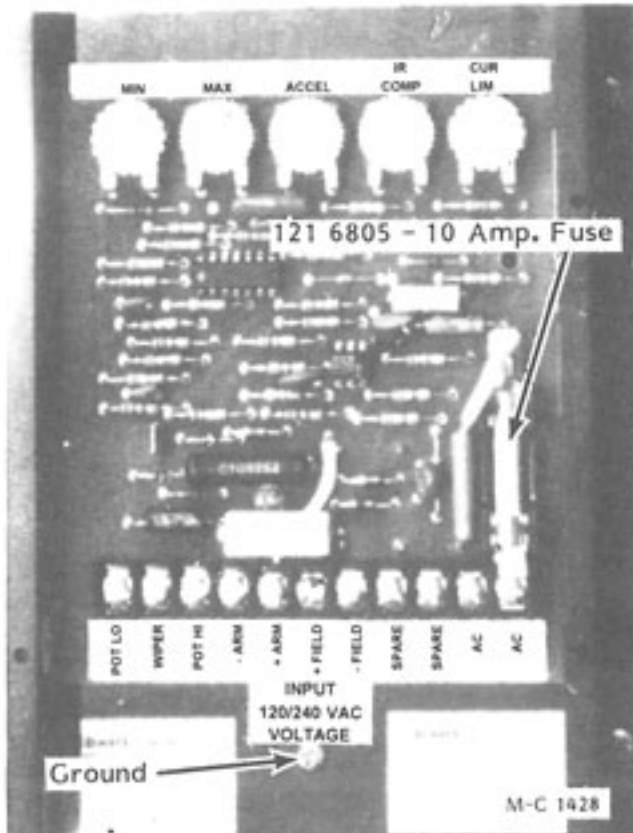


Figure 41 - SCR Drive Control Board

### Description

The metering rolls are driven by a 1/3HP variable speed permanent magnet DC motor and reduction gear box. The RPM range of the metering rolls is 1/2 to 10.

The speed of the motor is directly proportional to the amount of DC voltage supplied to it. When voltage increases speed increases and when voltage decreases speed decreases.

The SCR control board converts incoming AC current to DC current and controls the amount of DC voltage going to the motor. The SCR speed control regulates the amount of DC voltage the SCR control board supplies to the motor.

When the discharge metering roll switch is in the AUTOMATIC position, the moisture control controls the SCR board as explained in step 3 on page 24.

### SCR Board Terminal Strip Connections

- POT LO** - Connects to low side (white wire) of speed control. INPUT MUST NOT BE GROUNDED or serious damage to SCR board may result.
- WIPER** - Connects to (+) of Moisture-Matic® board.
- POT HI** - Connects to high side (black wire) of speed control. INPUT MUST NOT BE GROUNDED or serious damage to SCR board may result.
- + ARM** - Connects to motor armature wires 0-90 volts DC. MUST NOT BE SWITCHED OR BROKEN WHILE POWER IS ON or serious damage to SCR board may result.
- ARM** - Connects to motor armature wires. Reverse + and - motor leads to reverse motor rotation. MUST NOT BE SWITCHED OR BROKEN WHILE POWER IS ON or serious damage to SCR board may result.
- + FIELD** - NOT USED (Shunt wound motors)
- FIELD** - Connects to (-) of Moisture-Matic® board.
- SPARE** - NOT USED
- SPARE** - NOT USED
- AC LINE** - Connect hot wire 115 volt AC.
- AC LINE** - Connect neutral wire (white).

## SCR Board Trim Pot Adjustment Procedure

**NOTE:** Figure 40 shows approximate trim pot settings. Follow adjustment procedure below for final calibration.

Trim Pot	Function	Adjustment
<b>MIN.</b>	The Dart SCR Board minimum speed trim pot is non-functional. The minimum speed is now fixed by the M-C Moisture Control Board for both the auto and manual mode.	(Starting with Serial Number 56052)
<b>MAX.</b>	Sets Maximum Motor Speed when Speed Control is set at maximum (10) 100% rotation CW. CW rotation of MAX trim pot increases maximum motor speed.	<ol style="list-style-type: none"> <li>1. TURN DRIVE POWER OFF!</li> <li>2. Connect DC Voltmeter + to + ARM, - to - ARM.</li> <li>3. Set meter voltage range: (90 VDC).</li> <li>4. Turn power on. Set SPEED control at 100% (10).</li> <li>5. Adjust MAX pot to rated motor armature voltage as shown on meter (70 volts DC).</li> </ol>
<b>ACCEL</b>	Allows Adjustment of Acceleration	<ol style="list-style-type: none"> <li>1. CW rotation increases time of acceleration (.5 to 8 seconds).</li> </ol>
<b>IR COMP</b>	Calibrates speed regulation – % speed change from no load to full load at adjusted speed.	<ol style="list-style-type: none"> <li>1. Set SPEED control at 50% (5).</li> <li>2. Turn IR COMP pot CW until motor begins to hunt.</li> <li>3. Turn IR COMP CCW until hunting stops.</li> <li>4. Set IR COMP pot 1/3 of the span between where motor hunting stopped and fully CCW position. NOTE: For more precise calibration, a tachometer or strobe may be substituted for the above.</li> </ol>
<b>CUR. LIM</b>	Limits DC motor armature current (torque) to prevent damage to the motor or SCR board. The current limit is set for the rated motor current. CW rotation of this trim pot increases the armature current (or torque produced).	<ol style="list-style-type: none"> <li>1. TURN DRIVE POWER OFF!</li> <li>2. Connect a DC Ammeter between A1 on motor and + ARM on SCR board. This is in series with motor.</li> <li>3. Turn power on.</li> <li>4. Set SPEED control at 50% (5).</li> <li>5. Apply friction braking to the motor shaft until motor stalls (zero RPM).</li> <li>6. While motor is stalled, set current at 125% of rated motor armature current on the nameplate 4.4 amps (3.5 amps x 125%) by adjusting the CUR LIM pot. Remove ammeter after calibration.</li> </ol>

## Troubleshooting Discharge System



**CAUTION:** To avoid electrical shock that could result in personal injury or possible death, always use properly insulated tools when checking electrical components and circuits. **NEVER** check circuit continuity by shorting terminals with a screwdriver or other metal devices.

### SCR Drive Motor Does Not Run (Metering roll switch in MANUAL position)

Problem	Possible Cause	Remedy
A. No 115 volt AC input between "AC Line" terminals on SCR board.	<ol style="list-style-type: none"> <li>1. Discharge auger not running.</li> <li>2. SCR 8 amp. circuit breaker tripped.</li> <li>3. Defective or dirty discharge relay.</li> <li>4. Loose wire or defective switch(es).</li> </ol>	<ol style="list-style-type: none"> <li>1. Start discharge auger.</li> <li>2. Reset.</li> <li>3. Clean or replace if necessary.</li> <li>4. Trace power flow. See discharge circuit schematic at back of this manual.</li> </ol>
B. No DC voltage output between "Arm + and Arm -" terminals on SCR board.	<ol style="list-style-type: none"> <li>1. SCR board 10 amp. fuse blown.</li> <li>2. Minimum motor speed set incorrectly.</li> <li>3. Defective speed control.</li> <li>4. Defective SCR board.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace.</li> <li>2. See "Trim Pot Adjustment" on page 36.</li> <li>3. Replace.</li> <li>4. Replace.</li> </ol>
C. Have 115 volt AC input between "AC Line" terminals and output of 6 to 85 volts DC between "Arm + and Arm -" terminals.	<ol style="list-style-type: none"> <li>1. Overload condition.</li> <li>2. Current limit set incorrectly.</li> <li>3. Maximum motor speed set incorrectly.</li> <li>4. Worn or improperly seated motor brushes.</li> <li>5. Moisture or dirt accumulation in motor.</li> <li>6. Defective motor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check metering rolls and gear box for binding.</li> <li>2. See "Trim Pot Adjustment" on page 36.</li> <li>3. See "Trim Pot Adjustment" on page 36.</li> <li>4. Replace or adjust.</li> <li>5. Disassemble and dry or clean.</li> <li>6. Replace.</li> </ol>

### SCR Drive Motor Does Not Run (Metering roll switch in AUTOMATIC position)

**NOTE:** Operation of the moisture control is explained under step 3 on page 24.

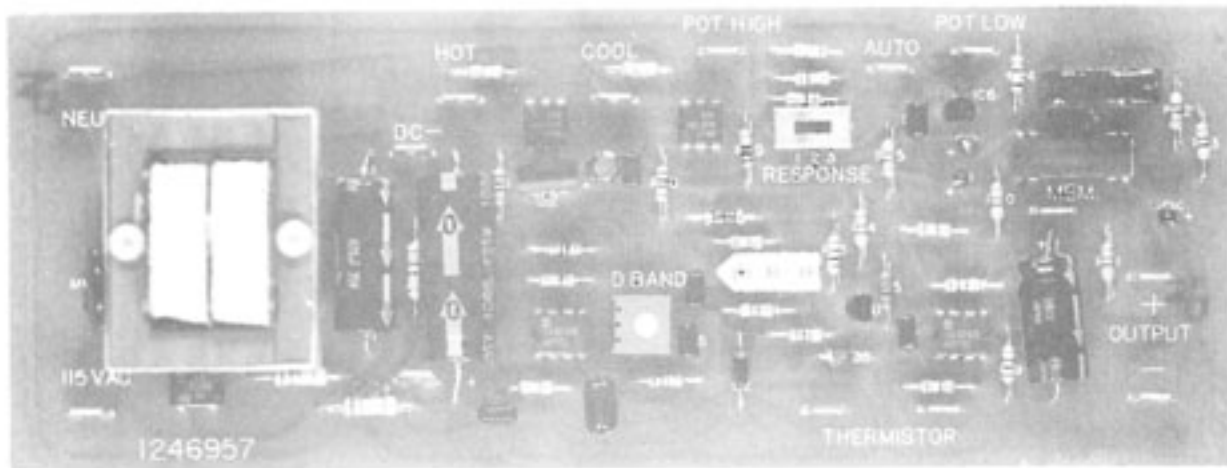
Problem	Possible Cause	Remedy
A. Motor operates normally when metering roll switch is in the MANUAL position, but not in the AUTOMATIC position.	<ol style="list-style-type: none"> <li>1. Moisture control set too high.</li> <li>2. Grain temperature not high enough to allow discharge.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust set point.</li> <li>2. Allow time.</li> </ol>

Problem	Possible Cause	Remedy
	3. Wet grain slug covering temperature probe. 4. Loose wire or defective switch(es). 5. Defective Moisture-Matic <sup>®</sup> control.	3. Operate in MANUAL for several minutes to clear area. 4. Trace power flow. See discharge circuit schematic at back of this manual. 5. Replace.

### SCR Drive Motor Runs Erratically (Metering roll switch in Manual position)

Problem	Possible Cause	Remedy
A. Motor speed fluctuates.	1. Loose connection from speed control potentiometer. 2. Defective speed control potentiometer. 3. Motor is at current limit. 4. Too much "IR" compensation.	1. Trace power flow. See discharge circuit schematic at back of this manual. 2. Replace potentiometer. 3. See "Trim Pot Adjustment" on page 36. 4. See "Trim Pot Adjustment" on page 36.
B. Speed control does not regulate motor speed.	1. Loose connection from speed control potentiometer. 2. Defective speed control potentiometer. 3. Minimum and maximum speed set incorrectly. 4. Defective SCR board.	1. Trace power flow. See discharge circuit schematic at back of this manual. 2. Replace. 3. See "Trim Pot Adjustment" on page 36. 4. Replace.
C. Motor runs backwards.	1. Motor leads reversed.	1. Switch leads.
D. Repeated blowing of SCR board 10 amp. fuse.	1. Low input voltage between "AC Line" terminals on SCR board. 2. Current limit set too high. 3. Motor shorted. 4. Worn motor brushes. 5. Defective motor bearings. 6. Defective SCR board.	1. Check - should be above 110 volts AC. 2. See "Trim Pot Adjustment" on page 36. 3. Replace or repair. Check for moisture in motor. 4. Replace. 5. Replace. 6. Replace.

Continued on next page

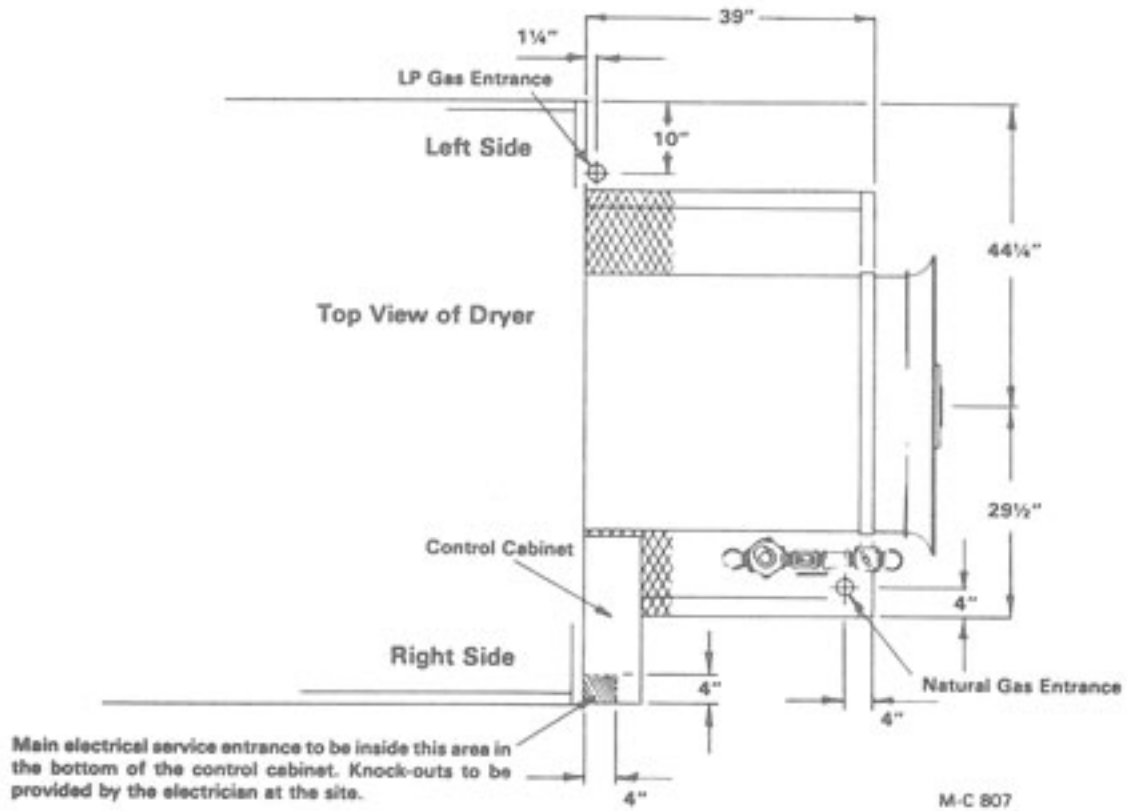


### M-C MOISTURE CONTROL SYSTEM

Problem	Corrective Action																								
A. Plus (+) and minus (-) lights will not go off when calibrating Moisture Control System.	1. Adjust the deadband trip pot on Moisture Control System board (R-7) until both lights stay off when turning moisture control dial two spaces on the scale.																								
B. Metering rolls will not run.	1. Discharge auger starter interlock bad. 2. Discharge auger not started. 3. Moisture Control System amp fuse is blown. 4. Moisture Control System board inoperative. Check output voltage at (+) and (-) terminals on Moisture Control System board. Voltage should be approximately 3 to 11 volts DC depending on the SCR speed control potentiometer setting in manual or moisture control setting in automatic. If no voltage, consult factory.																								
C. Moisture Control System does not control grain moisture.	1. Moisture Control System MANUAL OFF-AUTO switch not in AUTO position. 2. Bad thermistor. Check response with ohmmeter. <table border="1" data-bbox="730 1365 1396 1785" style="margin-left: 40px;"> <thead> <tr> <th><u>Thermistor Temp.</u></th> <th><u>Thermistor Resistance</u></th> </tr> </thead> <tbody> <tr><td>30°F</td><td>29,000 OHMS</td></tr> <tr><td>40°F</td><td>23,000 "</td></tr> <tr><td>50°F</td><td>18,000 "</td></tr> <tr><td>60°F</td><td>14,500 "</td></tr> <tr><td>70°F</td><td>11,000 "</td></tr> <tr><td>110°F</td><td>5,200 "</td></tr> <tr><td>120°F</td><td>4,200 "</td></tr> <tr><td>130°F</td><td>3,600 "</td></tr> <tr><td>140°F</td><td>3,000 "</td></tr> <tr><td>150°F</td><td>2,500 "</td></tr> <tr><td>160°F</td><td>2,100 "</td></tr> </tbody> </table> 3. Bad Moisture Control System board. 4. Bad moisture control potentiometer. Check potentiometer with ohmmeter. 5. Burner temperature not holding steady.	<u>Thermistor Temp.</u>	<u>Thermistor Resistance</u>	30°F	29,000 OHMS	40°F	23,000 "	50°F	18,000 "	60°F	14,500 "	70°F	11,000 "	110°F	5,200 "	120°F	4,200 "	130°F	3,600 "	140°F	3,000 "	150°F	2,500 "	160°F	2,100 "
<u>Thermistor Temp.</u>	<u>Thermistor Resistance</u>																								
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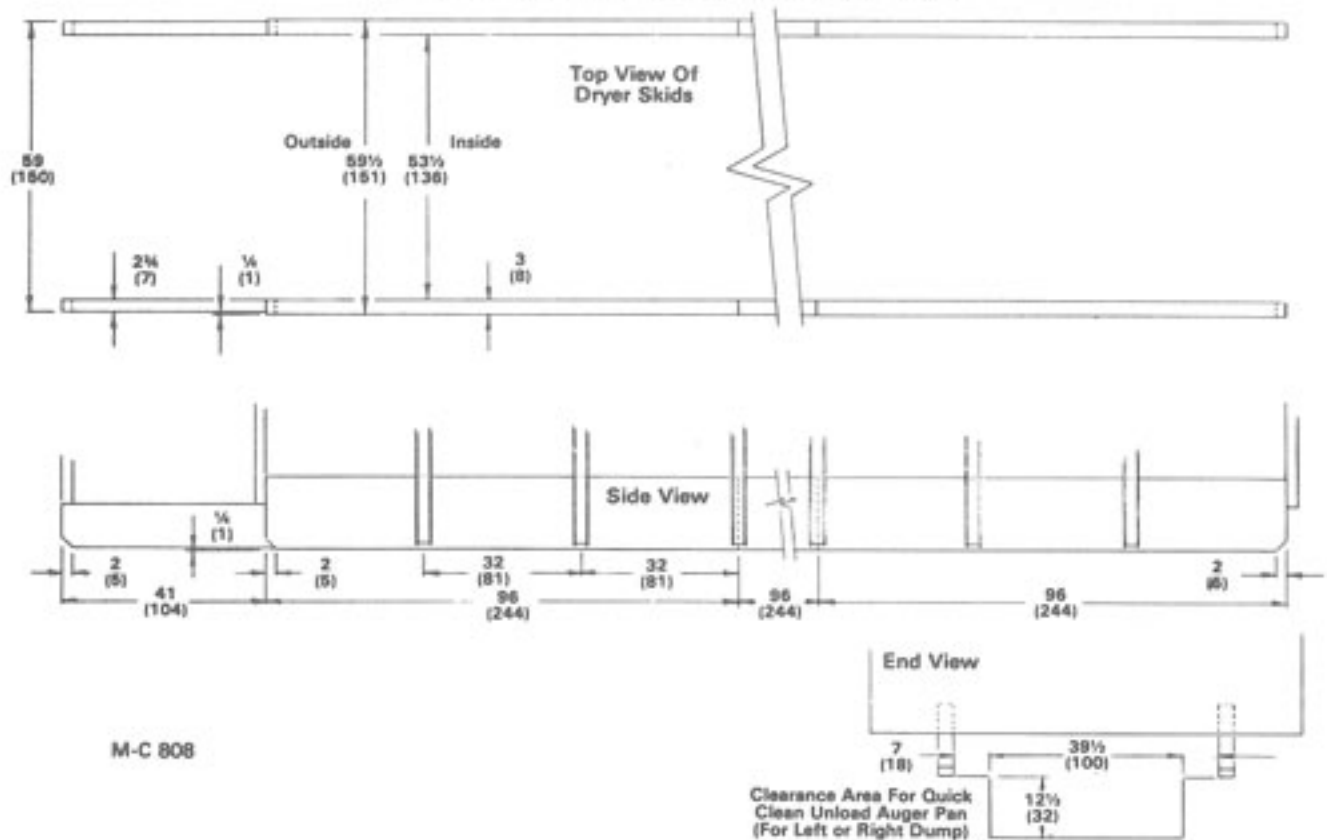


## Electrical and Gas Piping Entrance



## Dryer Base Dimensions

All Dimensions Are In Inches (Centimeters)

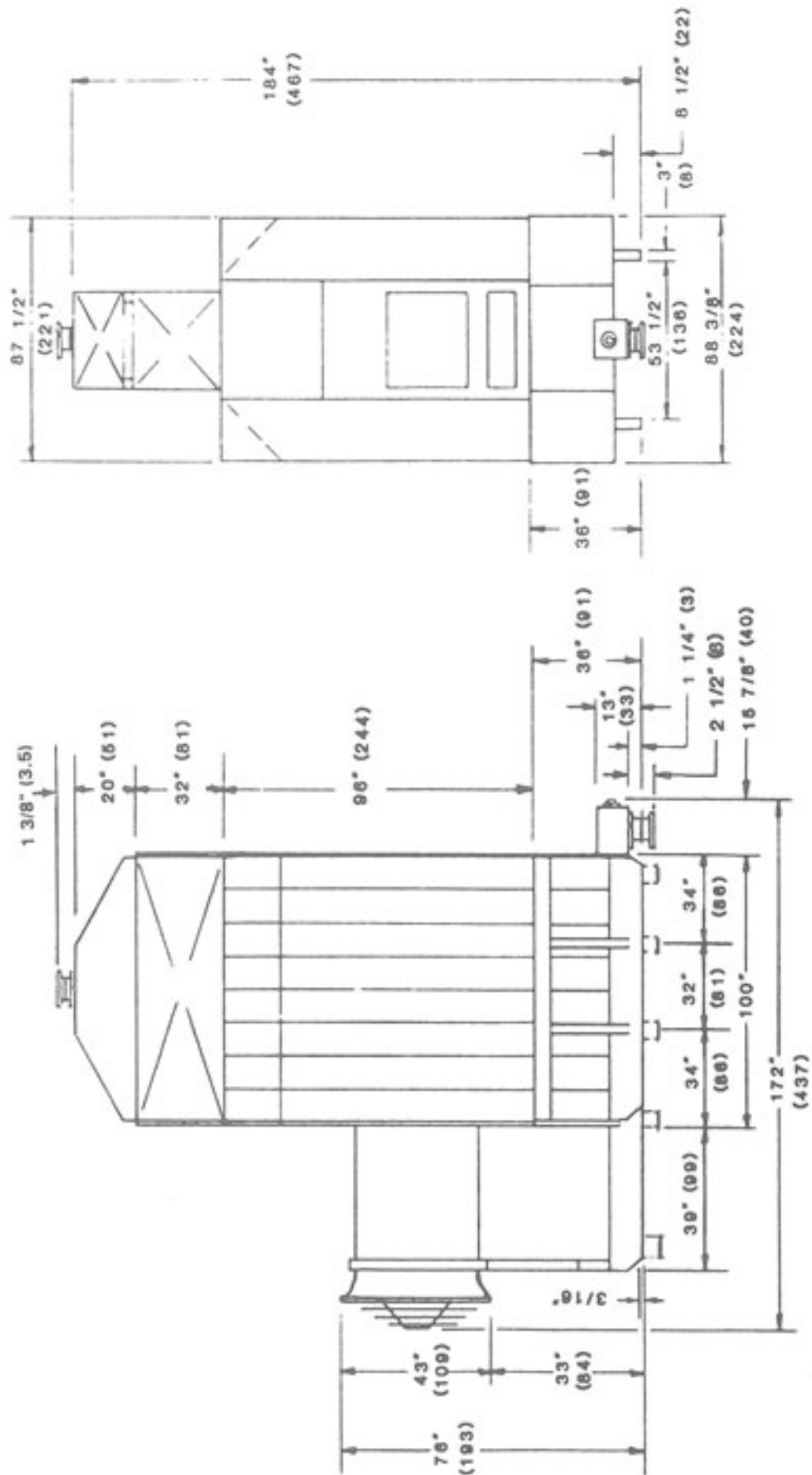




# Model 370 Dryer Dimension Chart

All Dimensions Are In Inches (Centimeters)

NOTE: The Grain Receiving Hopper Tube Ring is 10" (25.4cm.) I.D. - 12.5" (31.75cm.) O.D.  
The Grain Unload Auger Discharge Ring is 10" (25.4cm.) I.D. - 12.5" (31.75cm.) O.D.

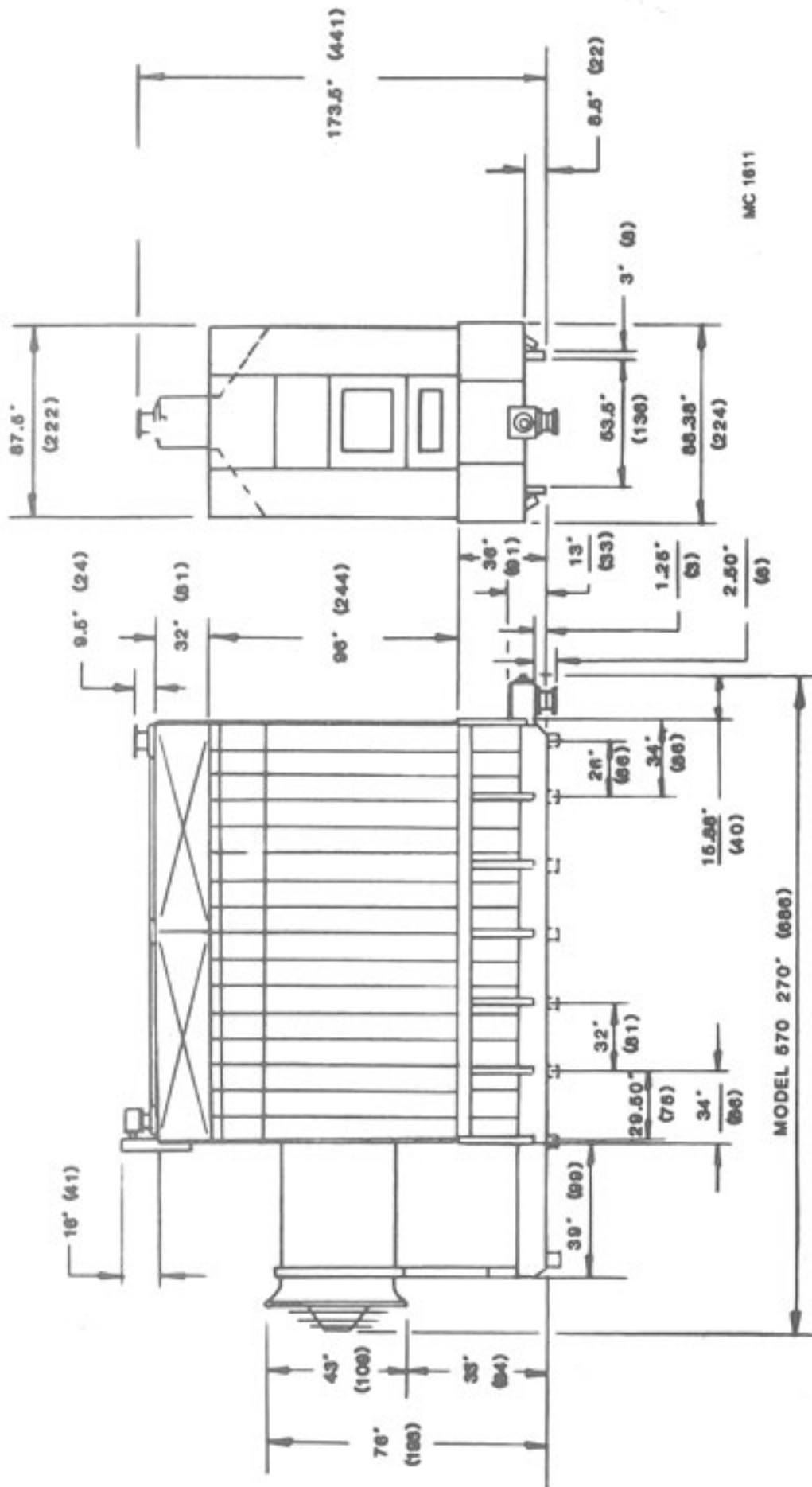




# Model 570 Dryer Dimension Chart

All Dimensions Are In Inches (Centimeters)

NOTE: The Grain Receiving Hopper Tube Ring is 10" (25.4cm.) I.D. - 12.5" (31.75cm.) O.D.  
The Grain Unload Auger Discharge Ring is 10" (25.4cm.) I.D. - 12.5" (31.75cm.) O.D.



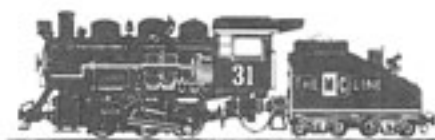
## Electrical Components

Starting with S/N 55242.

Part No.	Description	Part No.	Description
120 6800	Unload Switch	124 6848	8 Amp. Circuit Breaker (SCR Drive)
121 6849	Air Pressure Switch	121 6808	125V Indicator Lamp Ass'y
124 6934	High Limit Switch	122 6810	125V Indicator Lamp
121 6925	115V Ignition Board	122 6800	Indicator Lamp Lens (Clear)
123 6887	Differential Air Pressure Switch (Canadian Dryers Only)	121 6815	SPST ON-OFF Toggle Switch
<b>Terminal Block</b>		120 6827	Momentary Contact Toggle Switch
124 6928	12 Position	121 6807	DPDT ON-OFF-ON Toggle Switch
124 6929	3 Position	124 6890	.1 to 8 Minute Adj. Timer
128 6995	Electrode	124 6831	10 Second Timer
122 6814	Ignition Reset (0.1 Amp.)	124 6841	Light Bulb Socket
<b>115V LP Gas Solenoid Valves</b>		124 6842	50W Rough Service Bulb
125 7082	½" Solenoid Valve in LP Liquid Line (All USA & Canadian 370 thru 1195)	124 6972	Relay and Timer Socket
121 7002	¾" Solenoid Valve in Gas Manifold (All USA & Canadian 370 & 665, & Canadian 675 thru 3175)	021 6809	Relay
128 7001	1¼" Solenoid Valve in Gas Manifold (All USA & Canadian 670, 690 & 970, & USA 675 thru 3175)	127 6823	Neutral Lug
<b>115V Natural Gas Solenoid Valves</b>		124 6978	60 Minute Adjustable Timer
128 7001	1¼" Solenoid Valve in Gas Manifold (All USA & Canadian 370 thru 3175)	124 6874	SCR Board (Dart)
128 6967	10 Amp. Fuse (NON-10)	124 6837	½HP DC Motor
128 6851	Fuse Holder	128 6957	Splitter Block
128 6845	Stop Button (Red)	124 6872	Flame Sensing Probe
128 6844	Start Button (Green)	127 6855	Transformer-208V (750VA)
		127 6829	Transformer-230/460/575V (750VA)
		124 1089	10 Turn Potentiometer w/Wire
		124 6892	Multi-Dial
		124 6893	Thermistor
		124 6939	Potentiometer
		121 6805	10 Amp. GLH Fuse
		128 7004	Canadian Low Pressure Interlock
		124 6957	Moisture-Matic® Board
		124 6981	Discharge Meter
		124 6938	Fuse Holder
		124 6937	1 Amp. Fuse







*Iron Horse Quality*

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