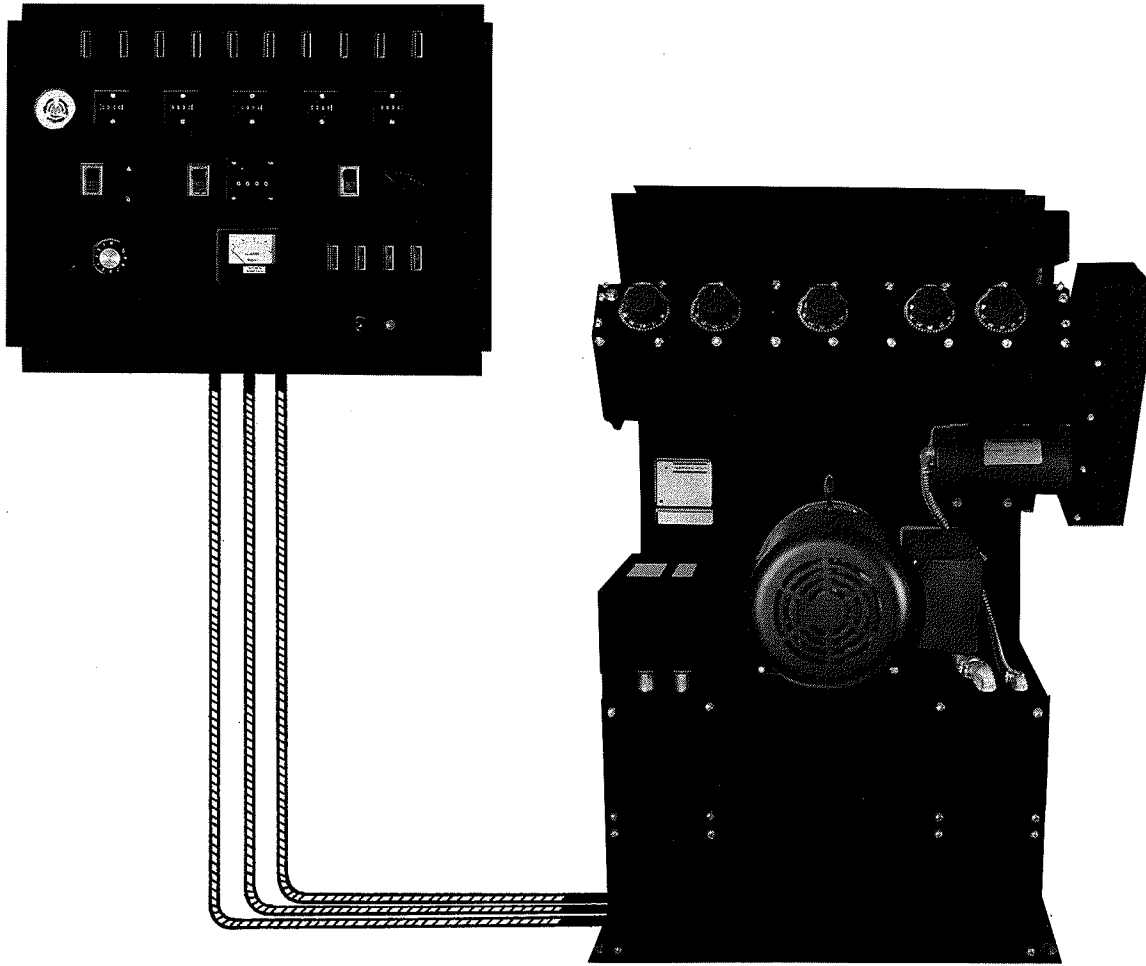


# MODERN MILL



**SERIES 50** Owner's Manual

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## MODERN MILL, INC. NEW PRODUCT WARRANTY

MODERN MILL, INC., warrants products of their manufacture to be free from defects in material and workmanship (except for electric motors) for 12 months or 1500 hours of use, whichever occurs first, provided that the warranty registration card is returned within ten (10) days of purchase. During this warranty period, MODERN MILL, INC.'S obligation under this warranty shall be limited to the repair or replacement, at MODERN MILL, INC.'S option, of such product which may thus prove defective, provided that the product is returned, transportation costs prepaid, to MODERN MILL, INC., Bluffton, Indiana; and in no event shall MODERN MILL, INC. be liable for consequential or special damages or for transportation, or other expenses which shall arise in connection with such product or part. This warranty covers only defects in material or workmanship in normal use and does not cover damages resulting from accident, negligence, misuse, abuse, lack of reasonable care, alteration, or other unreasonable use. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. MODERN MILL, INC. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY OF THE PRODUCT OR AS TO THE FITNESS OF THE PRODUCT FOR ANY PARTICULAR PURPOSE, AND MODERN MILL, INC. SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE, DIRECTLY OR INDIRECTLY, ARISING FROM THE USE OF SUCH PRODUCT OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. MODERN MILL, INC. reserves the right to make changes in products manufactured and/or sold by them at any time without incurring any obligation to make the same or similar changes on products previously manufactured and/or sold by them. No other representations or warranties have been made by MODERN MILL, INC., or relied upon by the purchaser. No waiver, alteration, or modification of the foregoing warranties shall be valid unless made in writing and signed by an executive officer of MODERN MILL, INC.

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## INTRODUCTION

Thank you for choosing a Modern Mill mixer-grinder for your livestock feed preparation. Since its inception in 1970, Modern Mill has strived to manufacture the finest products possible and the Big Red Series 50 mill is the result of our continuing effort to produce the "best".

Your new mill incorporates design improvements which make longer service life and greater accuracy possible. These special features will make your excellent choice of equipment seem even better in the coming years.

This manual provides information for installation, operation, and service of your mill. We urge you to familiarize yourself with its contents before attempting to install or operate the unit.

Your Modern Mill dealer or distributor is equipped to provide repair service and replacement parts. Contact him first should a question or service problem arise. In the event your dealer or distributor is unable to provide the service or parts you require, the Modern Mill Field Services Department, Bluffton, Indiana is available for your assistance.

## TABLE OF CONTENTS

Introduction .....	I
Safety Precautions .....	II
Installation .....	1
Operation .....	10
Calibration .....	13
Maintenance .....	16
Lubrication .....	23
Trouble Shooting Guide .....	24
Electrical Schematics .....	27

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## **SAFETY PRECAUTIONS**

Modern Mill, Inc. has made every effort to provide you with safe equipment; however, the following safety precautions must be observed:

- (1) Always disconnect the main electrical service switch before removing any mill housing covers or electrical boxes or covers.
- (2) Ground the mill frame as indicated by wiring diagram to a ground rod driven (6) six feet into moist soil.
- (3) Ground any augers or feeders that are powered or controlled by electrical equipment.
- (4) Never attempt to dislodge obstructions from any auger while electric power is connected.
- (5) Shield all drives that are exposed to either man or livestock during operation. Never attempt to adjust belt tensions while the unit is operating.

# INSTALLATION

## STEP 1

### SELECT THE MILL LOCATION CAREFULLY

To facilitate future operation, calibration and servicing, the mill should be located in a manner that will permit access from all sides. In general, the mill should be at least three feet (3') from all walls. Remember, however, that interconnecting cables must extend from the control panel to the mill. These cables are supplied with the mill and their length is ten feet (10').

If accessories (premixers, pneumatic conveyors, etc.) are to be installed along with the mill, plan their location now.

## STEP 2

### REMOVE ALL CRATING

Remove all crating, including the wooden base crate. To make future operation and service easier, extra metering unit drive pins, an allen wrench, and a 7/16" nut driver tool are packed with each mill. Be careful not to lose these items.

## STEP 3

### SECURE THE MILL AND CHECK METERING UNIT OIL LEVEL

Level the mill from front to rear and left to right, Figure 1. Use metal shims under the base flanges to level the unit. Secure the mill base to the floor through holes provided in the base flanges.

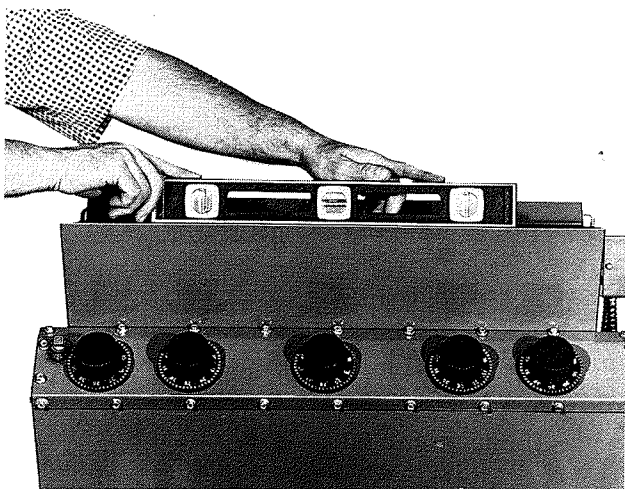


FIGURE 1  
LEVELING THE MILL

The proper quantity of oil has been added to the metering unit at the factory. After leveling the mill, it is advisable to double check the oil level. A sight glass is provided on the left side of the metering unit for this purpose. The correct oil level is the middle of the sight glass.

**CAUTION:** LEFT TO RIGHT LEVELING OF THE UNIT IS VERY IMPORTANT. AN OUT OF LEVEL CONDITION AFFECTS THE LUBRICATION OF THE METERING UNIT AND CAN DRASTICALLY REDUCE METERING UNIT SERVICE LIFE.

## STEP 4

### INSTALL THE CONTROL PANEL

The control panel is normally secured to a wall thru the mounting flanges on the sides of the panel. The center of the panel should be at average eye level (approx. 61" from the floor). WHEN SELECTING THE CONTROL PANEL LOCATION, REMEMBER: THE ELECTRICAL CABLES THAT CONNECT THE PANEL TO THE MILL ARE 10' IN LENGTH.

In the event wall-mounting of the panel is not practical, optional floor supports are available, Figure 2. These supports must be anchored to the floor through holes which are provided.

A large washer, welded to the control panel mounting angle, provides convenient storage for the 7/16" nut driver tool. The tool may be used to open the control panel, to gain access to the mill motor reversing switch, and to remove the aluminum baffles in the feed chamber discharge area.

## STEP 5

### CONNECT INGREDIENT SUPPLIES TO THE MILL

Ingredients can be supplied to the mill by gravity or by ground level augers controlled by control hoppers mounted on the mill. Installations may be supplied entirely by gravity, entirely by ground level augers or by a combination of the two.

# INSTALLATION

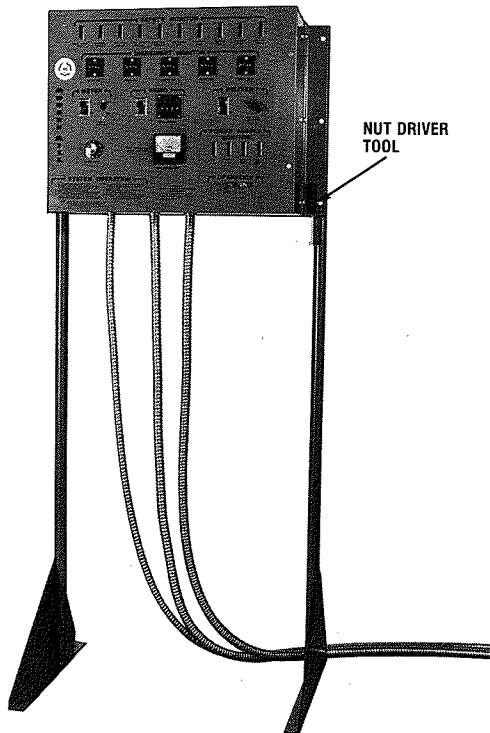


FIGURE 2  
CONTROL PANEL MOUNTED ON  
OPTIONAL FLOOR SUPPORTS

## GRAVITY SUPPLIES

Ingredients supplied to the mill by gravity are stored above the mill and are directed to the metering auger compartments thru 4" metal tubing. When using gravity ingredient supplies:

1. Always use a slide valve shut-off in each supply tube.
2. The length of gravity supply tubes is critical. If the tubes are too long, the ingredient flow switch paddles will not function properly. If the supply tubes are too short, ingredient spillage will occur. The best procedure is to extend supply tubes about 1"-1½" below the entrance to the metering auger compartments. Later, the supply tubes can be trimmed further, if necessary, to obtain optimum operation of the switch paddles, Figure 3.

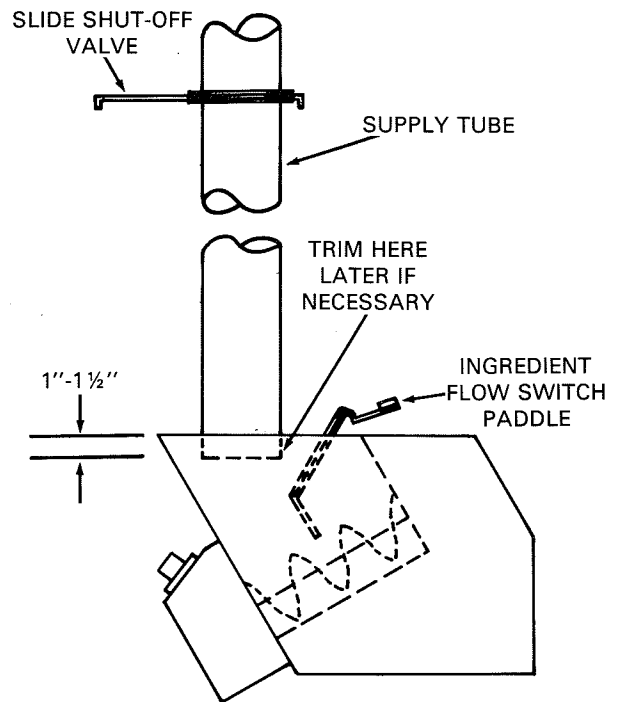


FIGURE 3  
INSTALLATION OF GRAVITY  
SUPPLY TUBE

NOTE: Flared extensions are available as options from Modern Mill, Inc. These extensions allow two 4" tubes to supply a single 4" metering auger compartment.

## GROUND LEVEL AUGER SUPPLIES

Control hoppers used to start and stop ground level augers are normally factory installed to meet customer requirements. These hoppers may also be field installed.

Auger support brackets are supplied with factory-installed control hoppers. These brackets may be used to support the ground level augers, Figure 4.

To assure proper operation of control hoppers, it is important not to operate supply augers at excessive speeds. Supply augers need only turn fast enough to keep up with the grinding capacity of the mill. In most cases, an auger rotation speed of 290 RPM will provide adequate ingredient

## INSTALLATION

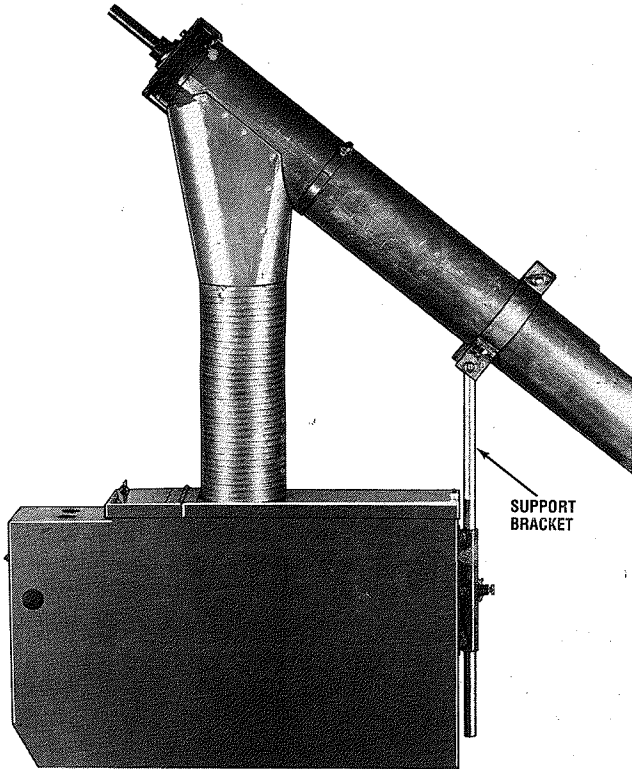


FIGURE 4  
AUGER SUPPORT BRACKET

supply to the control hoppers. Optional drive kits are available to change auger rotation speeds.

### FIELD INSTALLATION OF CONTROL HOPPERS

In the event ground level control hoppers are to be field installed, the installation may be performed as follows:

1. Bolt the hopper support bracket to the mill housing. Full length hopper support brackets are attached using  $1/4'' \times 1/2''$  cap screws, lockwashers, and the four holes with weld nuts provided in the top of the mill chamber housing. It will be necessary to drill additional  $5/16''$  holes if support brackets other than full length are to be used.

2. Place control hopper(s) over metering chamber(s). When two or more hoppers are mounted next to one another, use  $1/2''$  close nipples and four (4)  $1/2''$  conduit lock nuts with each nipple to provide protection for electrical wires, Figure 5.
3. Bolt control hopper(s) to the support bracket using the holes provided and  $1/4'' \times 1/2''$  cap screws with nuts and lockwashers.
4. Drill two  $7/32''$  holes in front of metering chamber(s) for each control hopper and fasten the hopper(s) to the metering chamber(s) with  $1/4'' \times 1/2''$  self-tapping screws and lockwashers.

Electrical wiring of control hoppers is covered in Step 7.

### STEP 6

#### INSTALL DISCHARGE AUGERS AND DRIVE KITS

Due to the unique requirements of each installation, horizontal and vertical discharge auger kits are available in several configurations. These include 4" or 6" diameters, various auger lengths, and various motor horsepower ratings.

The horizontal (base) auger may be assembled to discharge feed from either the right hand or left hand side of the mill base.

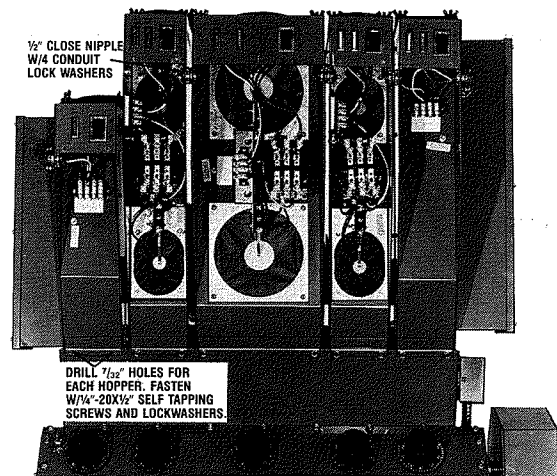


FIGURE 5  
INSTALLATION OF CONTROL HOPPERS

# INSTALLATION

Modern Mill, Inc. offers the following safety shields and weather cover as options for discharge auger drives:

Part #

- 30A66 Safety Shield - 4" Horizontal Drive
- 30A67 Safety Shield - 4" Vertical Drive
- 30A68 Safety Shield - 6" Horizontal Drive
- 30A50 Weather Cover - 4" Horizontal & Vertical

Use part # 30A50 when the auger corner is located outdoors. Separate safety shields (30A66 and 30A67) are not required when part # 30A50 is used.

## HORIZONTAL DISCHARGE AUGER INSTALLATION

When installing the horizontal discharge auger, be certain that the auger end shafts are fully inserted in the support bearings at each end of the auger. The spacer washers, Figure 6, must have just enough clearance between them to turn freely and the tube must be fully inserted in the 5" transfer corner split tube.

After the horizontal auger is in position, lock the eccentric collars in the direction of shaft rotation using a hammer and pin punch, Figure 8. Set the allen set screw to secure the collar position.

NOTE: Shaft rotation for both the vertical and the horizontal discharge augers will be clockwise when viewed from the discharge ends of the augers.

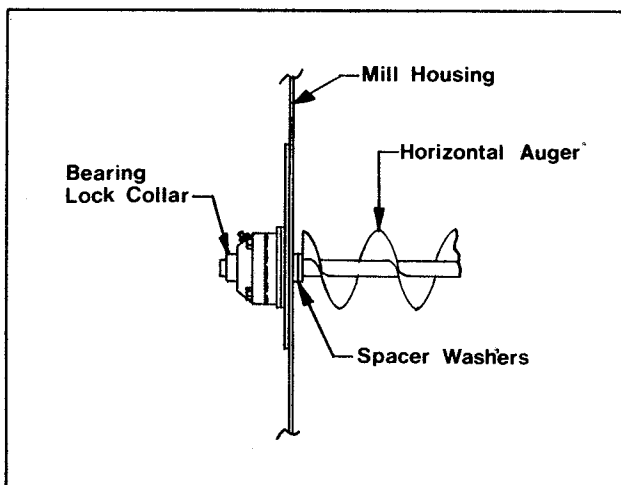


FIGURE 6  
DISCHARGE AUGER DETAIL

## VERTICAL DISCHARGE AUGER INSTALLATION

Install the vertical discharge auger making certain that the tube is fully inserted in the 12" transfer corner split tube on 4" assemblies.

After the vertical auger has been installed, make certain that the shaft and flight are moved against the bearing at the discharge (upper) end of the auger and that there is no pressure on the spacer washers at the inlet (lower) end, Figure 7. Lock the shaft in this position by first locking the upper eccentric locking collar in the direction of shaft rotation. The lower locking collar may be tightened after the upper collar has been locked in position.

## HEATER STRIPS

Heater strips for the horizontal and vertical discharge auger motor overload protection blocks, located in the control panel, vary with motor size. Properly sized heater strips are packaged with the discharge auger motors and must be installed in the control panel as shown in Figure 9.

Single phase motors require one heater strip and three phase motors require three heater strips. Mill motor heater strips are installed at the time of factory assembly.

Additional heater strip size information is provided on a decal located inside the control panel.

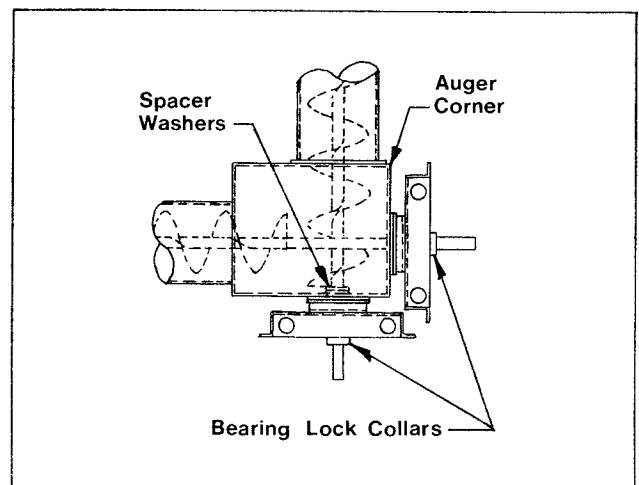


FIGURE 7  
DISCHARGE AUGER DETAIL



## INSTALLATION

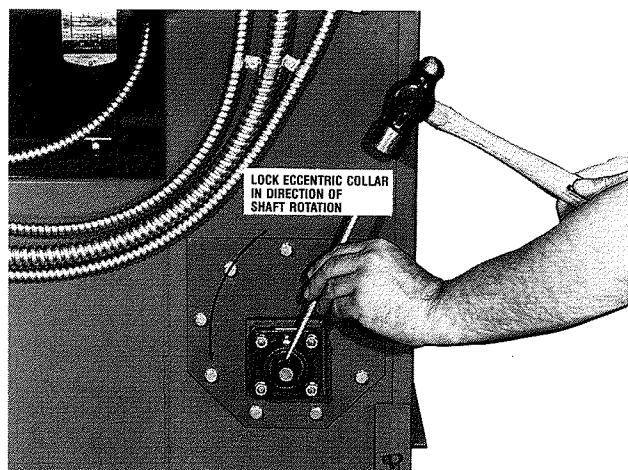


FIGURE 8  
TIGHTENING LOCK COLLARS

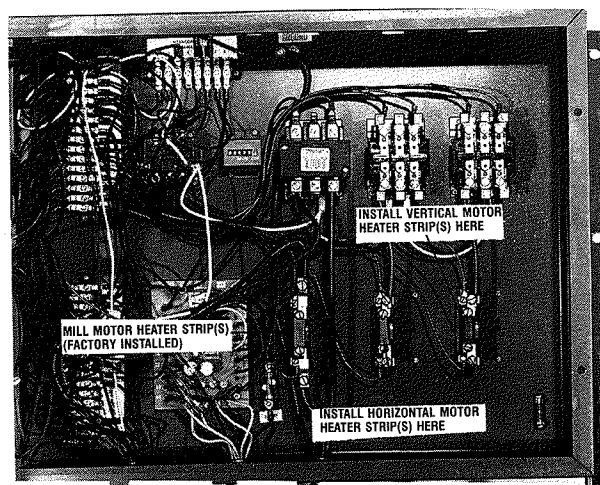


FIGURE 9  
HEATER STRIP INSTALLATION

### STEP 7

#### MAKE ELECTRICAL CONNECTIONS

Electrical connections for Series 50 mills consist of the following:

#### A.

##### GROUNDING THE CONTROL PANEL

The control panel housing must be connected to a suitable ground. A grounding lug is provided in the panel for this purpose.

#### B.

##### POWER SUPPLIES TO THE CONTROL PANEL

It will be necessary to provide a main disconnect switch and proper fuse or circuit breaker protection in all power lines supplying the

unit. Fuse or circuit breaker sizes and wire sizes must be determined by your electrician after calculating the load.

Power service connections to the control panel are made as shown on page 27 (page 28 for 460 V. and 575 V. installations). This information is also given on a decal attached to the inside of the control panel.

The wiring diagrams indicate separate supplies to be provided for:

1. 115 Volt Circuit
2. Mill Motor
3. Horizontal (Base) Auger Motor
4. Vertical Auger Motor

In some cases, depending upon motor size and local electrical codes, the horizontal and vertical auger motor supplies may be combined.

**CAUTION:** DO NOT CONNECT OTHER MOTORS TO THE POWER SUPPLIES GOING TO THE MILL PANEL.

#### C.

##### INTERCONNECTION OF THE CONTROL PANEL AND MILL

Three ten foot (10') flex-conduit cables are provided to make electrical interconnections between the control panel and the junction box in the front mill base. All wires, with the exception of the green ground wire and the mill motor power wires, are numbered and interconnection is simply a matter of attaching the wires to the like numbered terminals in the control panel and in the mill.

**NOTE:** The normal length of interconnecting cables is ten feet (10'). Cables up to fifteen feet (15') in length are available on special order.

**CAUTION:** ON SERIES 50 MILLS, THE INTERCONNECTING CABLES MUST NEVER EXCEED FIFTEEN FEET (15'). NEVER RUN ANY OTHER WIRES IN THE SAME CONDUIT AS THE MONITOR CIRCUIT WIRES (WIRES #35 - #48).

## INSTALLATION

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The flex-conduit cable containing the mill motor power leads also contains a green ground wire which is connected to the grounding lug in the mill base and also to the grounding lug in the control panel.

Mill motor connections between the mill base and the control panel are different for single phase and three phase installations.

Three phase mill motor interconnection leads are connected to the mill motor overload protector in the control panel and to the first three terminals of the mill motor terminal block in the mill base.

On single phase installations, one of the interconnection leads connects to the mill motor overload protector and to the first terminal of the mill motor terminal block in the mill base. The other interconnection lead connects to the T2 terminal of the mill motor contactor and to the third terminal of the mill motor terminal block.

### D.

#### INTERCONNECTION OF ACCESSORIES

A separate interconnection terminal block is provided in the control panel to extend the 115 volt control circuit to accessory equipment such as control hoppers, pneumatic conveyors and premixers.

All main electric supply for any of these accessories must be provided through circuit breakers or fuses in the electric supply source.

Wiring diagrams are provided with each accessory.

### E.

#### WIRING GROUND-LEVEL AUGER MOTORS AND CONTROL HOPPERS

All control hoppers, with the exception of model 30A28 which is used to control premixers only, have two power circuits and are wired as shown on wiring diagram 11A115, page 33. The two power circuits are:

- 1) 115 V. control circuit
- 2) Main electrical supply circuit to the auger motors.

The 115 V. control circuit is extended to the control hoppers from terminals ITB1 and ITB2 of the interconnection terminal block in the control panel.

The main electrical supply to the control hopper(s) and auger motor(s) must be provided through circuit breaker(s) or fuse(s) in the electrical supply source.

Ground lugs are provided in all control hoppers and must be connected to a suitable ground.

Wiring of 30A28 control hoppers is shown on the wiring diagrams on pages 34 and 35.

### F.

#### ELECTRICAL CONNECTION OF DISCHARGE AUGER MOTORS

It will be necessary to provide wires of the proper size and length for the discharge auger motors. Refer to the power circuit wiring diagram on page 27 (page 28 for 460 V. and 575 V. installations) and to the diagrams on the motors themselves to determine proper connections. Motors must be wired so that the augers turn clockwise when viewed from the discharge end. It will be necessary to verify this rotation before attempting to grind feed, Figure 10.

If it is determined that an auger is turning in the wrong direction, motor rotation may be changed as follows:

#### SINGLE PHASE MOTORS

A change of connections at the motor junction box is required to change motor rotation. (Follow diagrams printed on motors or inside motor junction boxes.)

#### THREE PHASE MOTORS

Interchange two (2) of the three (3) power lines to change rotation. This is most easily accomplished at the mill control panel.

# INSTALLATION

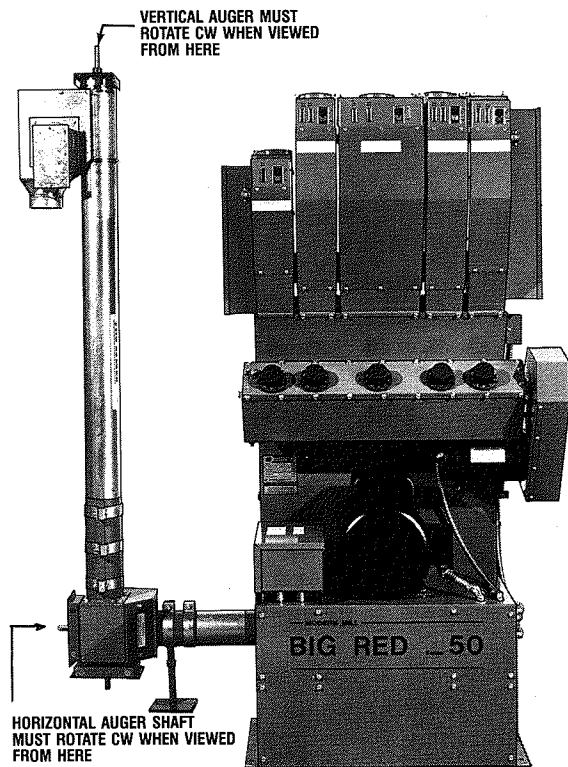


FIGURE 10  
DISCHARGE AUGER ROTATION

G.

## WIRING ADDITIONAL DELIVERY AUGERS INTO THE SYSTEM

Additional delivery augers may be wired to automatically start and stop with the mill or with a pneumatic conveyor.

Figure 11 shows how to wire three augers so that one of the three may be selected to be controlled by the mill or by a pneumatic conveyor. The components shown in the illustration are not provided with either the mill or the pneumatic system but they may be purchased separately.

Notice that the contactors must have 115 volt coils and that the additional motors should have internal overload protection.

H.

## WIRING THE OPTIONAL DISCHARGE AUGER SAFETY SWITCH

A discharge auger safety switch may be installed

to shut down the mill system if the vertical auger becomes plugged. To install the discharge auger safety switch, it is necessary to remove the jumper wire between terminals TB25 and TB26 in the control panel and wire in the safety switch as shown in Figure 12.

NOTE: These switches are always wired normally closed and common.

I.

## WIRING OPTIONAL BIN LEVEL SWITCHES

With the addition of up to four (4) optional bin level switches, the bin level selector in the control panel can be positioned to select the individual bin level switch that will control the mill.

Bin level switches are wired in a manner similar to the discharge auger switch. Remove the jumper wire between TB27 and TB31 in the control panel and wire in the optional bin level switches as shown in Figure 13.

Again, all switches must be wired normally closed and common.

## STEP 8

### INSTALL INGREDIENT FLOW SWITCH PADDLES

Remove the small wire and tape securing the trip bar over the top of the metering hopper. After ingredients have been placed in the metering compartments, install a switch paddle in each compartment containing an ingredient to be metered. Pull the trip bar toward the rear and slide the points of the paddle under the ingredients until the paddles rest on the extended lip above the hopper.

NOTE: If any one of the metering compartments is not used, fill this section with ingredient of any type to prevent mill pressures from blowing back through this section. Normally a switch paddle will not be installed in an unused section.

# INSTALLATION

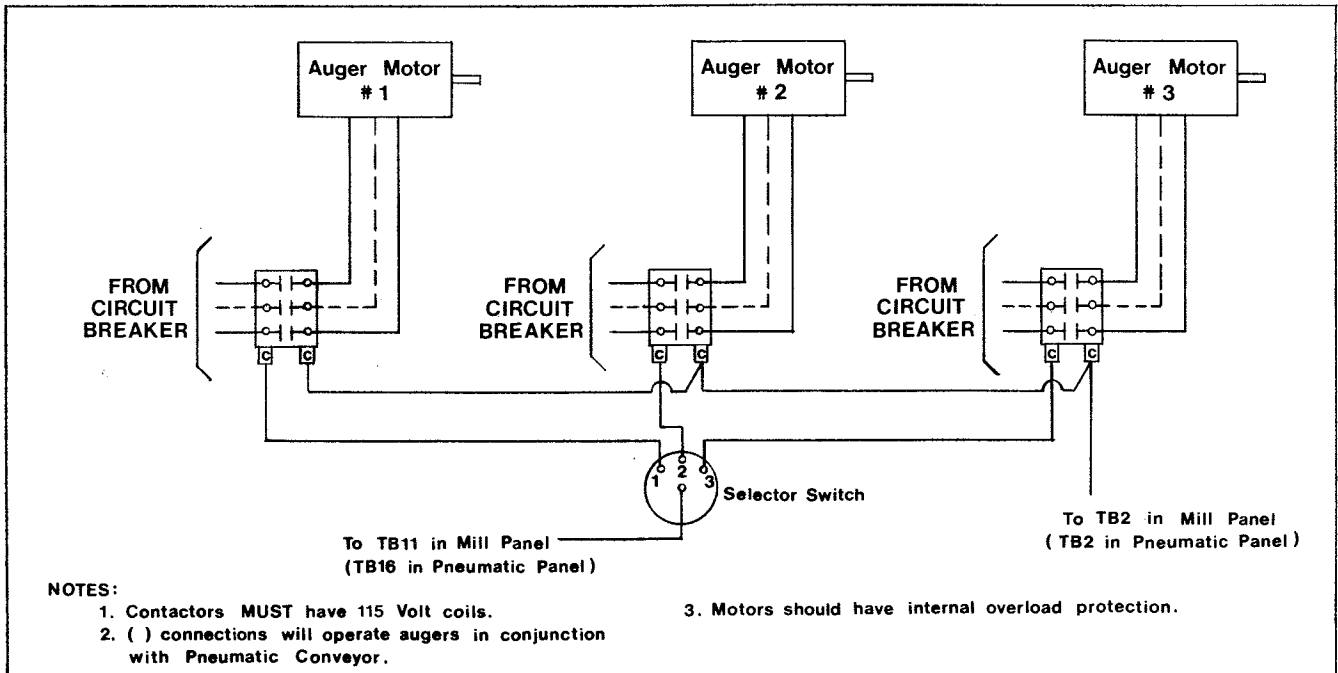


FIGURE 11  
WIRING ADDITIONAL DELIVERY AUGERS

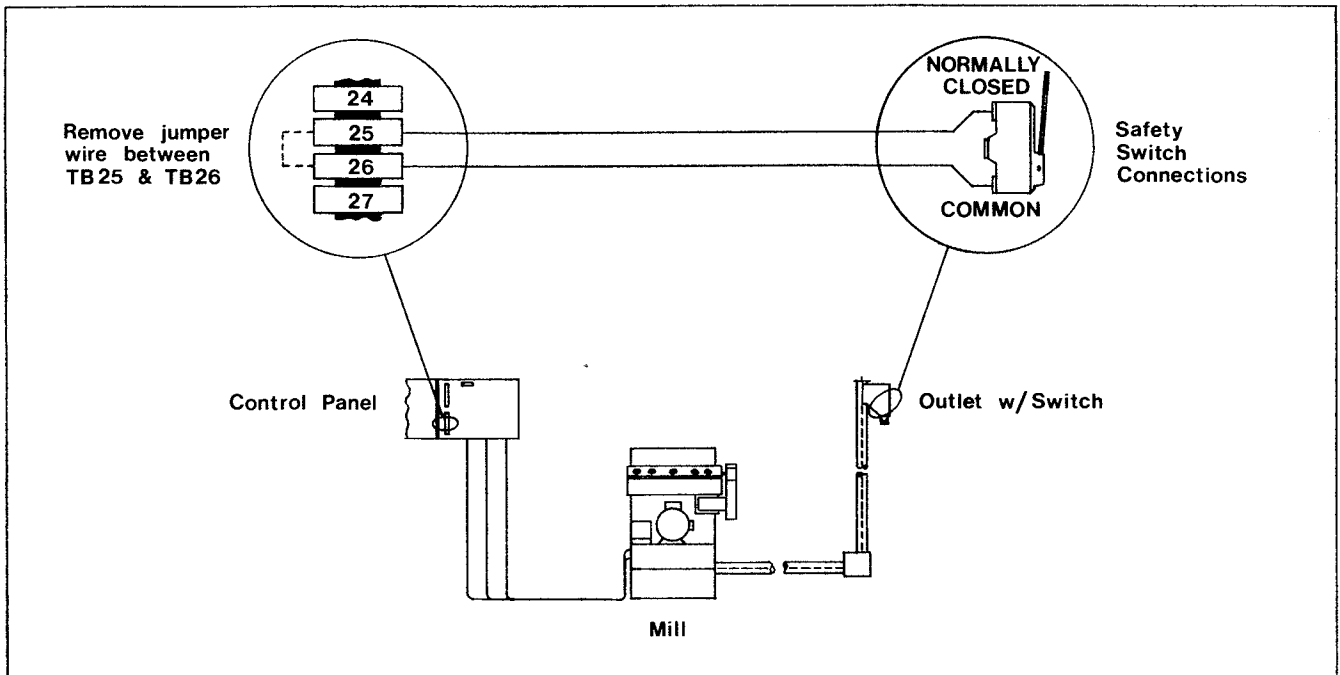


FIGURE 12  
WIRING THE OPTIONAL DISCHARGE AUGER SAFETY SWITCH

# INSTALLATION

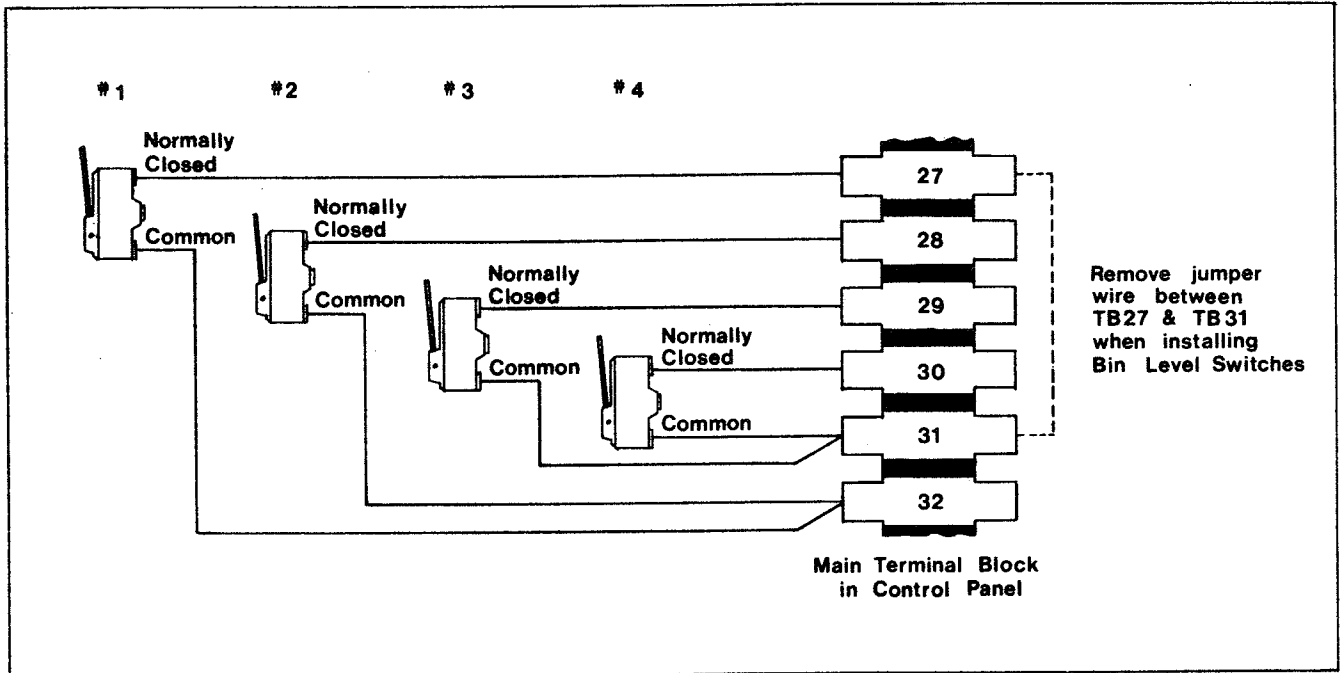
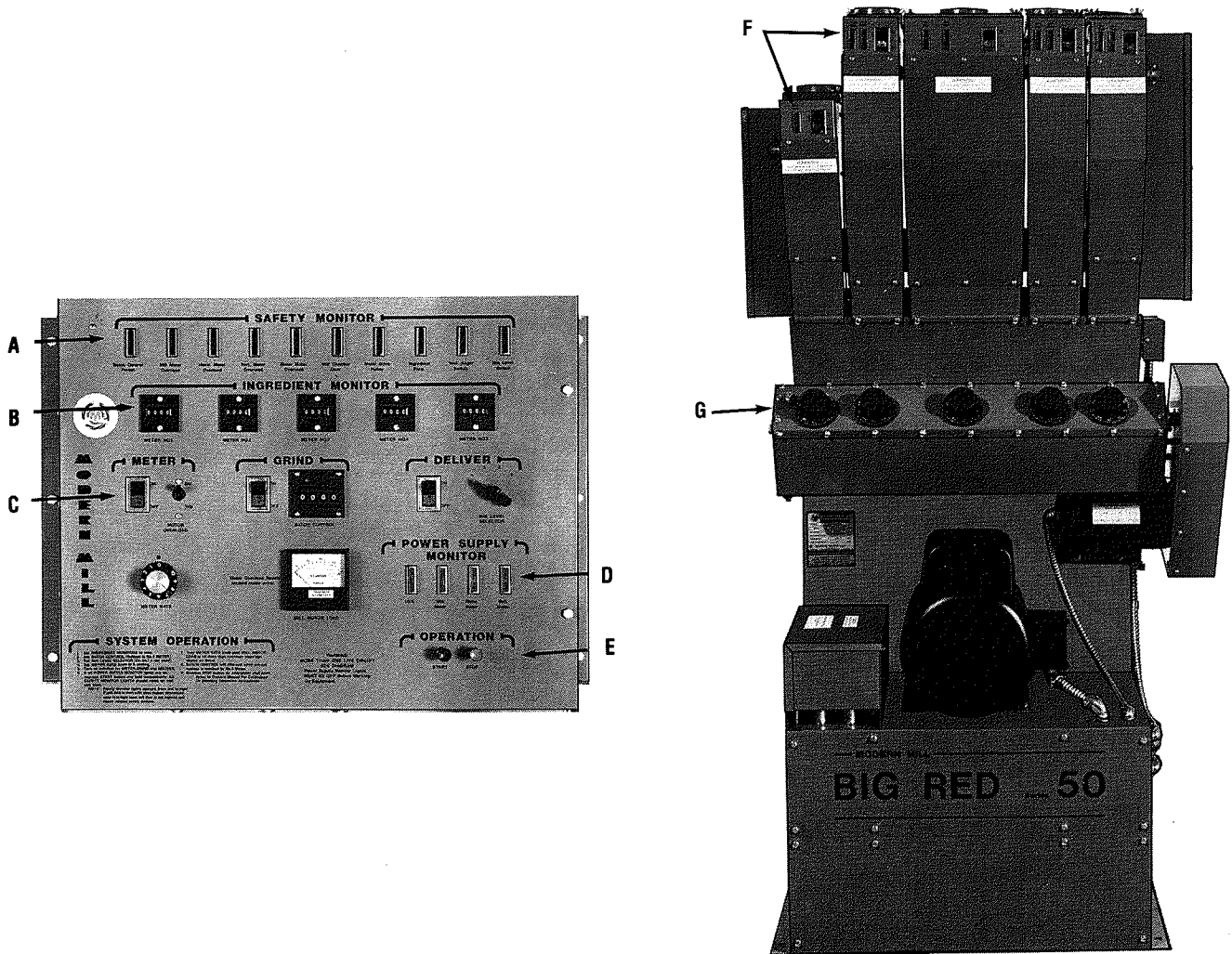


FIGURE 13  
WIRING BIN LEVEL SWITCHES

# OPERATION



CONTROL LOCATION CHART

- |   |  |
|---|--|
| A. SAFETY MONITOR LIGHTS                      | E. OPERATION CONTROL AREA  |
| B. INGREDIENT MONITORS                        | F. GROUND LEVEL CONTROL HOPPER<br>POWER SUPPLY MONITORS AND<br>ROCKER SWITCHES |
| C. METER, GRIND, AND DELIVER<br>CONTROL AREAS | G. METERING AUGER CONTROL DIALS  |
| D. POWER SUPPLY MONITORS                      | H. HOUR METER (NOT SHOWN)  |
|   | I. BY-PASS VALVES (FIGURE 14)  |

## OPERATION

### A.

#### SAFETY MONITOR LIGHTS

Across the top of the control panel, ten green neon lights monitor the safety features of the mill. These monitors help the mill operator quickly determine the location of an open switch in the safety circuit. The lights operate in series from left to right.

Under normal conditions, all of the safety monitor lights will light and the control circuit will "lock in" when the start pushbutton is depressed and held for approximately ½ second.

In the event that there is an open switch in the safety circuit, all of the lights will not light, the control circuit will not "lock in", and the mill will not start. In this case, the first light from the left that is not lighted indicates the open switch that is preventing the mill from starting.

These lights, starting at the left hand end of the panel, monitor the following:

1. Batch Control Preset
2. Mill Motor Overload
3. Horizontal Motor Overload
4. Vertical Motor Overload
5. Meter Motor Overload
6. Mill Chamber Door
7. Meter Drive Pulley
8. Ingredient Flow
9. Vertical Auger Switch
10. Bin Level Switch

Numbers 1 through 5 are safety features located in the panel and numbers 6 through 10 are those on the mill body or away from the panel area.

### B.

#### INGREDIENT MONITORS

Five ingredient monitors are provided to register the revolutions of their corresponding metering augers. These monitors are reset to zero by manually pressing the reset buttons on each individual monitor.

### C.

#### METER, GRIND, AND DELIVER CONTROL AREAS

Across the center section of the control panel are located three individual control areas of meter, grind, and deliver.

The meter section provides an on/off rocker

switch, meter motor overload protector, and a dial for setting the meter motor speed or grinding rate. The meter rate dial is graduated from zero (0) to ten (10) and is normally positioned on the highest setting possible without exceeding maximum amperage. Metering unit shaft speed is 200 rpm on the lowest dial setting (0) and 500 rpm on the highest setting (10).

The grind section provides an on/off rocker switch for the mill motor, a direct reading ammeter with decal showing maximum amperage, and a batch control that is used to determine the batch size or quantity of feed produced. The batch control must be preset with a number before the mill will operate. It receives a count signal from the #3, 6" metering auger and automatically shuts the system down after the #3 auger has completed the selected number of counts. If the system is shut down before the selected number of counts have been completed, it will be necessary to subtract the number of counts already completed from the selected number before restarting. If this subtraction is not made, the batch will be larger than desired.

A small green light on the face of the batch control indicates when the unit is preset to control. This light goes out when the first count signal is received. If the light is not lighted at start, the unit will not control.

The deliver section provides an on/off rocker switch for the base and vertical auger motors and a four-position bin level selector switch which permits selection of any of four (4) bin level switches that can control the system.

### D.

#### POWER SUPPLY MONITORS

All electrical power supplies are monitored by four (4) amber neon lights:

1. 115 Volt for Meter & Control
2. Mill Motor Power Supply
3. Horizontal Motor Power Supply
4. Vertical Motor Power Supply

These lights remain lighted at all times and will quickly indicate a tripped circuit breaker at the main supply source.

### E.

#### OPERATION CONTROL AREA

This area has (2) momentary contact push

## OPERATION

button switches with colored caps:

Green Cap for Start

Red Cap for Stop

### F.

#### GROUND LEVEL CONTROL HOPPER POWER SUPPLY MONITORS AND ROCKER SWITCHES

Electrical power supplies to control hoppers on ground level mills are also monitored by amber neon lights. These lights normally remain lighted at all times and a tripped circuit breaker at the main supply source is quickly indicated when a monitor is not lighted.

Each control hopper has an on/off rocker switch. The hopper will not operate the auger motor in the "off" position.

### G.

#### METERING AUGER CONTROL DIALS

Mixing is accomplished by changing the speeds of the five metering augers relative to each other. Each of the large black control dials, located on the mill metering unit, controls the speed of one metering auger relative to the speed of the metering drive motor.

The dial settings range from zero (0) to forty (40). When a dial is set on zero, the metering auger corresponding to that dial does not turn (even though the metering drive motor is running). When a dial is set on forty, the speed of the metering auger corresponding to that dial will be at a maximum relative to the speed of the metering drive motor.

If one dial were set on forty and another on twenty, the metering auger corresponding to the dial set on twenty would rotate at approximately  $\frac{1}{2}$  the rate of the one corresponding to the dial set on 40.

**CAUTION: DO NOT FORCE DIAL KNOBS.** Dial knobs should turn freely when adjusting. Since the auger shaft must move during this adjustment, any obstruction of metering auger movement will cause the dial knob to turn hard.

If a dial knob is inadvertently moved past the 40 position, continue to turn the knob in the same direction to the point of zero setting.

### H.

#### HOUR METER

An hour meter for recording mill running time is located inside the control panel.

### I.

#### BY-PASS FEATURE

Two handles in the mill back control by-pass valves which are used to divert abrasive ingredients around the grinding chamber. Two factory installed aluminum divider baffles and angles, located in the metering compartment, are also part of the by-pass feature, Figure 14.

Note: The aluminum divider baffles and angles must be removed for calibration of the mill and need not be reinstalled if the by-pass feature is not going to be utilized.

Ingredients metered by either the far right or the far left metering auger (auger #1 and auger #5) may be by-passed, but not simultaneously.

To by-pass ingredients, the aluminum divider baffles and angles must be installed and the valve beneath the auger metering the abrasive ingredients must be open and the other valve must be in the normal position. Both valves are not to be opened at the same time. Both valves must be closed when ingredients are not being by-passed.

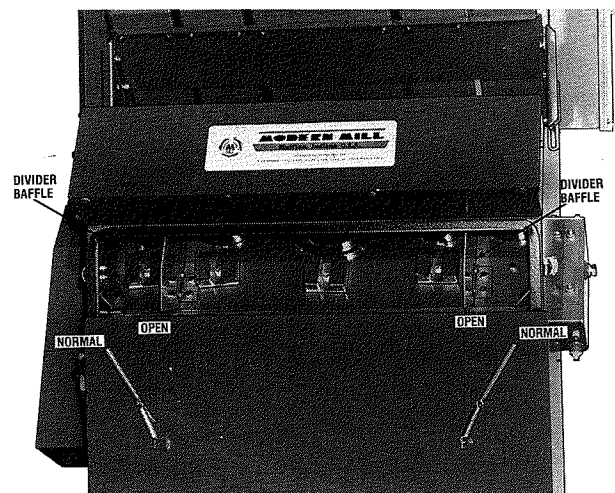


FIGURE 14  
BY-PASS FEATURE



# OPERATION

## SYSTEM OPERATION INSTRUCTIONS

(These instructions are also printed on the control panel.)

1. Set ingredient monitors to zero.
2. Set batch control (relates to #3 meter).
3. Set bin level selector (on #1 if not used).
4. Set meter rate knob to "0" setting.
5. Turn on switches for meter, grind, and deliver.
6. If all power supply lights are on, depress START button and hold momentarily. All safety monitor lights should come on and unit start.

NOTE: Safety monitor lights operate from left to right. If unit fails to start with start button depressed, note first light from left that is not lighted and check related safety feature.

7. Turn METER RATE knob until MILL MOTOR LOAD is no more than maximum amperage shown on decal.
8. Batch Control will stop unit when preset number is reached by the #3 meter.
9. Depress STOP button for emergency shut down.

## CALIBRATING THE METERING UNIT

Your new Modern Mill has been designed to deliver feed ingredients on a consistent and

accurate basis. The accuracy you contribute in this calibration procedure will permit peak performance of the equipment.

Once a particular ration has been established, we recommend, periodically, and upon receipt of a new supply of ingredient, that you reconfirm pounds per count ([2] in Figure 15) by taking a sample delivery from the metering augers. This will assure the consistent delivery of an accurate ration.

## EQUIPMENT REQUIRED FOR CALIBRATION

1. Mill Sample Chute. (Supplied with the mill, (5) chutes mounted on channel)
2. Sample Containers. Though other containers may be used, we recommend use of the containers manufactured by Modern Mill. Three sizes are available. Use 2A800 on the 6" metering auger, 2A540 - 1 cu. ft. container on all 4" augers metering over 200 # / ton and 2A539 - ½ cu. ft. container on all remaining low level ingredients.
3. An accurate scale with 2 oz. or smaller increments.
4. Electric Calculator
5. Pad and Pencil

## ESTABLISHING A BASIC DIAL SETTING

Make a chart for each feed ration similar to the example in Figure 15.

Sow Ration	(1) Percent Of Total	(2) Pounds Per Count	(3) Counts Per Ton	(4) Dial Set Initial	(5) Dial Set Final
1335 # Dry Corn	66.75%	2.03	658	26.5	26
665 # Concentrate	33.25%	.67	993	40.0	40
2000 #	100.00%				

FIGURE 15  
RATION CHART

## OPERATION

If the main ingredient is metered by more than the 6" metering auger, establish 25% of the main ingredient as the amount to be supplied by one of the 4" metering augers. Calibrate with the consideration that each of these metering augers will contribute to the total. (This will, in most cases, only be necessary on 15 H.P. mills.)

The following steps explain how to complete your ration charts:

1. To establish POUNDS PER COUNT, install the sample chute under the discharge end of the metering augers. (Remove aluminum divider baffles and angles, Figure 14.)
2. Put a sample container under each auger chute that will meter ingredient into the ration, Figure 16.
3. Set the dial knobs on the computer drive unit as follows:

Feed ration ingredients over 900 # /ton on 10

Feed ration ingredients 500 # -900 # /ton on 20

Feed ration ingredients 150 # -500 # /ton on 30

Feed ration ingredients under 150 # /ton on 40

4. Set the meter motor rate knob on 5.
5. Set all ingredient counters on zero.
6. Set the Batch Control on 30.
7. Turn on the meter switch only and depress the start button. (Note that the small green light on the batch control is lighted and goes out with the first count.)
8. When the unit shuts down, weigh the ingredient samples. Be sure to deduct container weight in order to obtain net weight.
9. To find POUNDS PER COUNT, divide the net ingredient weight by the number of counts registered on the particular auger counter.
10. Divide the recommended pounds of the ingredient in the ration by the POUNDS PER COUNT in order to determine COUNTS PER TON.

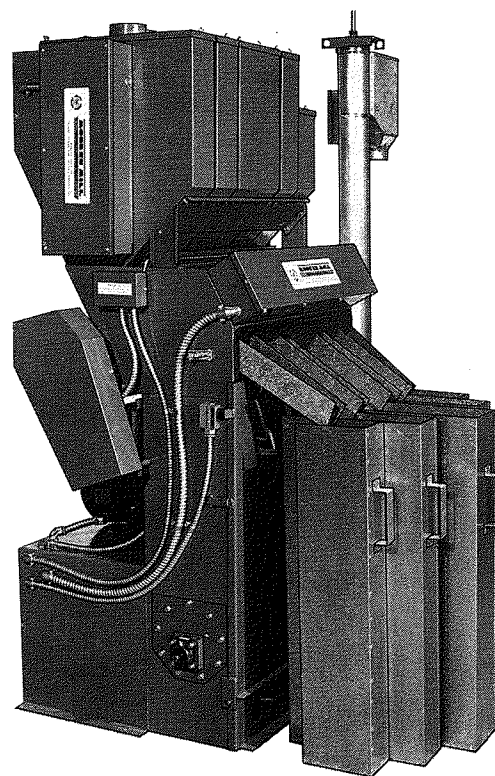


FIGURE 16  
USING SAMPLE CONTAINERS

11. Use a 40 dial setting on the ingredient in the ration requiring the highest number of COUNTS PER TON.
12. To find the dial settings for the other ingredients in the ration, divide the COUNTS PER TON of these other ingredients by the COUNTS PER TON of the ingredient set on 40 and multiply each by 40.

(Our example ration:  $658 \div 993 = .6626$ )

$40 \times .6626 = 26.5$

The corn dial calculates 26.5.)

¼ oz. — .0156 lb.	5 oz. — .3125 lb.	11 oz. — .6875 lb.
½ oz. — .0313 lb.	6 oz. — .3750 lb.	12 oz. — .7500 lb.
1 oz. — .0625 lb.	7 oz. — .4375 lb.	13 oz. — .8125 lb.
2 oz. — .1250 lb.	8 oz. — .5000 lb.	14 oz. — .8750 lb.
3 oz. — .1875 lb.	9 oz. — .5625 lb.	15 oz. — .9375 lb.
4 oz. — .2500 lb.	10 oz. — .6250 lb.	16 oz. — 1.0000 lb.

FIGURE 17  
CONVERSION - OUNCES TO POUNDS

## OPERATION

---

NOTE: Operation of the metering unit will be most efficient when the dial for the ingredient requiring the highest number of counts per ton is set on forty (40). While this will be possible in most cases, certain combinations of ingredients and mill screen perforation size may cause a mill motor overload condition, even when the metering motor control is set on its lowest setting.

If this condition should occur, it will be necessary to lower all of the calculated dial settings by a percentage sufficient to eliminate the overload condition.

### Confirming Metering Auger Delivery

1. Set all dials. The dials should be set on the whole numbers nearest the calculated dial settings.
2. Install sample containers under the sample chute.
3. Set all auger counters to zero.
4. Set batch control on 30.

5. Turn on the meter switch and wait for the batch control to shut the unit down.
6. Weigh each ingredient and establish the net weight.
7. Record the net weight of each ingredient and total and convert to percent of total.

Example:

Corn	80.25 #	66.74%
Sow Concentrate	<u>40.00 #</u>	<u>33.26%</u>
	120.25 #	= 100.00%

8. Compare percentages to original ration calculations or, if desired, multiply the percentage by 2000 to get pounds per ton.
9. In the example ration, dial settings of 26 corn and 40 sow concentrate were used. Actual deliveries were within tolerance.
10. If your final samples contain a margin of error too great, reset the dials and take another sample.

Remember, ingredient samples are a comparison of one to another. Raise a single ingredient and you reduce all others. If you lower one ingredient, you automatically increase the others.

# MAINTENANCE

## METERING UNIT MAINTENANCE

Metering unit adjustment and repair, by the owner, is limited to the items in this section. If at any time your metering unit should require internal repairs, it is recommended that you contact your Modern Mill dealer or distributor to have the services performed. There are certain technical adjustments necessary whenever the top cover of the metering unit is removed. Your Modern Mill dealer or distributor has been instructed to perform these adjustments properly.

### Metering Unit Control Knob Adjustment

An improperly adjusted metering unit control knob may cause a metering auger to creep when the knob is set on zero (0), hard turning of the knob, or failure of the metering auger to reach full speed.

If any of the above conditions exist, the control knobs may be adjusted as follows:

1. Loosen the control knob set screw and remove the knob, being careful not to lose the detent ball and spring.
2. Use a file to remove the burr from the collar that was previously made by setting the set screw.
3. Rotate the dial knob collar CCW (counterclockwise) to the maximum rotation position. CAUTION: Pliers may be used

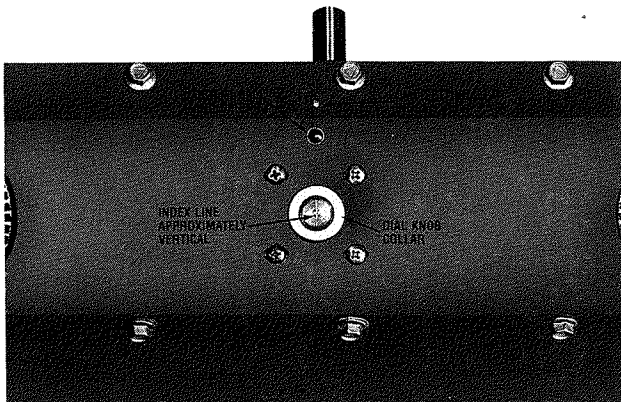


FIGURE 18

to rotate the collar but avoid forcing the collar past the maximum rotation position. The index line on the end of the auger adjustment camshaft will be approximately vertical in the maximum rotation position, Figure 18.

4. Place the knob over the collar with the forty (40) mark aligned with the dial setting index and tighten the set screw. The bottom edge of the knob should compress the detent ball against the spring and be approximately 3/16" above the surface of the metering unit cover, Figure 19.

**NOTE:** If the detent ball is either depressed too far or not far enough, the knob will be difficult, or even impossible, to turn.

5. Turn the metering motor on and check operation. The metering auger must not rotate when the dial is set on zero and it must begin to rotate when the dial is set on one.

If operation is not satisfactory, turn the knob back to forty and again remove the knob. If the metering auger rotates on zero, turn the dial knob collar slightly cw (clockwise) so that the index line is slightly to the right of the vertical. Turn the dial knob collar slightly CCW if the metering auger does not rotate when the dial is set on one.

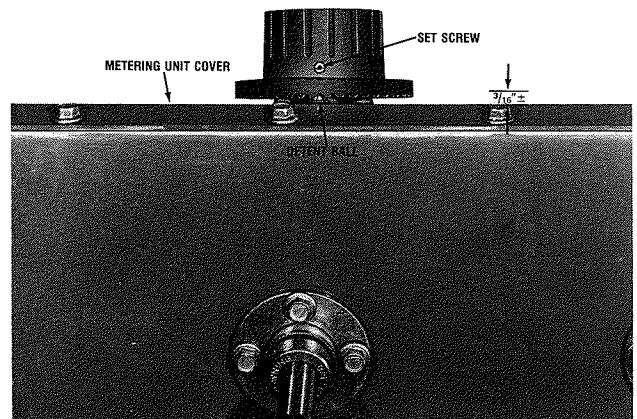


FIGURE 19

## MAINTENANCE

Re-install the knob with the forty mark aligned with the dial setting index and again check operation.

### Adjusting Metering Unit Drive Belt Tension

The meter motor mounting base has slotted holes and metering unit belt tension is adjusted by loosening the mounting nuts and moving the meter motor in the proper direction. The belt must not be tightened any further than the amount required to prevent slippage. Excessive tension will result in improper operation of the metering unit.

### Metering Unit Safety Pin Replacement

The metering unit drive pulley is equipped with a safety pin, Figure 20, that will bend and disengage the pulley in the event any metering auger is overloaded or bound by a foreign object. When the safety pin becomes disengaged from the pulley, a spring, behind the meter drive pulley, pushes the drive pulley outward, opening the meter drive pulley safety switch.

Always replace the safety pin with a new pin supplied by Modern Mill, Inc. These pins are available without cost from your dealer or distributor. **DO NOT USE NAILS OR HARDWARE.** An initial supply of safety pins was shipped with your new mill.

The pin is held in place by a set screw. Tightening the set screw will tend to bend the safety pin, so, after the set screw is tightened, be sure the pin is straight. If necessary, bend the pin by hand to straighten.

### Adjusting the Meter Pulley Safety Switch

After replacing the metering unit safety pin, always check the meter pulley safety switch for proper adjustment.

Two criteria determine correct adjustment of the meter pulley safety switch:

1. The safety switch actuating lever must not touch the meter drive pulley when the pulley is normally engaged to the safety pin. Normal clearance between the actuating lever and the pulley is 1/16" to 1/8".
2. The meter pulley safety switch must "click" open before the meter pulley reaches the end of its travel when the pulley is disengaged from the drive pin.

To adjust the meter pulley safety switch, loosen the actuating lever adjusting nut, Figure 20, position the lever so the above criteria are met, and then retighten the adjusting nut. Note that the safety pin must be straight before adjusting the lever.

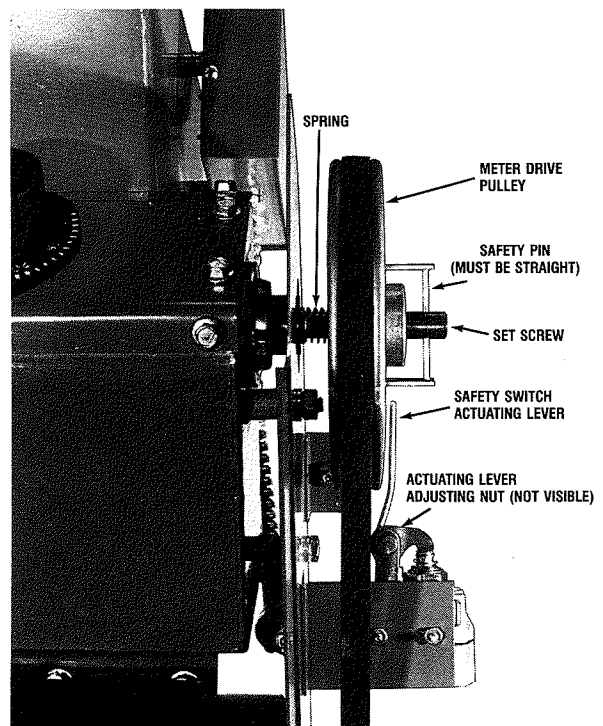


FIGURE 20

## MAINTENANCE

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### Removal of the Metering Unit

To remove the metering unit from the mill, proceed as follows:

1. Shut off ingredient supplies to the mill and operate the unit until metering compartments are empty.
2. Disconnect all mill power supplies.
3. Remove the meter pulley safety switch.
4. Remove the metering unit drive belt and metering unit pulley.
5. Remove the metering unit belt guard back plate.
6. Remove nuts and lockwashers securing the metering unit to the mill and remove the metering unit with metering augers attached.

### Changing Metering Augers

To change metering augers:

1. Remove the metering unit as described in the preceding section.
2. Remove the bolt and lockwasher securing the metering auger to the metering auger shaft and remove the metering auger.
3. Install the placement auger(s) and install the metering unit as described in the following section.

### Installing the Metering Unit

When installing the metering unit, it is best to have two people, even though it is not impossible

for one person to perform the operation. Installation is performed as follows:

1. Clean the front of the metering hoppers and the back of the metering unit to assure sealing.
2. Remove the mill back.
3. Position the metering unit on the mill, install lockwashers, and start retaining nuts. DO NOT TIGHTEN RETAINING NUTS AT THIS TIME.
4. Have an assistant in back of the mill make certain that the auger end tabs are engaged in the monitor drive shaft lugs.
5. When all five auger end tabs are engaged in the lugs, tighten the retaining nuts.
6. Re-install the belt guard back plate.
7. Re-install the pulley, pulley safety switch, and belt making sure that the switch adjustment and drive belt tension are as explained previously in this section.

### BEATER HUB AND MILL SCREEN MAINTENANCE

#### Reversing Switch

When the leading edges of the beater hub hammers become worn, the mill motor rotation can be reversed in order to utilize the opposite cutting edges. Reversing is accomplished by changing the position of the toggle switch located in the box just to the left of the mill motor, FIGURE 21.

It is necessary to remove two hex-head screws to gain access to the reversing toggle switch.

Reversing should be accomplished before  $\frac{1}{2}$  of the hammer cutting edge is worn away, FIGURE 22.

## MAINTENANCE

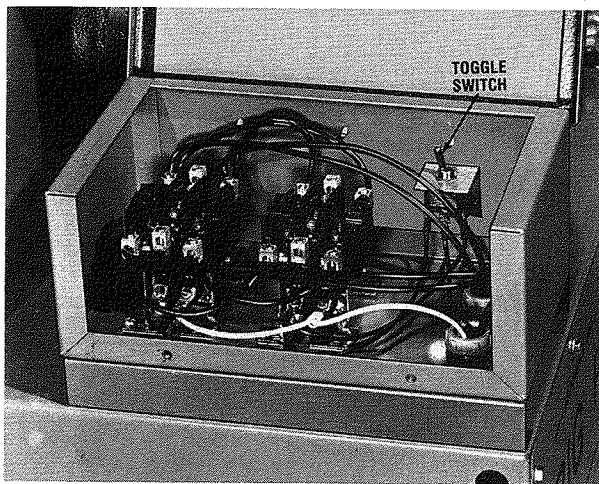


FIGURE 21  
REVERSING SWITCH BOX

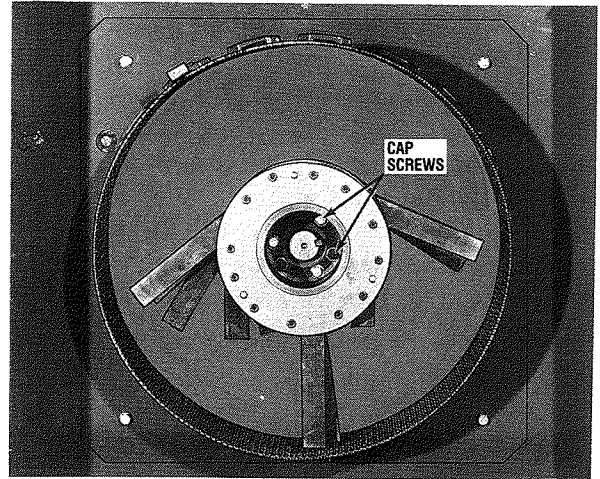


FIGURE 23  
BEATER HUB ASSEMBLY

**CAUTION: DO NOT REVERSE WHEN UNIT IS OPERATING.**

When the hammers become worn on both sides, it will be necessary to remove the hub assembly and replace the hammers.

### Removal of the Beater Hub Assembly

The hub and hammer assembly is fastened to a taper lock hub with three 1/4" x 1-13/16" cap screws and lockwashers. There are also three shorter 1/4" x 1" cap screws in the hub assembly. These shorter screws serve only to keep threads used for hub removal clean, Figure 23.

To remove the hub, remove all six cap screws and thread the three longer screws into the three holes from which the shorter (1/4" x 1") screws were removed. Begin to tighten the screws evenly and the beater hub assembly will be pressed away from the taper lock hub.

The taper lock hub, Figure 24, is normally not removed. Should it become necessary to remove the taper lock hub, it is secured to the mill motor shaft with an allen type set screw. The taper lock hub should be spaced 3/8" from the wear plate on the mill.

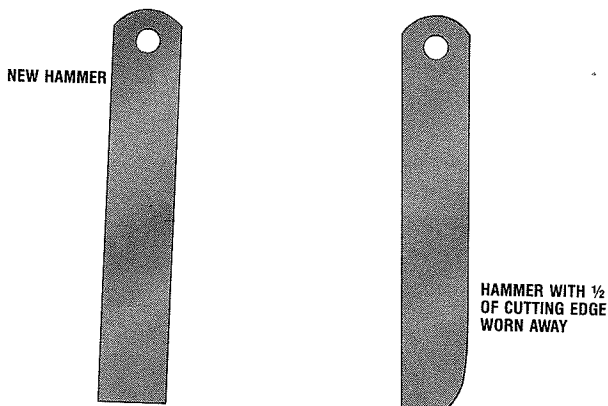


FIGURE 22  
HAMMER WEAR PATTERN

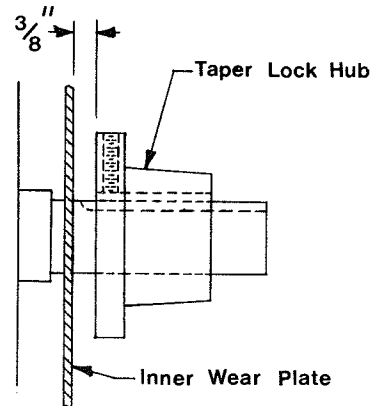


FIGURE 24  
TAPER LOCK HUB

## MAINTENANCE

### Replacing Hammers

To replace the hammers, remove the six (6) shoulder bolts securing the end cover plates, remove the end cover plates, and push the hammer hinge pins out. If the hinge pins show wear at the point of hammer pivot, be sure to replace all pins. NEVER OPERATE the mill with a broken hammer or at any time that vibration exists. Damage to the mill motor bearings will result.

Temporary operation can be performed by removing one (1) hammer on each row if breakage should occur and replacement hammers are not immediately available.

If vibration exists after new hammers are installed, check for wear of the hinge pins or the hinge pins in the washers on the beater hub. Binding hammers that do not swing freely can also cause vibration.

### Mill Screen Sizes

Mill screens for your BIG RED series 50 mill are available in 1/32" increments in perforation size from 3/32" thru 1/4" and 1/16" increments from 1/4" thru 1/2".

For a coarser grind than that achieved with a 1/2" screen, it is recommended that the screen be left out entirely. This provides nearly the same texture of feed as a 5/8" or 3/4" screen would.

### Changing Mill Screens

The front wear plate has 18 die cut, lanced projections, Figure 25, that hold the screen and also permit the screen to be installed in 18 different positions.

Always turn or replace the screen when hole perforations become rounded and no sharp edge exists for the hammers to strike material against.

NOTE: Foreign material may prevent the mill back from closing properly and holding the screen securely. Clean the areas of contact before attempting to close the mill back.

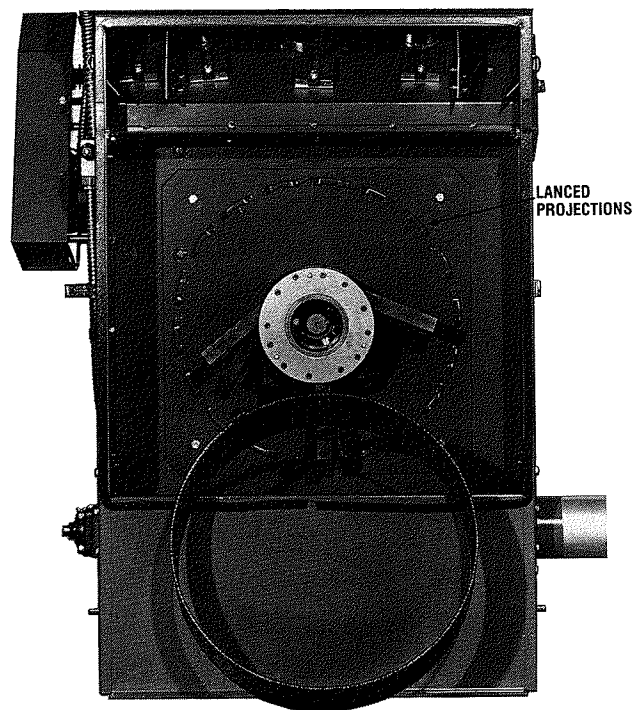


FIGURE 25  
MILL BACK WITH DOOR REMOVED

### SWITCH ADJUSTMENTS

#### Ingredient Flow Switch Adjustment

Flow switch adjustment consists of two steps:

##### Step 1

##### Set Screw Collar Adjustment

The set screw collar limits the backward travel of the trip bar. To adjust the set screw collar, loosen the set screw and position the collar on the trip bar so that the stop pin on the collar will permit the trip bar to come close to, but not touch, the back of the switch paddle when the switch paddle is in the "normal operating position", Figure 26. When the collar is positioned properly, tighten the set screw.



## MAINTENANCE

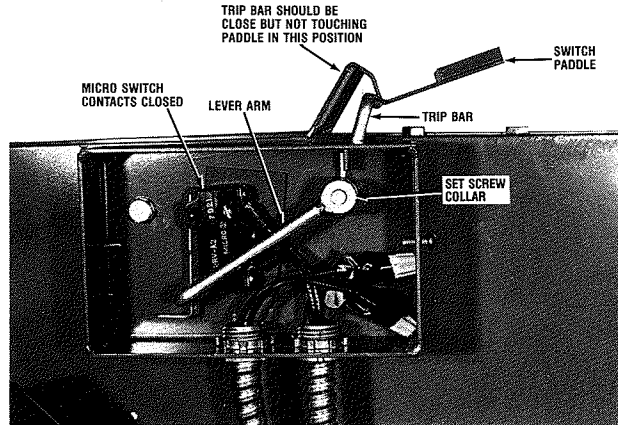


FIGURE 26  
FLOW SWITCH PADDLE  
(NORMAL OPERATING POSITION)

NOTE: If the clearance between the trip bar and switch paddle is not uniform at both ends of the trip bar, it is permissible to bend the trip bar slightly to obtain uniform clearance.

### Step 2

#### Trip Bar Lever Arm Adjustment

To adjust the trip bar lever arm, loosen the set screw in the lever arm collar and position the lever arm on the trip bar in such a manner that the micro switch contacts "click" open when any of the switch paddles reach the "tripped position", Figure 27. (Note that the paddle weight is approximately level in the "tripped position".) When the lever arm is positioned properly on the trip bar, tighten the set screw.

Make certain that the micro switch "clicks" closed when the paddles are returned to the "normal operating position".

#### Adjusting Micro Switches In Control Hoppers And In Other Diaphragm Switches

At the time of installation and from time to time thereafter, it may become necessary to adjust the micro switches in control hoppers and in the other diaphragm switches manufactured by Modern Mill, Inc. Improper switch adjustment is most noticeable in very cold weather when

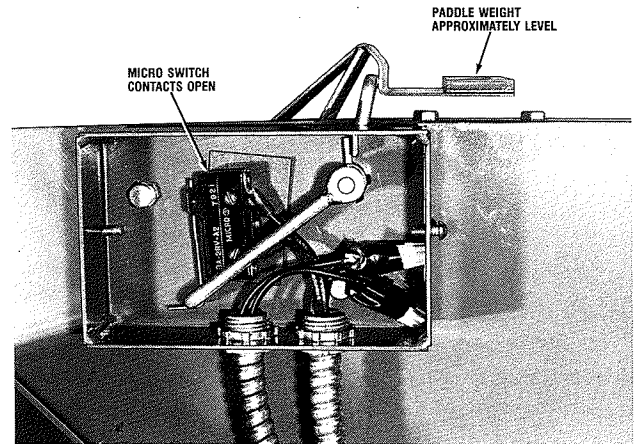


FIGURE 27  
FLOW SWITCH PADDLE  
(TRIPPED POSITION)

the diaphragms tend to be less flexible.

CAUTION: Before attempting to adjust the switches, make certain that all electrical power to the switch or control hopper is off.

Adjustment is accomplished by bending the micro switch actuating levers. Be careful not to damage the diaphragms while adjusting the switches.

The switches must be adjusted so that they "click" open when the ingredient exerts pressure on the diaphragm and so that they return to the normally closed position when the ingredient is no longer exerting pressure.

Control hoppers with dual diaphragms require both switches to be adjusted in the above manner.

#### V-BELT MAINTENANCE

It is necessary to keep v-belts adjusted to the proper tension. A v-belt adjusted too tightly will cause undue stress on motor bearings, pulleys, and motor mounts. A v-belt that is too loose will cause slippage.

When it is necessary to replace a v-belt, be sure to use the correct type of belt. See your Modern Mill dealer or distributor for proper replacement belts.

## **MAINTENANCE**

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It is usually necessary to re-adjust a v-belt a short time after initial installation.

### **FUSE REPLACEMENT**

The safety (control) circuit is protected by a 1/4 amp fuse located inside the control panel near the lower center portion of the panel. A spare fuse is also provided and it is mounted in the lower right hand side of the panel.

### **ELECTRIC MOTOR SERVICE**

All A.C. electric motors used on Modern Mill equipment are protected by the motor manufacturers' warranties. The ¼ H.P., 90 V.D.C. metering motor is protected by Modern Mill's warranty. If repair or replacement is required, contact your Modern Mill dealer or distributor so that he may recommend the service source

best qualified to make the needed repair on your motor.

Never allow unauthorized personnel to attempt repairs, particularly, if the motor is eligible for warranty repair.

### **CLEANLINESS**

Cleanliness is important for both safety and for proper operation.

The area around the ingredient flow trip bar must be kept clean at all times in order to assure shutdown in the event of ingredient depletion.

Motors must be kept clean in order to provide proper cooling.

Magnets located directly below the metering auger troughs should be cleaned periodically with a wisk broom and a non-ferrous container.

# LUBRICATION

## METERING UNIT LUBRICATION

The metering unit operates in a bath of oil and the level must be maintained at all times. The correct level is the middle of the sight glass on the left side of the metering unit, Figure 28.

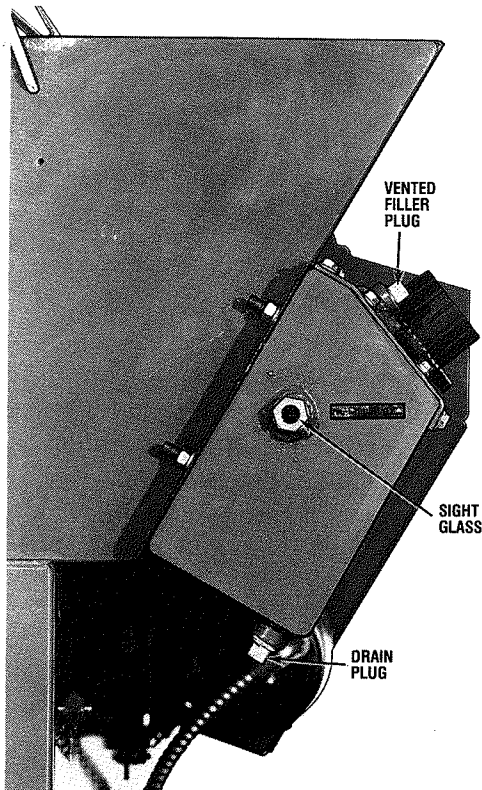


FIGURE 28  
METERING UNIT LUBRICATION

OIL TYPE: Texaco Regal (R & O) 32

CAPACITY: 2 gallons (approx.)

DRAIN AND REFILL: ANNUALLY in the late fall or, if use exceeds 500 hours per year, after each 500 hours of operation.

## ELECTRIC MOTOR LUBRICATION

All electric motors that are equipped with grease fittings, should be lubricated as follows:

ANNUAL USAGE	LUBRICATION INTERVAL
MORE THAN 500 HRS./1YR.	3 YRS.
LESS THAN 500 HRS./1YR.	5 YRS.
NOT USED/6 MO. OR MORE	RELUBRICATE BEFORE RETURN TO SERVICE

Lubricate motors with SHELL ALVANIA #2 or equivalent grease. Apply 1 - 2 full strokes from a hand-held grease gun. DO NOT OVERLUBRICATE

Motors not equipped with grease fittings may be assumed to be lubricated for life.

## AUGER BEARING LUBRICATION

Auger bearings in the mill base or any other location where grease fittings are provided, should be relubricated monthly with Shell Alvania #3 or equivalent grease.

## TROUBLE SHOOTING GUIDE

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TROUBLE	POSSIBLE CAUSE	REMEDY
Mill will not run	No power	Check amber power supply monitors. If they are not lighted, check power supply.
Power supply lights are lighted but no green safety monitors light when start pushbutton is depressed and held.	No numbers set in batch control	Set batch control.
	Blown fuse in control circuit	Determine why fuse was blown.
	Defective wiring or loose connection	Repair/Replace as necessary.
	Defective circuit board	Repair or replace circuit board.
	Defective batch control	Replace batch control.
Some, but not all of the safety monitors light when start pushbutton is depressed and held	Defective start pushbutton	Replace start pushbutton.
	Open switch in safety circuit	Check safety feature related to first monitor from left that does not light.
All monitors light but go out as soon as start pushbutton is released.	Defective wiring or loose connection	Repair/Replace as necessary.
	Defective stop pushbutton	Replace stop pushbutton.
	Defective control relay	Replace control relay.
All safety monitors light and remain lighted but mill motor will not run.	Defective wiring or loose connection	Repair/Replace as necessary.
	Defective reversing contactor	Place reversing toggle switch in opposite position and see if the mill motor operates. If it does, repair/replace contactor as necessary.
	Defective mill motor contactor	Repair/Replace contactor as necessary.
	Defective grind switch	Replace grind switch.
	Defective mill motor	Repair/Replace mill motor as necessary.

## TROUBLE SHOOTING GUIDE

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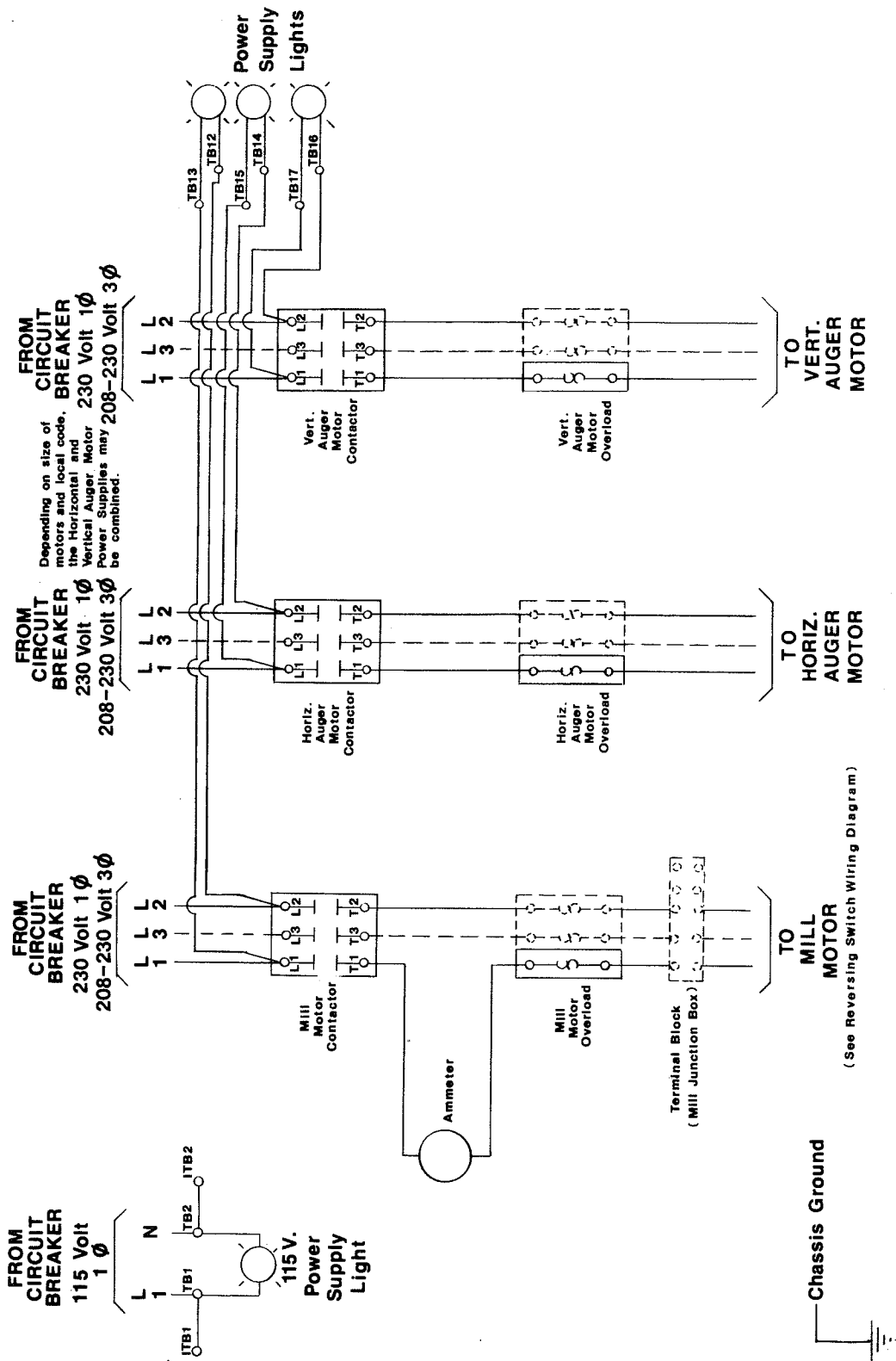
TROUBLE	POSSIBLE CAUSE	REMEDY
Mill does not shut down when predetermined count is reached.	Batch control memory was not set.	Small green light on batch control must be on when mill is started. It goes out after the first revolution of the #3 auger.
	Mill was shut down in the middle of the grinding operation and the number of counts already made were not subtracted before restart.	Reset the batch control before starting next time.
	Defective batch control	Replace the batch control.
One or more ingredient monitors do not operate.	Defective wiring or loose connection	Repair or replace wiring as necessary.
	Loose counter disc	Tighten counter disc.
	Defective ingredient monitor	Replace defective monitor.
	Defective monitor circuit board	Repair/Replace monitor circuit board.
	Defective optical switch	Replace optical switch.
Metering motor rate knob does not change metering rate.	Loose or defective knob	Tighten or replace knob.
	Defective motor control	Replace SCR controller.
Horizontal or vertical auger overload protector trips frequently.	Loose drive belts	Adjust belt tension.
	Improper or defective heater(s) in overload protection blocks	Install new heaters.
	Motor(s) too small	Install higher power motors and heaters.
	Auger binding or plugged	Repair as necessary.
	Defective Motor	Repair/replace as necessary.

## TROUBLE SHOOTING GUIDE

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TROUBLE	POSSIBLE CAUSE	REMEDY
Inconsistent metering	Mill not recalibrated after changing ingredients.	Recalibrate.
	Ingredient density change	Recalibrate.
	Excessive wear in metering unit	Repair/Replace metering unit.
	Belt slippage	Adjust belt tension.

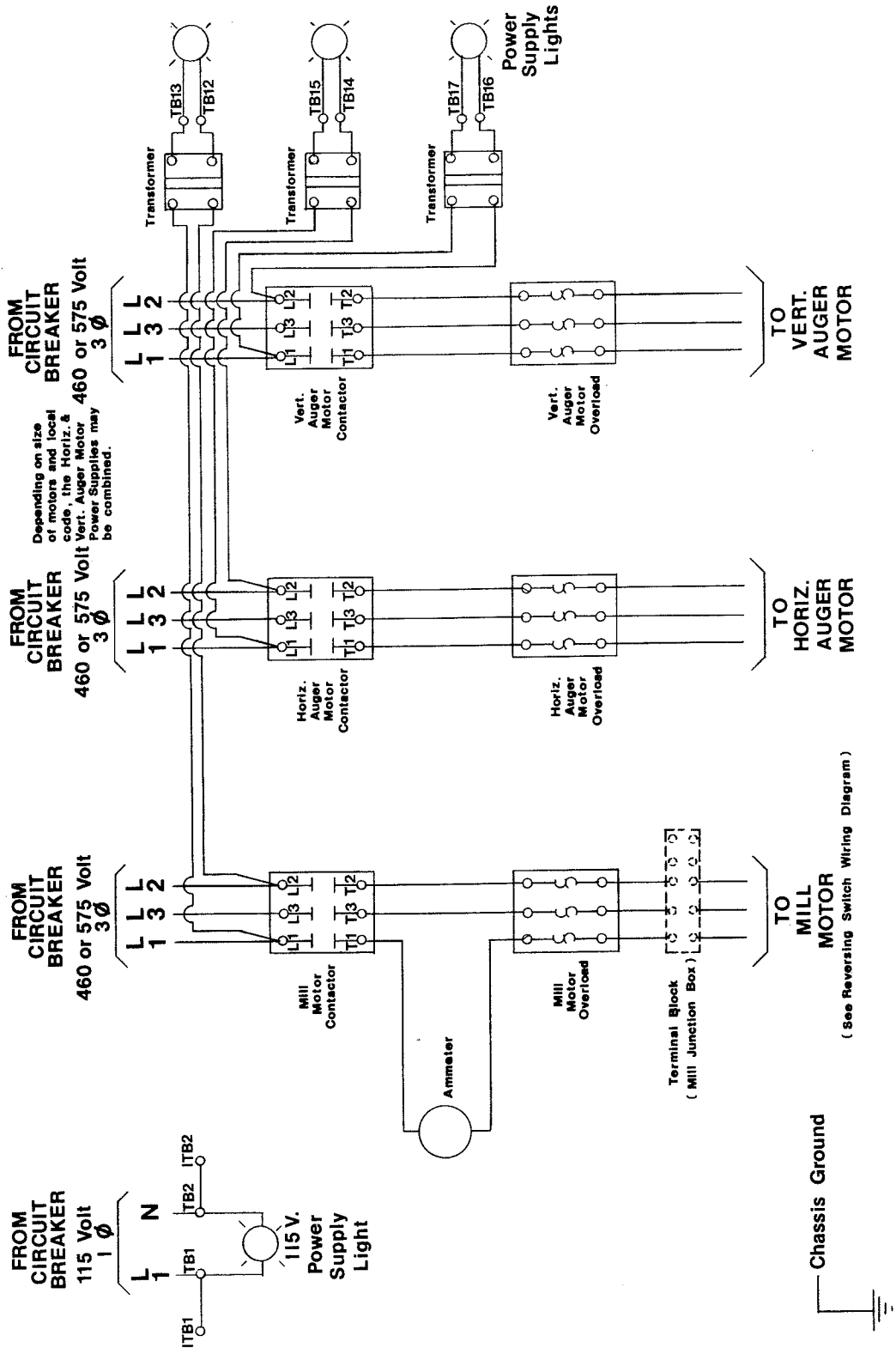
# ELECTRICAL SCHEMATICS



**SERIES 5 & 50 MILL  
POWER CIRCUIT WIRING DIAGRAM**

11A111

# ELECTRICAL SCHEMATICS



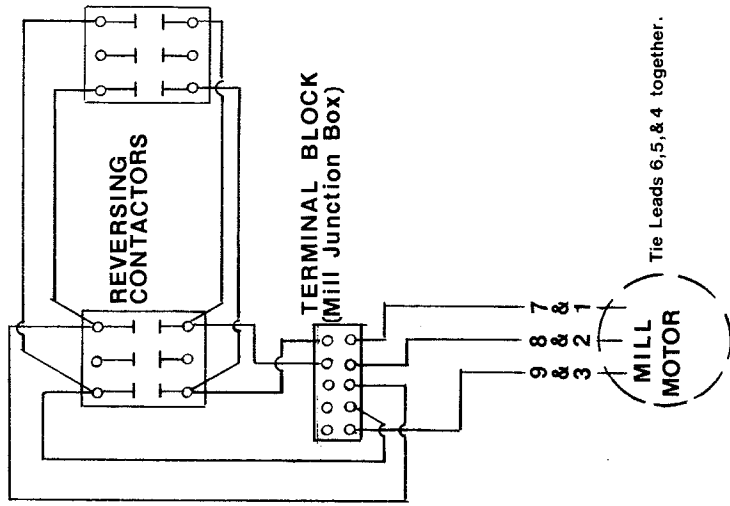
**SERIES 5 & 50 MILL  
POWER CIRCUIT WIRING DIAGRAM**

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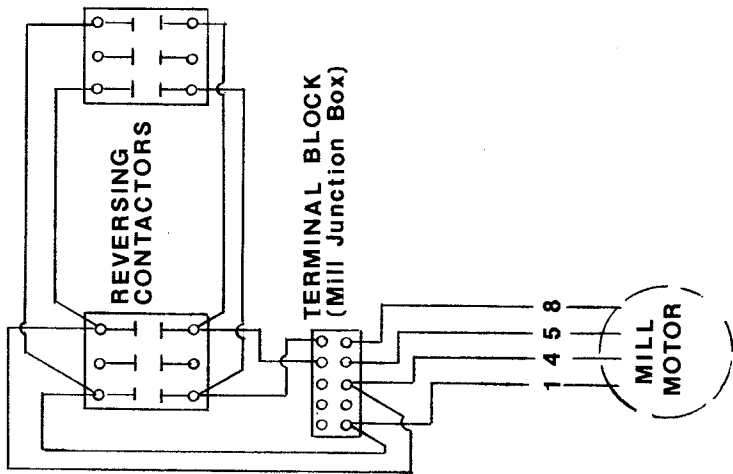


ELECTRICAL SCHEMATICS

208 - 230 Volt  
3  $\phi$



230 Volt  
1  $\phi$

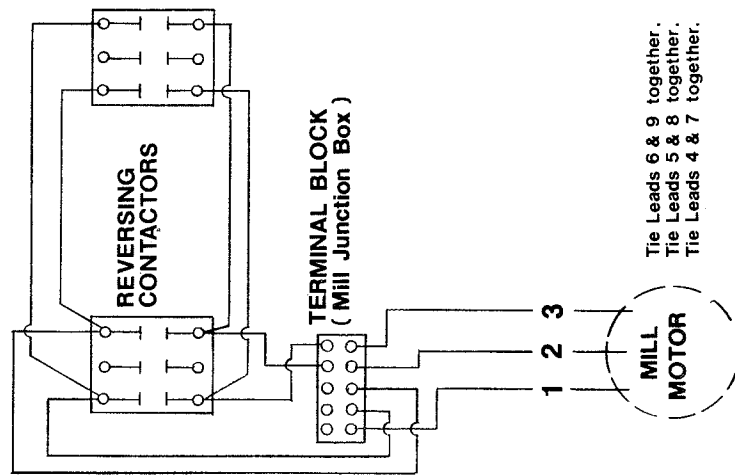


SERIES 5 & 50 MILL  
 REVERSING SWITCH WIRING DIAGRAM

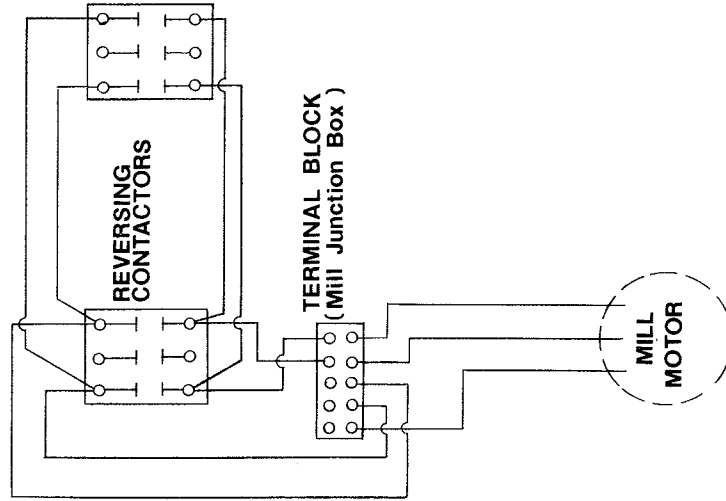
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# ELECTRICAL SCHEMATICS

460 Volt  
3  $\phi$

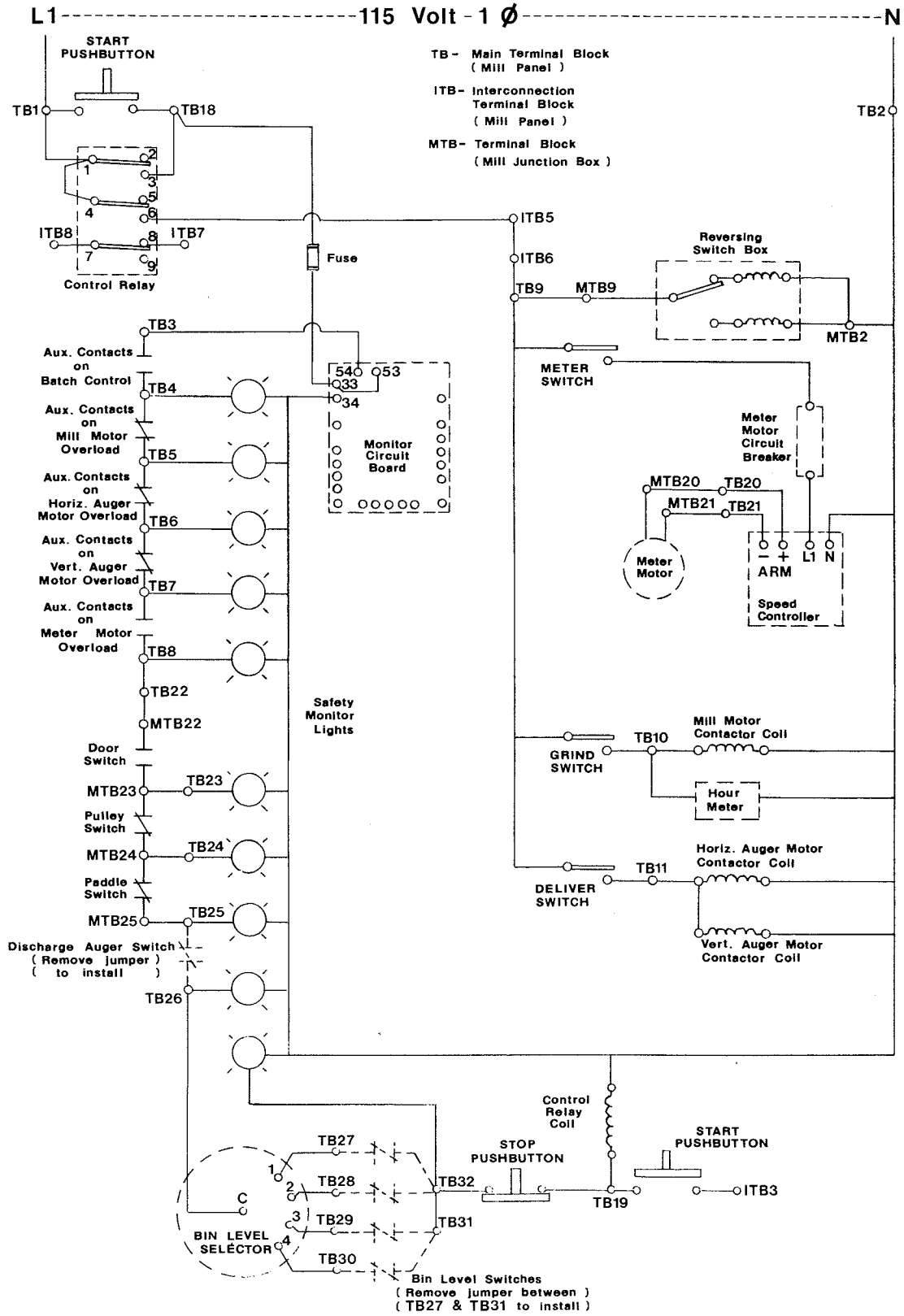


575 Volt  
3  $\phi$



SERIES 5 & 50 MILL  
 REVERSING SWITCH WIRING DIAGRAM  
 11A124

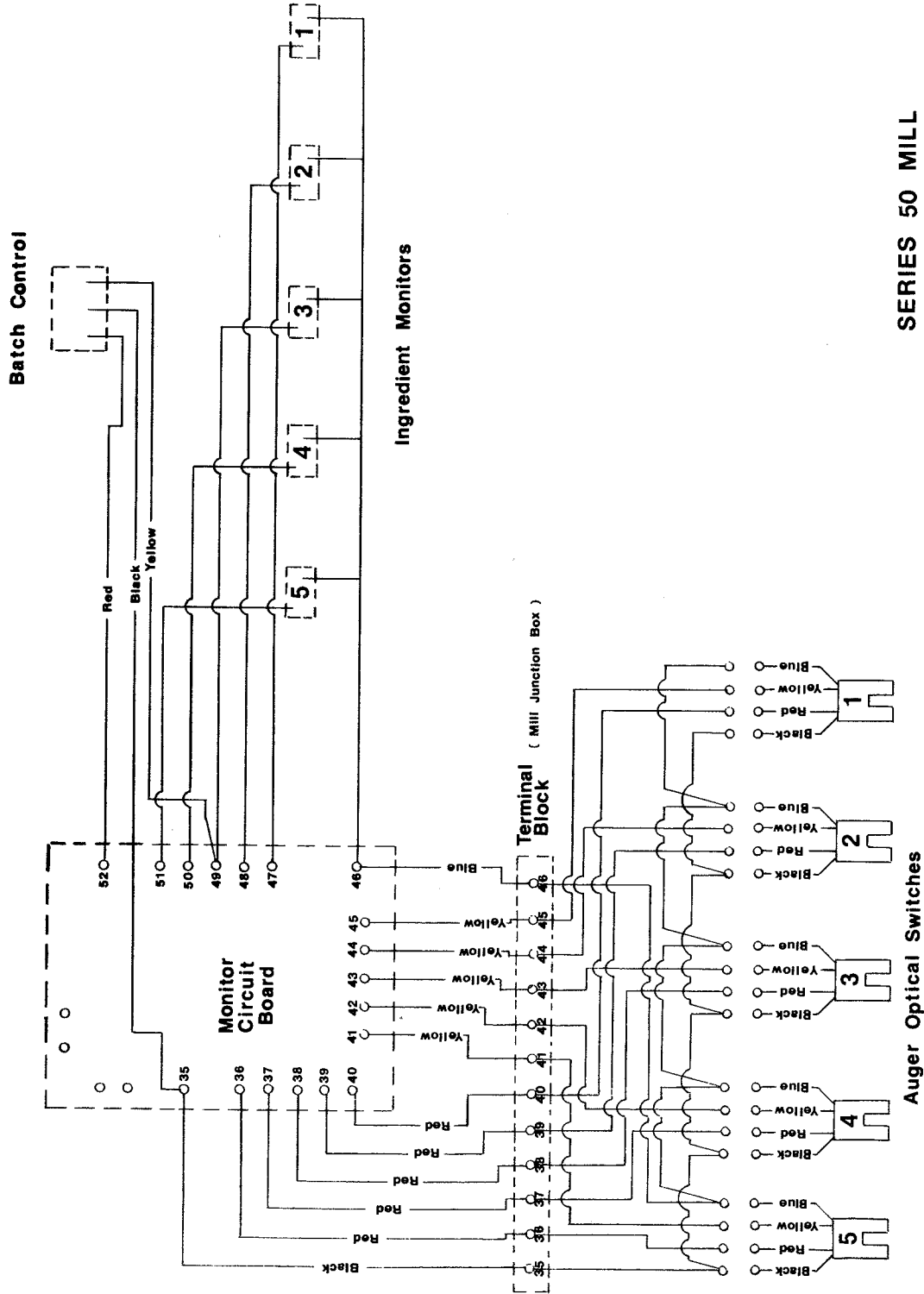
# ELECTRICAL SCHEMATICS



**SERIES 50 MILL  
CONTROL CIRCUIT WIRING DIAGRAM**

11A113

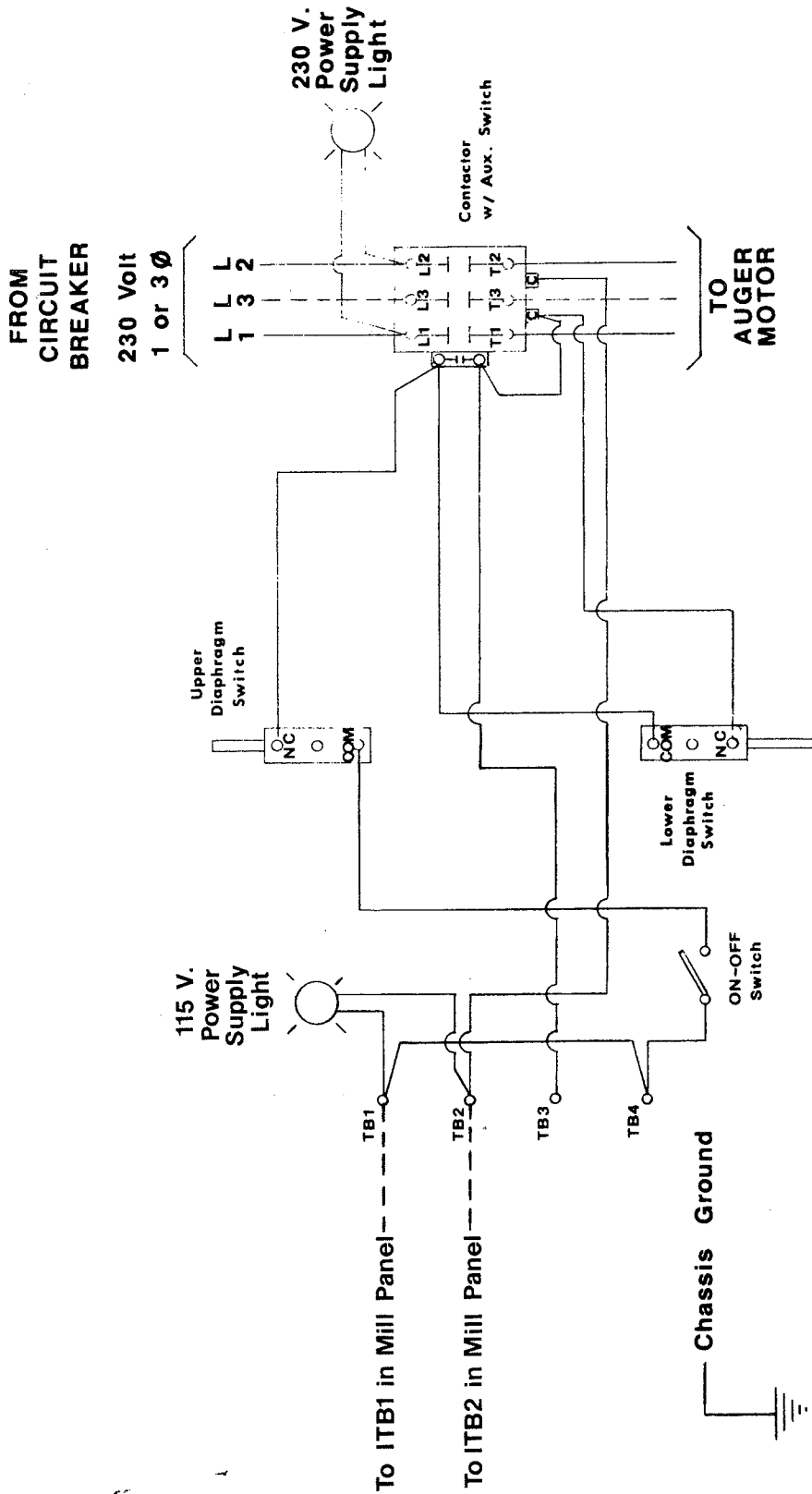
# ELECTRICAL SCHEMATICS



**SERIES 50 MILL  
MONITOR CIRCUIT WIRING DIAGRAM**

11A114

# ELECTRICAL SCHEMATICS

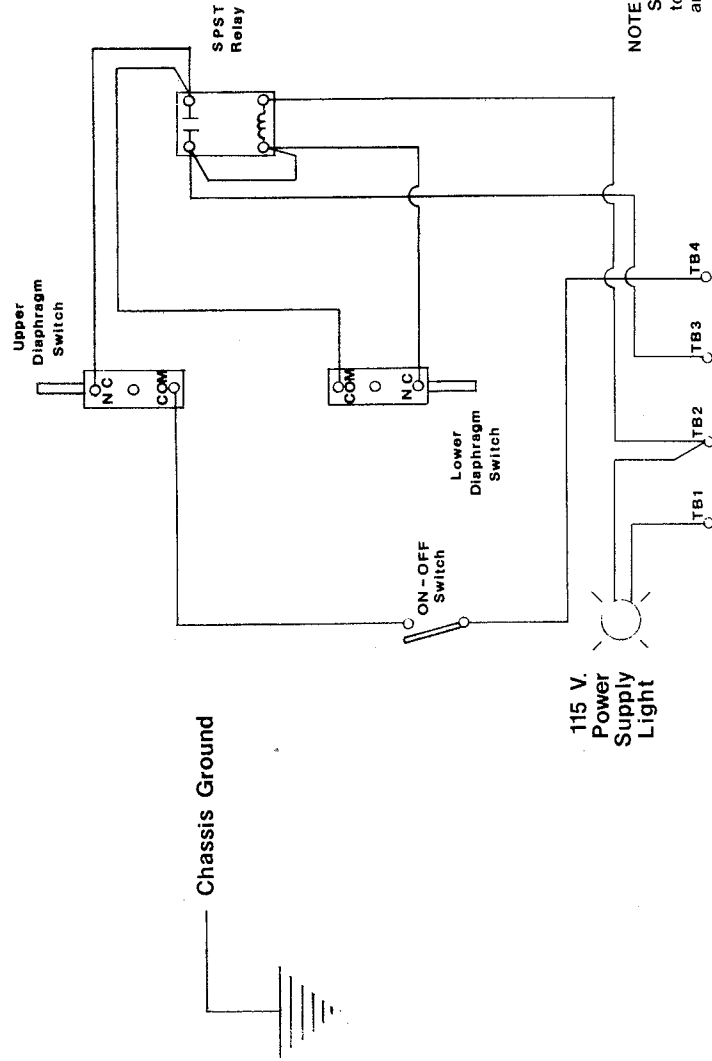


**NOTE:**  
When used to control Premixer, wire per  
Interconnection Diagram 11A120

**WIRING DIAGRAM** { 30A27; 30A28; 30A30; 30A31; 30A48 }  
Control Hoppers

11A115

# ELECTRICAL SCHEMATICS

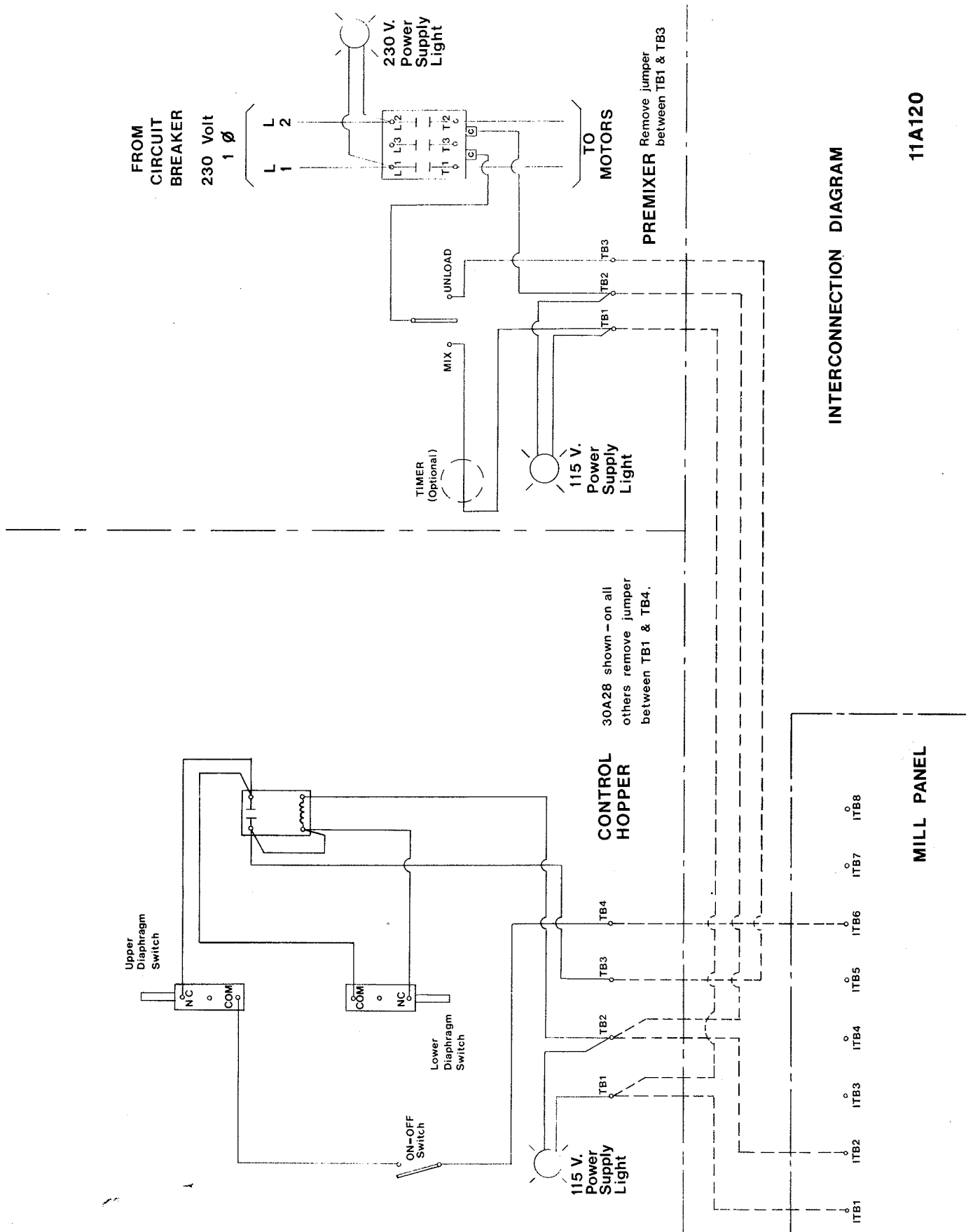


NOTE:  
See Interconnection Diagram 11A120  
to connect Control Hopper to Mill  
and Premixer.

WIRING DIAGRAM  
30A28 Control Hopper

11A116

# ELECTRICAL SCHEMATICS



INTERCONNECTION DIAGRAM

11A120