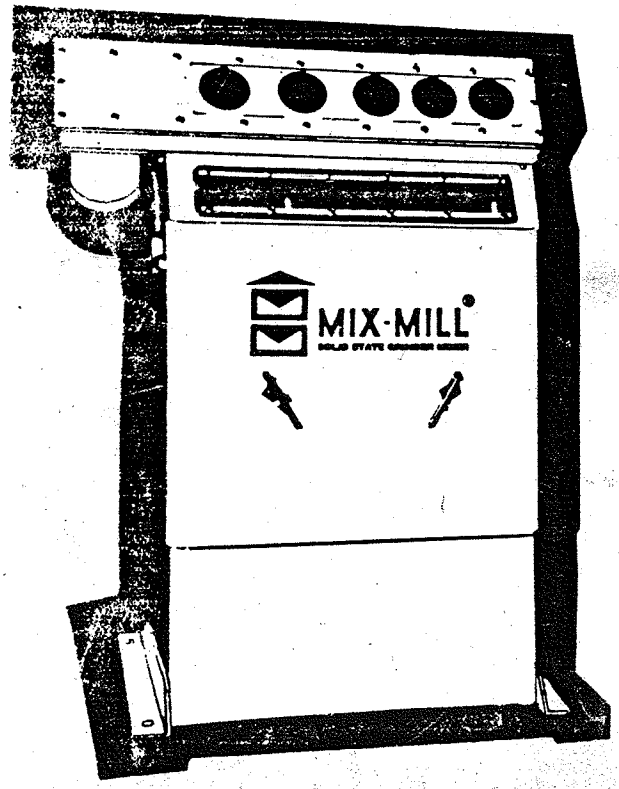
BLOUNT / mix-mill

TEMPORARY

INSTRUCTION MANUAL

SOLID STATE
MODEL D MILL



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NEW "SUPER D" CONTROL FEATURES FROM MIX-MILL

1. Solid-state, microprocessor-based.
2. Automatically adjusts mill motor to full load as load changes, as well as manual speed control on DC motor.
3. Memory capacity for six rations.
4. Shows pounds per ton of ingredient actually being processed.
5. Simplifies calibration.
6. Simplifies troubleshooting.
7. Automatically calculates knob settings. (Retains density and calibration information.)
8. Continuous readout in pounds or bushels.
9. Preset total batch in pounds, not counts.
10. Automatic control by bin-level switches.
11. To be UL and CSA approved.
12. Dust-tight, touch-sensitive membrane switches.
13. Ambient temperature range $-40^{o}F$ to $120^{o}F$, $-40^{o}C$ to $49^{o}C$.
14. Solid-state protection for proportioner.
15. Magnetic starters for both mill and discharge auger motors.
16. Emergency stop button.
17. Battery backup for full week to retain all inputs as well as ingredient usages.

SECTION II

MIX - MILL
MODEL "D" MILL

NEW INSTALLATION REQUIREMENTS

The mixer grinder must be located in a weatherproof structure. A Mix-Mill Farm Feed Factory building has been designed for this purpose and is available in sizes ranging from 12 ton through 400 ton of overhead storage capacities. See your Mix-Mill dealer for information regarding one of these all galvanized steel heavy duty structures. Your dealer has been factory trained to help you to determine the best installation of Mix-Mill equipment to handle your present requirements and provide for future growth.

EXISTING INSTALLATIONS:

Some existing farm structures are suitable for mill installation. See your authorized Mix-Mill distributor and let him work with you to develop the most efficient, most economical system for your needs.

DISCHARGE AND FEED HANDLING SYSTEMS:

Several systems are available for grain and feed handling.

A heavy guage-heavy duty 3 1/2" auger system with capacities up to 7500 lbs. per hour is available for both vertical and horizontal conveying of ingredients.

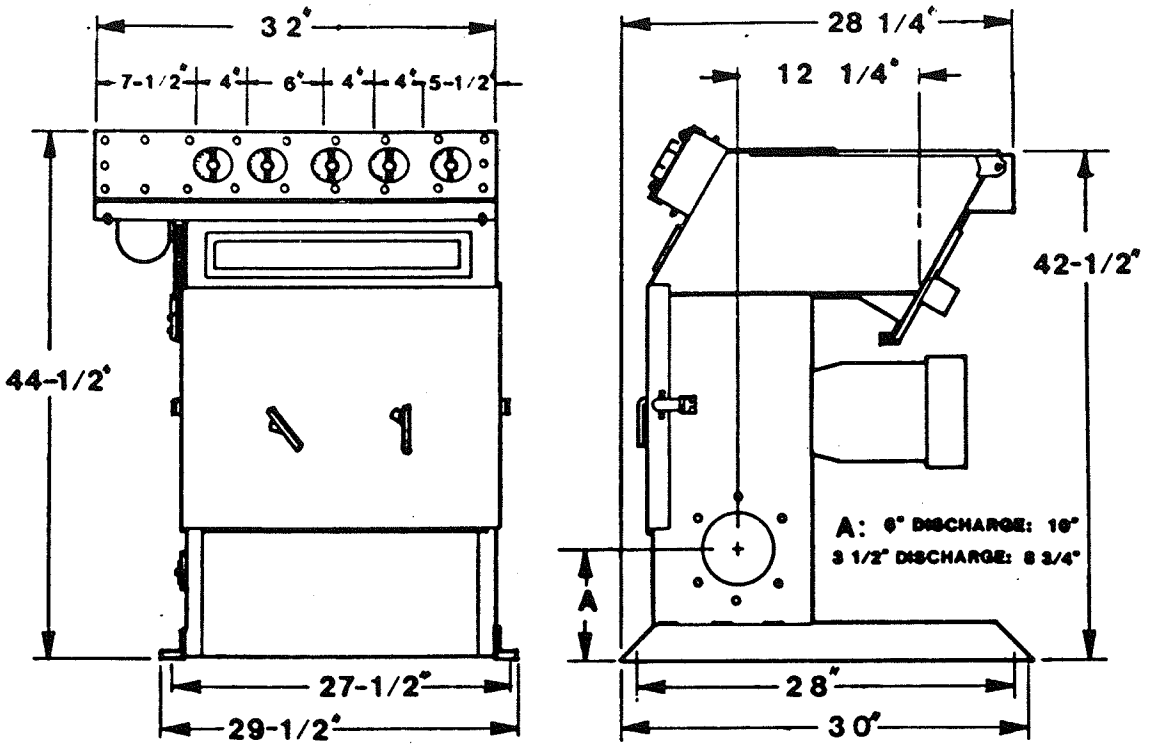
A 6" vertical high capacity auger system is available.

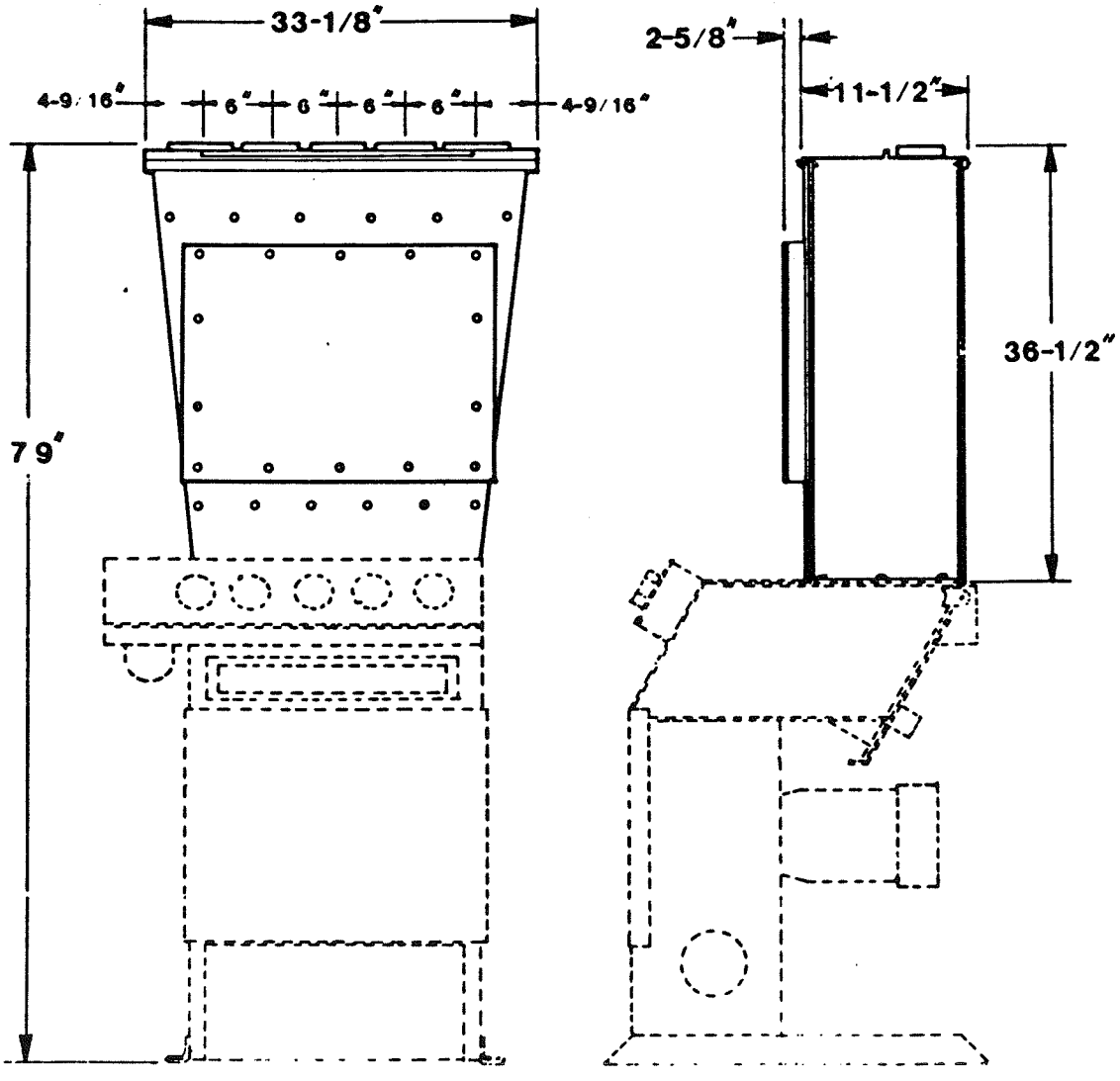
Standard Elevators in a 6" round tube type with capacities of 750 to 800 bushels per hour or square leg models with capacities from 1500 bu. per hour to 5500 bu. per hour are available.

MILL CAPACITIES

Several factors must be considered when figuring mill capacities; the type and amount of each ingredient, the amount of material ground and the amount that is bypassed, mill horsepower and screen size. An undersized discharge system can be a limiting factor on mill capacity. Hardness and variations in the hardness of different grains will have an effect on the mill capacity and in the amount of wear to replaceable parts such as screens, hub and hammers and mill wear plates.

MAJOR DIMENSIONS
D-MILL AND GROUND LEVEL HOPPER





SECTION III

INSTALLATION & OPERATING INSTRUCTIONS

CONTROL PANEL INSTALLATION:

NOTE: It is possible that current from the motors could affect the panel components and give you an incorrect reading, therefore every effort should be made to keep the motor circuitry and control circuitry as far apart as possible when making connections in the mill junction box and seperate wiring conduits.

1. Mount control panel in desired location.

2. Install the optional long wire harness #91000158 containing 14 color coded wires to the top of the control panel. The end with the straight connector should be mounted in this postion.

3. Connect the color coded wires as follows: (Refer to page____ for the external wiring diagram.)
   A. Blue #24 Wire to Terminal #5 on bottom terminal block.
   B. Yellow #24 Wire to Terminal #4 on bottom terminal block.
   C. Orange #24 Wire to Terminal #3 on bottom terminal block.
   D. Purple #24 Wire to Terminal #2 on bottom terminal block.
   E. Pink #24 Wire to Terminal #1 on bottom terminal block.
   F. Red #24 Wire to Terminal #13 on bottom terminal block.
   The above wiring connections are all wire leads for the reed switches. The red wire is the common lead for all the reed switches.
   G. Blue #14 Wire to Terminal #5 on top terminal block.
   H. Yellow #14 Wire to Terminal #6 on top terminal block.
   The above two wire leads are the D.C. Motor wires. The blue lead is positive and the yellow is negative.
   I. Purple #16 Wire to Terminal #6 on the bottom terminal block.
   J. Orange #16 Wire to Terminal #13 on the bottom terminal block.
   The above two wire leads are the paddle switch wires.
   K. Brown #24 (2) Wires to Terminals #9 & #10 on top terminal block.
   L. Green #24 (2) Wires to Terminals #9 & #10 on bottom terminal block.

4. Connect the conduit with a 90^{o} fitting to the safety switch box through the hole provided in the top front portion of the switch box. Connect wires as follows:
   A. Blue #24 to Blue with #5 wire marker from reed switches with a wire nut.
   B. Yellow #24 to Blue with #4 wire marker from reed switches with a wire nut.
   C. Orange #24 to Blue with #3 wire marker from reed switches with a wire nut.
   D. Purple #24 to Blue with #2 wire marker from reed switches with a wire nut.
   E. Pink #24 to Blue with #1 wire marker from reed switches with a wire nut.
   F. Red #24 wire (common) connect all 5 white wires from reed switches to this lead with a wire nut.
   This completes the counter wiring.
   D.C. Motor wiring and Safety Circuit in paddle switch electrical box.
   G. Blue #14 wire to Blue #14 wire from D.C. Motor with a wire nut.
   H. Yellow #14 wire to Yellow #14 wire from D.C. Motor with a wire nut.
   I. Purple #16 wire to Purple #16 wire from micro switch with a wire nut.

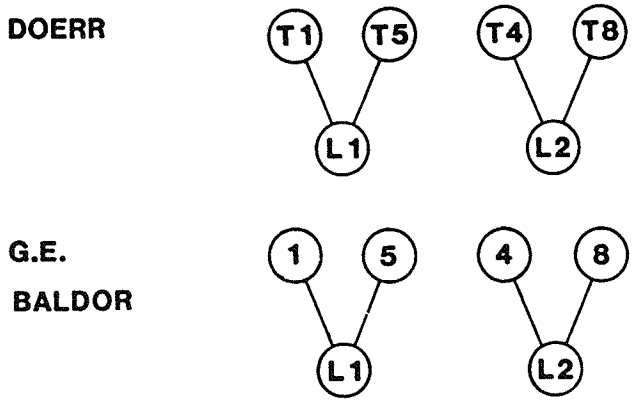
J. Orange #16 Wire to Orange #16 Wire from mill paddle micro switch with a wire nut.
K. Connect each of the (2) Brown #24 Wires to each of the (2) Brown #24 Wires with a wire nut.
L. Connect each of the (2) Green #24 Wires to each of the (2) Green #24 Wires with a wire nut.

DISCHARGE AUGER MOTOR

Since the location of the discharge auger motor is so variable a wire harness is not furnished. The proper size wiring must be furnished for this connection.
Follow the connection diagram of the particular brand of motor for the connection at the motor.
When wiring a single-phase discharge motor, connect the two (2) wires coming from the motor to terminals 2 and 6 on the auxiliary magnetic starter in the panel.
When wiring a three-phase discharge motor, connect the three (3) wires coming from the motor to terminals 2, 4, and 6 on the auxiliary magnetic starter in the panel.
It is very important to set the auxiliary magnetic starter overload to the full load name plate amps of the discharge motor for overload protection.
If an additional motor(s) is/are necessary an additional auxiliary magnetic starter(s) and overload(s) will be required.

MILL MOTOR - 230V - 1Ø - 3 Wire

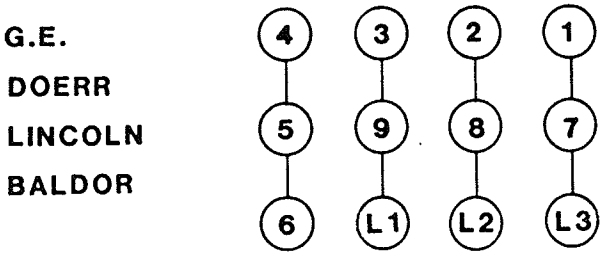
A wire harness will have to be field supplied containing three wires, two (2) #6 Black wires and one (1) #10 Green wire. Connect the two Black wires to the magnetic starter at terminals 2, 6 and the Green wire to the ground screw in the D Mill Panel. Connect the other end of the two Black wires to the two #6 Black wires in the junction box and the Green wire to the ground screw in the front of the mill junction box.
The mill magnetic starter overload should be set at the full load name plate amps of the mill motor.
NOTE: Motor connections are here for reference, these connections are prewired at the factory.



The mill motor may be operated with either CW or CCW rotation. To change rotation, reverse lead numbers five (5) and eight (8).

MILL MOTOR - 230V - 3Ø - 4 Wire

A wire harness will have to be field supplied containing four wires. three (3) #6 Black wires and one (1) #10 Green wire. Connect the three Black wires to the magnetic starter at terminals 2, 4, 6 and the Green wire to the gound screw in the D Mill Panel. Connect the other end of the three Black wires to the three #6 Black wires in the junction box and the Green wire to the ground screw in the front of the mill junction box.
The mill magnetic starter overload should be set at the full load name plate amps of the mill motor.
NOTE: Motor connections are here for reference, these connections are prewired at the factory.



The mill motor may be operated with either CW or CCW rotation. To change rotation, reverse any two (2) of the Black wires to the motor.

INCOMING POWER

A wire harness will have to be field supplied containing lines L1, L2, (L3 if 3Ø) and a neutral, which needs to be connected from the circuit breaker box to the D Mill Panel. These leads should be sized accordingly to the amps on the D Mill name plate and any other additional motors that are added. Connect lines L1, L2 and (L3) of the incoming power to L1, L2 and (L3) of the magnetic starter. Wire nut the neutral lead to the White lead wire connected to N2 of the top terminal block. A ground rod is a must! Drive a ground rod into permanently moist undisturbed earth. Connect a wire, that is equivalent to the incoming wire size, from the rod to the panel and secure the wire to the ground connection in the upper left inside corner of the panel.

IMPORTANT: It is of extreme importance to double check all field electrical connections before power is supplied to the solid state mill, otherwise serious damage can result to the mill controller.

COMPONENT FUNCTIONS

Before attempting to operate the Mix-Mill mixer-grinder, the operator should become familiar with the functions of all control elements of this machine.
Each switch, dial, or knob has a specific function which, when properly operated, will produce very satisfactory results.

A. CONTROL PANEL

The control panel is designed for wall mounting. It should be located close to the mill for convenient operation. Operating instructions have been printed at the lower left portion of the panel. Each touch pad and light have been indentified to help you to become familiar with the operation of your new mill. Refer to the mill controller Figure #3 for locating and identifying the touch pads and lights.

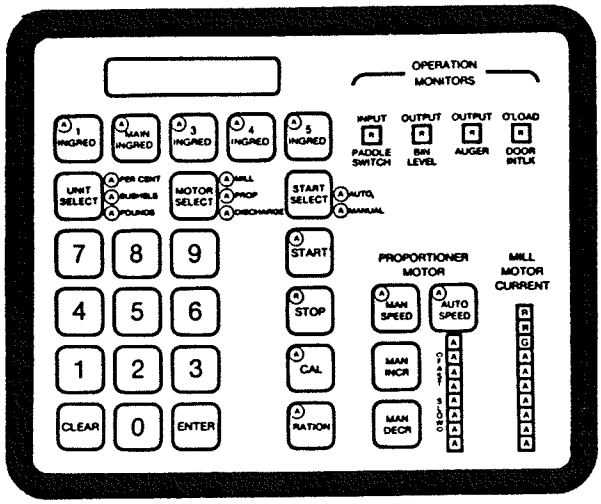


FIGURE # 3

1. INGREDIENT SELECT

   a. When selected, indicates which ingredient is displayed or which ingredient is ready to receive new input, such as ration in pounds per ton or calibration in pounds.

   b. Push to select (light comes on).

   c. Push CLEAR to deselect.

   d. When all ingredient lights are out, the number in the display is the total of all the ingredients in pounds or bushels.

2. UNIT SELECT

   a. Each push alternates between bushels and pounds. Lights indicate which unit is being used.

   b. When in the RATION mode, the percentage proportion by weight of a specific ingredient to the total can be displayed by selecting the PERCENT indicated.

3. MOTOR SELECT

   a. Each push alternates selection. The MILL position is for normal operation and controls the mill motor, proportioner motor, and discharge motor.

   b. The PROP position operates the proportioner motor.

   c. The DISCHARGE position operates the discharge auger motor only.

   d. Once the desired motor is selected, press START for operation.

4. START SELECT

   a. Each push alternates indicators.

   b. The AUTO START position allows the starting and stopping of mill with bin-level switches.

   c. In the MANUAL START position, the mill will start only when the START selector is depressed.

5. START

When depressed, lights (amber) and causes unit to operate in the selected run mode unless an interlock is evident. (The interlocks are those switches in the safety circuit, such as mill door, auger switch, paddle switch, etc.)

6. STOP

When depressed, lights (red) and causes shutdowns in any run mode. Remains lit when unit is not in operation.

7. CALIBRATE

When depressed, lights (amber) and puts control in calibrate mode. To exit, push CLEAR.

8. RATION

When depressed, lights (amber) and puts control in ration mode. The current ration number is displayed in left digit. To exit, push CLEAR.

9. 0-9 NUMERICAL INPUTS

When depressed, the number appears in the display right-hand justified.

10. DISPLAY

Up to six digits with leading zeros blanked.

11. CLEAR

When depressed, resets display to zero if a numerical input is in process. When display is clear, a second depression will reset the following: RATION, CAL, INGREDIENT AND OPERATION MONITORS.

12. [ENTER]

When depressed, will enter displayed number as part of calibration, ration, or preset function.

13. [MAN SPEED]

When depressed, lights (amber) and selects manual control of the drive level for the proportioner motor.

14. [AUTO SPEED]

When depressed, lights (amber) and selects loop control of the proportioner motor. The drive level increases or decreases automatically to maintain mill motor current at 100%. When in the AUTO START position, this mode is automatically selected.

15. FAST/SLOW

Bar graph display for both AUTO and MAN modes, indicating the drive level of the proportioner motor.

16. [MAN INC]

When depressed, the drive level will increment one step (in the MAN SPEED mode). There are steps between lights in lower range.

17. [MAN DECR]

When depressed, the drive level will decrement one step (in the MAN SPEED mode).

18. MILL MOTOR CURRENT

Bar graph display of mill motor current. The green light is 100% motor load. The motor control will control to the green level when AUTO SPEED is selected. There are seven (7) amber lights, indicating lower than optimum motor load, one (1) green light, indicating 100% motor load and two (2) red lights, indicating an overload condition.

19. OPERATION MONITORS

a. INPUT PADDLE SWITCH
Lights (red) and shuts down mill when paddle switch opens, running status is stored and [CLEAR] resets the control, [START] restores operation.

b. OUTPUT AUGER

Lights (red) and shuts down mill when pressure switch in discharge outlet opens, indicating a jam in feed delivery system. Running status is stored. [CLEAR] resets the control. [START] restores operation. (Pneumatic interlock also)

c. O'LOAD/DOOR INTLK

Lights (red) and shuts down mill when proportioner motor is overloaded, motor starters overload, or the mill door switch is opened. Running status is stored and (CLEAR) resets the control. (START) restores operation.

d. OUTPUT BIN LEVEL

Lights (red) when bin-level switch opens. Mill will automatically start only if (AUTO START) and (START) are selected and bin switch closes. (A high-low bin level switch arrangement with interlocking relay is required for proper operation.)

B. PROPORTIONER HOPPER

1. SWITCH PADDLES:

A weighted switch paddle is provided for each ingredient hopper. The paddle is inserted into the filled hopper by sliding the paddle blade down inside the sloping hopper on the proportioner side. An alternate method is to hold the paddle in contact with the inside face of the empty hopper and then fill the hopper. As long as there is grain in the hopper, the paddle in the hopper will be held in this position. If the supply of grain is exhausted and the hopper is empty, the paddle blade will swing up, the weighted end will swing down, trip the rod, and cause the mill to stop. A paddle is needed for each hopper being used; switch paddles should be removed if hopper is empty. A full hopper with the gearbox knob set on zero will stop a lot of dust flowback.

2. INGREDIENT FLOW SWITCH:

The trip rod on the hopper engages an overcenter actuator finger that trips a micro switch.

3. MAGNETIC SEPARATOR:

All mills are provided with magnets that remove tramp iron from the grain being delivered by the proportioner to the grinding chamber. These magnets function whether the material is bypassed or not.

Important: The magnets should be checked every day, if possible, as metal caught by them will eventually work itself off if not removed. If steel parts are forced off of the magnets by the constant flow of grain they will enter the grinding chamber and destroy a screen and a set of hammers. This type of damage is not covered by warranty.

C. PROPORTIONER GEAR BOX

1. STANDARD PROPORTIONER:

The new model "D" proportioner is a five auger model. Compartment numbers one, three, four and five are all of equal size with each ingredient feed auger being controlled by an adjustable knob. These knobs are numbered from one to twenty-five.

The number two auger is a double size compartment. This auger is also being controlled by an adjustable knob numbered one to twenty-five.

The fifth auger compartment is geared down internally to provide a one-fourth speed delivery for greater accuracy in adding small quantities per ton of a premix ingredient.

2. PROPORTIONER DRIVE MOTOR:

A variable speed DC motor is used to direct drive the proportioner gear train. This eliminates the need for a belt drive. The DC variable voltage is provided by an electronic control located on the main control panel for the mill. The input voltage into the control is 115V A.C. 60 HZ. The output is continuously variable from 0 to 90V-DC.

CAUTION: DO NOT CONNECT AN A.C. VOLTAGE TO THE PROPORTIONER MOTOR.

D. MILL DOOR

1. BYPASS VALVES:

The built-in bypass valves on the mill door give the operator the option of bypassing two ingredients around the grinding chamber. Either the material from the left-hand (No. 1) auger, the material from the right-hand (No. 5) auger, or both can be bypassed.

Note: Bypass only materials such as oyster shell or grit, materials that would cause excessive wear on hammers and screens.

OPERATING INSTRUCTIONS

IMPORTANT: It is of extreme importance to double check all field electrical connections before power is supplied to the solid state mill, otherwise serious damage can result to the mill controller.

A. Calibrate Procedure:

1. Remove door; install chute.
2. Press [CAL].
3. Press [INGREDIENT #1].
4. Prepare to catch sample weight. Set ingredient knob to 25. All others to 0.
5. Press [START] and catch sample.
6. Weigh sample and press numerical keys representing the weight.
7. Press [ENTER].
8. Check density of ingredient with calibration box.
9. Compare your density check with value being displayed.
10. If the number displayed does not check with your density value, then key up your density value, and press [ENTER].
11. If the number displayed does check with your density value, then press [CLEAR].
12. Control will automatically exit the calibration mode.
13. Repeat Steps 2 through 13 for each ingredient.

B. Ration Input:

1. Develop ration, or rations, per your TDN and protein requirements in terms of pounds-per-ton amounts and assign numbers to the different rations up to 6.
2. Press [RATION].
3. Key up ration number and [ENTER].
4. Press [UNIT SELECT] for POUNDS.
5. Select [INGREDIENT #1].
6. Key up required pounds/ton of ingredient #1 and press [ENTER].
7. Control will automatically advance to ingredient #2. Repeat Step 6 for ingredient #2, etc.

NOTE: A ration amount must be entered for each ingredient even if 0 (zero) pounds per ton is required.

8. When ingredient #5 is entered, control will exit ration mode. To review ration, simply press (RATION), select (INGREDIENT #) and then (UNIT SELECT), POUNDS.

9. To enter a new ration, press (RATION); key up ration number; and (ENTER). Repeat Steps 4 through 8 above.

10. Be sure your ration adds up to 2000!

    NOTE: If ration does not equal 2000 lbs., the exact total will be displayed instead of knob settings on ingredient numbers 1, 3, 4, and 5.

C. Knob Setting:

1. Select ration.

   a. Press (RATION). Present operating ration is displayed to the left in display window.

   b. If different ration is desired key up ration number and (ENTER).

2. Select (MAIN INGREDIENT).

3. Key up 25 and (ENTER).

4. Review ingredients #1, #3, #4 and #5.

   a. Select (INGREDIENT #1) and observe display.

   b. Repeat for #3, #4 and #5.

5. NOTE: The values displayed are the knob settings when the main ingredient knob is set at 25. If any of the knob settings are greater than 25, then repeat Step 3 at a knob setting of 24. Then repeat Step 4. Continue until all knob settings are less than or equal to 25. The first main ingredient knob setting which brings all other knob settings to 25 or less is the maximum setting for your ration and will produce maximum flow through the mill. However, this combination of knob settings may not necessarily be the most accurate. By repeating Steps 3 and 4 above and decreasing the main ingredient knob setting by whole intergers from 25, you can observe when the knob settings for ingredients #1, #3, #4 and #5 are whole numbers. Knob settings at or very close to whole numbers will provide the most accurate ration. Special attention may be given to the 1/4 or 1/2 speed auger where more expensive ingredients may be used.

D. Operation:

1. Select ration.

   a. Press [RATION]. Number in display is ration which will presently be made.

   b. To change ration, key up desired ration number and [ENTER].

   c. Once desired ration is selected; select an ingredient; and push the [UNIT SELECT] pad for PER CENT, BUSHELS, and POUNDS until indicator light is out. The number now in the display is your knob setting.

2. Determine the most accurate knob setting for your ration. See Knob Setting Procedure.

3. Position knobs on mill accordingly for your ration.

4. Enter total pounds of feed required for this batch.

   a. Select [CAL]. Number displayed is last preset value in pounds.

   b. If a different amount is desired, key up the new total pounds and press [ENTER]. Mill will automatically shut down when this value is achieved.

5. Select [AUTO SPEED] or [MAN. SPEED].

6. Select AUTO START or MANUAL START, with [START SELECT].

7. Press [CLEAR] to clear all "red" indicators.

8. Press [START].

9. If operating in [MAN. SPEED], increase proportioner motor speed by depressing [MAN. INCR]. until green light is achieved on mill motor current bar graph.

10. If operating in AUTO START, a bin-level pressure switch will start and stop the mill automatically. Enter a preset batch amount in pounds as a shutdown safety factor.

11. Press [STOP] for shutdown.

12. If mill stops before the total batch is completed, check the OPERATION MONITORS to locate the system problem. Resolve the problem and press [CLEAR].

    NOTE: Mill will not start until red OPERATION MONITOR lights are off.

SECTION IV

TROUBLESHOOTING

STARTUP CHECK LIST (Manual Start)

1. Proportioner compartments full of material.
2. Switch paddles in place.
3. Trip rod set.
4. Remove any remaining "Red" operation monitor lights, push [CLEAR].
5. [START SELECT] in "Manual Start" position.
6. [MOTOR SELECT] in "Mill" position.
7. Proportioner motor in [MANUAL] or [AUTO SPEED] position.
8. Select ration to be ground.
9. Check calibration information on all ingredients used in above ration.
10. Enter number of pounds of feed to be ground.
11. Press [START].

STARTUP CHECK LIST (Auto Start)

1. Proportioner compartments full of material.
2. Switch paddles in place.
3. Trip rod set.
4. Remove any remaining "Red" operation monitor lights, push [CLEAR].
5. [START SELECT] in "Auto" position.
6. Select ration to be ground.
7. Check calibration information on all ingredients used in above ration.
8. Enter number of pounds of feed to be ground.
9. Press [START].

PROPORTIONER TROUBLESHOOTING PROCEDURE

1. Enter dummy ration.

   For ¼-speed auger:

Ingredient	1	2	3	4	5
A_n Pounds/Ton	421	632	421	421	105
K_n Knob Setting	* 15	15	15	15	15
%	21	31.6	21	21	5.2

2. Enter dummy calibration information.

Ingredient	1	2	3	4	5
S_n Sample Weight	100.0	50.0	100.0	100.0	100.0

3. Preset dummy batch for 2000 pounds.

4. Respective ingredient totals will equal pounds per ton of dummy ration.

* Any equal knob setting of 24 or less.

RATION EXAMPLE

	1 Soybean Meal	2 Corn	3 Corn	4 Oats	5 Premix
%	17.5	53.5	16.5	10	2.5
A #/ton	350	1070	330	200	50
D #/ft^3	38	44.8	44.8	25.6	60
S #	48.6	61.6	57.3	32.7	76.7
K(Knob Setting)	31.0	25	24.8	26.4	11.2
	29.8	24	23.8	25.3	10.7
	28.6	23	22.8	24.2	10.3
	27.3	22	21.8	23.2	9.8
	26.1	21	20.8	22.1	9.4
	24.8	20	19.8	21.1	8.9
	23.6	19	18.8	20.0	8.5
	22.3	18	17.9	19.0	8.0
	21.1	17	16.9	17.9	7.6
→	19.8	16	15.9	16.8	7.1
	18.6	15	14.9	15.8	6.7
	17.4	14	13.9	14.7	6.2
	16.1	13	12.9	13.7	5.8
	14.9	12	11.9	12.6	5.3
	13.6	11	10.9	11.6	4.9
	12.4	10	9.9	10.5	4.4
	11.1	9	8.9	9.5	4.0
	9.9	8	7.9	8.4	3.5
	8.7	7	6.9	7.3	3.1
	7.4	6	5.9	6.3	2.6
	6.2	5	4.9	5.2	2.2

CALIBRATION CHART - SOLID STATE PANEL

RATION	INGREDIENT #1		INGREDIENT #2		INGREDIENT #3		INGREDIENT #4		INGREDIENT #5	
1 GEST. SOW	SOYBEAN MEAL 350#	S 48.60 D 38.00 K 25	CORN 1070#	S 61.60 D 44.80 K 20	CORN 330#	S 57.30 D 44.80 K 20	OATS 200#	S 32.70 D 25.60 K 21	PREMIX 50#	S 76.70 D 60.00 K 9
2		S D K		S D K		S D K		S D K		S D K
3		S D K		S D K		S D K		S D K		S D K
4		S D K		S D K		S D K		S D K		S D K
5		S D K		S D K		S D K		S D K		S D K
6		S D K		S D K		S D K		S D K		S D K
7		S D K		S D K		S D K		S D K		S D K

[S] — SAMPLE WEIGHT [D] — DENSITY LBS / U.F.T. [K] — KNOB SETTING DATE ____ ____

MIX-MILL INGREDIENT USAGE

RATION # _____ MONTH _____

DATE	INGR. #1	INGR. #2	INGR. #3	INGR. #4	INGR. #5	TOTAL
TOTALS						

CALIBRATION CHART - SOLID STATE PANEL

RATION	INGREDIENT #1		INGREDIENT #2		INGREDIENT #3		INGREDIENT #4		INGREDIENT #5	
1		S D K		S D K		S D K		S D K		S D K
2		S D K		S D K		S D K		S D K		S D K
3		S D K		S D K		S D K		S D K		S D K
4		S D K		S D K		S D K		S D K		S D K
5		S D K		S D K		S D K		S D K		S D K
6		S D K		S D K		S D K		S D K		S D K
7		S D K		S D K		S D K		S D K		S D K

[S] — SAMPLE WEIGHT [D] — DENSITY LBS / CU.FT. [K] — KNOB SETTING DATE _____

ELECTRIC MOTORS & ELECTRICAL SYSTEMS

FUSES OR CIRCUIT BREAKERS BLOW IMMEDIATELY BEFORE THE MOTORS COME UP TO SPEED.

1. Check for proper voltage coming in. Low voltage can cause this problem. If voltage measures OK you may possibly have a defective mill motor. Refer to a qualified electrician or service technician. If additional motors have recently been added fuses or breakers may be undersized.

2. The fuses are not lag type, such as Fusetrons.

3. A fault (ground or short circuit) is somewhere in the wiring, motor, or some other device. Refer service to a qualified electrician or Mix-Mill trained service technician.

FUSES OR CIRCUIT BREAKERS BLOW AFTER A PERIOD OF OPERATION.

1. The fuse or circuit breaker may be too small for the total load. The fuse or circuit breaker should be approximately 25% greater than the normal maximum operating load. Do not increase the fuse or circuit breaker size without regard to the size of the wire being protected.

2. There may be a poor connection in the fuse box.
Poor connections will get hot, raise the temperature of the fuse, and cause it to blow well below its rating. The poor connection can be a loose terminal screw, low pressure between the switch blades and clips, plug fuse not screwed in tight, low pressure between cartridge fuse and clips, or dirty contact surface. Switch and cartridge fuse clips loose their spring tension after they once have been hot. Auxiliary clamps must be used or the switch replaced.

3. Temporary ground or short.
It is possible but not very likely for a temporary fault to come and go. This happens so infrequently that it probably can be ignored.

OVERLOAD TRIPS BEFORE THE MILL GETS UP TO SPEED.

This can be caused by too much grain being on the screen when the mill starts. Before restarting the mill, pull the main line switch, remove the mill back, and remove the grain from the screen. If problem still exists a low voltage problem or a motor problem could be the cause.

OVERLOAD TRIPS AFTER A PERIOD OF OPERATION.

Motor is overloaded.
Load meter may be incorrect. Check load current with amp-probe. Adjust load knob to obtain full load amps as listed on motor name plate.
Fan or fan blades are missing.
Air ducts between inner and outer shell are plugged.
Bearings are worn out and rotor is dragging on the stator - makes a loud noise.

Defective (shorted) motor. A motor with a small short circuit in the winding could trip the overload without blowing the fuse. However, a small short circuit will result in a burned-out motor after operating for a short period of time.

A burned-out motor will have a distinct burnt smell. It may growl when energized, may not start at all, or if it does, will not come up to speed. Such a motor must be replaced.

A burned-out motor is always shorted. Sometimes it is also grounded.

NOTE: A grounded motor can present a shock hazard.

NOISY BEARINGS.

It may not be necessary to replace a motor because of noisy bearings unless there is noticeable end play in the shaft. Bearings should be replaced to prolong the life of the motor windings.

Ball bearings eventually wear out, but their life is seriously reduced by operating the motor overloaded, in a hot area (high temperature operation causes the grease to leak out of the bearings). Hammering on the motor shaft can also cause premature bearing failure and will void your warranty.

When bearings are to be replaced, it is recommended that the motor be returned to the motor repair station.

LOW OUTPUT FROM THE MILL.

The complaint is, "The mill formerly operated with a load dial setting of 20, but now it cannot be set higher than 15. What is the matter with the motor?"

There is nothing wrong with the motor. There is almost nothing that can happen to a motor which will cause it to loose power. Dozens of motors have been returned for this reason. In every case, the motor has been found to be in perfect condition. The reduced output could be caused by:

1. Worn screen or hammers.

2. Low voltage.

3. Motor leads connected for 230 volts but connected to a 115-volt line.

4. Change in feed formula (less concentrate).

5. Incorrect load meter.

6. Most likely it is a change in the condition of the grain which may change the capacity by 20%.

SECTION V

SERVICE TIPS & ROUTINE MAINTENANCE

1. SCREEN & WEAR PLATES: The screen and the wear plate have been designed so that you can get 18 different adjustments per side for extended screen life.

2. HAMMERS: The hammers and hammer bolts are replaceable items. The hammers can be reversed to double their life. They can also be moved in sets of three from the point of grain entry to the back of the housing for additional life. When changing their location, care must be exercised to keep the hammers in their original sets of three to prevent unbalance. It is of great importance to inspect the hammers to see if they are wearing properly. Figure #6 illustrates normal wear of a worn out hammer. To get the maximum life out of your hammers, you should rotate the hammer 180° when it wears to the middle of the end tip. The other side can be worn down to the same point, but after the length of the hammer has been affected the hammer is then wore out as illustrated in figure #6.

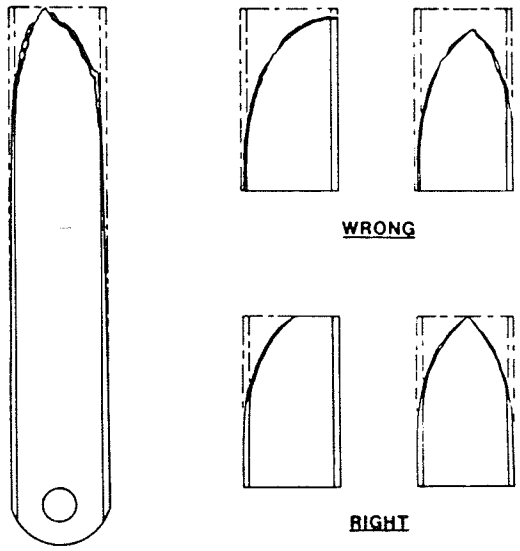


FIG. #6

By continually using a worn out hammer it could cause the following:
1. Poor quality of ground feed
2. Loss in grinding capacity
3. Motor bearing failure
4. Screen and housing damage do to a broken hammer

LINE VOLTAGE.

Motors are built to operate at 10% over or under the nameplate voltage rating. If the voltage is off more than 10% (usually under), performance suffers and you can burn out a motor winding.

This is of primary importance. No motor will give good service unless it is supplied with good voltage.

The voltage available during starting is also important. Special attention should be given to this condition because the heavy starting current (amps) inrush pulls the voltage down far more than when the motor is running.

BURNED LEAD INSLUATION.

Occasionally a panel will have two or three inches of insulation burned off. This is almost always the result of heat caused by a poor connection at a terminal screw.

c. Position trip rod 9/16" from face of proportion hopper as shown, using a spacer (9/16" dia. rod is good). Tighten actuator set screw securing actuator to trip rod.

d. Assemble 70008003 spring from hole in switchbox above center line of trip rod to hole in actuator at notch in actuator.

e. Screw 65482217 adjusting screw against actuator to hold the trip rod in the 9/16" position as in Step c. Lock in place with 66082200 on adjusting screw.

f. If necessary for proper tripping, minor adjustment may be made with adjusting screw. Care must be exercised to make sure the weighted paddle will always actuate the trip rod and not bind or hang up on the rod and that the actuator will have enough travel to trip the micro switch.

4. REPLACEMENT AND ADJUSTMENT INSTRUCTIONS - AUGER CORNER BELT:

a. Assemble the round belt over the auger pulleys and idler pulleys. To avoid undue belt wear, adjust pulley on vertical auger up or down so that belts from idlers will enter this pulley in a horizontal line. They should not ride "heavy" on either top or bottom of pulley groove.

Caution: Bolts holding hinged idler brackets to auger corner must be loose enough to allow idlers to find their proper alignment with the belt. After this adjustment is completed retighten the bolts.

b. Adjust idler pulleys approximately even each side to arrive at proper belt tension. With an approximately three-pound pressure applied midway between idler pulley and vertical auger pulley, belt should deflect no more than 1/16".

c. Because all new belts will stretch when first put into service, the tension on the auger corner belt must be checked periodically after approximately fifteen minutes, one hour, and five hours of running time.

5. SERVICING THE PROPORTIONER:

a. To replace Pawl and Spring:
   1. Make sure power to mill is shut off.
   2. Drain oil by removing pipe plug from bottom of proportioner gear box.
   3. Remove the 20 washer head cap screws from cover.
   4. Do not remove the knobs from cover.
   5. Use screw driver under cover to break seal. Pry up gently and remove cover.
   6. Remove push on fasteners.
   7. You can now remove and inspect pawls and springs. If pawls are worn or broken replace, if springs are bent replace. If pawls and springs are not worn or bent you can put them back into the proportioner. Always use new push on fasteners.
   8. If you only need to inspect or replace a pawl or spring, reverse the above steps.

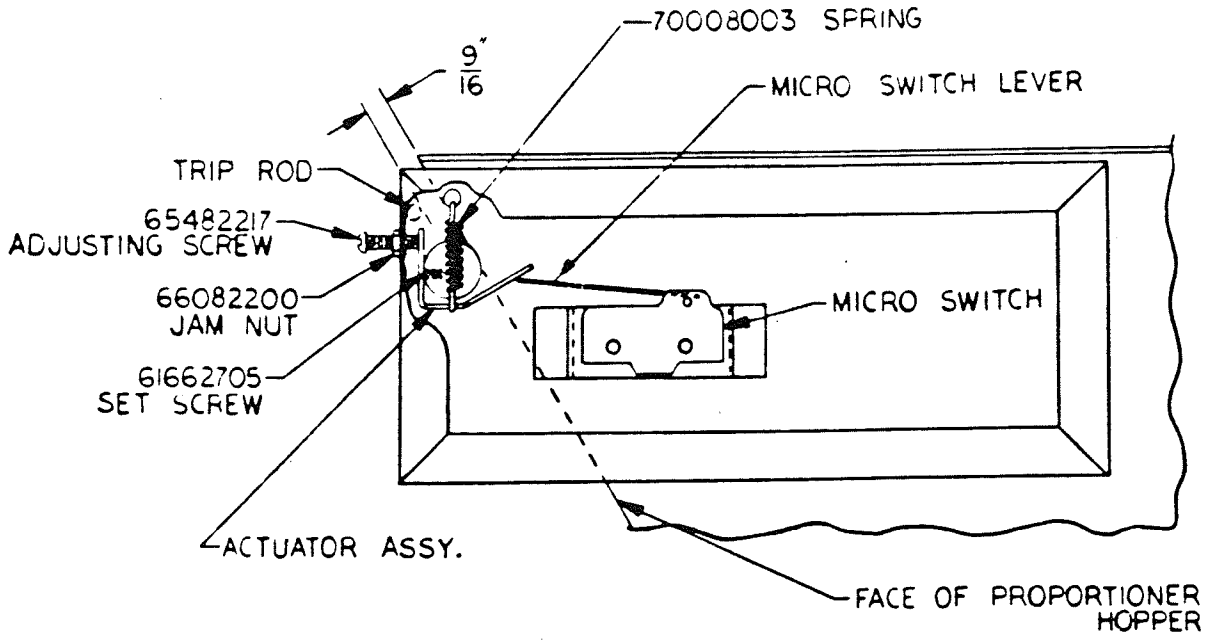
Vibration is hard on the motor bearings and can cause premature failure. An out of balance condition can result from vibrations caused by a broken hammer.

When tightening nuts on the hammer bolts, they should be snugged up enough so that the hammers cannot swing freely.

Vibration can be caused by uneven wear of the hammer on the hammer bolts. In spite of carefully controlled heat treating of the hammers and bolt, the wear is not uniform. The bolt that wears the fastest permits the hammers to move out farther from the center of rotation, causing unbalance. It is important that you carefully examine hammer bolts for wear when replacing a set of hammers.

Hammer cost is relatively inexpensive when considering the damage that can be caused by wornout hammers.

3. ADJUSTMENT INSTRUCTIONS - PROPORTIONER HOPPER SAFETY SWITCH:



SAFETY SWITCH ASSEMBLY

a. Back out 65482217 adjusting screw in end of switchbox to clear actuator and remove 70008003 spring.

b. Position actuator set collar on end of trip rod by inserting Allen wrench through hole in end of switchbox into 61662705 set screw in actuator.

b. To rebuild a proportioner complete or to replace a shaft and ratchet, pawl carrier, nylon bearing, or auger then the gear box must be removed from the mill as in the following steps:
   1. Seal off grain flow to proportioner hopper.
   2. Remove all grain from hopper.
   3. Disconnect D.C. motor.
   4. Remove nuts from bolts holding proportioner to hopper.
   5. Drain oil.
   6. Remove washer head screws (20).
   7. Do not remove knobs from cover.
   8. Remove cover.

c. To replace a shaft & ratchet, pawl carrier, or nylon bearing:
   1. Remove auger from shaft on back of proportioner.
   2. Remove set collar from shaft.
   3. Clean shaft before removing.
   4. Carefully remove shaft and ratchet out of the front of proportioner, twisting slightly as it is removed.
   5. Remove pawl carrier from bearing.
      Note: Pawl carriers 2, 3, 4, and 5 can be removed after removing shaft and ratchet. To remove pawl carrier 1, idler gear 1, 2 and 3 must be removed at the same time.
   6. Inspect nylon bearing for wear or grooves inside and outside. If marked replace.
   7. Remove 4 screws holding nylon bearing. Remove bearing cap and gaskets from the back side of proportioner.
      Note: Clean inside of proportioner gear box thoroughly.

d. Reassemble gear box:
   1. Using new nylon bearing, bearing cap and gasket reassemble with 4 screws to the proportioner back.
      Note: Assemble nylon bearing, gasket and bearing cap as shown on page 47.
   2. Pawl carriers 2, 3, 4 and 5 can be reassembled by replacing them over the nylon bearing in the same way they came off. Pawl carrier 1 and idler gears 1, 2 and 3 must be assembled at the same time as shown in figure #7 .
      Note: All idler gear assemblies are assembled with the weld facing the cover.

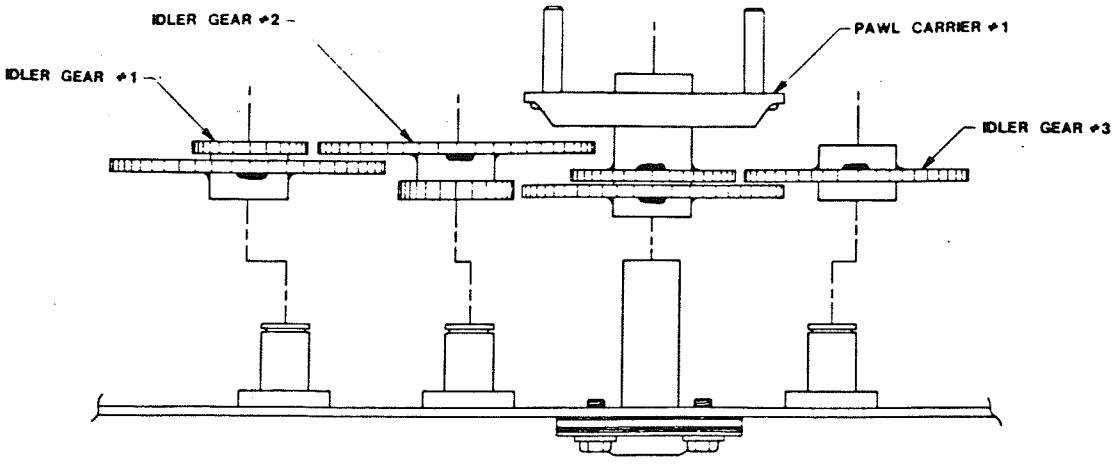


FIGURE # 7

3. If using any old ratchets make sure that the teeth are not chipped, and replace with 2 new "O" rings. It is necessary to use oil when sliding "O" ring onto the shaft. If installing new shaft and ratchets you need to install 2 new "O" rings on each shaft. The oil on the "O" rings will help to slide the shaft into the bearing also.
4. Replace the set collar on the auger shaft and ratchet at the back of the proportioner allowing only enough end play in the auger shaft and ratchet to let it turn without binding.
5. Replace the augers on the shafts with 1/4" bolts and nuts.
6. Assemble the proportioner on the mill - auger must fit over the shaft in the bottom of the proportioner hopper. Starting at left side slide one auger at a time over the shaft until the proportioner is down on the hopper.
7. Install 4 nuts and lock washers on the back side of the proportioner.
8. Rewire the D.C. motor.
9. Install pawls and pawl springs held in place with push on fasteners. The pawl should engage with the full width of the ratchet which would require the push on fastener to be 31/32" from the top of the pawl carrier. See figure #8.

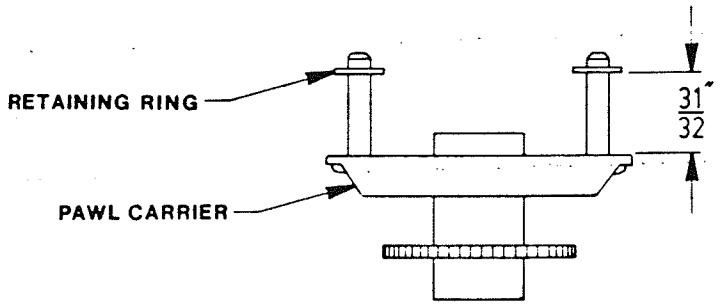


FIGURE #8

10. Replace cover assembly - starting at the left side one at a time turn knob #1 until cam drops into place on the ratchet. Do this on all knobs until the cover is in place. Replace all 20 washer head screws and tighten.
    Note: DO NOT FORCE THE COVER DOWN it will drop in place with a little care.
11. Replace drain plug in the bottom and put 2 quarts of oil in the proportioner.
12. Replace fill plug.

ROUTINE MAINTENANCE

1. Change oil every 500 hours or 6 months - use Texaco preserative oil, 10W.
2. Check hammers for wear weekly.
3. When changing hammers check bolts for wear.
4. Check screen for wear weekly.
5. Check door seals monthly.
6. Check power corner belts for alinement and tension weekly.
7. Inspect proportioner every 2,000 hours.
8. Check mill magnets for tramp iron daily.

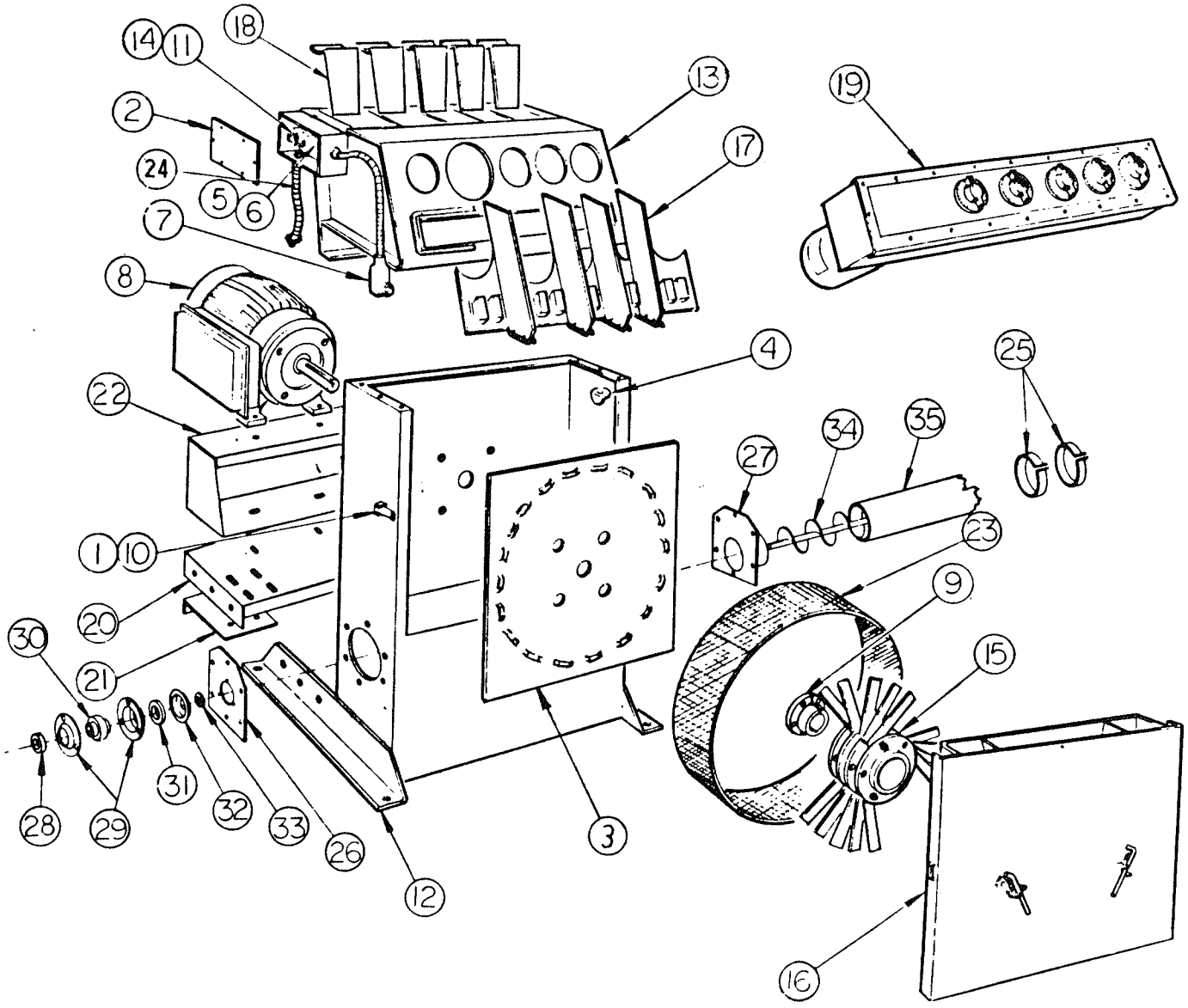
SECTION VI

Parts Lists and Wiring Diagrams

INPUT POWER WIRING

Electrical input wiring should be done by a qualified electrician following NEC and local standards. Eac machine should be grounded to a ground rod driven at least 8 feet into moist soil.

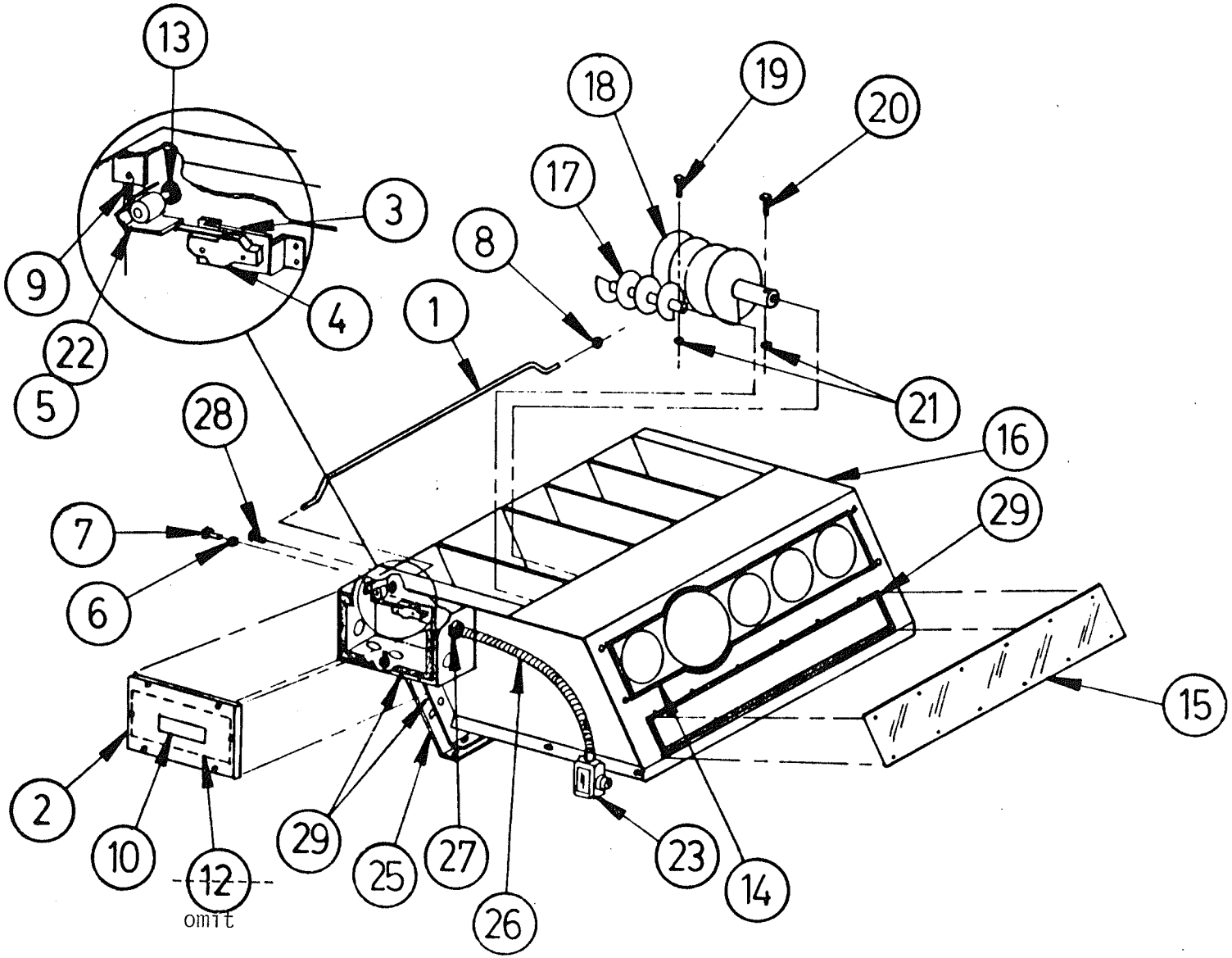
"D" MILL ASSEMBLY



"D" MILL ASSEMBLY

ITEM	PART NO.	DESCRIPTION	QUAN.
1	7000-4506	Latches	2
2	1120-6640	Cover, Switch Box	1
3	1119-5910	Back Wear Plate	1
4	1119-5940	Magnet Clips	2
5	1119-5950	Insulation, Switch	1
6	3100-8001	Micro Switch	1
7	9100-0157	Wire Harness - Door	1
8	3300-0601	Motor 5 H.P.-1Ø	1
or	3300-0602	Motor 7 1/2 H.P.-1Ø	1
or	3300-0603	Motor 10 H.P.-1Ø	1
or	3300-0701	Motor 5 H.P.-3Ø	1
or	3300-0703	Motor 10 H.P.-3Ø	1
or	3300-0705	Motor 20 H.P.-3Ø	1
9	4401-0712	Bushing SD 1-1/8"	1
or	4401-0716	Bushing SD 1-3/8"	1
or	4401-0720	Bushing SD 1-5/8"	1
10	7000-7001	Pop Rivets	4
11	7000-8003	Spring	1
12	9000-0100	Mill Housing - Welded	1
13	9000-0102	Prop Hopper - Welded	1
14	9000-0123	Actuator	1
15	9200-0234	Beater Hub Ass'y.	1
16	9200 0634	Door & Chute Ass'y.	1
17	9200 0237	Magnet Plate	1
18	9000-0131	Switch Paddle Welded Ass'y.	1
19	9200 0233	Prop. Ass'y.	1
20	9000-0443	Motor Base	1
21	9000-0438	Adjustment Plate	1
22	1120-6620	Motor Stand (20 H.P. Only)	1
23	9000-0142	Screen - 3/16" (See Page 52 for Replacement Numbers)	1
24		Wire Harness - Motor	
	9100-0150	5 H.P. - 1Ø	1
or	9100-0137	7 1/2 H.P. and 10 H.P. - 1Ø	1
or	9100-0151	5 H.P. - 3Ø	1
or	9100-0136	10 H.P. and 20 H.P. - 3Ø	1
25	1032-2902	Clamp Ring - 3 1/2" Auger	2
26	1119-5920	Offset Bearing Plate-3½" Auger	1
or	1119-6500	Bearing Plate - 6" Auger	1
27	9000-0122	Tube & Offset Plate Ass'y. - 3 1/2" Auger	1
or	9000-0207	Sleeve & Ring Ass'y.-6" Auger	1
28	4000-0018	Lock Collar (5/8") - 3½" Auger	1
or	4000-0009	Lock Collar (1 1/16")-6" Auger	1
29	4000-0016	Stamping (5/8") - 3 1/2" Auger	2
or	4000-0005	Stamping (1 1/16")- 6" Auger	2
30	4000-0017	Bearing (5/8") - 3 1/2" Auger	1
or	4000-0012	Bearing (1 1/16") - 6" Auger	1
31	8001-1506	Felt Washer (5/8") - 3½" Auger	1
or	8001-1509	Felt Washer (1 1/16")-6" Auger	1
32	8001-1507	Retaining Cup (5/8")-3½" Auger	1
or	8001-1508	Retaining Cup (1 1/16")-6" Auger	1
33	8001-4502	Thrust Washer (5/8")-3½" Auger	1
34	9000-2152	Flight & Shaft Ass'y. (52 3/4") - 3 1/2" Auger	1
or	9000-2153	Flight & Shaft Ass'y. (90 3/4") - 3 1/2" Auger	1
or	9000-1232	Flight & Shaft Ass'y. (58") - 6" Auger	1
35	1119-7100	3 1/2" Galv. Tubing (12") - 3 1/2" Auger	1
or	1119-7102	3 1/2" Galv. Tubing (50") - 3 1/2" Auger	1
or	1119-5003	3 1/2" Galv. Tubing (44 1/2") - 6" Auger	1

PROPORTIONER HOPPER ASSY.



PROPORTIONER HOPPER ASS'Y.

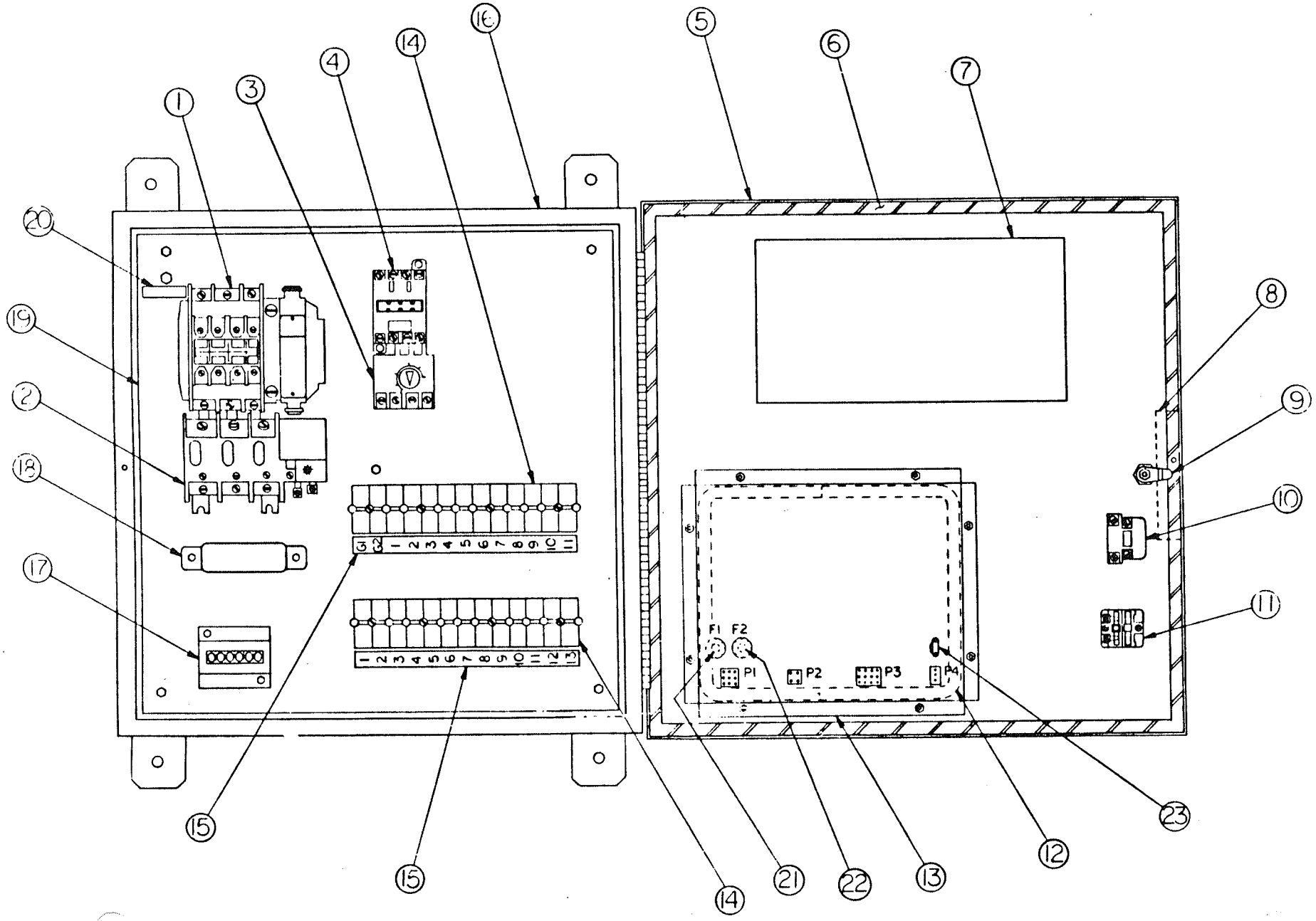
	PART NO.	DESCRIPTION	QUAN.
	9200-0247	Proportioner Hopper - Complete	
1	1119-5890	Trip Rod	1
2	1120-6640	Cover - Switch Box	1
3	1119-5950	Insulation - Switch	1
4	3100-8001	Micro Switch	1
5	6166-2705	Set Screw	1
6	6608-2200	Nut	1
7	6548-2217	Adjustment Screw - #8 - 32 x 3/4"	1
8	7000-0502	Push - on - Fastener	1
9	7000-8003	Spring	1
10	8000-6506	Label - Warning	1
11	8000-6509	Label - Danger (Not Illustrated)	1
** 12	8000-6515	Decal - Switch Box Wiring	1
13	8000-5008	Grommet - 7/64" I.D.	1

ITEM	PART NO.	DESCRIPTION	QUAN.
14	8001-4002	Polyurethane Tape - 3/8"	60"
15	8002-2002	Magnet Window	1
16	9000-0102	Proportioner Welded Assembly	1
17*	9000-0116	4" Auger Assembly	4
18*	9000-0118	6" Auger Ass'y.-Dbl. Full Pitch	1
19*	6258-3326	Cap Screw - 1/4" - 20 x 1 1/4"	4
20*	6258-3330	Cap Screw - 1/4" - 20 x 1 3/4"	1
21	6674-3300	Nut - 1/4" - 20	5
22	9000-0123	Actuator	1
23	3100-8033	Door Switch, DPDT	1
24	9200-0233	Prop. Gear Box (See Page 47)	1
25	9200-0242	Counter Switch Ass'y.(See Pg 50)	1
26	1120-6101	3/8" Liquid Tight Conduit - 14"	1
27	3100-2611	3/8" Liquid Tight Straight Connector	2
28	6548-2205	M.S. Slotted Hex Hd. #8-32-1/4"	1
29	8001-4001	Polyurethane Tape - 3/16"	90"

**omit until further notice!(Item 12)

* These items are not included in 9200-0247 Proportioner Hopper Assembly Complete.

SOLID STATE CONTROL PANEL – COMPONENTS

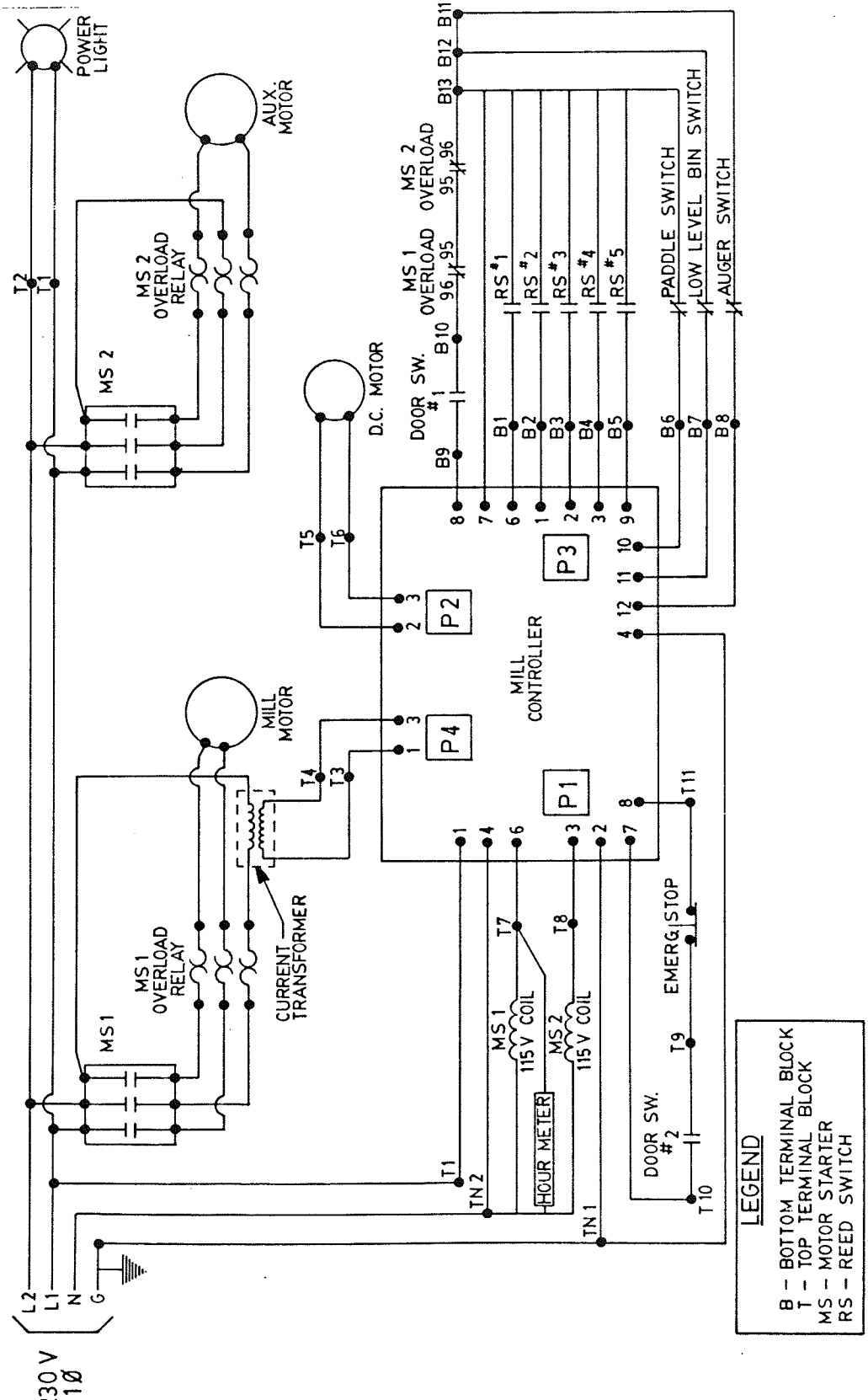


SOLID STATE CONTROL PANEL - COMPONENTS

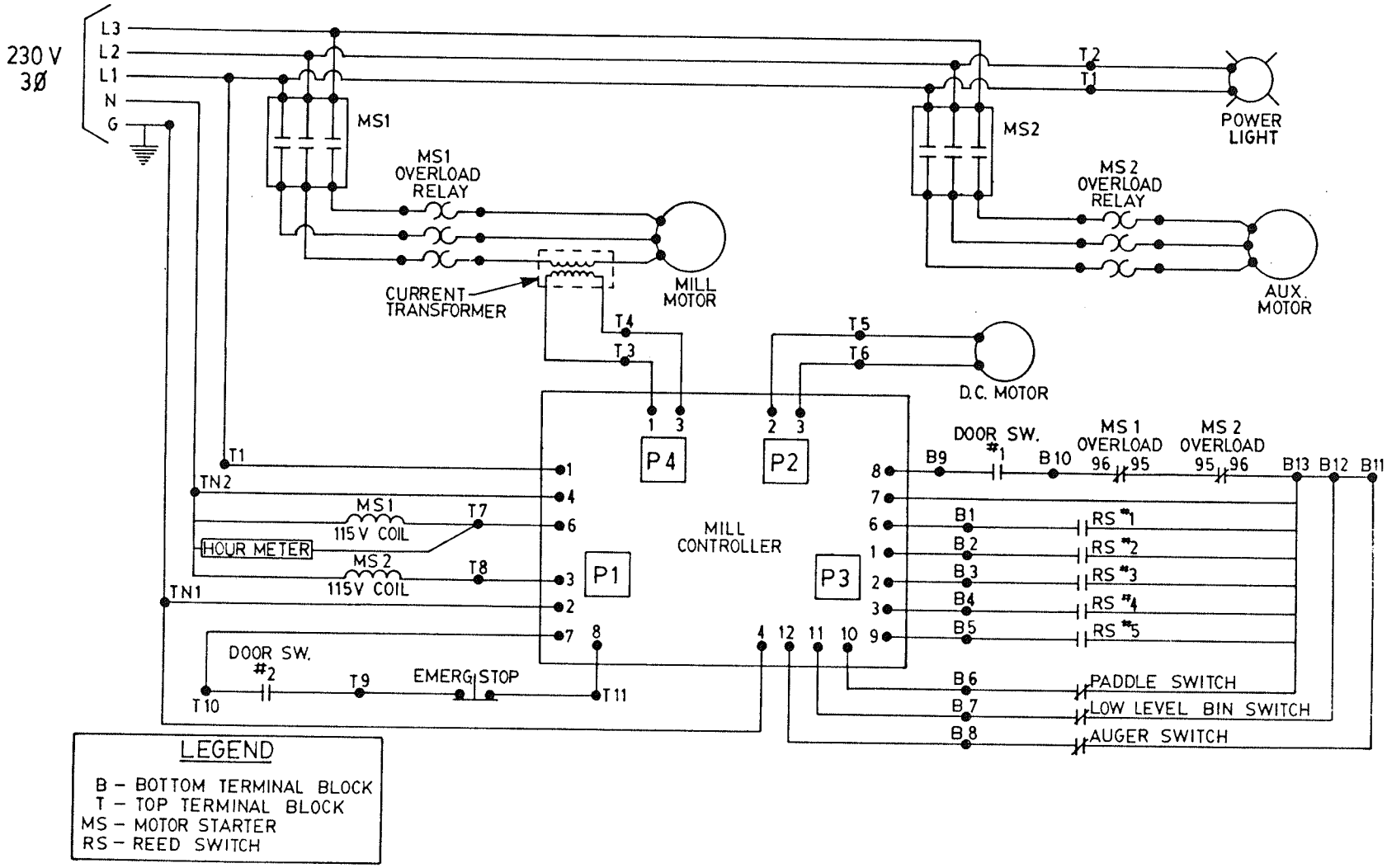
ITEM	PART NO.	DESCRIPTION	QUAN.
1	See Below	A.C. Contactor (Main Contactor)	
	31016102	25 Amp. 5hp 1Ø, 5hp 3Ø, 10hp 3Ø	1
or	31016103	40 Amp. 7½hp 1Ø	1
or	31016104	63 Amp. 10hp 1Ø, 20hp 3Ø	1
2	See Below	Overload Relay (Main Contactor)	
	31016110	10-16 A 5hp 3Ø	1
or	31016112	20-30 A 5hp 1Ø, 10hp 3Ø	1
or	31016113	25-43 A 7½hp 1Ø, 10hp 1Ø	1
or	31016114	40-72 A 20hp 3Ø	1
3	See Below	Overload Relay (Aux. Contactor)	
	31016107	2.5-4.0 A 5hp 3Ø, 10hp 3Ø, & 20hp 3Ø	1
or	31016108	3.8-6.0 A 5hp 1Ø, 7½hp 1Ø, & 10hp 1Ø	1
4	31016101	Aux. A.C. Contactor - 16 Amp.	1
5	90000486	Front Panel - Welded Assembly	1
6	80014003	Polyurethane Tape	82"
7	80003529	Decal - Schematic	1
8	80006506	Decal - Warning	1
9	70004501	Door Latch	1
10	31008034	Amber Light	1
11	31008032	Mushroom Head Stop Switch	1
12	11208130	Rubber Gasket	1
13	31012005	Mill Controller	1
14	31009005	Terminal Block	26
15	80006508	Decal - Terminal Block	2
16	90000487	Control Box - Welded Assembly	1
17	31003501	Hour Meter	1
18	31013003	Current Transformer	1
19	11209050	Panel Insert	1
20	80006501	Ground Label	1
21	31001036	1/4 Amp Slow Blow Fuse	1
22	31001037	5 Amp Ceramic Tube Fuse	1
23	See Below	Resistor & Plug Assy.	
	91000300	59 K - 20hp 3Ø	1
or	91000301	69.8K - 10hp 1Ø	1
or	91000302	78.7K - 7½hp 1Ø	1
or	91000303	124K - 5hp 1Ø & 10hp 3Ø	1
or	91000304	221K - 5hp 3Ø	1
24	See Below	Wire Harness - Mill Controller (Not Shown)	
	91000153	P4 - 3 Socket Wire Harness	1
	91000154	P2 - 4 Socket Wire Harness	1
	91000155	P1 - 9 Socket Wire Harness	1
	91000156	P3 - 12 Socket Wire Harness	1
25	91000157	DPDT Door Micro Switch & Wire Harness Assembly (Not Shown)	1

SECTION VII

SCHEMATIC DIAGRAM
SOLID STATE D-MILL - 1Ø



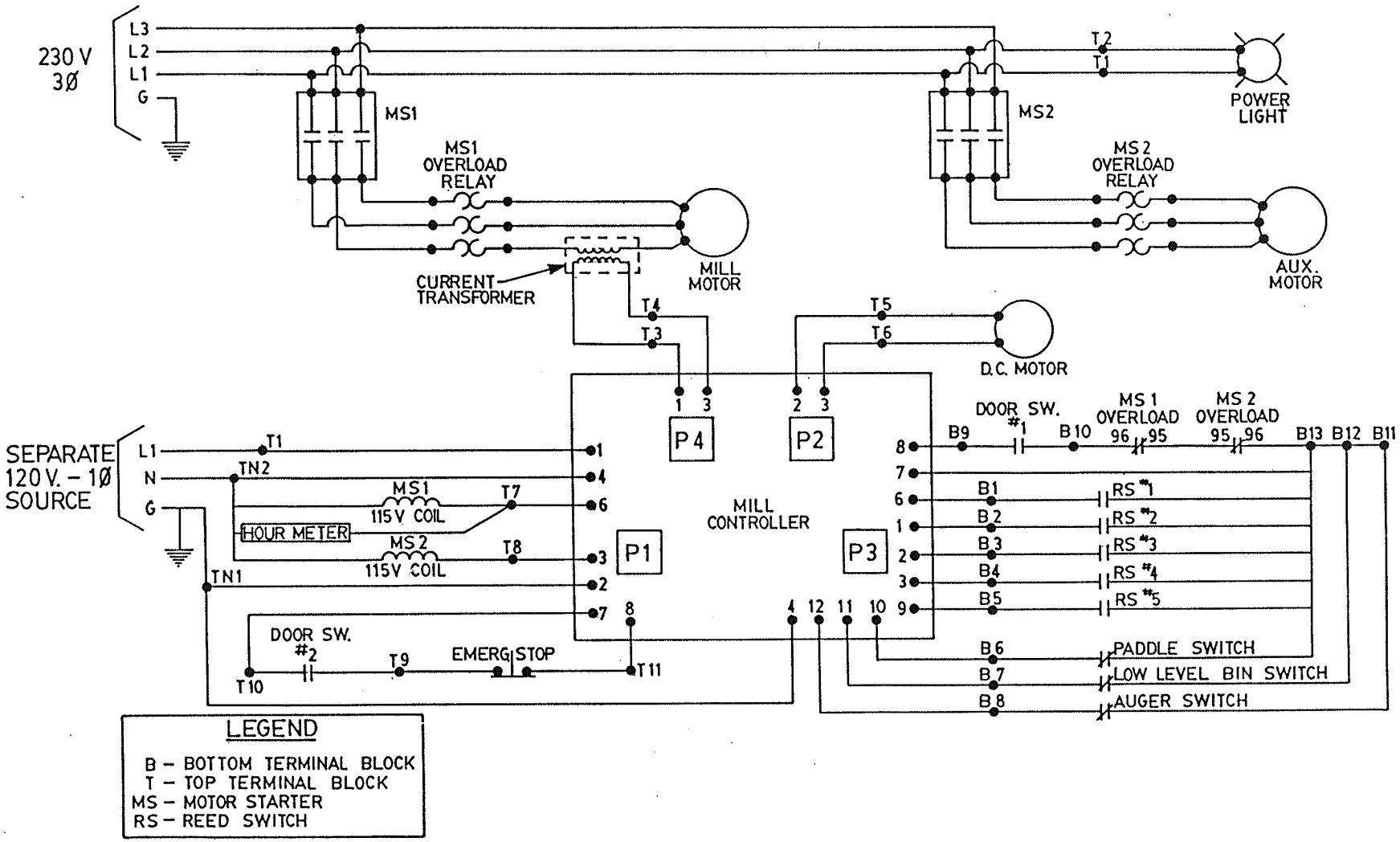
SCHEMATIC DIAGRAM
SOLID STATE D-MILL – 3Ø



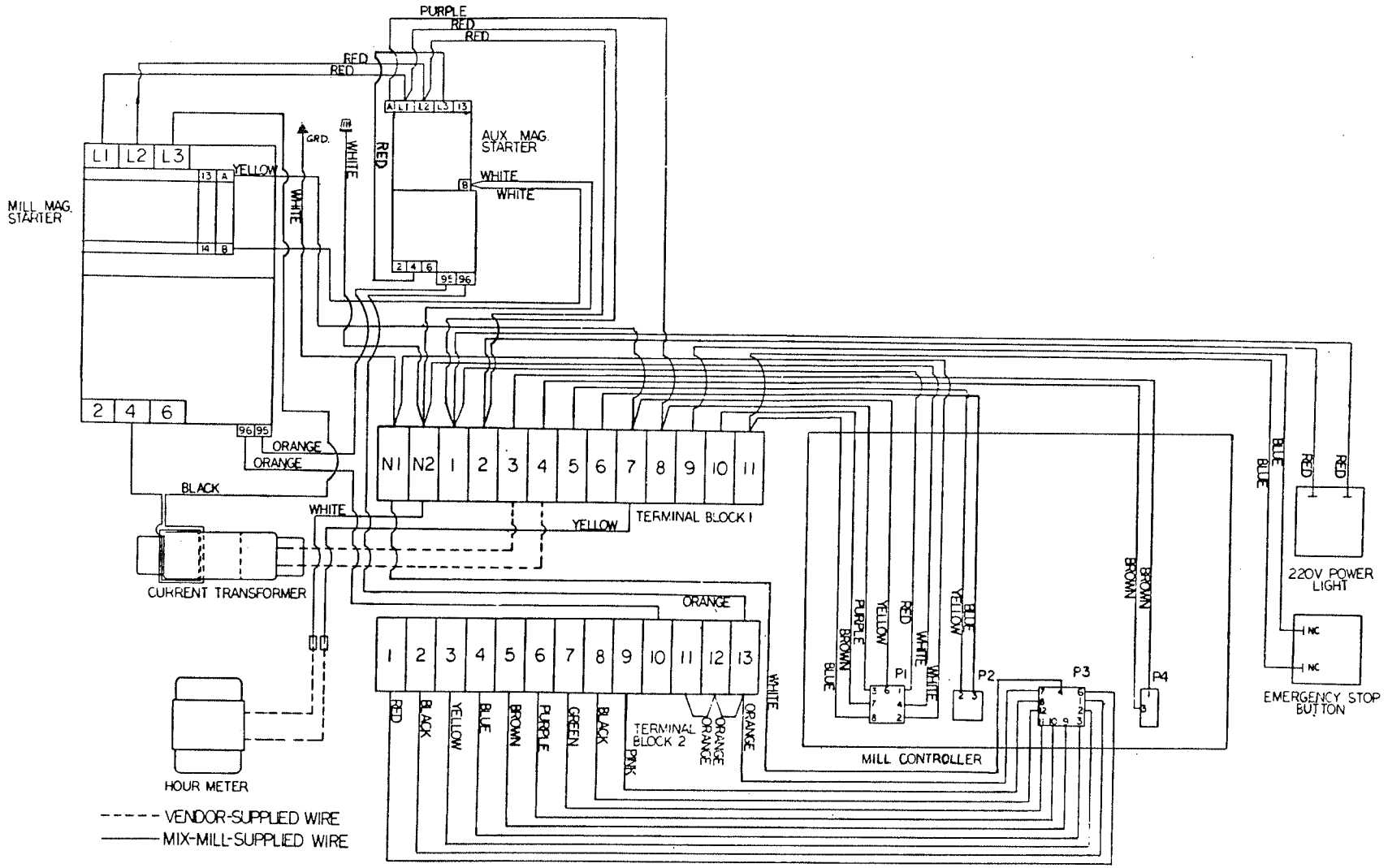
LEGEND

B – BOTTOM TERMINAL BLOCK
T – TOP TERMINAL BLOCK
MS – MOTOR STARTER
RS – REED SWITCH

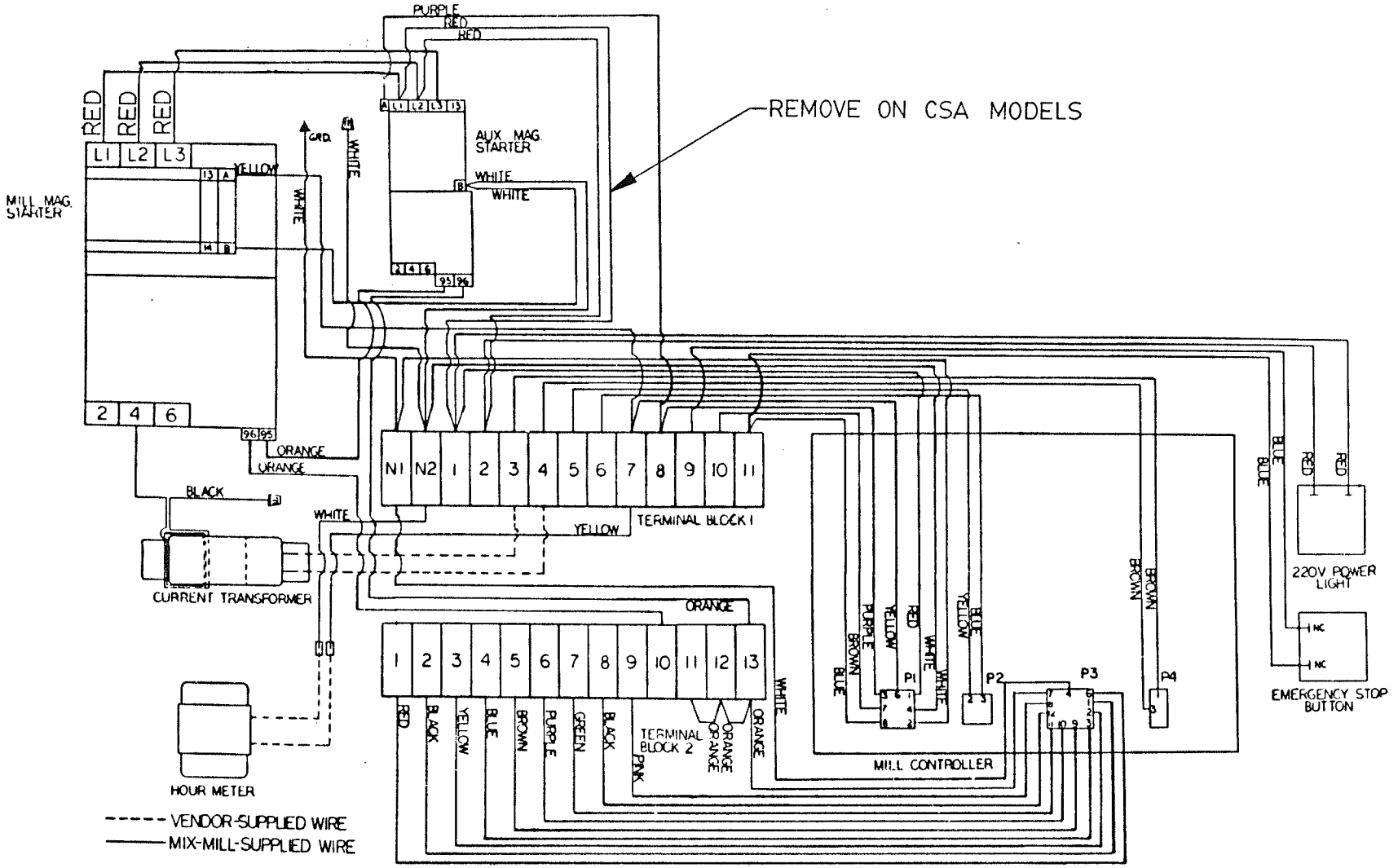
SCHEMATIC DIAGRAM
CSA SOLID STATE D-MILL - 3Ø



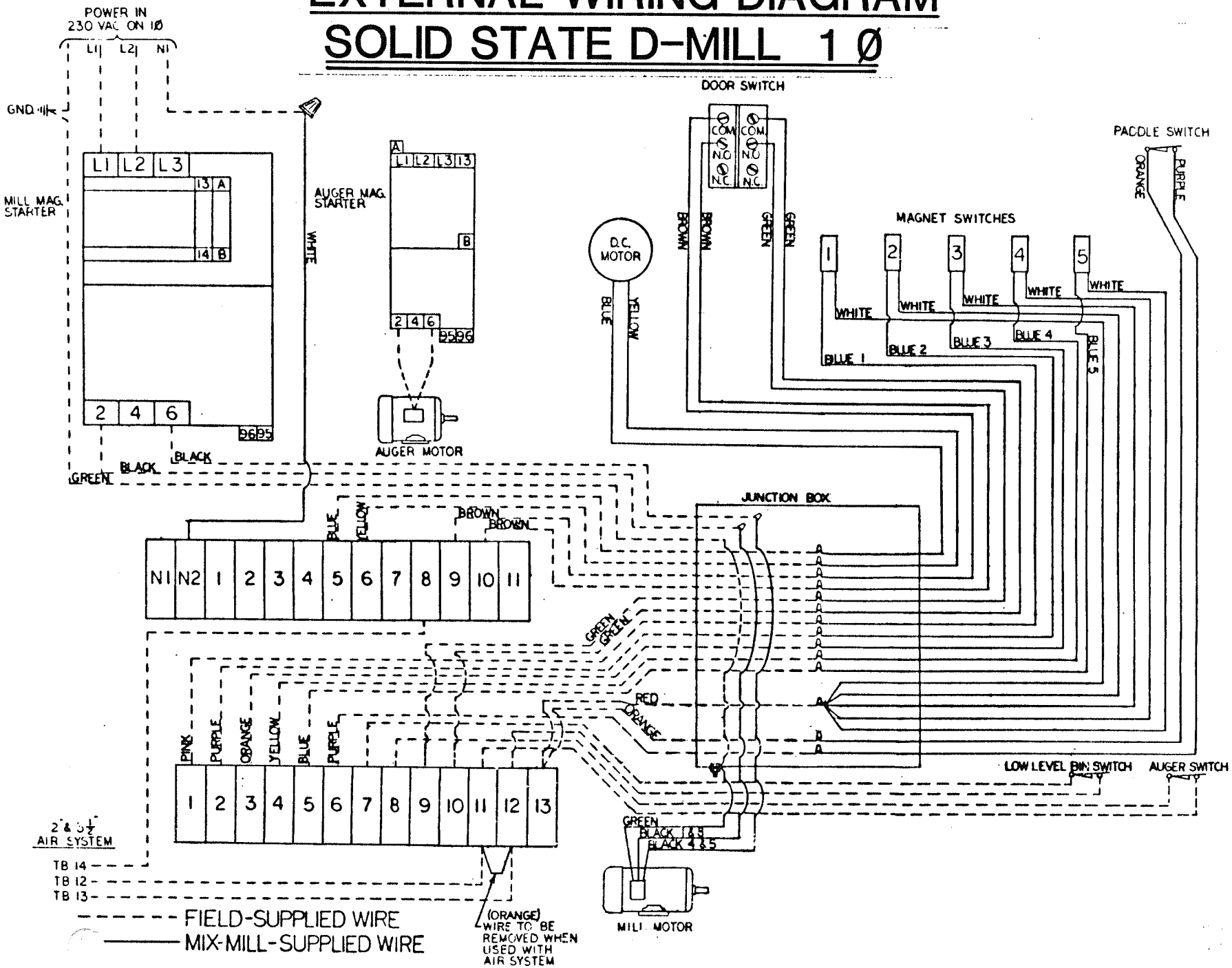
INTERNAL WIRING DIAGRAM
SOLID STATE D-MILL CONTROL PANEL - 1 Ø



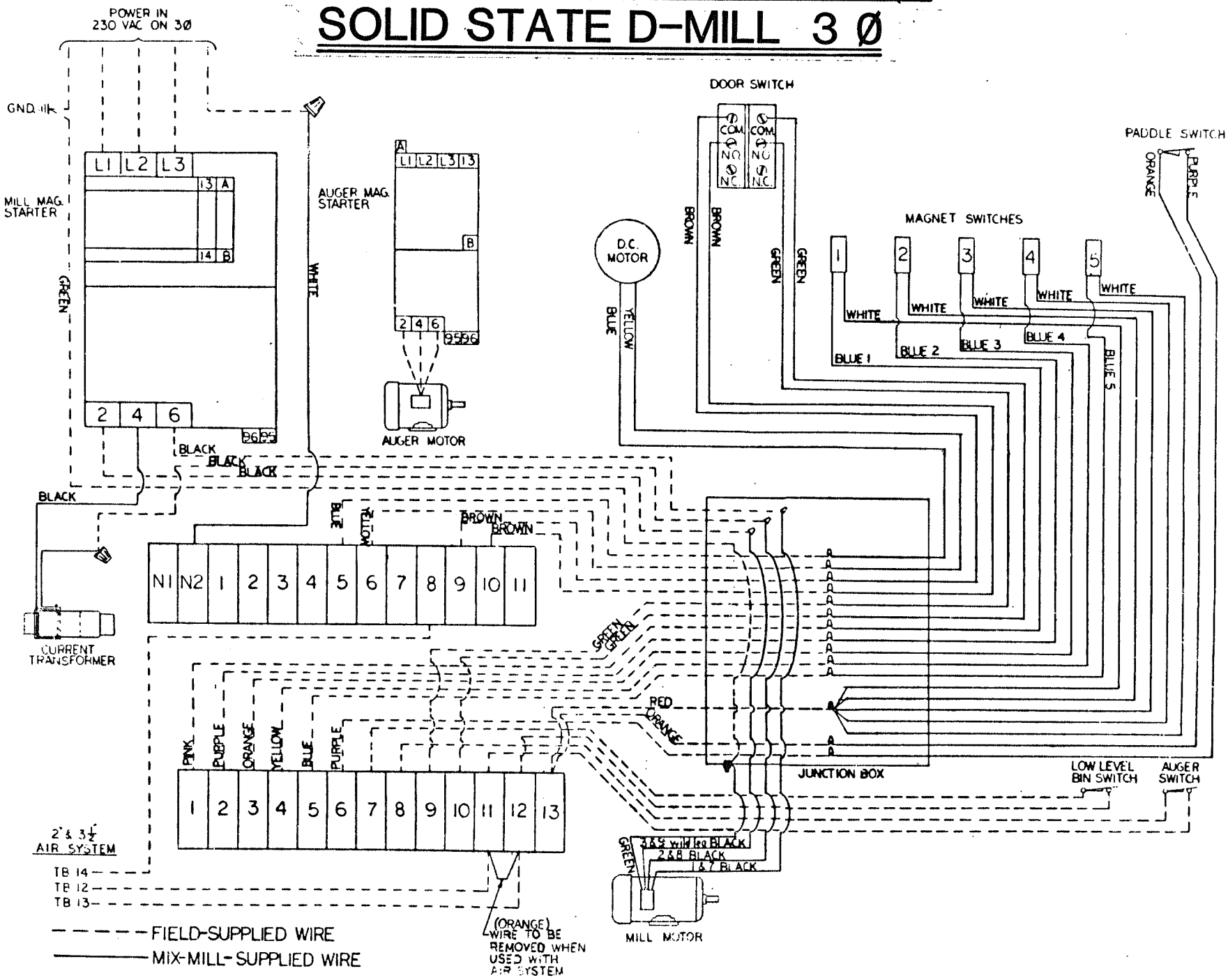
INTERNAL WIRING DIAGRAM
SOLID STATE D-MILL CONTROL PANEL - 3Ø



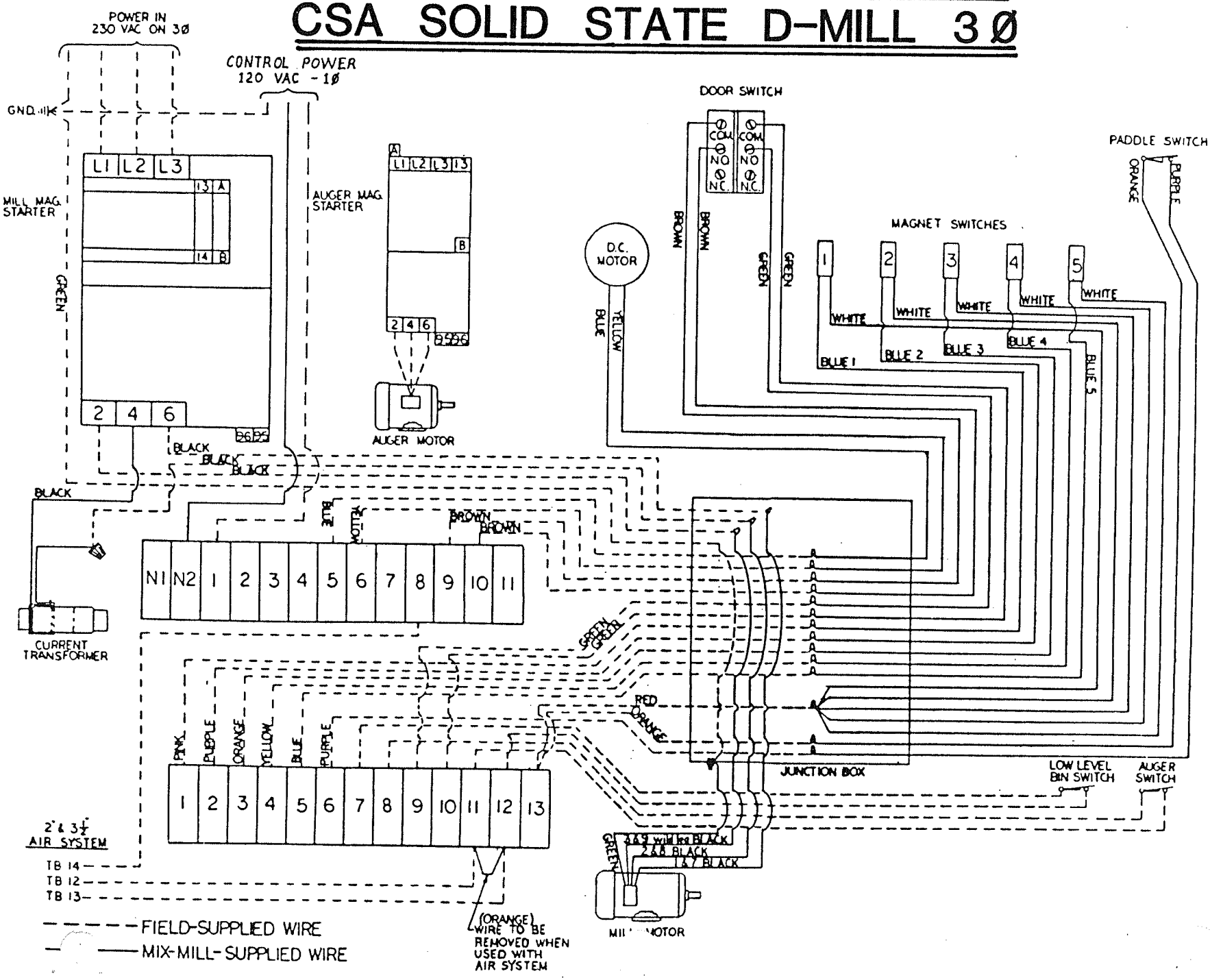
EXTERNAL WIRING DIAGRAM
SOLID STATE D-MILL 1 Ø



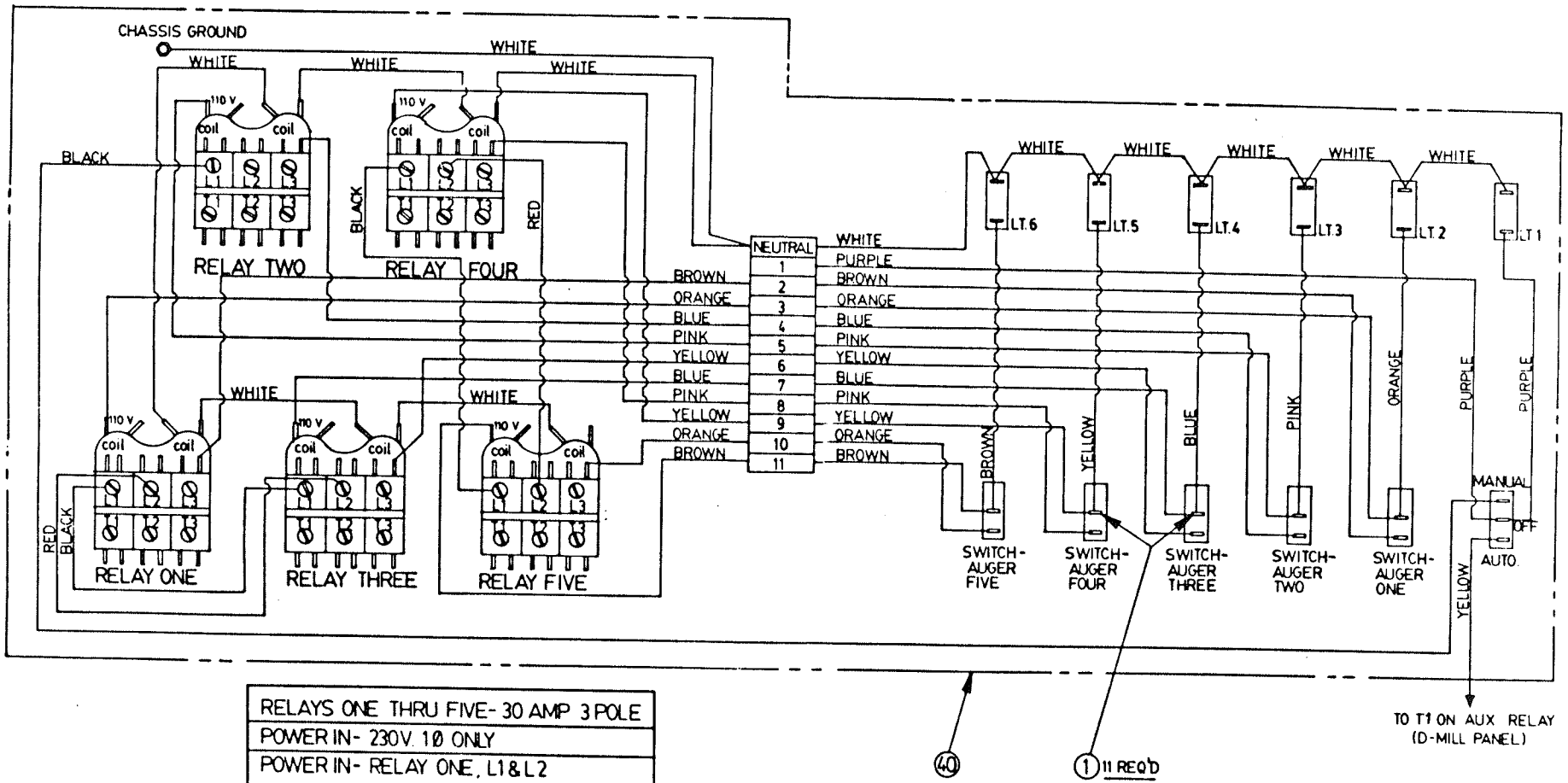
EXTERNAL WIRING DIAGRAM
SOLID STATE D-MILL 3 Ø



EXTERNAL WIRING DIAGRAM
CSA SOLID STATE D-MILL 3Ø

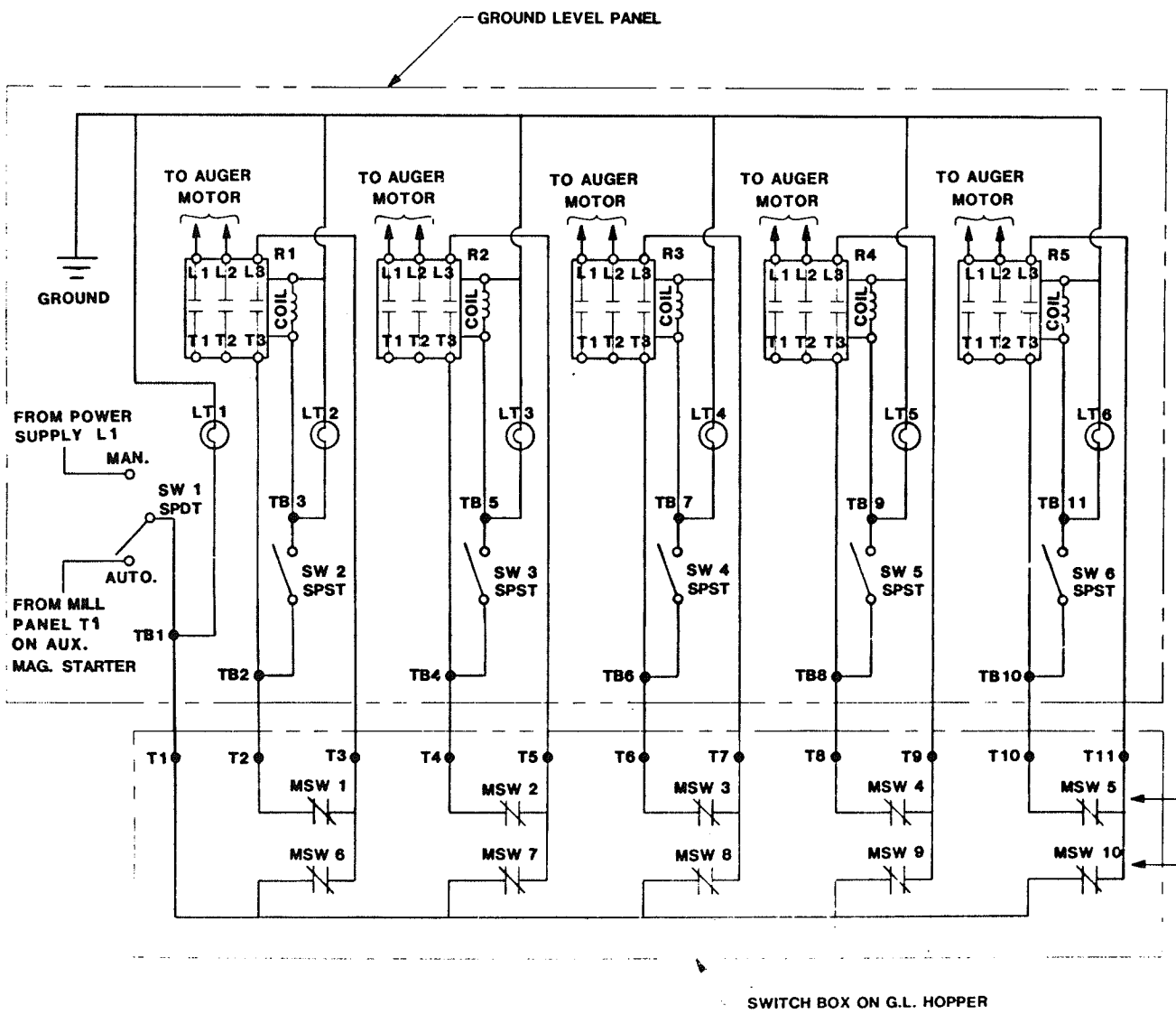


INTERNAL WIRING DIAGRAM
GROUND LEVEL CONTROL PANEL



RELAYS ONE THRU FIVE- 30 AMP 3 POLE
POWER IN- 230V. 1Ø ONLY
POWER IN- RELAY ONE, L1 & L2 POWER IN- RELAY TWO, L1 & L2 POWER IN- RELAY FOUR, L1 & L2
230 V. 1Ø - POWER OUT TO AUGER MOTORS FROM T1 & T2 CONTACTS ON EACH RELAY
POWER INTO RELAYS THREE & FIVE IS FACTORY WIRED THRU RELAYS ONE & FOUR

SCHEMATIC DIAGRAM
GROUND LEVEL - SOLID STATE D - MILL



R1 THRU R5 = RELAY (30A, 3 POLE, 110V. COIL)
LT 1 THRU LT 6 = GREEN LIGHT - 110V.
SW 1 = SPDT "CENTER OFF" SWITCH
SW 2 THRU SW 6 = SPST SWITCH
MSW 1 THRU MSW 10 = MICRO SWITCH
TB = TERMINAL BLOCK IN G.L. PANEL
CB = CIRCUIT BREAKER
T1 THRU T11 = TB IN G.L. SWITCH ASS'Y.

MSW 1 THRU MSW 5 = BOTTOM M.S.

MSW 6 THRU MSW 10 = TOP M.S.

SOLID STATE D MILL WIRING DIAGRAM

WITH NUTRI-BLENDER & CONTROL HOPPER CONNECTIONS