FARMATIC
FEED PROCESSING SYSTEMS

Mix-Mill
FEED PROCESSING SYSTEMS

SENTRY II HAMMER MILL

MODELS 5000, 4000, 3000, 2000, 1000

INSTALLATION MANUAL

Contents

Dear Mix-Mill and/or Farmatic Owner/Operator:

Thank you for purchasing a new Sentry Series mixer/grinder or roller mill. More than 35 years of experience in the manufacture of feed milling equipment and grain handling systems has made Farmatic/ Mix-Mill the leader in the field of electric powered, on-the-farm feed conditioning systems.

Many of the features that have provided trouble free service for thousands of owners will still be found on your new Sentry mill. New design technology and new components have also been incorporated in your mill to further increase the reliability and the flexibility needed for today's farming needs.

Some of these features are increased horse power sizes, state of the art electronics, new type C frame motors, larger screen and grinding chamber size. A new beater hub design, with these other features, gives you more output per hour to get the job done faster and more efficient.

The new Magic Window control panel provides instant visual indication of how much of each ingredient is being metered into the grinding chamber. This gives you precise control and flexibility in making different rations and in accurately controlling the amount of feed ground.

After initial calibration procedures have been completed, you will be able to preset your controls, push a button and automatically make your daily feed requirements.

The following pages of this owner's manual will provide you with the correct operating information and answer many of your questions about your new Sentry mill. Please take a few minutes to read these instructions and keep them for future reference.

The parts breakdown will help you to obtain genuine factory parts when needed. Please contact your local authorized dealer any time you need parts or service. He can also provide you with other equipment and help you plan for future growth.

Sincerely,

Bluffton Agri/Industrial Corp.
Manufacturers of Farmatic/Mix-Mill Equipment

Warranty

When purchased from an authorized representative, each new product of BAIC is warranted for a period of one year from the date of delivery to the Purchaser/User or 1500 hours of operation, whichever occurs first. This warranty shall apply to all parts and workmanship that shall appear to BAIC to have been defective in manufacture. BAIC's sole and entire obligation under such warranty shall be satisfied by shipment to the Purchaser/User without charge (except for transportation costs which shall be paid by Purchaser/User) the part or parts returned for inspection and parts or repair of the returned parts intended to replace those acknowledged by BAIC to be defective. This warranty shall not apply and shall be void under the following conditions:

1. The product is transported from the original installation site.

2. The product is installed or assembled by other than factory-trained, authorized distributor service personnel.

3. Any part of the product has been altered, modified, or changed except at BAIC's factory or as authorized by BAIC in writing.

4. Attachments or devices unsuitable to the product have been used on or in conjunction with the product.

5. The product has not been installed, used, operated, handled, or serviced in accordance with the appropriate instruction manual.

BAIC reserves the right to make changes in design or improvements in it products without any obligation whatsoever to prior Purchaser/User of such products.

BAIC will pass on to a Purchaser/User only such warranty as it shall receive on products or components not of its manufacture from the manufacturer or supplier thereof.

This warranty is expressly in lieu of any other express or implied warranties, including any implied warranty of merchantability of fitness and of any other obligation on the part of BAIC, and may not be altered, modified, or changed in any way except in writing by an officer of BAIC.

BAIC shall not be liable for any loss or damage directly or indirectly arising from the use of its products or for any special or consequential damage of any nature.

The Warranty Registration Card **must** be filled in completely and signed by Purchaser/User and returned to BAIC to validate any warranty claim.

Safety

Be a safe operator - avoid accidents

Most accidents, whether they occur in industry, on the farm, at home, or on the highway, are caused by the failure of some individual to follow simple and fundamental safety rules or precautions. For this reason, most accidents can be prevented by recognizing the real cause and doing something about it before the accident occurs.

Regardless of the care used in the design and construction of any type of equipment, there are many conditions that can not be completely safe guarded against without interfering with reasonable accessibility and efficient operation.

A careful operator is the best insurance against an accident.

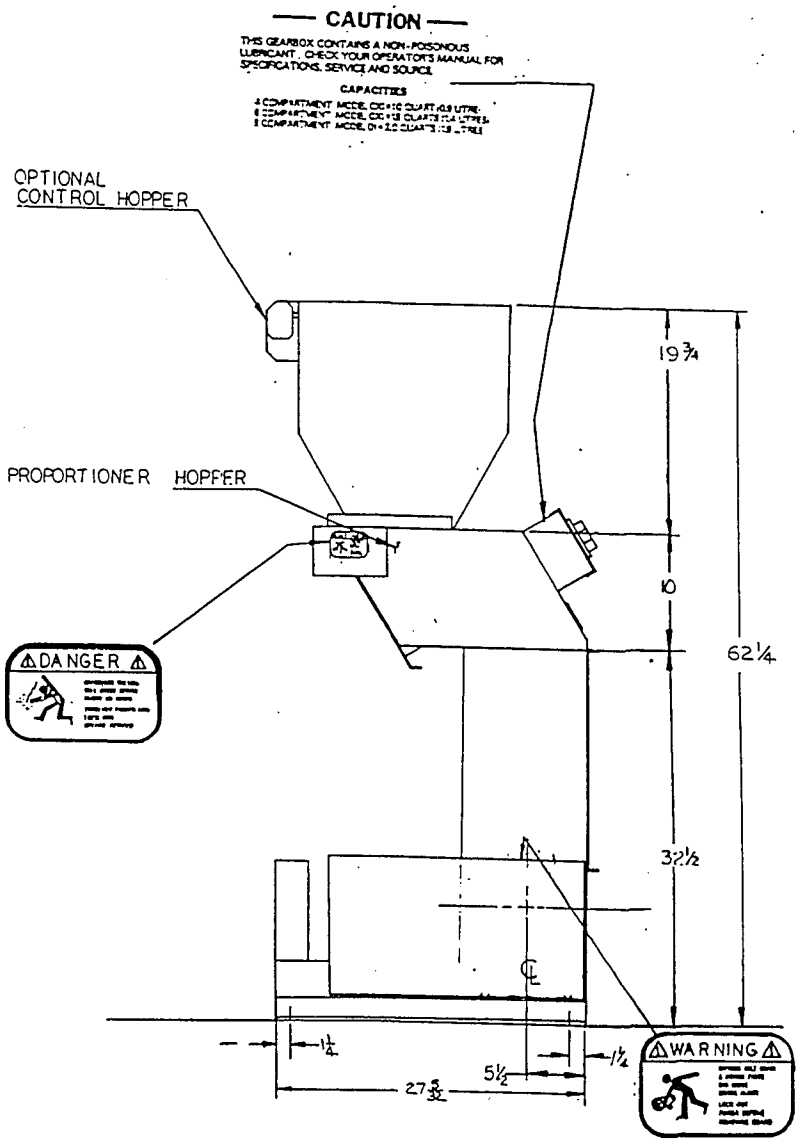
The complete observance of one simple rule would prevent many serious injuries each year. That rule is:

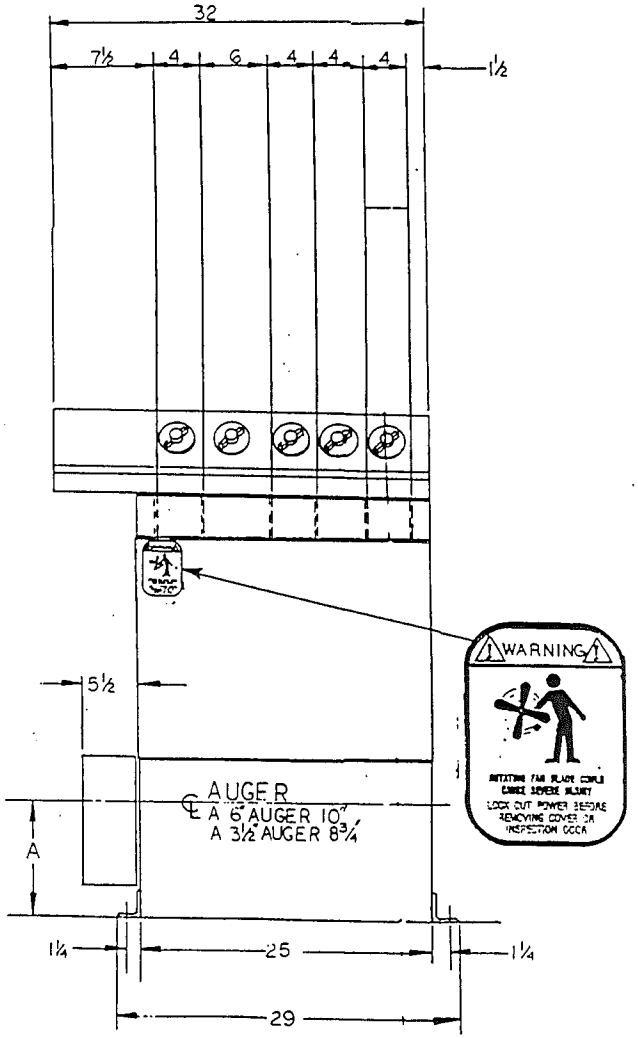
Never attempt to clean, oil, or adjust a machine while it is in motion!
-National Safety Council

BAIC has made every effort to provide safe equipment, however, the following precautions should be carefully observed!

1. Disconnect main service switch before removing any housing covers or electrical boxes or switches.
2. Ground the mill frame according to local electrical codes.
3. Ground any augers or feeders where livestock might contact either augers or feeders.
4. Keep all shields and covers in place.
5. See location of warning labels and mill dimensions on next page.

Sentry II Series Hammer Mill - Major Dimensions





Installation and Operation

New Installation Requirements

The mixer/grinder must be located in a weatherproof structure. A feed factory building has been designed for this purpose and is available in sizes ranging from 20 ton through 400 ton of overhead storage capacities. See your 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 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 dealer 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 gauge-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 bushels per hour to 3000 bushels 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.

Control Panel Installation

1. Mount control panel in desired location.

2. Electrician must install a wire harness containing the appropriate wires as per wiring diagram on page 39 & 40.

3. Connect the color coded wires as indicated by the diagram on page 39 or 40.

4. The discharge auger motor is prewired to junction box. Connect to control panel as shown on page 39 or 40 by field installed wiring.

5. Mill motor (230V - 1 Phase - 3 Wire) (230V - 3 Phase - 4 Wire) (575V - 3 Phase - 4 Wire) is prewired to the junction box on the mill. Connect to the control panel with field installed wiring to the terminal block that shows **mill motor**. The mill motor may be operated with either CW or CCW rotation. To change rotation, use the reversing switch supplied in the junction box on the mill 1 phase models only.

Incoming Power

A wire harness will have to be field supplied containing lines L1, L2, (L3 if 3 Phase) and a neutral, on three phase mills a separate 110V control circuit will also be needed. This harness needs to be connected from the circuit breaker box to the Sentry mill panel. These leads should be sized accordingly to the amps on the 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 terminal block. All equipment must be grounded according to local electrical codes.

Installation Procedures

WARNING! Failure to properly ground this machine could lead to serious injury to animals or persons operating the equipment. **Grounding** of all equipment is recommended. Grounding should be in accordance with the national electrical code and should be consistent with sound local practice.

Before attempting repairs to any equipment, disconnect and **"lock out"** the incoming power to that equipment. An electrical shock can be obtained from an electric motor even though the incoming power is shut off. This could be caused by capacitor discharge in single phase, capacitor type motors.

Component Functions

Proportioner Hopper

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.

Ingredient Flow Switch

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

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 bypasses the grinding chamber 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.

Proportioner Gear Box

Standard Proportioner

A new Sentry 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 capacity 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. Gearbox oil is a non-poisonous lubricant. Contact your local dealer for proper gearbox lubricant. (10W mineral based oil). Change oil every 500 hours or six months.

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 AC 60 HZ. The output is continuously variable from 0 to 90V-DC.

Mill Door

Bypass Valves

The built-in bypass valves on the mill door give the operator the option of bypassing three ingredients around the grinding chamber. Either the material from the left-hand (No. 1) auger, the material from the right-hand (No.4 and 5) augers, or all three can be bypassed.

Panel

Current Transformers
These devices measure the mill and proportioner currents and provide a useable signal to the electronic ammeter and shear pin sections of the electronic board.

Power Transformer
This transformer provides low voltage power to the electronic control board.

Electronic Circuit Boards
The Control Board makes all the timing, sequencing, measurement and safety decisions for the mill. It is connected by a 64 conductor ribbon cable to the faceplate display board and supplies 12 volt power to the optional counter board.

Contactors
Because all of the motor contactors are equipped with overload relays, all motors are installed without their manual reset overloads. When installing the optional vertical motor, be sure that its manual reset overload has been removed.

The overload current is set by the black dial on the overload relay's top face to match the full load current indicated on the motor's nameplate.

The overload relay has three operating modes which can be selected by gently turning the gray mode selector switch. The **AUTO** mode is for normal operation. The overload will trip when the motor current exceeds the dial setting amperage, and will reset automatically within two minutes. In the **MAN** mode, the overload will trip at the same amperage, but must be reset manually by pressing the blue reset button. In the **TEST** position, an overload can be simulated by pressing the reset button.

Fuses
Two 2 amp fast-acting fuses protect the control board power supply and the 110 volt control circuit.

An 8 amp fast-acting fuse protects the DC controller in the electronic panel. In the electric panel, the DC controller is protected by a circuit breaker mounted in the faceplate.

All other motors are independently fused.

All replacement fuses must be identical to the ones supplied with the mill.

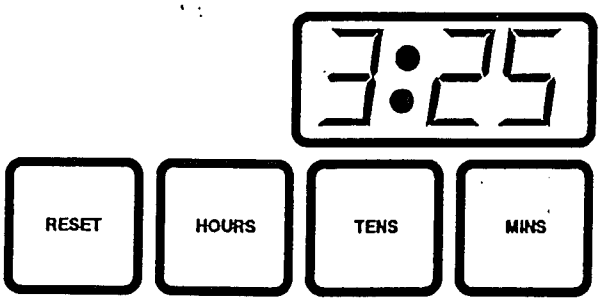
Control Features

IMPORTANT!
The faceplate touch pads are designed to respond to light fingertip pressure only. Pressing them with screwdrivers and other hard objects will damage them permanently and voids the warranty.

Electronic Timer

The timer display should remain illuminated while the power to the mill is on. The battery backup system is used to save the amount of grinding time left in the event of a power failure. If the power is to be left off and battery backup is not desired, the 9 volt battery under the control board should be disconnected.

The **HOURS, TENS** and **MINS** buttons are used to set the desired running time of the mill. These buttons are pressed until the desired digit appears.

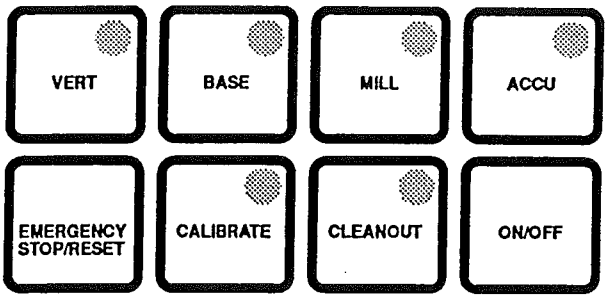


Note that the TENS button counts from 0 to 5 and remains on 5 until the internal counter goes from 6 to 9. The grinding time can be changed while the mill is running, providing the timer does not hit 0:00 while being changed.

The **RESET** button returns the timer to "0:00" and will cause the mill to sequence down.

Main Mill Controls

The four lights above the control buttons indicate which motor contactors are being powered by the control board.



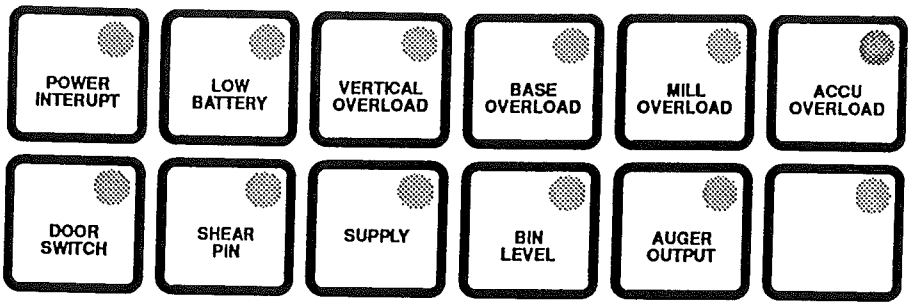
The **EMERGENCY STOP / RESET** button is used to clear any trouble indicator after-the problem has been corrected. The emergency stop causes an immediate shutdown of the entire mill during any mode of operation. After this feature is used, the grinding chamber must be cleaned out before restarting the mill.

The **CALIBRATE** button runs the proportioner only, and is used during the calibration process. The red light in the corner of the button indicates when this mode is on. The button is of a push-on push-off type.

The **CLEANOUT** button is also a push-on push-off type, and has an indicator of its own. This control runs the base and vertical auger motors and is used to extend the cleanout sequence. This mode will operate even after the bin level switch has been tripped.

The **ON/OFF** button is used to sequence the mill up or down. The timer must be set to a value other than "0:00" before the mill will start.

Trouble and Status Indicators



The **POWER INTERRUPT** light indicates that the power to the mill has been off. If the mill was running when the interruption occurred, the grinding chamber must be cleaned out before the mill is restarted.

The **LOW BATTERY** light will increase in intensity or flicker as the battery voltage drops off. The replacement battery should be a 9 volt alkaline battery. The battery should be removed if no battery backup is desired.

The **OVERLOAD** lights indicate that an overload relay has been tripped. When tripping occurs, the mill will immediately shut down the overloaded motor and the motors "before" it, and will sequence down the remaining motors. For example, a mill motor overload will shut down the mill and proportioner motors and sequence down the base and vertical motors. It will therefore be necessary in most cases to clean out the grinding chamber before restarting the mill. Although the overload relays are self-resetting, the overload light must be RESET before restarting the mill. After any overload, inspection of the motor is necessary to remove the obstruction or to correct any electrical or ventilation problem.

The **DOOR SWITCH** light indicates that the door to the grinding chamber has been opened. Opening the door while the mill is running will cause immediate shutdown. This important safety feature should never be bypassed.

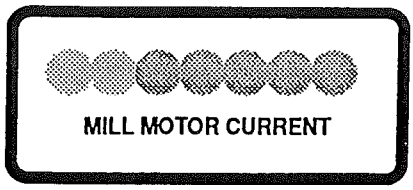
The **SHEAR PIN** light indicates that the electronic shear pin circuit has been tripped. Before resetting the indicator, the proportioner **must be inspected** to remove the obstruction from the proportioner augers and to make sure that the augers turn freely.

The **SUPPLY** light indicates that an ingredient has run out and that the trip rod has been tripped. The mill will sequence down, and the trip rod must be pulled back again before the supply light is reset.

The **BIN LEVEL** light indicates that the finished feed bin is full and causes the mill to sequence down. The calibrate and cleanout buttons are still operable before this indicator is reset.

The **AUGER OUTPUT** light is used with the appropriate switch to shut down the mill in case the vertical auger jams.
The blank indicator can be used in various situations to sequence down the mill. Its wiring appears on the wiring diagrams as **EXTRA SWITCH.**

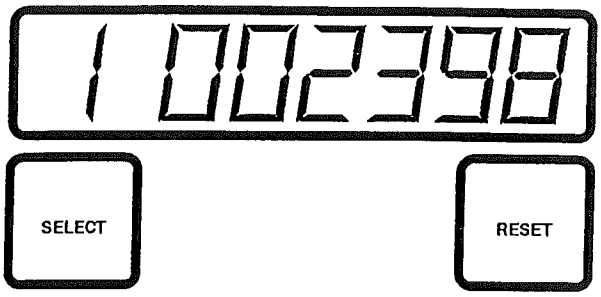
Electronic Ammeter



These seven lights indicate 80% to 110% of full load mill motor current in steps of 5%. The first five lights (80% to 100%) are green and represent the normal operating range of the mill. The 105% and 110% lights are red and indicate mill motor overloading. The operator should adjust the DC motor speed control to prevent the red lights from flashing on.

The speed control knob as seen from the outer panel side of the control box is an adjustable, electronic AC to DC converter. This device profides a variable DC voltage to the proportioner direct drive motor. The knob is adjustable from 0 to 10 and controls the speed of the mix augers. As a higher number is selected the speed increases and the ingredients are augered into the grinding chamber at a faster rate. **Do not** advance the control too fast when approaching the higher number settings. Due to the reaction time of the proportioner, speed increase, and the time required for the increased amount of ingredients to get into the grinding chamber, an overload condition of the mill motor could develop.

Optional Counter



The counter system derives its power and battery back-up from the control board. Therefore, both the count and grinding time are saved during a power failure.

This system counts all five augers simultaneously, but only displays one at a time. The **SELECT** button is used to select which auger's count is to be displayed. The auger number is indicated by the single left-hand digit. The augers are numbered 1 to 5 from left to right, facing the mill.

The **RESET** button resets all counts to zero.

Augers 1-4 count every 1/2 revolution while number 5 counts every 1/6th revolution.

NOTE Because of different internal speeds in the proportioner and different counts per revolution when two dials are set at the same number you will not always get the same number of counts on the display.

External Wiring

Safety Precautions

- Always disconnect the main power source before working on equipment.
- Always install proper guards and shields where required.
- Always have installations or major repairs done by qualified electricians or service personnel.
- Always ground mills and material handling equipment according to local electrical code.
- Keep all electrical panel boxes, switch boxes and motor terminal boxes closed.

Cautionary Notes

The electronic control and counter board are sensitive to static electricity. While handling the boards or the panel's control wiring:

- All power to the mill must be disconnected.
- Wear an anti-static wrist strap connected to the mill panel's ground bar strip.

If the removal of a circuit board becomes necessary:

- Handle all electronic boards by their edges only.
- Any electronic board must be kept in the anti-static envelope and shipping box provided until it is installed.

Mill Motor and Power Terminal Strip

These heavy duty terminals are used to wire the mill motor and to accept the main power lines.

Power Terminal Strip

These heavy duty terminals are used to accept the main power lines.

The interconnect wires for all motors with the exception of the proportioner motor are connected directly to the corresponding contactor for that motor. The proportioner motor connects to the right two terminals on the terminal strip in the bottom left of the panel.

When wiring up the vertical motor, be sure that the motor's full load amperage is within the range of the overload relay inside the panel. Since a motor mounted overload is not required, it should be disconnected from the motor. Leaving it in could interfere with the intended shut-down of the mill during an overload condition.

Ground Bar

This terminal receives a ground wire from the feed room's breaker box and is used to ground the control panel box, and all motor housings.

Control Wiring

The terminal strip (first six terminals) are used in the wiring of mill shut-off switches. Any unused shut-off feature should be bypassed by a jumper wire, since mill shut-off will occur when any of these circuits are open. While the door switch circuit carries 110V AC, the remaining shut-off circuits carry 12V DC. To avoid permanent damage to the electronic control board, the main power must be disconnected before changing any connections on this terminal strip.

The terminals labelled **AUX** on this terminal block are connected across a set of normally open auxiliary contacts from the vertical motor contactor. These are used to control other equipment such as an air conveyor.

The terminals labelled **PROP** supply power for the 90V DC proportioner motor.

Electrical Troubleshooting

Symptom	Probable Cause	Corrective Action
Motor will not start	Bad connection in display strap	See "Partial clock/counter display".
	Failed contactor	Check for contactors not engaging during cycle-up. Test and replace if necessary.
	Blown motor fuse	Check and replace fuses. Inspect motor for cause of overload.
	Loose connection	Tighten all motor wiring.
	Failed motor	Test and replace if necessary.
Frequent motor overload	Mechanical obstruction	Remove obstruction. Check bearings.
	Loose connection	Tighten all motor wiring.
	Failed contactor	Test and replace if necessary.
	Low overload	Check overload adjustment against motor's full load amperage.
Frequent SHEAR PIN tripping	Feed restriction	Check back of accuportioner for build-up of feed or foreign material.
	Internal accuportioner failure	Service accuportioner for seized or broken component.

Symptom	Probable Cause	Corrective Action
No clock/counter display	No power to mill	Turn all breakers on.
	No power to control board	Check and replace 2 amp fuses. Look for possible shorts in 110/120 volt control circuits.
Partial clock/counter display	Bad connection in display strap	Wiggle connectors gently. Display will flicker and become complete.
No response to ON/OFF, CALIBRATE or CLEANOUT	Trouble light on	Correct the cause of trouble. Reset light, try again.
	Timer reads "0:00"	Set timer to grinding time.
	Damaged faceplate	Inspect touch pads for scratches and dimples. Replace if necessary.
No response to clock/counter buttons	See "Partial clock/counter display" above.	
	See"Damaged faceplate" above.	
Overload light will not reset	Overload has not reset itself	Wait 2 minutes, try again.
	Failed overload	Test overload contacts. Replace if necessary.
Shutoff indicator light will not reset	Switch is still tripped	Reset switch, reset light.
	Faulty wiring	Check for open switch circuit.

Note: All connections should be checked one month after installation, six months after installation and once a year thereafter.

Calibration Instructions

A

Facing the accuportioner dials, write down the names of the ingredients in Compartments 1 through 5 on the worksheet (next page).

B

Write down the desired amount per tonne/ton of each ingredient to come from each compartment. If an ingredient is in more than one compartment, divide the total amount desired evenly between the compartments.

C

Write down the % protein of each ingredient in the appropriate space. See Appendix A or test figures from your supplier.

D

Write down the dial settings for the present formula or turn all the dials to 20 and write "20" in each space provided.

E

a) Hang an empty canister (one that you will fill with premix or concentrate) on the calibration scale and set the scale's adjustable needle to "0".
b) Attach the calibration chute to the mill and set all the canisters under it.
c) Start the proportioner using the CALIBRATE button. When one of the canisters is filled without spilling, stop the proportioner by pushing the mill's trip rod.

F

Weigh each canister on the scale and write down each net weight in the space provided. Add up all of the canister weights and write this figure in the total weight box at the right hand side of this line.

G

Divide each of the weights in step F by the total sample weight and write this "decimal number" under the associated test weight. The numbers to the right of the decimal point are the kilograms or lbs. of each ingredient per tonne/ton (example: 0.375 = 375 kg/tonne or lb./ton). If you wish to have your weights in pounds per imperial ton, simply multiply these numbers by 2.

H

For each compartment, multiply the protein figures of step C by the "decimal number" of step G. This gives the % protein contributed to the ration by each compartment. Add these figures up and write the total in the total protein box at the right hand side of this line.

I

To obtain primary dial settings for you desired ration, multiply step B by step D, then divide by step G and finally divide by 1000. Do this calculation for each compartment and write these new settings in the spaces provided. If the settings are too high (if some are higher than 25) or too low for good accuracy, use the dial multiplier steps J and K. If the settings seem reasonable, go to the step F below and then with steps G and H if necessary.

J

Divide the number "23" by the highest dial setting step I. Write this number in the box provided at the right.

K

Multiply the dial multiplier number by each setting in step I and enter these calculated settings in the spaces provided. Remember to round off these figures to the nearest whole number. Use these settings to go through steps F, G and H once more. After that, slightly readjust you dials to "fine tune" the ration if necessary.

NOTE It is a good idea to check your rations periodically. Go through steps F, G and H and calculate your rations on a regular basis.

Calibration Worksheet

Date: _____ Name of ration: _____ Desired Protein: _____ %

	Compartment Number	1	2	3	4	5	
A	Ingredient name						
B	Desired amount per ton						Total = 1000 kg or 2000 lb.
C	% Protein of each ingredient						
D	Dial settings						Load dial settings
E	Run proportioner						
F	Weight of each ingredient (Kg or lbs.)						Total weight
G	Fraction of a ton(ne) (each ingredient weight / total weight)	.___	.___	.___	.___	.___	Total = 1 ton(ne)
H	Protein contribution (step C x step G)						Total protein = ___.__ %
I	Primary dial settings (B x D / G / 1000)	___.__	___.__	___.__	___.__	___.__	
	If primary dial settings are too high (greater than 25) or too low for accuracy, use the dial multiplier below to obtain more suitable settings.						
J	Dial multiplier	23 / [ ] (highest setting from step I) = [ ]					
K	Calculated dial settings (step I x dial multiplier)						
	Run proportioner						
F	Weight of each ingredient (Kg or lbs.)						Total weight
G	Fraction of a ton(ne) (each ingredient weight / total weight)	.___	.___	.___	.___	.___	Total = 1 ton(ne)
H	Protein contribution (step C x step G)						Total protein =
	If the weights per ton(ne) are not close enough to the desired amounts in step B, readjust the appropriate dials.						

Recalibration check date:

F	Weight of each ingredient (Kg or lbs.)						Total weight
G	Fraction of a ton(ne) (each ingredient weight / total weight)	.___	.___	.___	.___	.___	Total = 1 ton(ne)
H	Protein contribution (step C x step G)						Total protein =

Recalibration check date:

F	Weight of each ingredient (Kg or lbs.)						Total weight
G	Fraction of a ton(ne) (each ingredient weight / total weight)	.___	.___	.___	.___	.___	Total = 1 ton(ne)
H	Protein contribution (step C x step G)						Total protein =

Magic Window (for Sentry 5000)

How to use your Magic Window

1. Have your ingredients analysed for protein, moisture, calcium and phosphorus content on an "as fed" basis. Enter the results into Magic Window's permanent memory. Book values or average values can be used, but an actual analysis will provide the highest accuracy.

2. Calibrate your mill the easy way. Let Magic Window guide you through a calibration in 3 simple steps. You won't even need a pencil; Magic Window does all the calculations for you. The entire calibration takes only a few minutes, so we recommend that you calibrate your mill every week.

3. Enter feed formulas into the Magic Window. Tell Magic Window how many Kg/Tonne or Lbs/Ton you want from each compartment and Magic Window automatically tells you where to set the proportioner dials. It's that simple.

At any time, you can:

Check the protein, moisture, calcium and phosphorus content of the ration you are preparing.

Check the number of Kg/Tonne or Lbs/Ton of each ingredient going into the ration at any moment.

Check the number of tonnes or tons each ingredient used since the last time the inventory was "reset".

Features

1. The start screen

MAGIC WINDOW (C) 1991

appears when you first power up the mill panel. From this screen, you may select any one of Magic Window's functions by pressing the appropriate key.

If at any time you get confused, make a mistake or simply want to get out of a function, press the START OVER key. This will send you back to the start screen without interfering with Magic Window's operation. You may then start over what you were doing or select another function.

2. To enter a number into the Magic Window:
   a) Use the 0 to 9 and Decimal keys to make the number appear on the screen.
   b) When the correct number appears on the screen, press the ENTER key.
   c) If you made a mistake while keying in the number, press the CORRECT LAST ENTRY key before pressing the ENTER key. The

CORRECTION =

   screen will appear. Re-enter the correct number onto this screen and press ENTER.

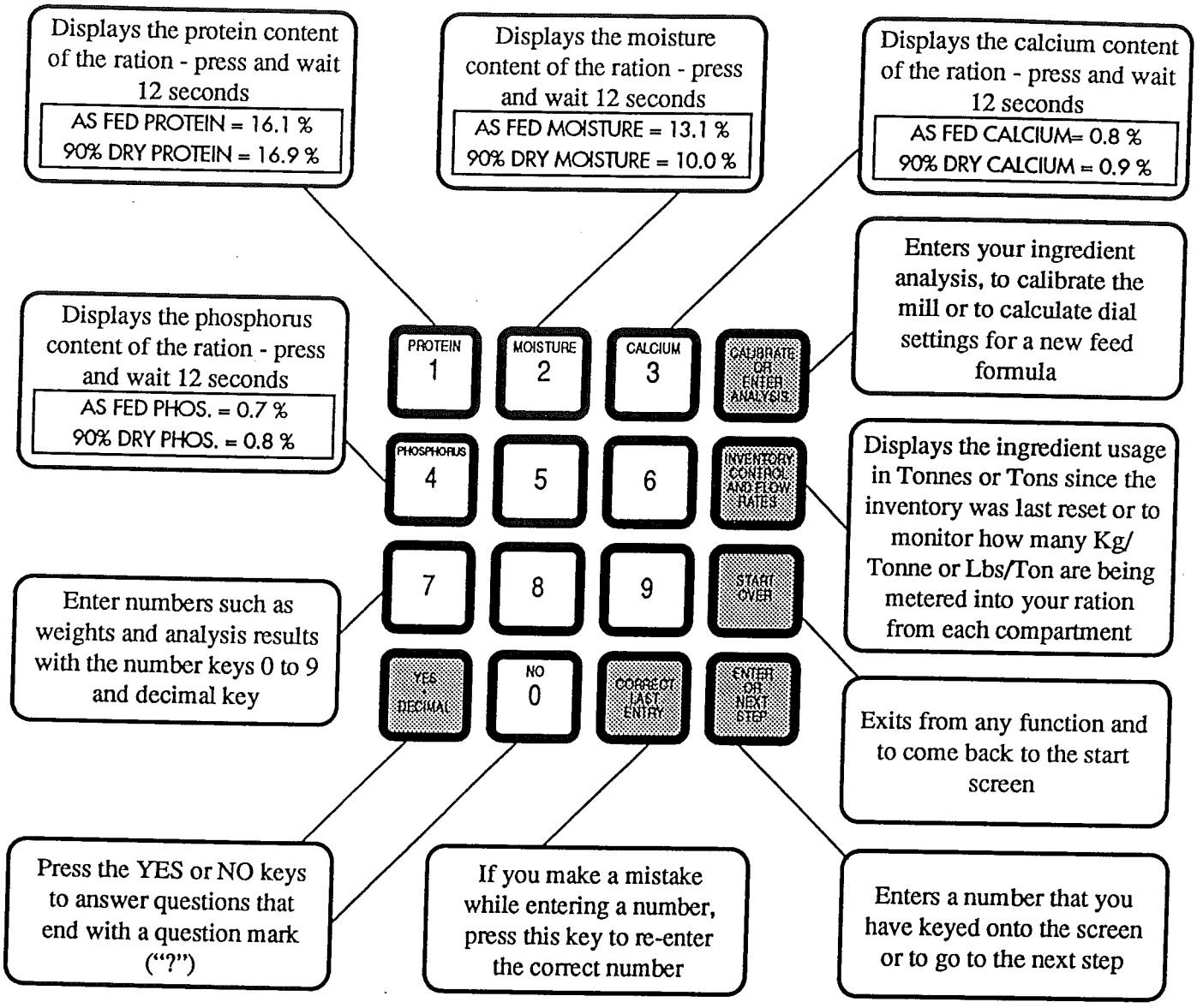
3. The Magic Window ends any statement or question with one of these three symbols:

   ? a question mark means "answer YES or NO"

   = an equal sign means "enter a number"

   --> an arrow means "go to the NEXT STEP"

Keypad functions



Ingredient analysis

You purchased your Magic Window because you were concerned with the accuracy of your ration. You also know that farm grown grains and corn vary from province to province, county to county and even from farm to farm.

For the best accuracy, we recommend sending your ingredients away for analysis. Always remember to use proper sampling methods for all ingredients and to keep half of each sample for future reference. Ask the lab to report the values on an "as fed" basis since this is the basis on which the Magic Window operates.

If you do not wish to send your premix or supplement away for analysis, feel free to use the "tag" values provided by the manufacturer. If you wish to get started before your results are back, a listing of some common feed stuffs and their "book" or average values are provided in Appendix A.

Magic Window functions

In the following pages, each Magic Window function is illustrated by a "flowchart" with explanations on the right side of the page. The fastest way to familiarize yourself with the Magic Window is to physically perform all of the functions on your mill, using these flowcharts as guides. There are just two things to remember about the flowcharts:

1. Follow each flowchart from top to bottom.

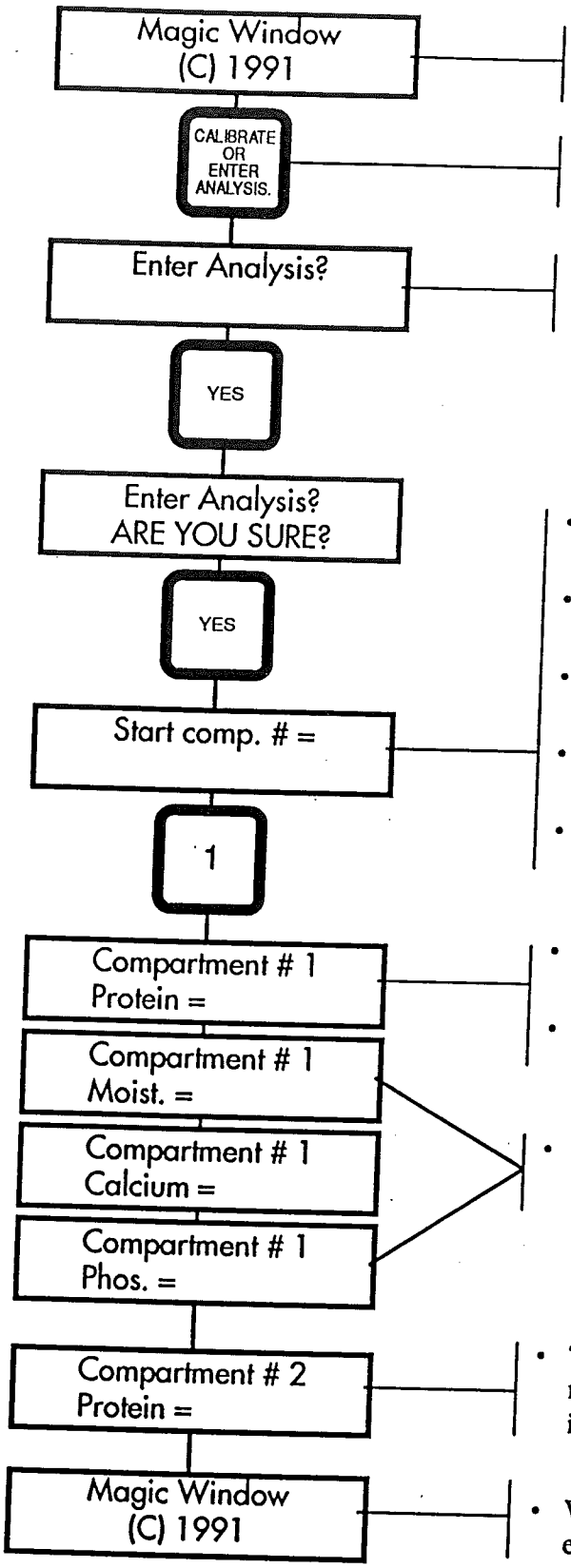
2. This shape 

represents a key.

This one 

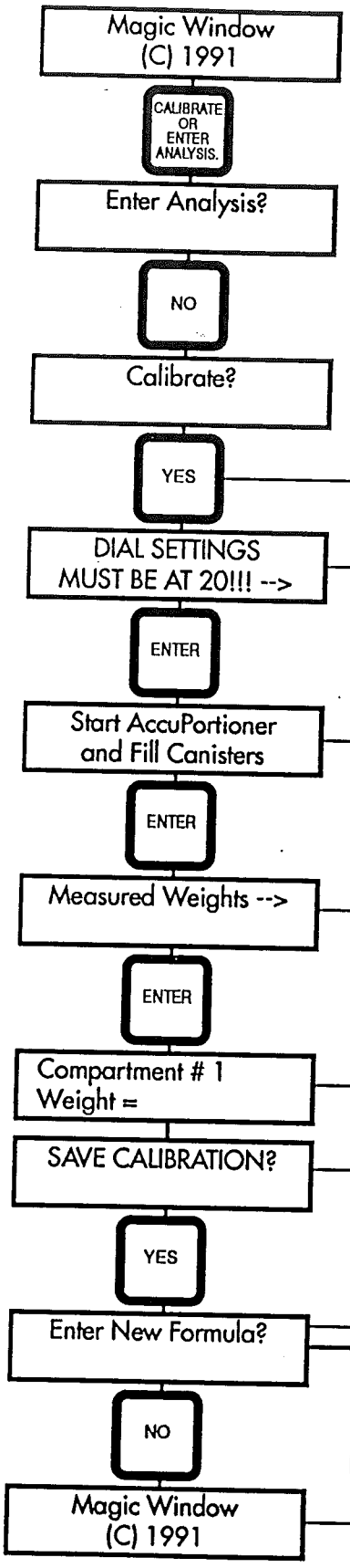
represents a screen message.

How to enter, change or check an analysis



- This is the start screen. It appears when you power up the mill panel.
- Press this key to start the ENTER ANALYSIS function.
- This screen will appear instantly. Answer the question by pressing the YES key.
- Enter the compartment number you would like to start with (1 to 5).
- To enter an analysis for the first time, start with compartment #1.
- To change some values to match a new analysis, select the compartment where you want to make the changes.
- You can review the analysis values without changing them by pressing the ENTER key.
- You can exit the ENTER ANALYSIS function at any time by pressing the START OVER key.
- Enter the protein on an "as fed" basis for the ingredient in compartment #1.
- When the correct number appears on the screen, press ENTER.
- Enter the moisture, calcium and phosphorus for the same ingredient, always on an "as fed" basis.
- The Magic Window will then ask you for the protein, moisture, calcium and phosphorus content of the ingredient in compartments #2, 3, 4, and 5.
- When the analysis for compartment #5 has been entered, you will be sent back to the start screen.

How to calibrate



Calibrate your mill regularly, once a week if possible.

Get ready!

1 Remove the mill's upper compartment back panel and attach the test chute.

2 Make sure that each proportioner auger trough is filled with ingredient so that it will start to flow down the chute as soon as you turn on the proportioner.

3 Hang the empty premix or supplement canister on the calibration scale and set the scale's "tare" needle to zero.

4 Place the 5 canisters under the test chute.

Note: If answered YES, you must do a complete calibration.

- Set all the proportioner's dials at 20.
- Press the ENTER key to continue.

- Start the proportioner by pressing the CALIBRATE button on the mill control panel.
- When one of the canisters is filled (without spilling over!), push the mill's trip rod to stop the proportioner.
- Press the ENTER key to continue.

- Get ready to weigh each canister and enter the weights.

- Enter the weight of the compartment #1 canister.
- Press ENTER to proceed to the next compartment.

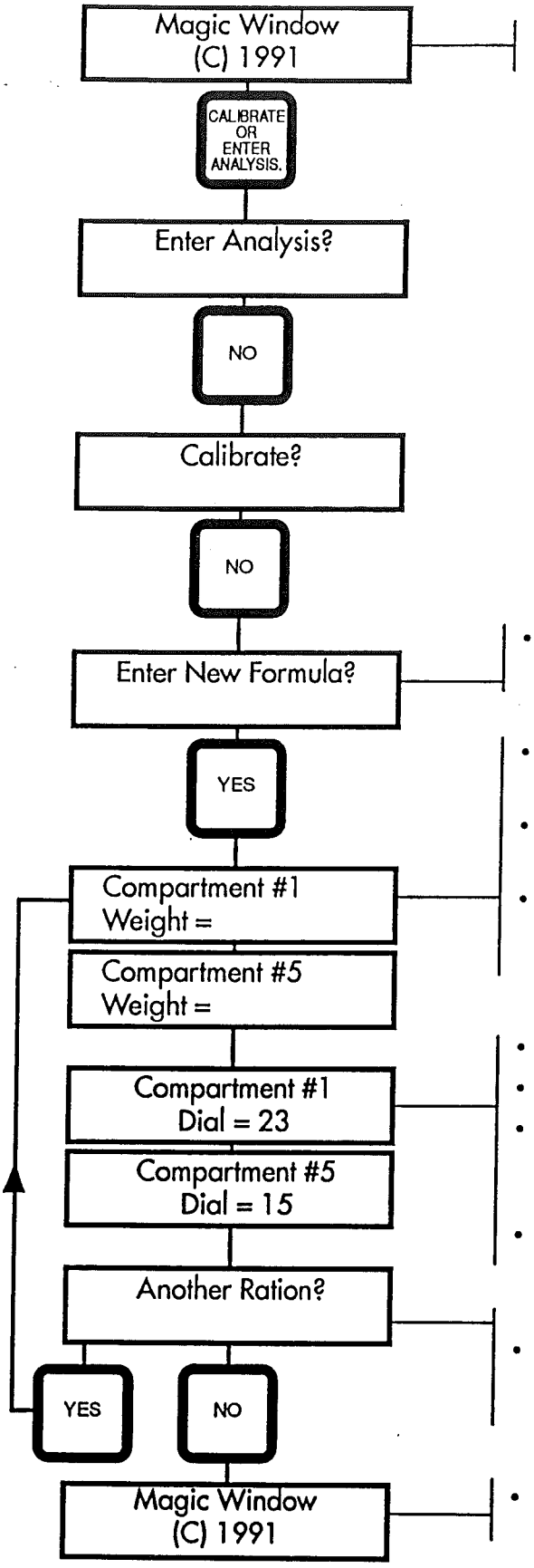
- You must press YES to enter new weights into the system

- When the weight for compartment #5 has been entered, the calibration is complete. Magic Window will ask you if you would like to calculate dial settings for a new ration.

- See next page, "How to calculate proportioner dial settings"

- You have left this function and have returned to the start screen.

How to calculate proportioner dial settings



- If you started from the start screen, do these steps to calculate dial settings for a formula.

- If you just finished the CALIBRATE routine, this is where you would start.

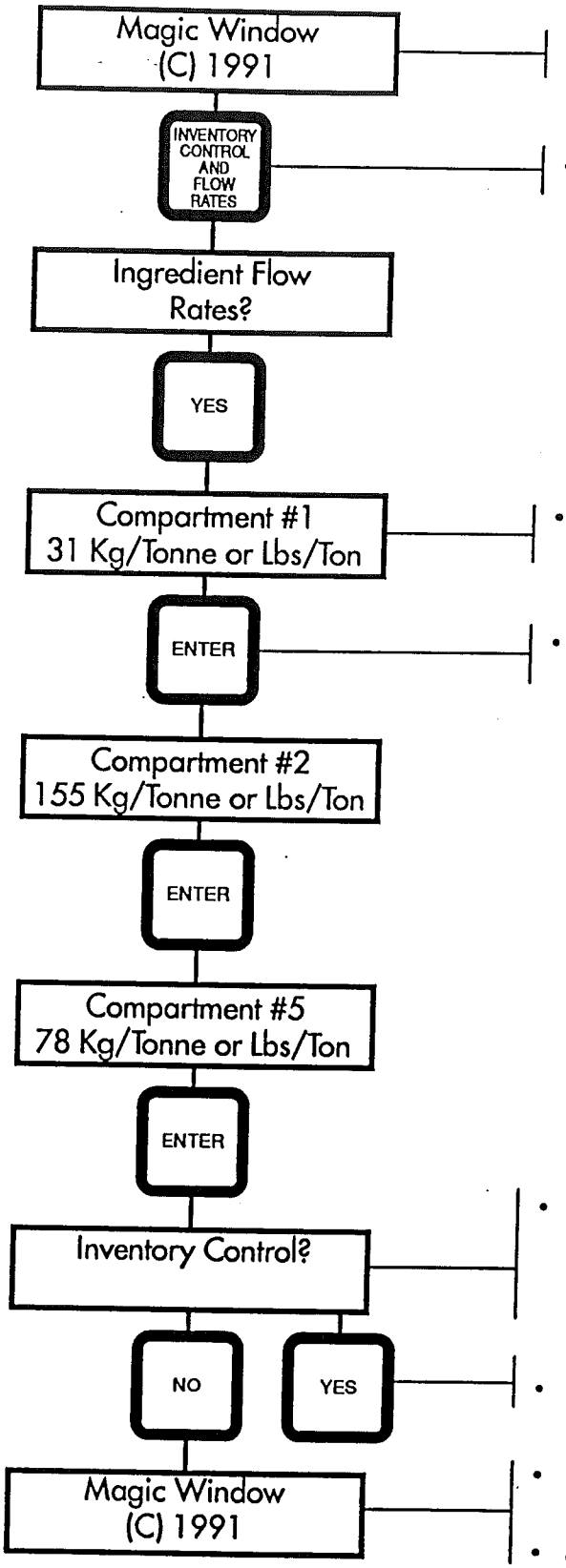
- Enter the weight per tonne or ton to come from each compartment.
- Enter "0" if none of the ingredient is required in the formula.
- When the weight from compartment #5 has been entered, the Magic Window will automatically calculate and display the required proportioner dial settings.

- Set each dial according to the screen.
- Press ENTER to display the next dial setting.
- Run the mill with these settings and have Magic Window check the flow rates and nutrient levels. "Fine tune" the dial settings if required.
- Write down your final dial settings on the FEED ROOM CHART (see page 28).

- When all the settings have been displayed, Magic Window will ask you if you would like to calculate dial settings for another formula.

- You have left this function and have returned to the start screen.

How to check ingredient flow rates

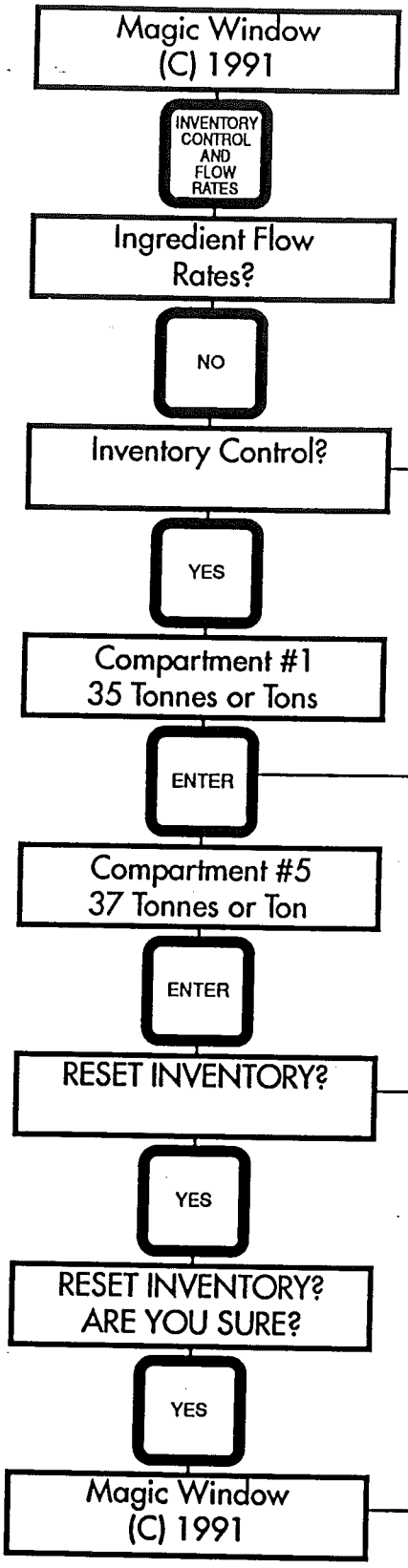


- This is the start screen.
- Press this key to select the FLOW RATES function.
- This function displays the flow rate for compartment #1 first.
- Press ENTER to check the flow rate of the next compartment.

NOTE Do not press start over at any point in this sequence as it will cause inventory to be incorrect.

- After the flow rate of compartment #5 has been displayed, Magic Window will ask you if you want to check your ingredient usage through the INVENTORY CONTROL function. Select YES or NO.
- See next page, "How to control your inventory".
- You have lift htis function and have returned to the start screen.
- Select another function if desired.

How to review inventory



Important!

Magic Window will keep up to 656 Tonnes or Tons in its memory for each ingredient. When an ingredient's usage goes over that amount, Magic Window starts counting from "0" again. If you forget to "reset" the inventory on a regular basis and you notice that your usage has jumped back to a very low number, simply add 656 Tonnes or Tons to that number to know your exact usage.

- If you just finished the FLOW RATES routine, this is where you would start.

- Press ENTER to check the inventory of the next compartment.

- After the inventory for compartment #5 has been displayed, press ENTER and Magic Window will ask you if you would like to reset all the inventory figures to "0".• If you do, remember to write down the current inventory figures on the INVENTORY CONTROL sheet before pressing the YES key.

- The inventory figures for all compartments are reset to "0" and you are returned to the start screen.
- The next inventory recording period has now started.

Feed Room Card

RATION NAME:						COMPARTMENT				
						1	2	3	4	5
DATE	PROT.	MOIST.	CALC.	PHOS.	INGREDIENT					
					DIAL SETTING					
					FLOW RATE					
					DIAL SETTING					
					FLOW RATE					
					DIAL SETTING					
					FLOW RATE					
					DIAL SETTING					
					FLOW RATE					

RATION NAME:						COMPARTMENT				
						1	2	3	4	5
DATE	PROT.	MOIST.	CALC.	PHOS.	INGREDIENT					
					DIAL SETTING					
					FLOW RATE					
					DIAL SETTING					
					FLOW RATE					
					DIAL SETTING					
					FLOW RATE					
					DIAL SETTING					
					FLOW RATE					

RATION NAME:						COMPARTMENT				
						1	2	3	4	5
DATE	PROT.	MOIST.	CALC.	PHOS.	INGREDIENT					
					DIAL SETTING					
					FLOW RATE					
					DIAL SETTING					
					FLOW RATE					
					DIAL SETTING					
					FLOW RATE					
					DIAL SETTING					
					FLOW RATE					

Inventory Control

INVENTORY PERIOD	COMPART. NUMBER	INGREDIENT NAME	NUMBER OF TON(NE)S	X	PRICE($) PER TON(NE)	=	COST($)
FROM	1			X		=	
	2			X		=	
TO	3			X		=	
	4			X		=	
	5			X		=	

TOTAL: ____________ TON(NE)S TOTAL: $ ____________

INVENTORY PERIOD	COMPART. NUMBER	INGREDIENT NAME	NUMBER OF TON(NE)S	X	PRICE($) PER TON(NE)	=	COST($)
FROM	1			X		=	
	2			X		=	
TO	3			X		=	
	4			X		=	
	5			X		=	

TOTAL: ____________ TON(NE)S TOTAL: $ ____________

INVENTORY PERIOD	COMPART. NUMBER	INGREDIENT NAME	NUMBER OF TON(NE)S	X	PRICE($) PER TON(NE)	=	COST($)
FROM	1			X		=	
	2			X		=	
TO	3			X		=	
	4			X		=	
	5			X		=	

TOTAL: ____________ TON(NE)S TOTAL: $ ____________

INVENTORY PERIOD	COMPART. NUMBER	INGREDIENT NAME	NUMBER OF TON(NE)S	X	PRICE($) PER TON(NE)	=	COST($)
FROM	1			X		=	
	2			X		=	
TO	3			X		=	
	4			X		=	
	5			X		=	

TOTAL: ____________ TON(NE)S TOTAL: $ ____________

Routine Maintenance

1. Change proportioner oil every 500 hours or 6 months use 10W mineral based oil.
2. Check hammers for wear weekly or every 15 hours of operation which ever occurs first.
3. When changing hammers check bolts for wear.
4. Check screen for wear weekly or every 15 hours of operation whichever occurs first.
5. Check door seals monthly.
6. Check all belts for alignment and tension weekly.
7. Inspect proportioner every 2,000 hours.
8. Check mill magnets for tramp iron daily.
9. All electrical connections should be checked one month after installation, six months after installation and once a year thereafter.
10. Check proportioner auger for build up weekly and clean as necessary, build up on augers can severely affect calibration.
11. Recalibrate at periodic intervals or any time a new ingredient is brought in.

Service Tips

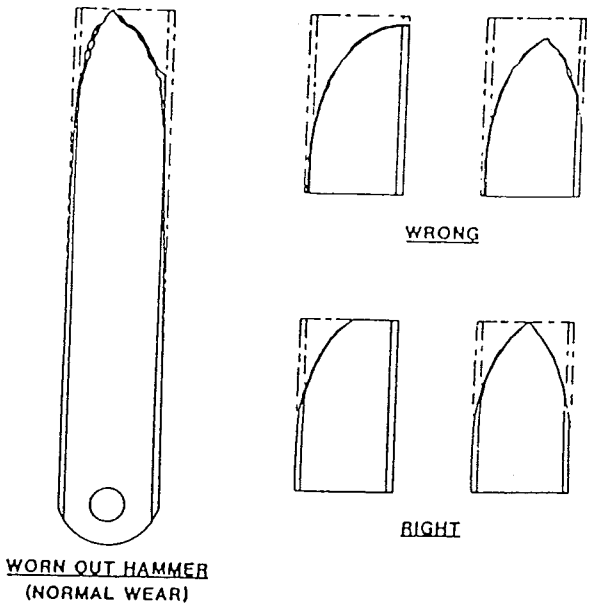
Screens and Wear Plates

The screen and wear plates have been designed so that you can get 18 different adjustments per side for extended screen life.

Hammers

The hammers, spacers and hammer bolts are replaceable items. The hammers can be reversed (using the reversing switch on single phase mills) to double there 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 imbalance. It is of great importance to inspect the hammers to see that they are wearing properly. Figure #6 illustrates normal wear of a worn out hammer. To get the maximum life out of you hammers you should reverse the direction of travel (with reversing switch on single phase mills) or rotate the hammer 180 degrees when it wears to the middle of the end tip. The other side can be wore 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.

Figure 6



By continually using a worn out hammer it could cause the following:

1. Poor quality of ground feed due to inconsistent particle size.
2. Loss in grinding capacity, therefore causing higher cost per ton to process feed.
3. Motor bearing failure due to vibration.
4. Screen and housing damage due to broken hammer.

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

When tightening nuts on the hammer bolts, they should be tight enough so that the hammers cannot swing freely but can still be moved with hand pressure.

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

The cost of hammer replacement is inexpensive when compared to the damage that can occur by using worn out hammers.

Servicing the Proportioner

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.

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.

To replace a shaft and 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.

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.

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.

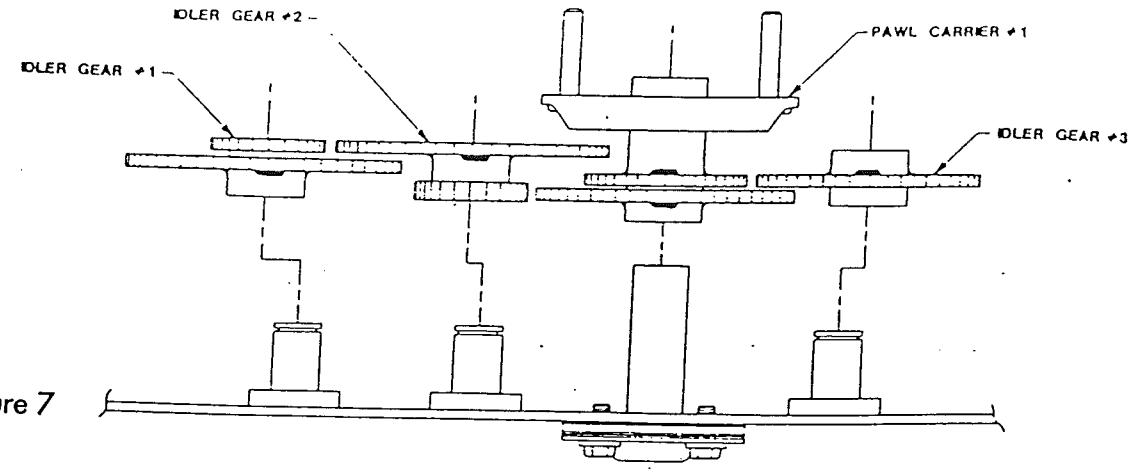


Figure 7

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.
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.

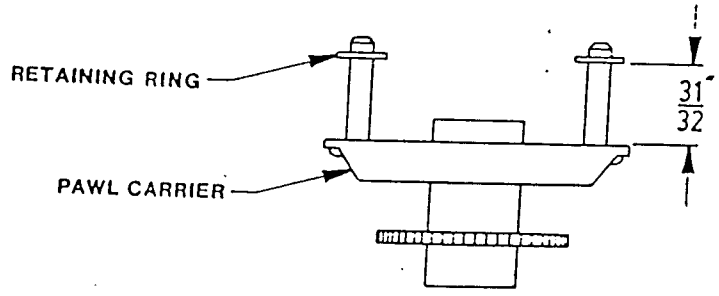
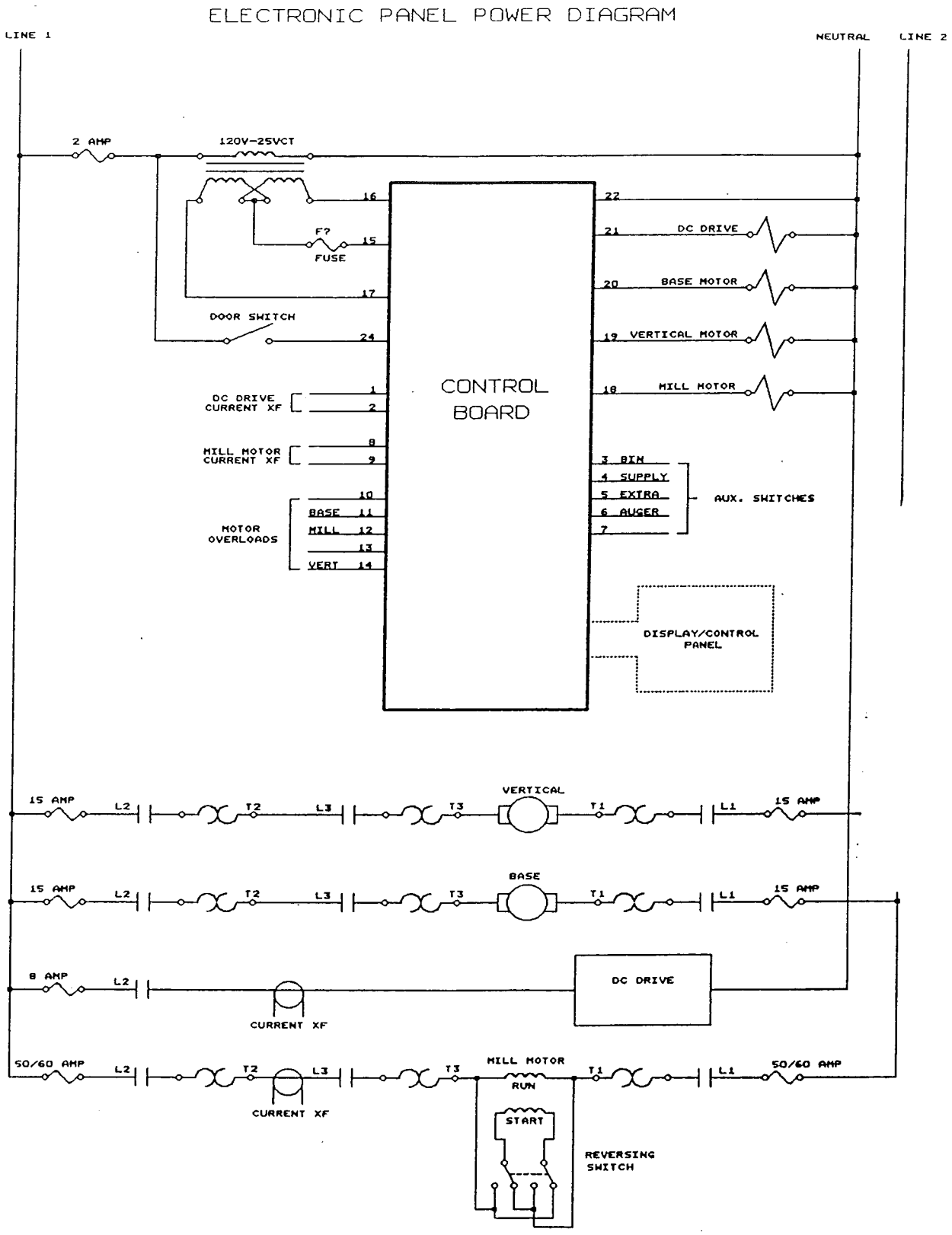


Figure 8

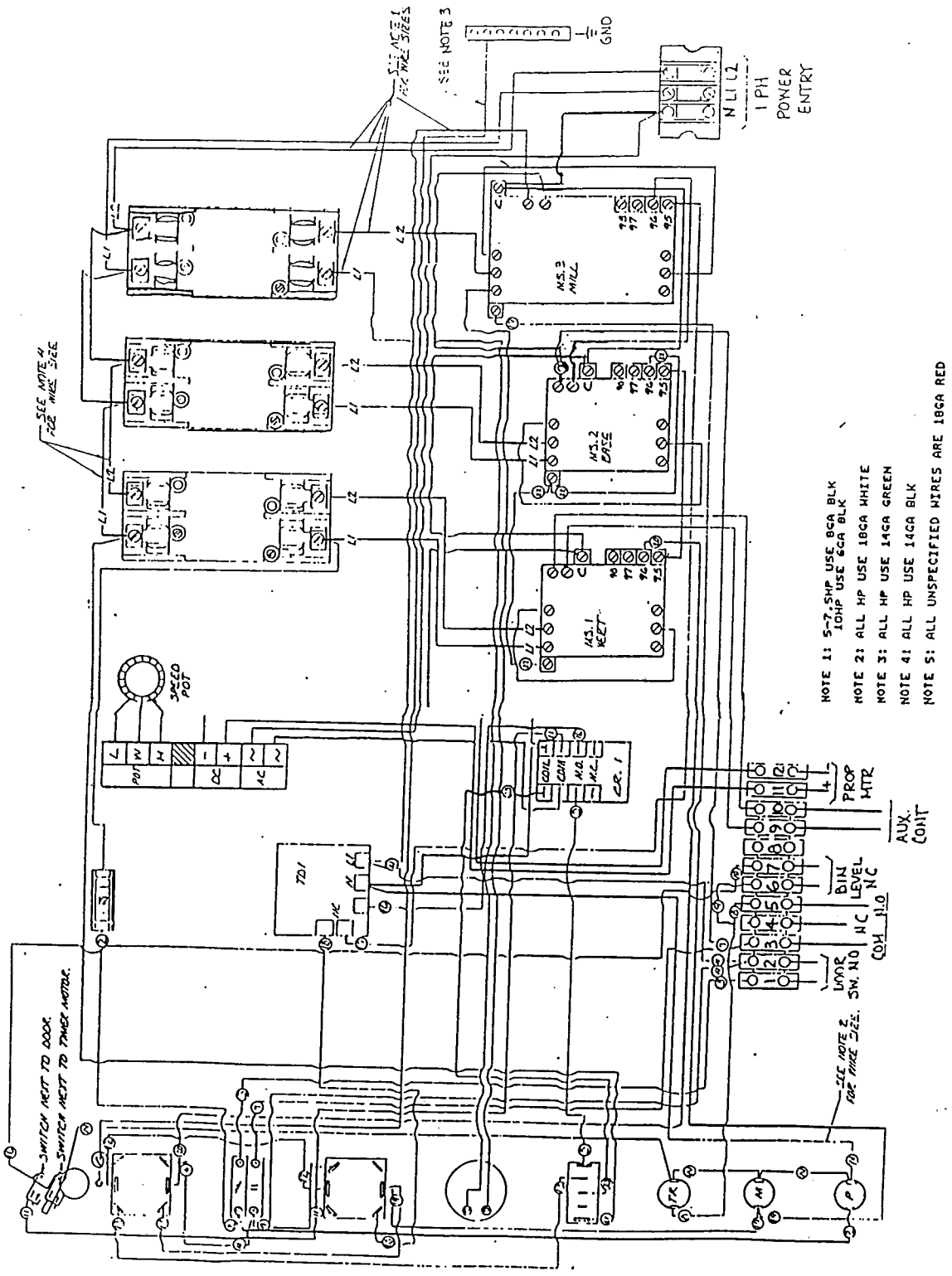
10. Replace cover assembly starting at the left side one at a time turn knob #1 until cam drops into place on the ratchet. Do this on all knobs until the cover is in place. Replace all 20 washer head screws and tighten.
    Note: DO NOT FORCE THE COVER DOWN it will drop in place with a little care.
11.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

Electrical Diagrams

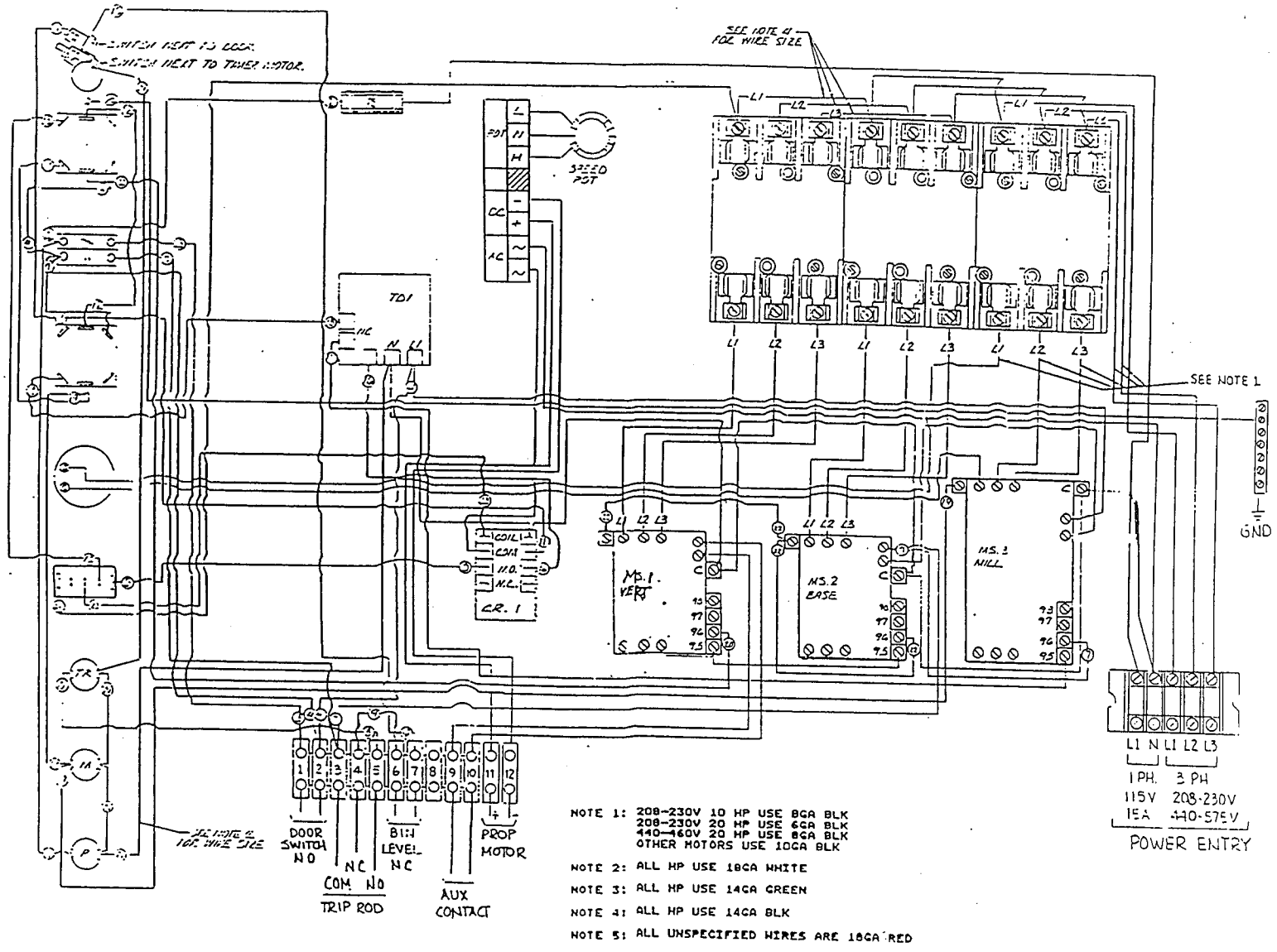
Circuit description



Panel wiring - Sentry 3000, 2000 - single phase



Panel wiring - Sentry 3000, 2000 - three phase



NOTE 1: 208-230V 10 HP USE 8GA BLK
208-230V 20 HP USE 6GA BLK
440-460V 20 HP USE 8GA BLK
OTHER MOTORS USE 10GA BLK

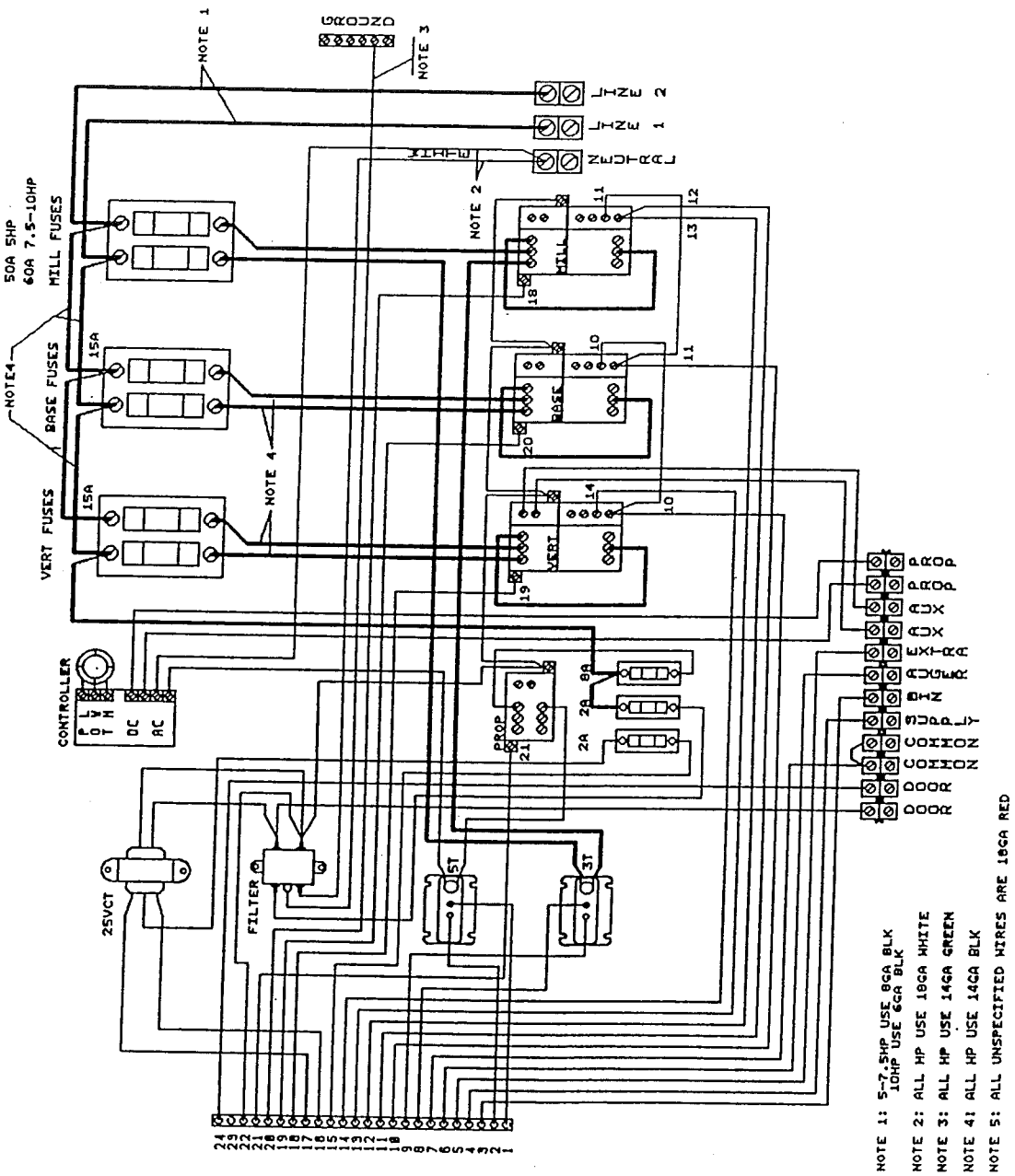
NOTE 2: ALL HP USE 18GA WHITE

NOTE 3: ALL HP USE 14GA GREEN

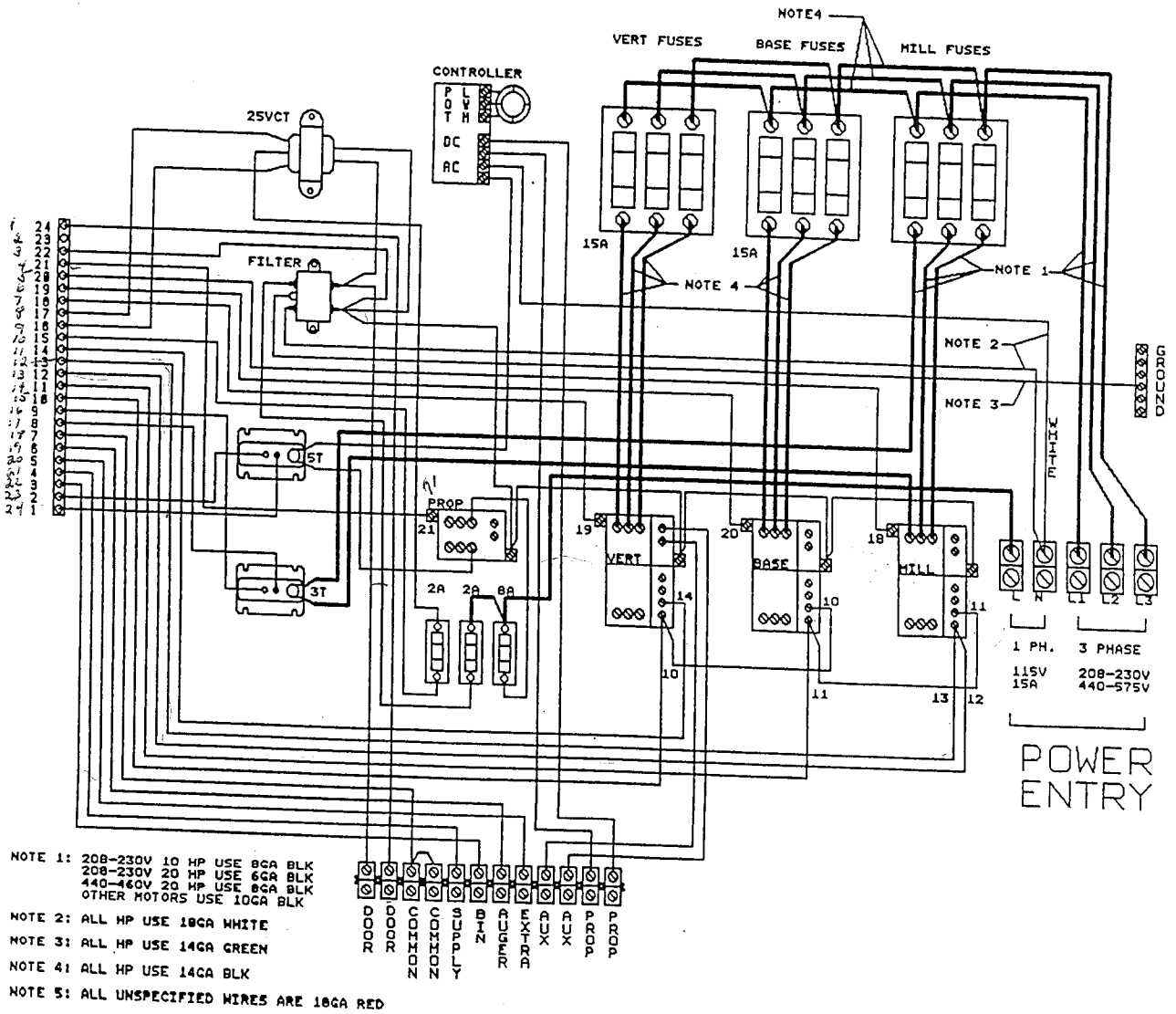
NOTE 4: ALL HP USE 14GA BLK

NOTE 5: ALL UNSPECIFIED WIRES ARE 18GA RED

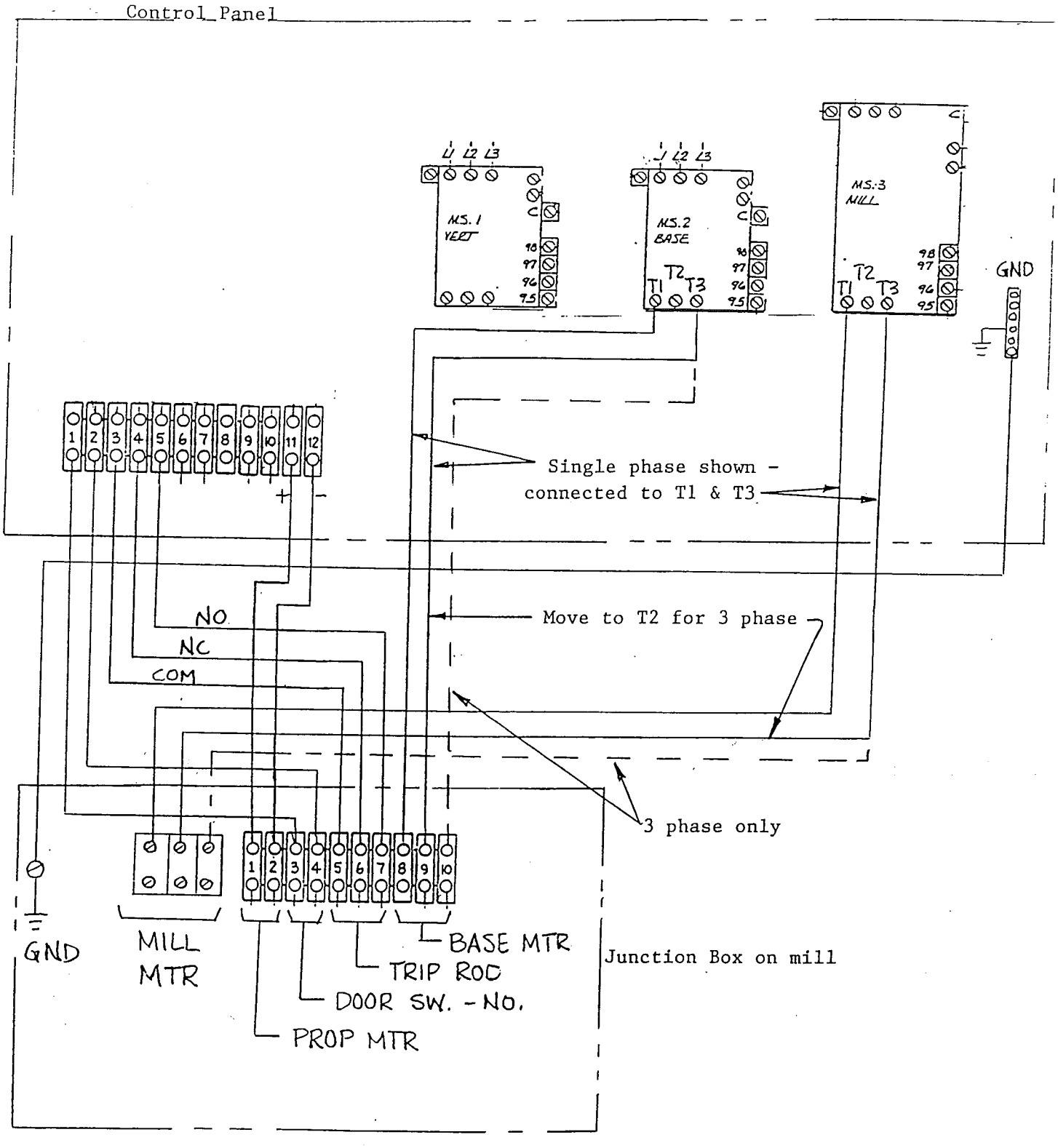
Panel wiring - Sentry 5000, 4000 - single phase



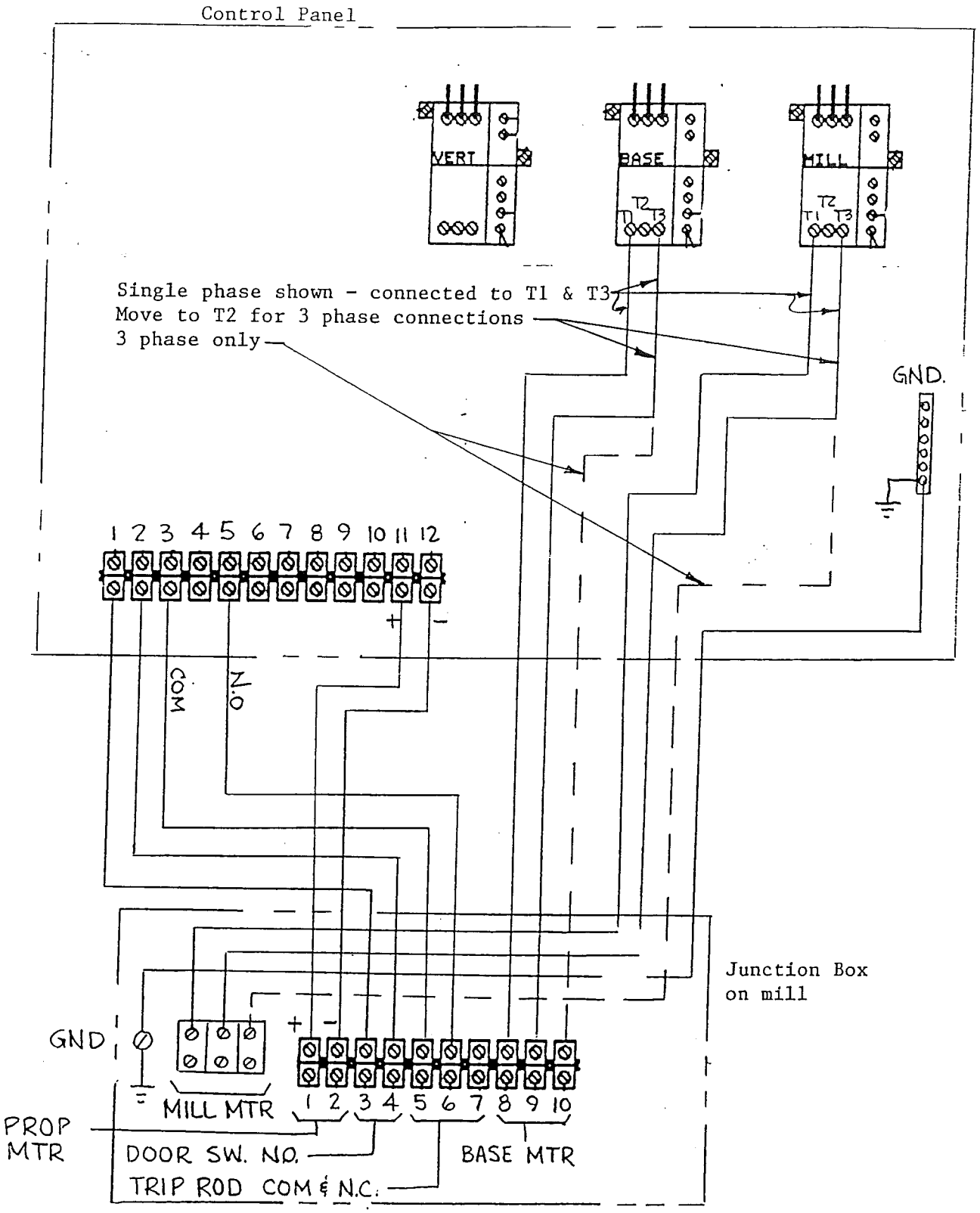
Panel wiring - Sentry 5000, 4000 - three phase



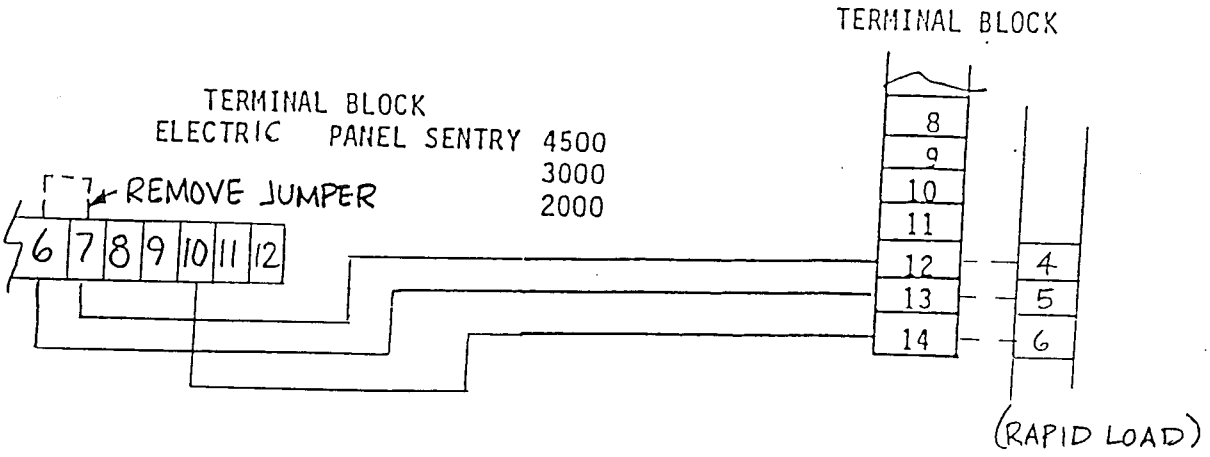
Interconnect wiring - Sentry 3000, 2000



Interconnect wiring - Sentry 5000, 4000



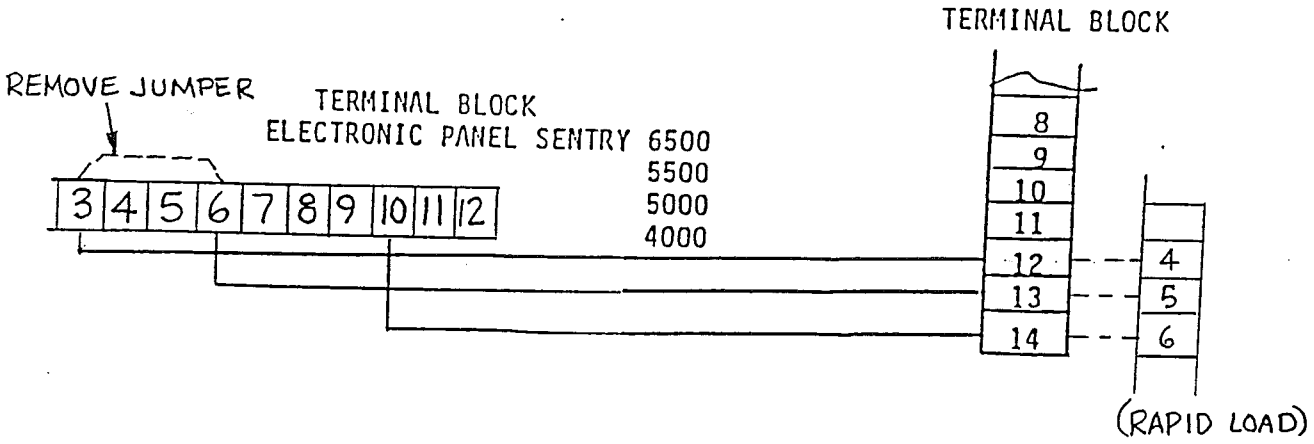
Pneumatic panel 2", 3 1/2", or rapid load to electric panel Sentry



Jumper must be installed between 15 amp fuses load side line 1 and terminal 9 in mill panel

NOTE: Be certain that L1 of mill and L1 of air conveyor are on the same line. Damage to panel components will result if voltage difference between L1 of mill and L1 of air conveyor is 230 volts.

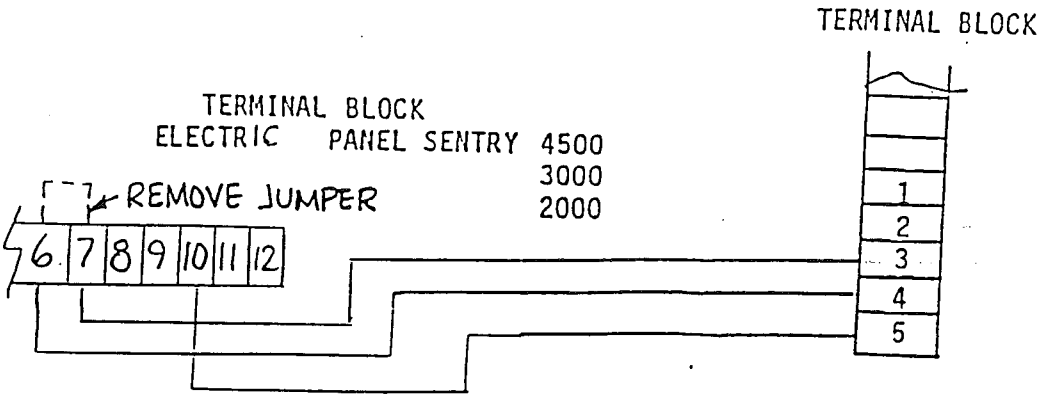
Pneumatic panel 2", 3 1/2", or rapid load to electronic panel Sentry



Jumper must be installed between 15 amp fuses load side line 1 and terminal 9 in mill panel

NOTE: Be certain that L1 of mill and L1 of air conveyor are on the same line. Damage to panel components will result if voltage difference between L1 of mill and L1 of air conveyor is 230 volts.

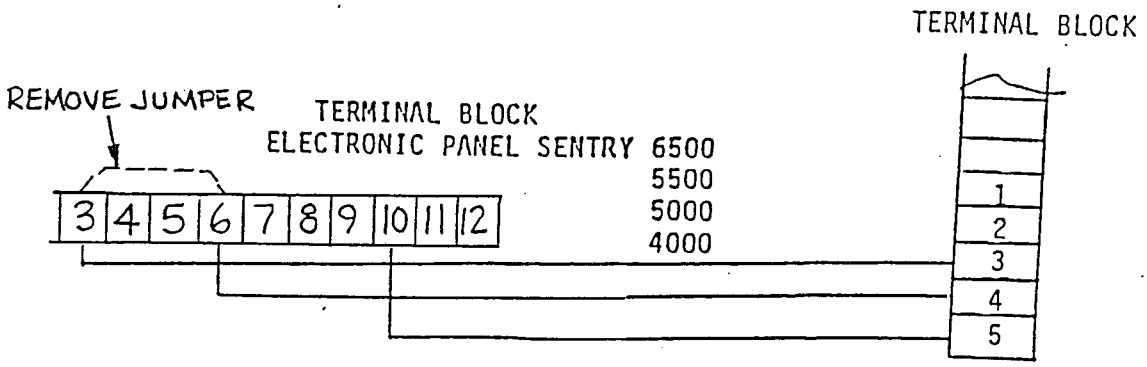
Cabinet style pneumatic panel 2" to electric panel Sentry



Jumper must be installed between 15 amp fuses load side line 1 and terminal 9 in mill panel

NOTE: Be certain that L1 of mill and L1 of air conveyor are on the same line. Damage to panel components will result if voltage difference between L1 of mill and L1 of air conveyor is 230 volts.

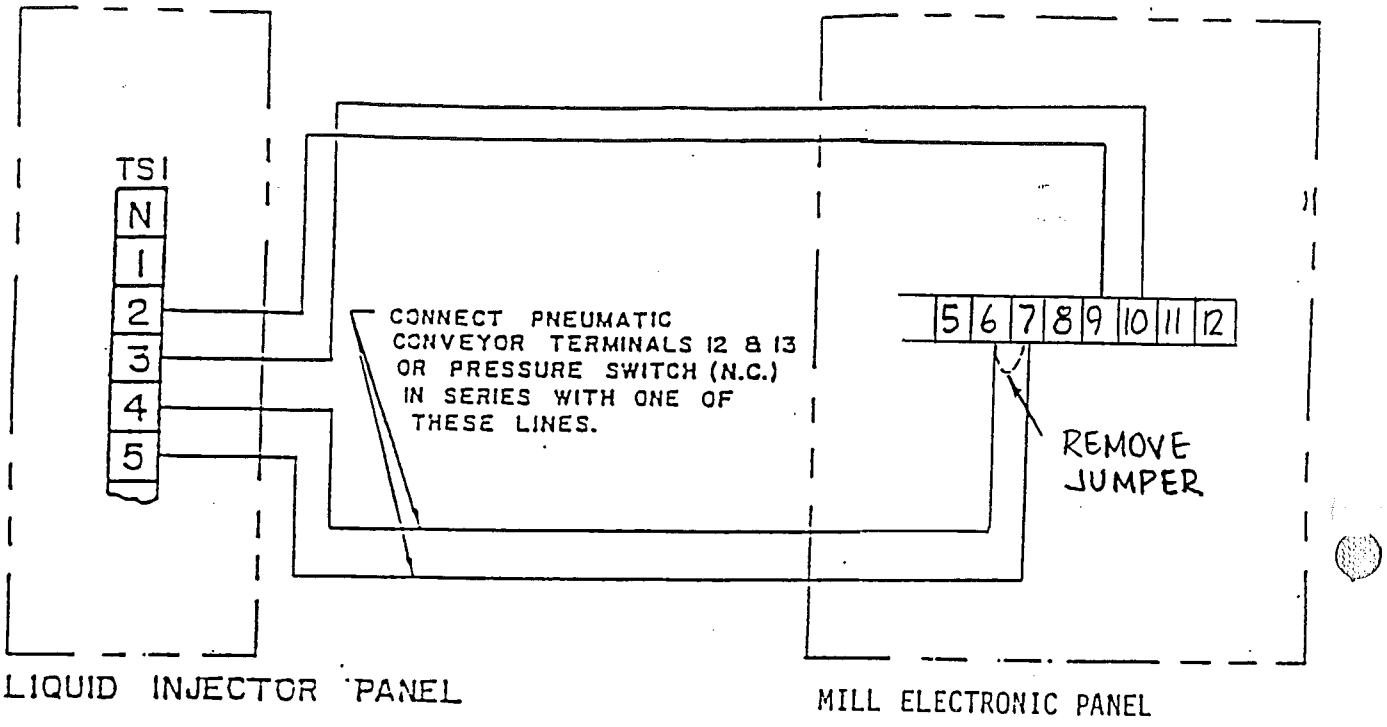
Cabinet style pneumatic panel 2" to electronic panel Sentry



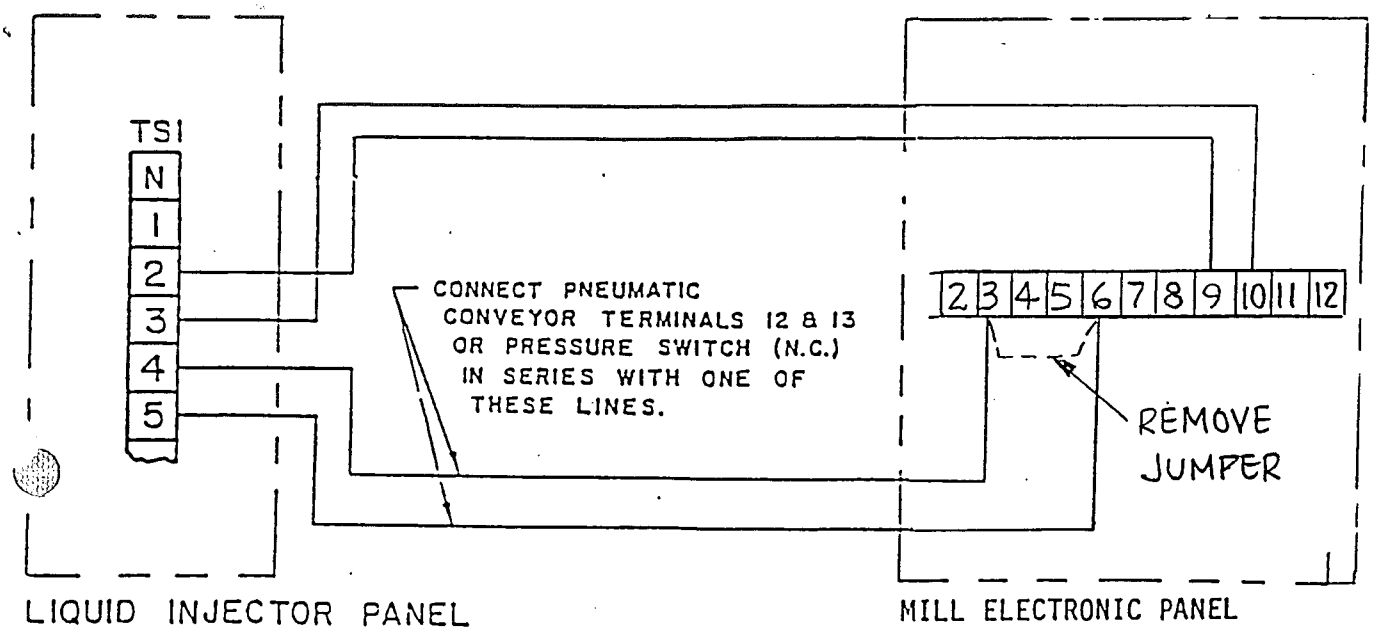
Jumper must be installed between 15 amp fuses load side line 1 and terminal 9 in mill panel

NOTE: Be certain that L1 of mill and L1 of air conveyor are on the same line. Damage to panel components will result if voltage difference between L1 of mill and L1 of air conveyor is 230 volts.

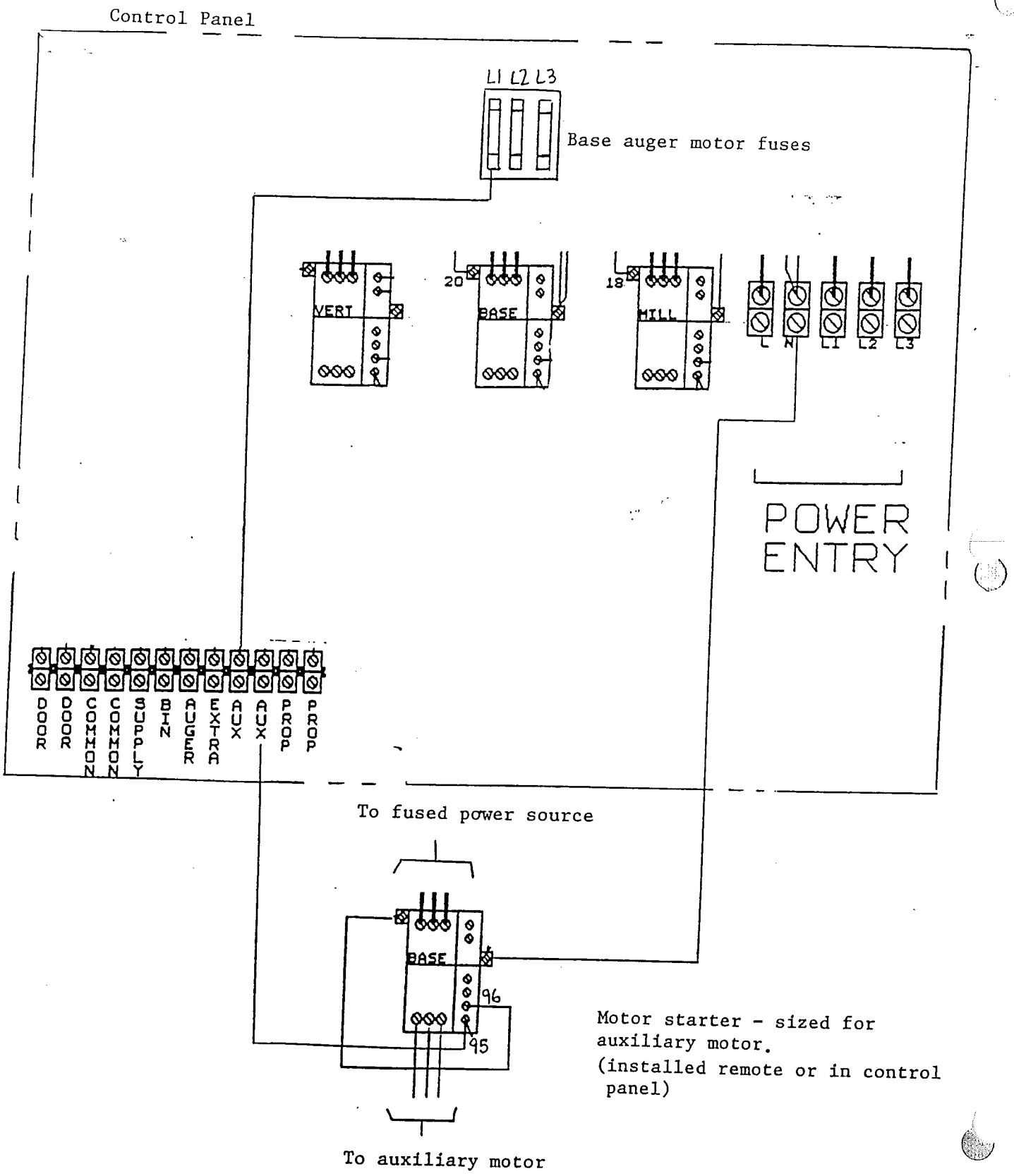
Injector to electric panel Sentry



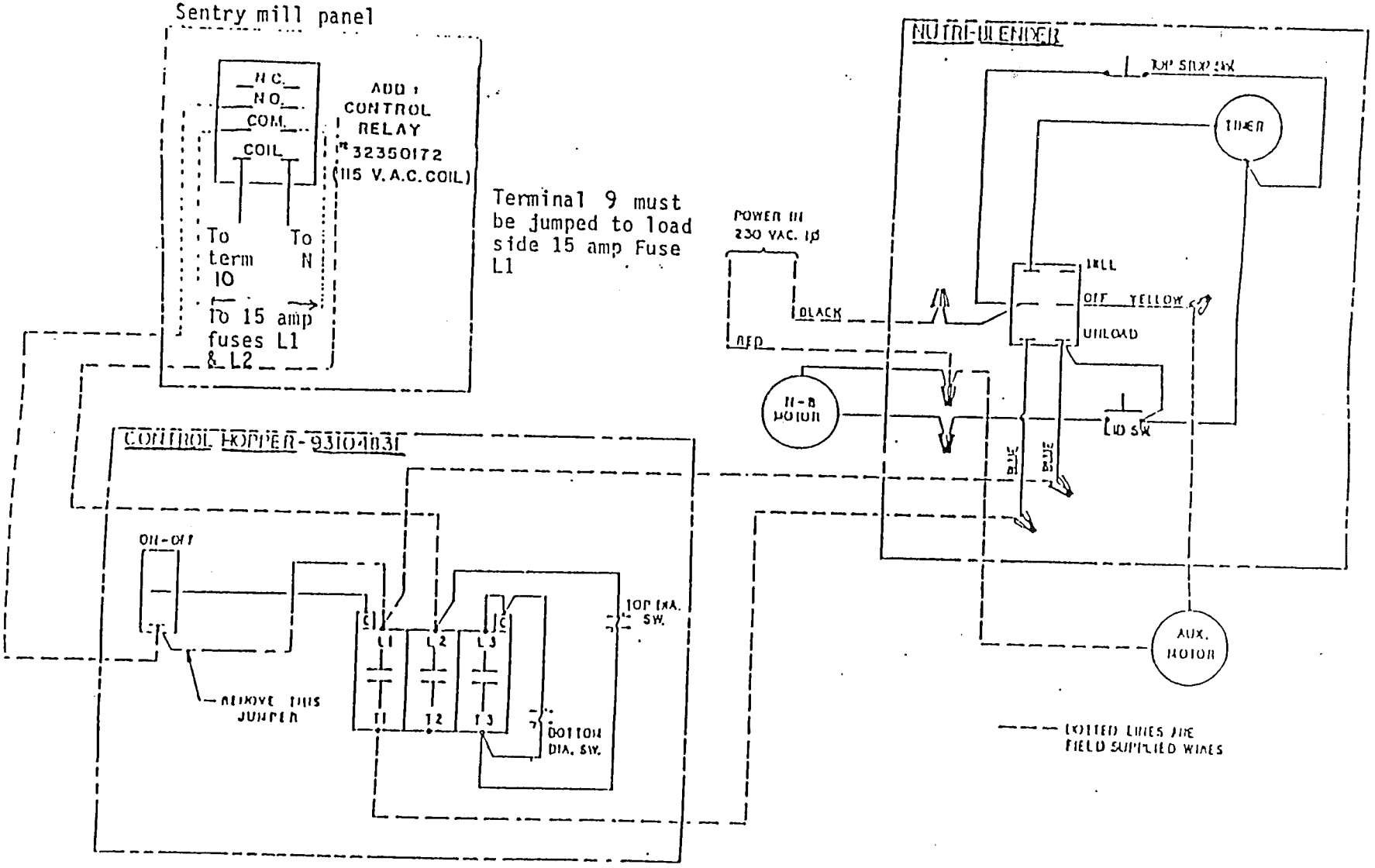
Injector to electronic Sentry panel



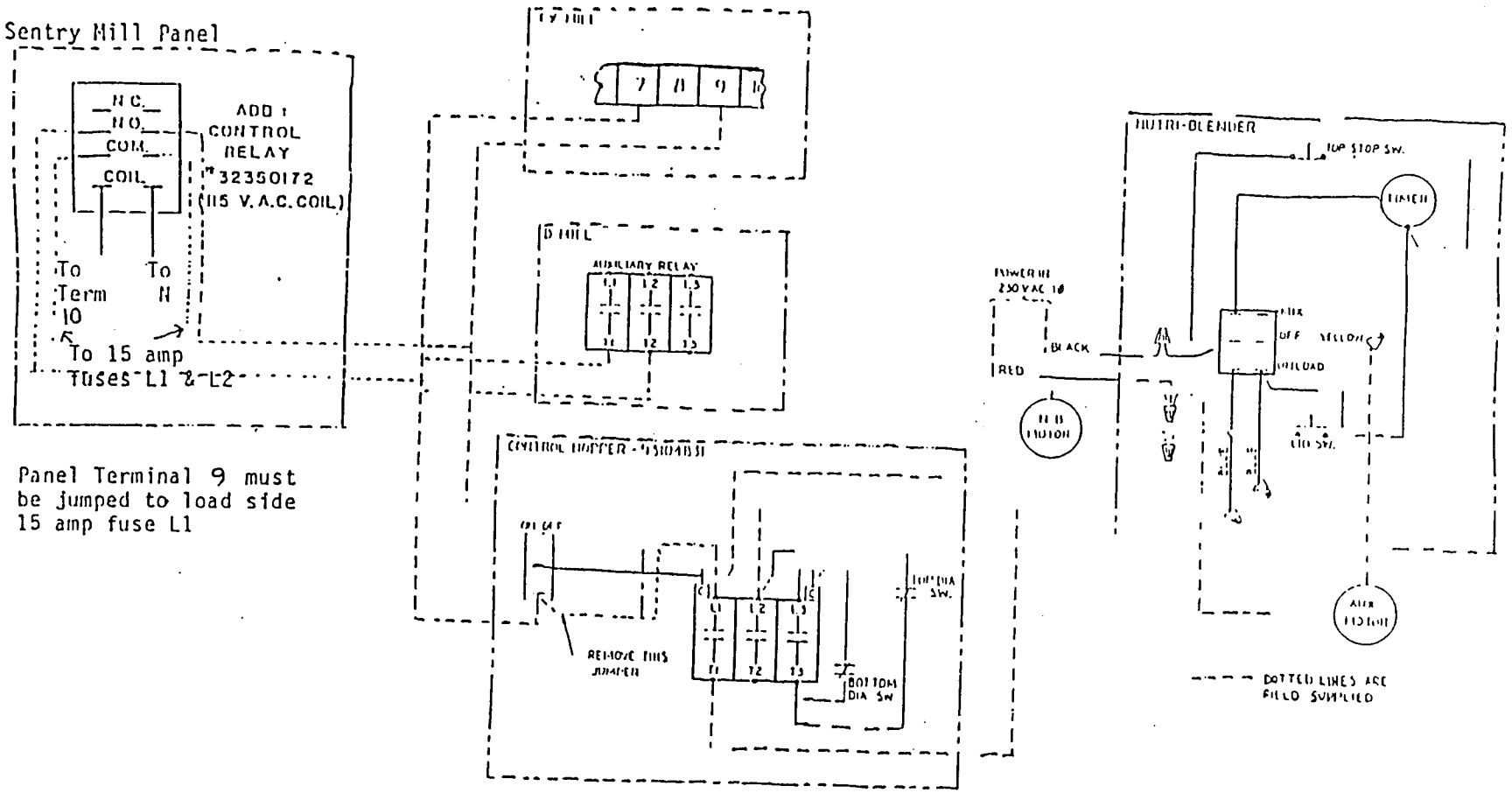
Auxillary augers to Sentry panel



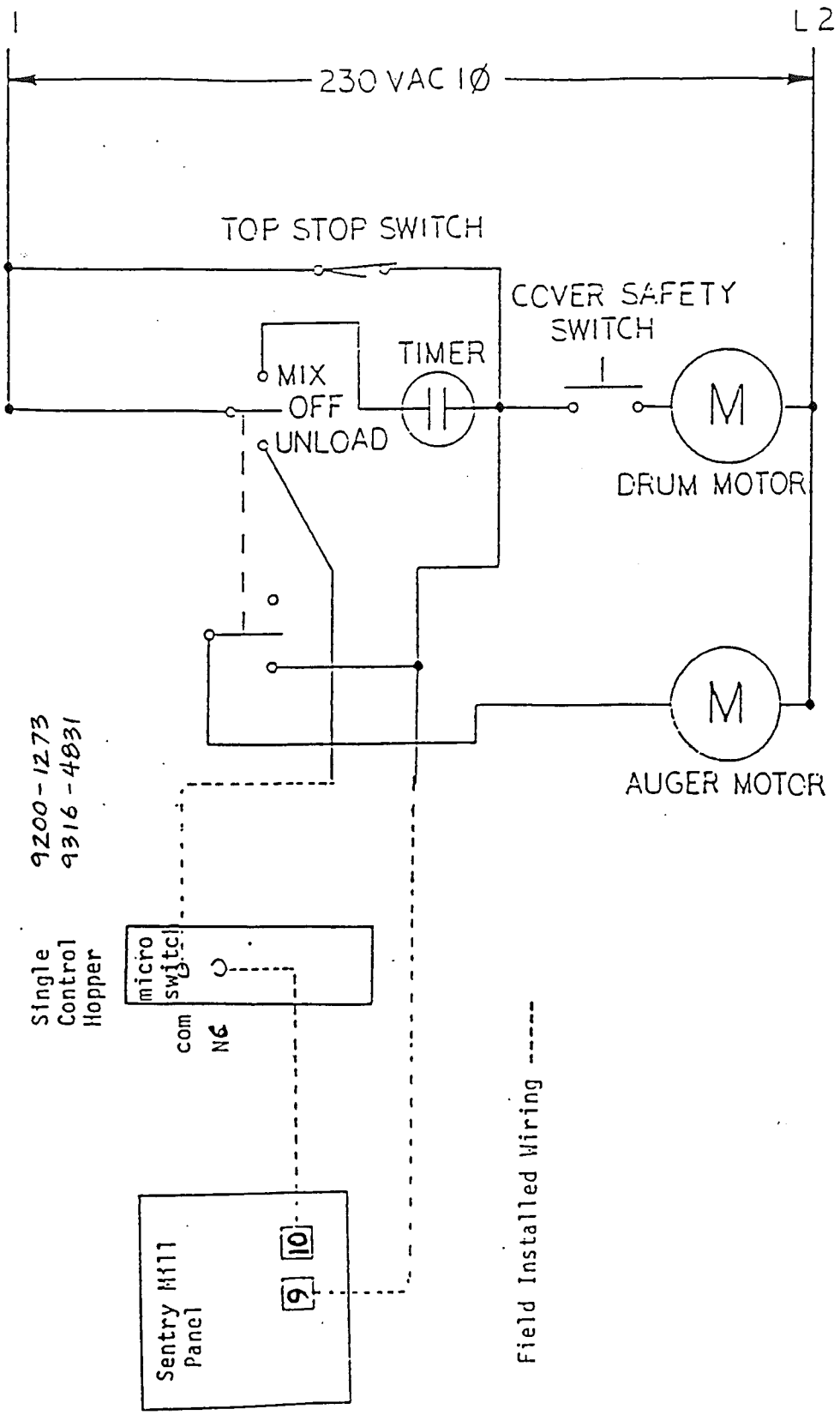
Sentry mill with nutri-blender and control hopper connections



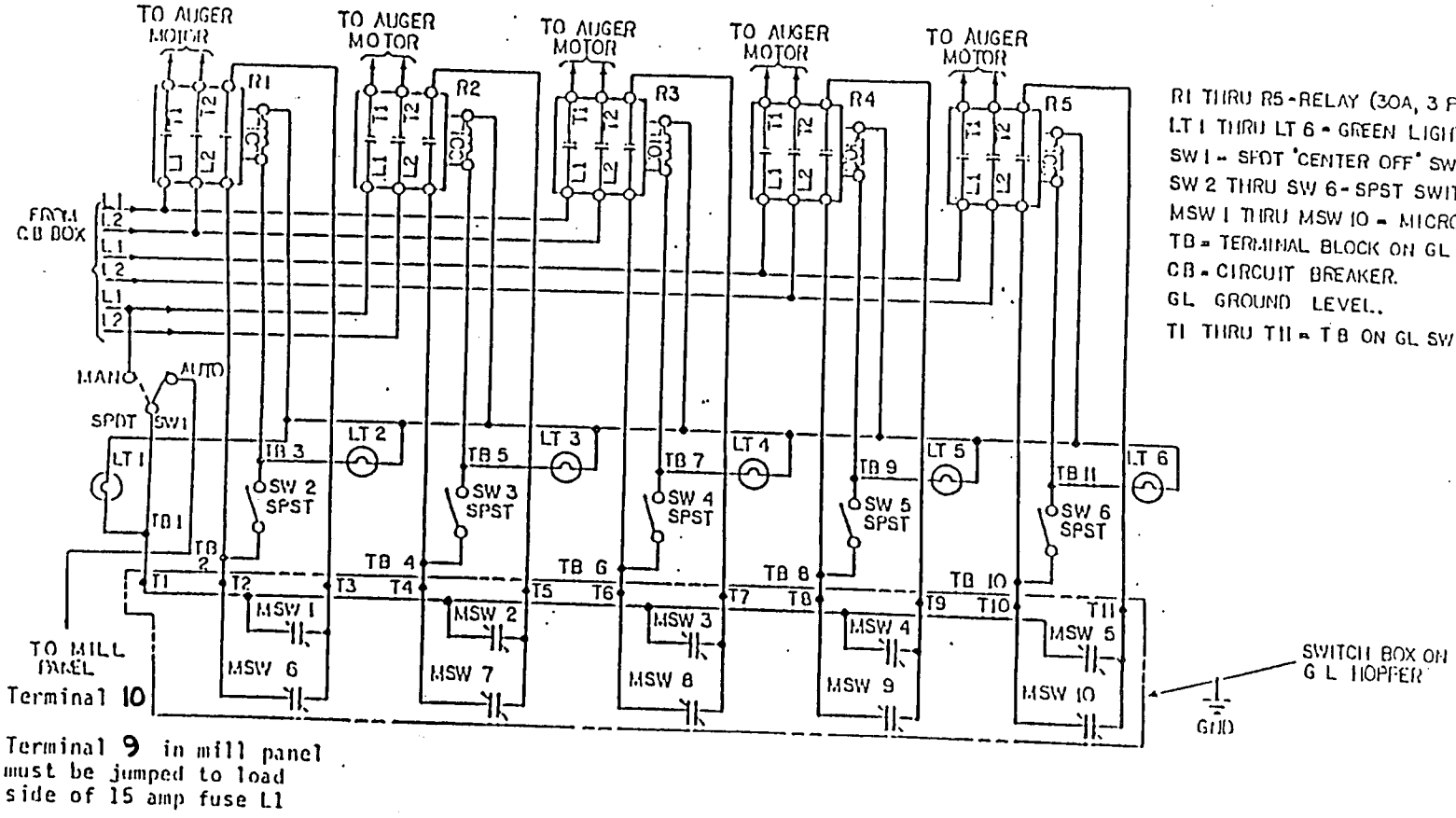
Nutri-blender for gravity mills and double diameter control hopper



Nutri-blender for Sentry mill and single control hopper



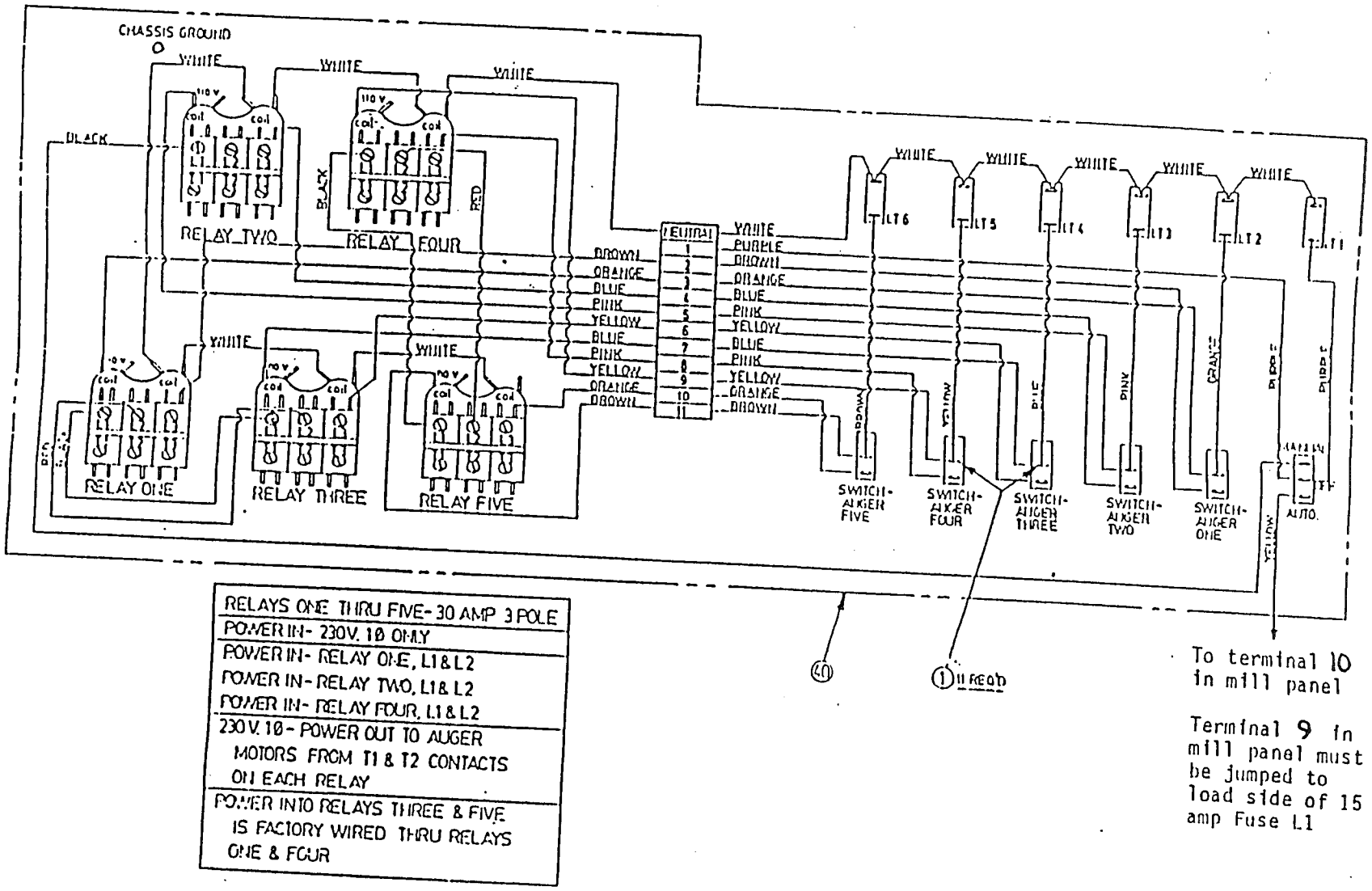
Ground level control panel power schematic



R1 THRU R5 - RELAY (30A, 3 POLE, 110 V. COIL)
LT 1 THRU LT 6 - GREEN LIGHT-110 V.
SW 1 - SPDT "CENTER OFF" SWITCH.
SW 2 THRU SW 6 - SPST SWITCH.
MSW 1 THRU MSW 10 - MICRO SWITCH.
TB - TERMINAL BLOCK ON GL MODULE
CB - CIRCUIT BREAKER.
GL GROUND LEVEL.
T1 THRU T11 - T B ON GL SWITCH ASSY

Terminal **9** in mill panel must be jumped to load side of 15 amp fuse L1

Ground level control panel wiring diagram



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

Parts Information

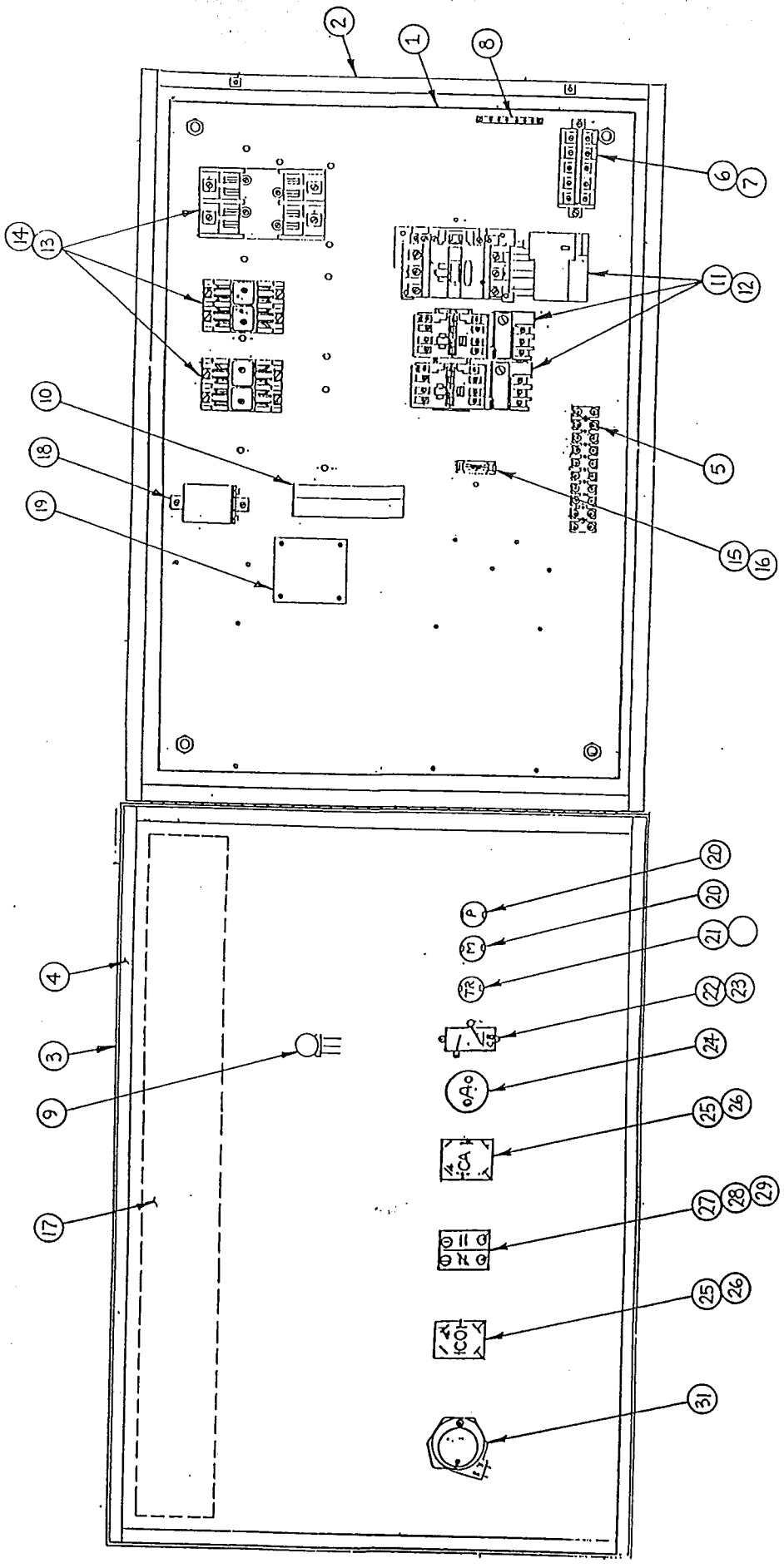
Common Control Panel Parts

Item no.	Part number	Quantity	Description
1	11222490	1	Backplate
2	90001192	1	Control Box
3	90001184	1	Panel Door, Sentry 5000 and 6500, or
	90001185	1	Panel Door, Sentry 4000 and 5500, or
	90001191	1	Panel Door, Sentry 2000, 3000 and 4500
4	80014007	98"	Sponge Rubber, 3/16 x 1/2
5	31009027	1	Terminal Strip, 12 Pt.
6	31009026	1	Terminal Block #222 Modular
7	100711	1	Terminal Block End
8	100715	1	Ground Bar Strip, 6 Pt.
9	91000509	1	Speed Pot Assembly
10	91000522	1	DC Controller (including Speed Pot)
11	Contactor – see chart on page 58		
12	Overload Relay – see chart on page 58		
13	Fuse – see chart on page 58		
14	Fuse Holder – see chart on page 58		
15	100713	1	Fuse, 2 Amp, ¼ x 1¼
16	100712	1	Fuse Holder, ¼ x 1¼
17	80003655	1	Decal, Farmatic, 5 x 21, or
	80003662	1	Decal, Mix-Mill, 5 x 21
18	See Electric (page 54) or Electronic (page 56) Control Panel Listings		

Electric Control Panel Parts (Sentry 2000, 3000 and 4500)

Item no.	Part number	Quantity	Description
18	100699	1	Relay, DPDT, 120 VAC Coil
19	91000327	1	Time Delay Board
20	302012	1	Amber Light, 120 VAC
21	302013	1	Red Light, 120 VAC
22	31001004	1	3 Amp Circuit Breaker
23	80011521	1	Dust Seal Boot, 3 Amp Breaker
24	302015	1	Ammeter, 0-50 Amp
25	31008007	1	Switch, DPDT
26	302026	1	Dust Seal Boot, Toggle Switch
27	31008052	1	3 Pos. Sw. Operator, Spring Return Left to Ctr
28	31008068	1	N.O. Contact Block
29	31008061	1	N.C. Contact Block w/ Base
30	31011016	1	Interval Timer, 2½ Hour
31	31011009	1	Timer Knob

Electric Control Panel - 5 hp



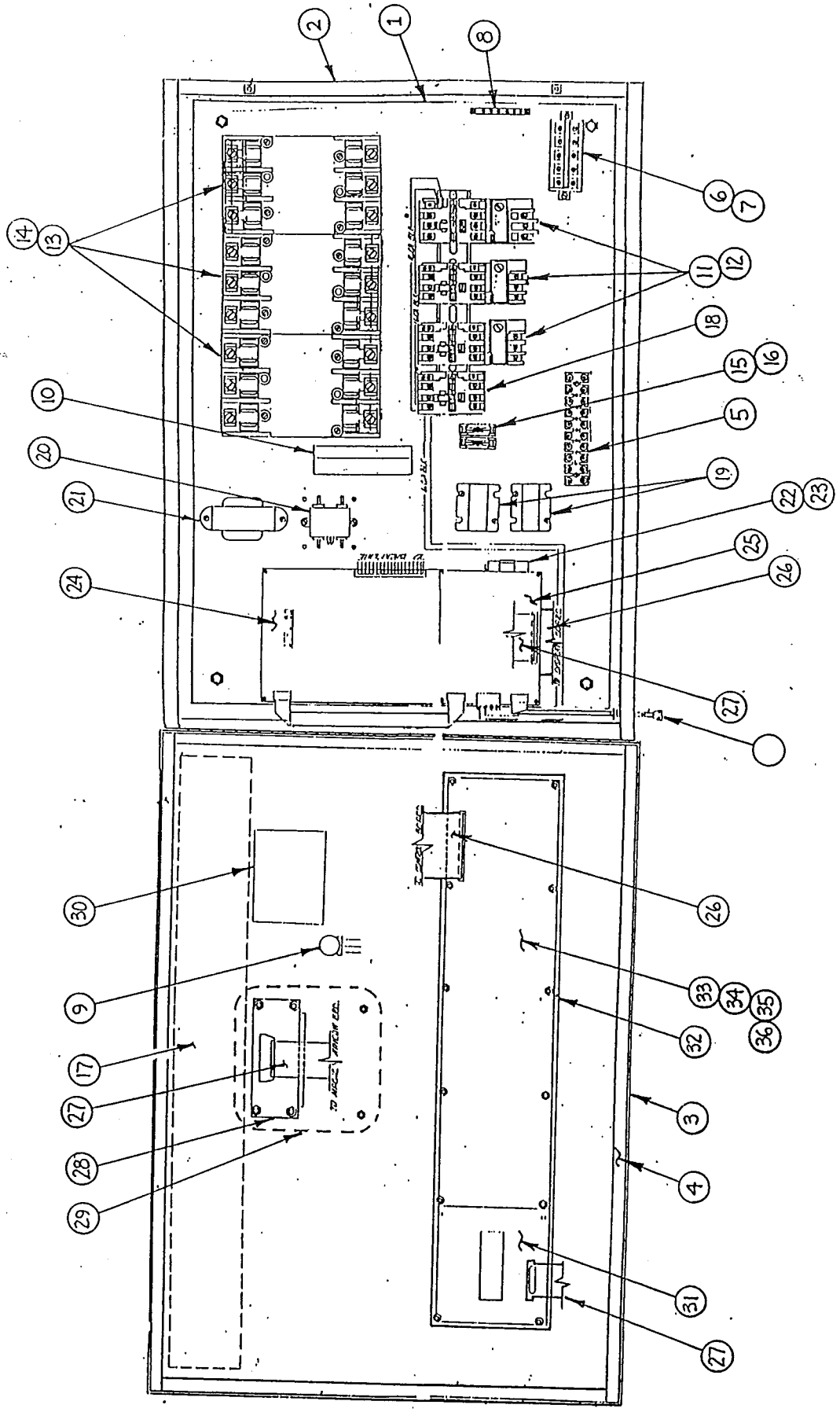
Electronic Control Panel Parts (Sentry 4000, 5000, 5500 and 6500)

Item no.	Part number	Quantity	Description
18	31016147	1	Contactor (Prop), CA3-9-10-NO
19	100708	1	Current Transformer
20	100766	1	Line Filter
21	100707	1	Power Transformer
22	100806	1	Battery, 9V
23	100805R	1	Battery Clip Holder
24	Control Board – see chart page 56		
25	91000316	1	Counter Board (4000 and 5500 only), or
	91000432	1	Magic Window Board, US (5000 and 6500 only), or
	91000433	1	Magic Window Board, Metric (5000 and 6500 only), or
	91000434	1	Magic Window Board, French (5000 and 6500 only), or
26	91000317	1	Control Board Strap
27	91000318	1	Counter Board Strap (4000 and 5500 only), or
	91000320	1	Magic Window Board Strap (5000 and 6500 only)
28	91000325	1	Magic Window Display Board (5000 and 6500 only)
29	92001389	1	Magic Window Hood, English (5000 and 6500 only), or
	92001445	1	Magic Window Hood, French (5000 and 6500 only), or
30	80003669	1	Decal, Electronic Panel Service
31	91000326	1	Counter Display Board (4000 and 5500 only)
32	100865	1	Rubber "U" Channel
33	91000330	1	Display Board
34	100866	1	Keypad
35	100864	1	Decal, Faceplate
36	800116	1	Dome, Keypad

Sentry II Control Boards

Part number	Quantity	Description
91000462	1	Control Board, 5 HP, 1 Phase
91000463	1	Control Board, 7.5 HP, 1 Phase
91000464	1	Control Board, 10 HP, 1 Phase
91000430	1	Control Board, 5 HP, 3 Phase
91000431	1	Control Board, 7.5 HP, 3 Phase
91000457	1	Control Board, 10 HP, 3 Phase
91000458	1	Control Board, 20 HP, 3 Phase
91000466	1	Control Board, 5 HP, 575 V, 3 Phase
91000467	1	Control Board, 7.5 HP, 575 V, 3 Phase
91000468	1	Control Board, 10 HP, 575 V, 3 Phase
91000469	1	Control Board, 20 HP, 575 V, 3 Phase

Electronic Control Panel



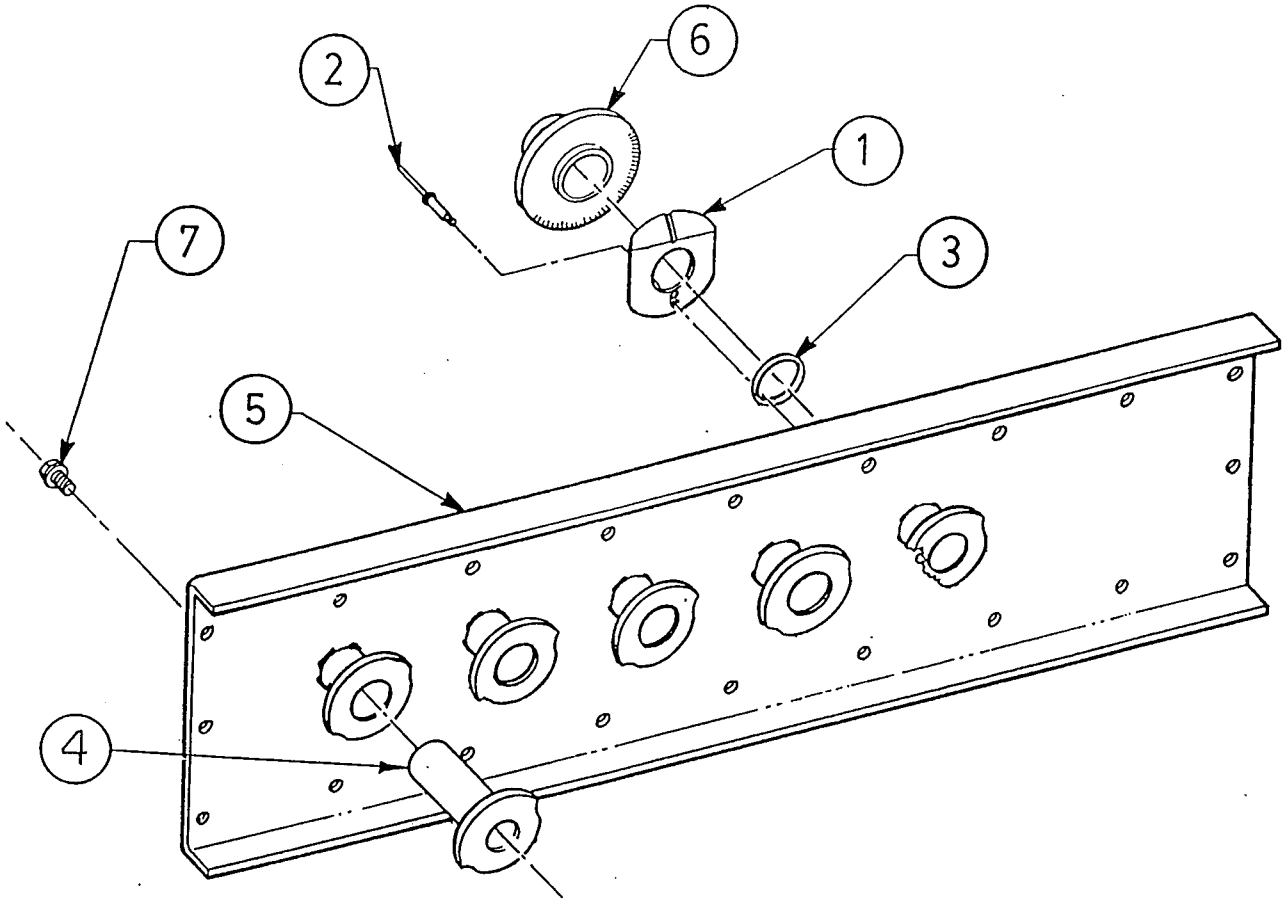
Fuseholder, Fuses, Contactors and Overload Selection Chart

Motor HP	Component	1 phase, 230V	3 phase, 208-230V	3 phase, 575V
1/4 and 1/3	Fuse	31001048	31001046	31001054
	Fuse holder	31001063	31001064	31001060
	Contactor	31016147	31016147	31016147
	Overload	31016107	31016151	31016157
1/2	Fuse	31001048	31001047	31001055
	Fuse holder	31001063	31001064	31001060
	Contactor	31016147	31016147	31016147
	Overload	31016108	31016106	31016157
3/4	Fuse	31001049	31001047	31001055
	Fuse holder	31001063	31001064	31001060
	Contactor	31016147	31016147	31016147
	Overload	31016109	31016107	31016151
1	Fuse	31001049	31001048	31001056
	Fuse holder	31001063	31001064	31001060
	Contactor	31016147	31016147	31016147
	Overload	31016109	31016107	31016151
1½	Fuse	31001049	31001048	31001056
	Fuse holder	31001063	31001064	31001060
	Contactor	31016101	31016147	31016147
	Overload	31016154	31016108	31016106
2	Fuse	31001067	31001066	31001068
	Fuse holder	31001063	31001064	31001060
	Contactor	31016101	31016147	31016147
	Overload	31016154	31006109	31016106
5	Fuse	31001052	31001050	31001057
	Fuse holder	31001061	31001064	31001060
	Contactor	31016148	31016144	31016147
	Overload	31016156	31016155	31016108
7½	Fuse	31001053	31001051	31001058
	Fuse holder	31001061	31001064	31001060
	Contactor	31016146	31016144	31016147
	Overload	31016150	31016156	31016109
10	Fuse	31001053	31001052	31001058
	Fuse holder	31001061	31001062	31001060
	Contactor	31016145	31016148	31016101
	Overload	31016150	31016150	31016154
20	Fuse	31001053	31001053	31001059
	Fuse holder	31001062	31001062	31001060
	Contactor	31016145	31016145	31016144
	Overload	31016149	31016149	31016156

Gear box cover assembly

Complete part # 92000231

Item no.	Part number	Quantity	Description
1	11195780	5	Proportioner Knob Spring
2	70007001	5	Pop Rivet 5/32 x 3/8 GSMD 54S
3	80008502	5	"O" Ring
4	90000119	5	Moveable Cam & Sleeve Assembly
5	90000121	1	Proportioner Cover Assembly
6	92000235	5	Knob Assembly (with Set Screw)
7	70000502	20	1/4-20 x 1/2 Washer HD Screw Assembly

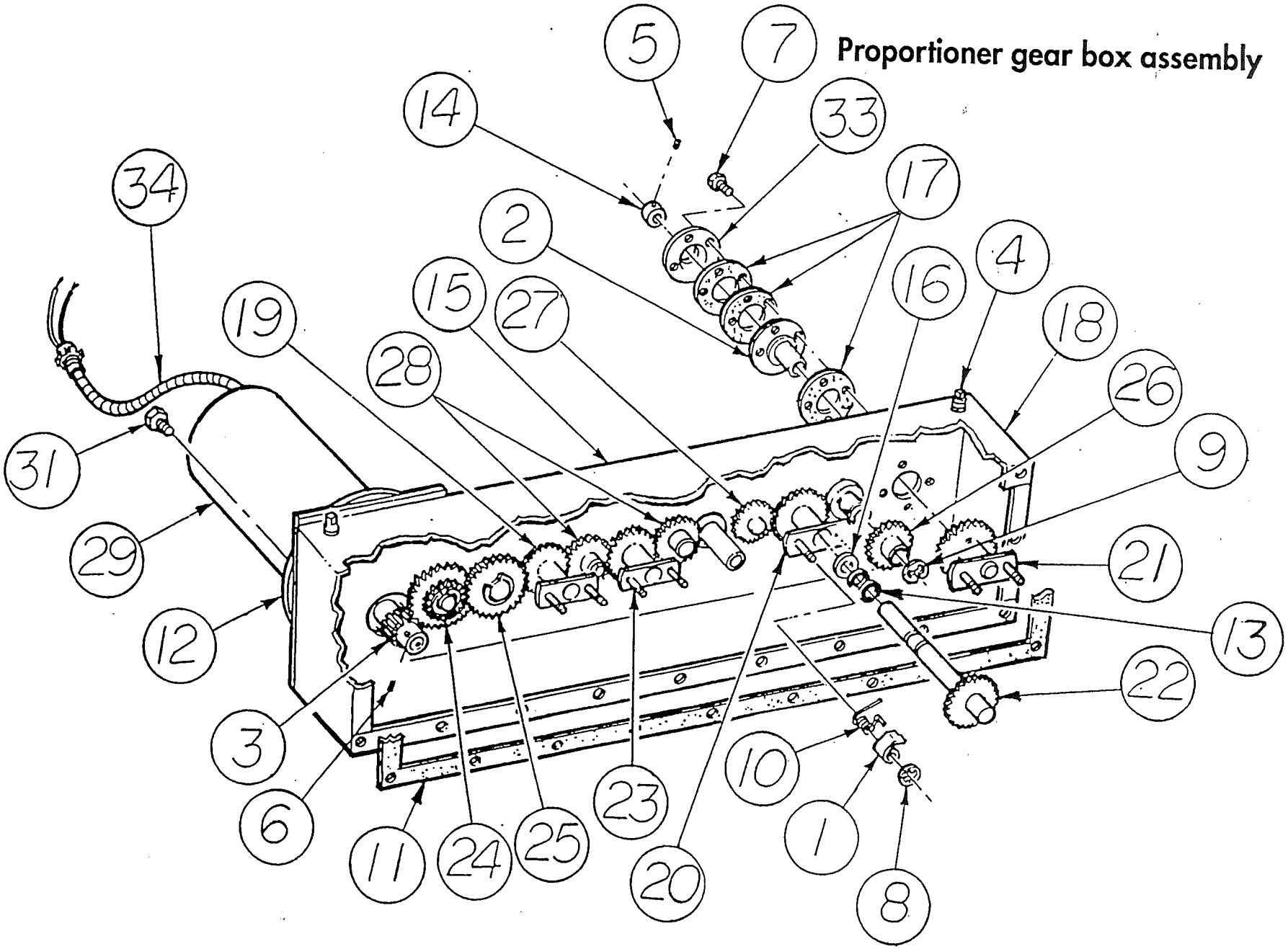


Proportioner gear box assembly

Complete part # 92001424

Item no.	Part number	Quantity	Description
1	11195820	9	Drive Pawl
2	40000014	5	Bearing - Auger Shaft
3	40002003	1	Gear - Motor Drive
4	51713002	4	Plug - 1/4 Pipe
5	61662705	5	Set Screw #10 - 32 x 1/4"
6	61663305	2	Set Screw 1/4 - 20 x 1/4"
7	70000502	20	Washer Hd Cap Screw
8	70006002	9	Push-On Fastener
9	70006501	6	Retaining Ring
10	70008002	9	Spring - Drive Pawl
11	80004503	1	Gasket - Cover
12	80004504	1	Gasket - Motor
13	80008501	10	Roto Seal ("O" Ring)
14	80012001	5	Lock Collar
15	80014002	56"	Tape - Polyurethane 3/8 x 1/2
16	80014501	5	Thrust Washer
17	80004502	15	Gasket - Auger
18	90000101	1	Prop Box Welded Assembly
19	90000106	1	Pawl Carrier 42/24 Teeth
20	90000107	2	Pawl Carrier - 24 Teeth
21	90000108	1	Pawl Carrier - 32 Teeth
22	90000998	5	Shaft & Ratchet Assembly
23	90000110	1	Pawl Carrier - 32 Teeth
24	90000111	1	Reducer Gear - 16/42 Teeth
25	90000112	1	Reducer Gear Offset
26	90000113	1	Reducer Gear - 16/24 Teeth
27	90000114	1	Idler Gear - 24 Teeth
28	90000115	2	Idler Gear - 32 Teeth
29	33000100	1	DC Motor - 1/4 HP
30	92000231	1	Prop. Cover (shown on next page)
31	70000503	4	Washer HD Bolts
32	80007003	1	Label Oil (not shown)
33	92000232	5	Bearing Cap
34	91000348	1	Wire Harness - DC Motor Sentry
35	92000243	2 Qt.	Oil

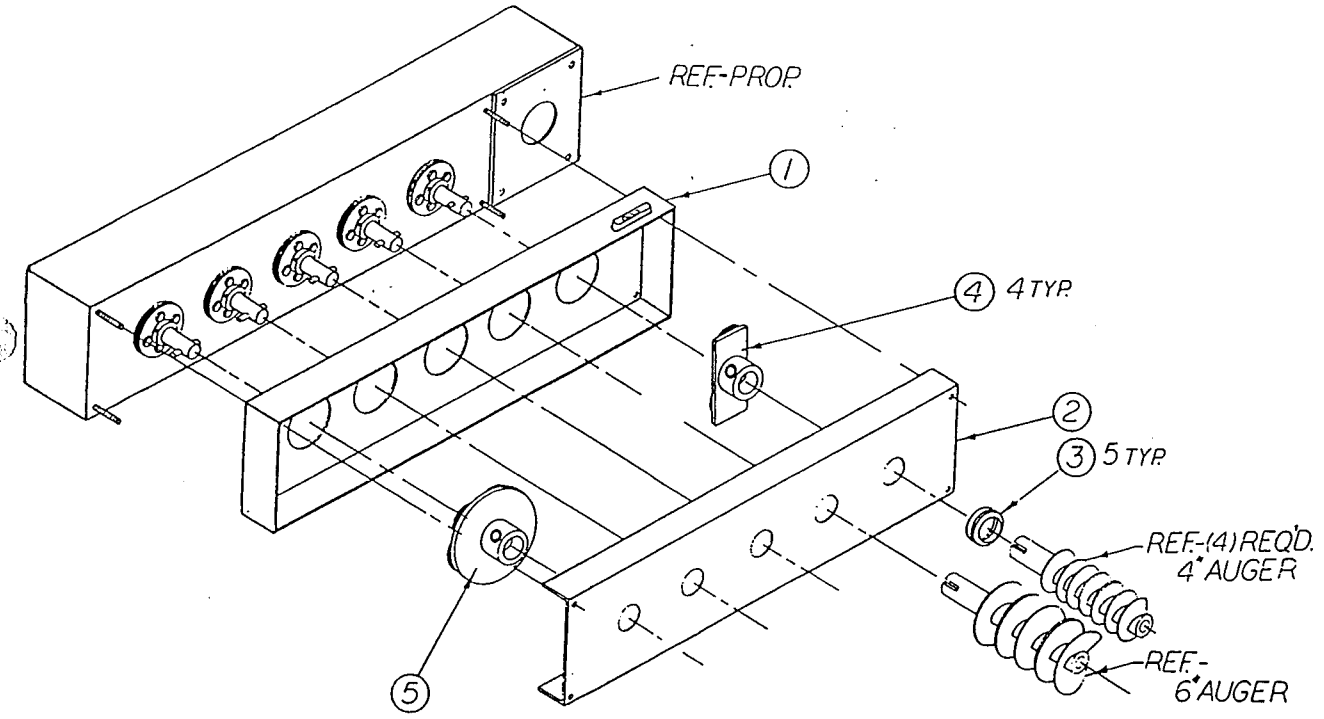
Proportioner gear box assembly



4000

Counter sandwich assembly

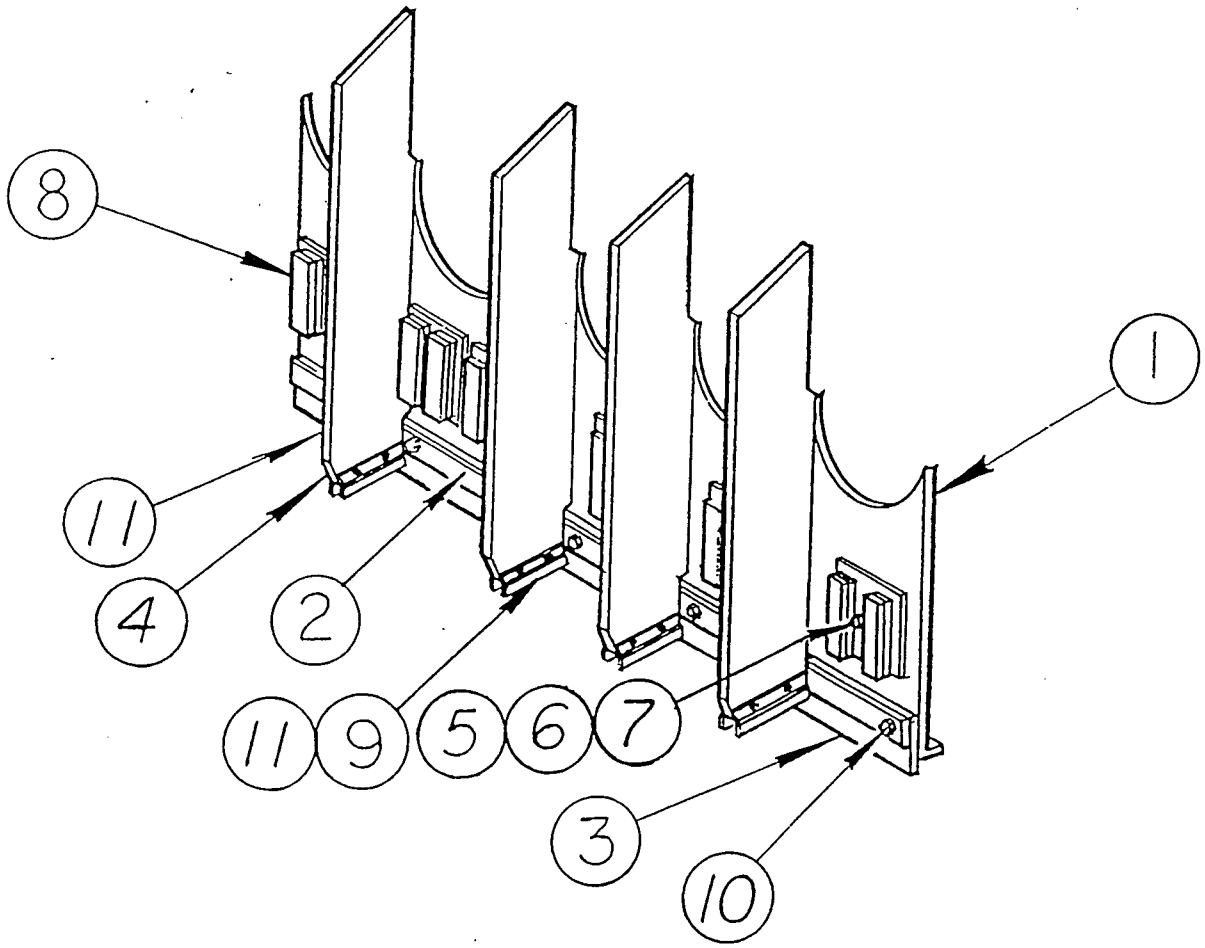
Item no.	Part number	Quantity	Description
1	92001364	1	Pick up bd/sandwich plt assembly
2	11217370	1	Btm plt counter sandwich
3	80011536	5	Seal, Forsheda types 25 mm
4	92001360	4	Magnet assembly, counter sandwich
5	92001381	1	Magnet assembly #5 counter



Magnet plate assembly

Complete part # 92000237

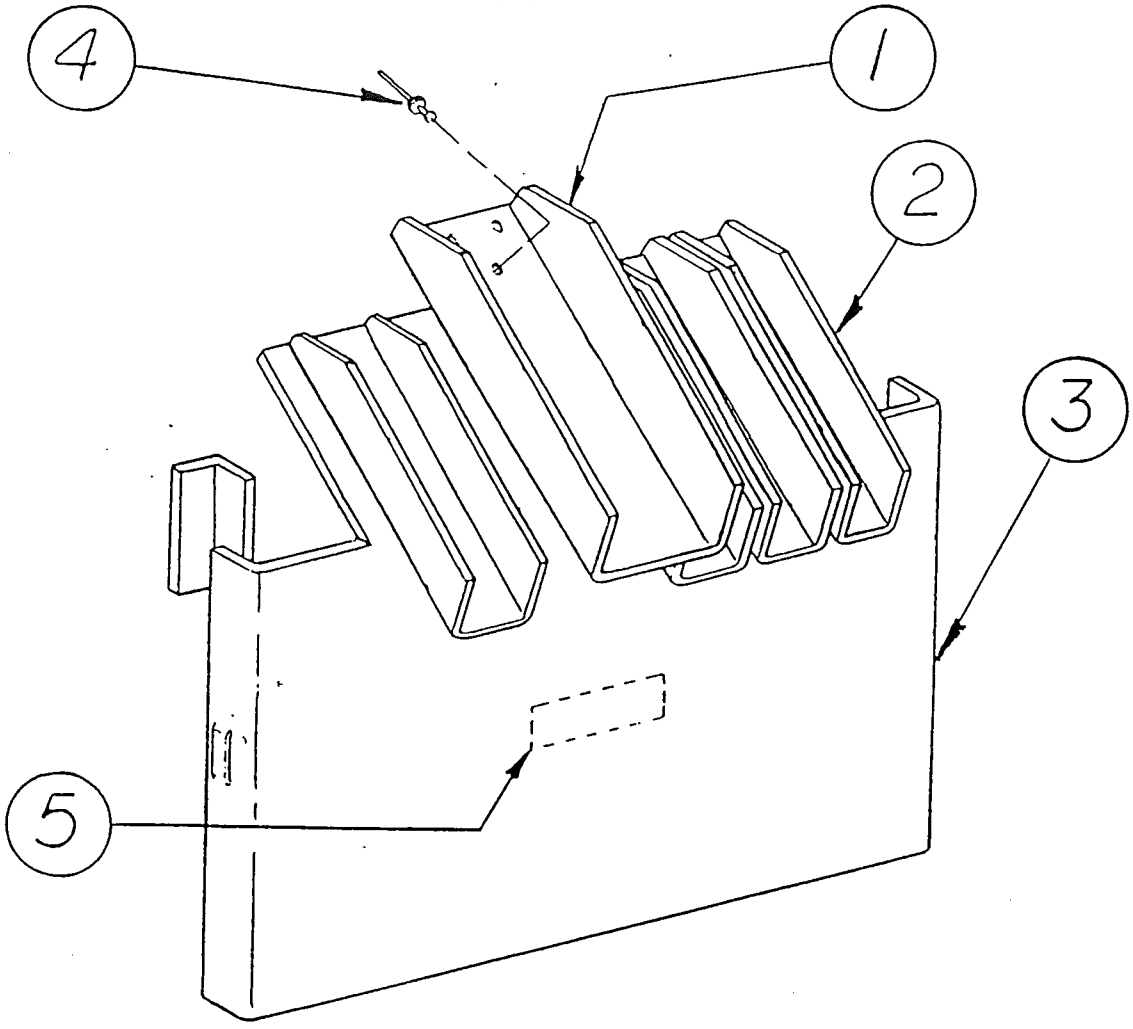
Item no.	Part number	Quantity	Description
1	11196050	1	Sentry magnet plate
2	11196060	1	Sentry strip magnet plate
3	11205300	1	Neoprene strip - Sentry mill
4	11196080	4	Sentry divider, magnet plate
5	62583812	6	1/4-20 x 3/4 hex HD cap screw
6	66443800	6	1/4 Lock Washer
7	66083800	6	1/4-20 hex nut
8	80008001	6	Ceramic - steel mill magnet
9	11204390	4	Adapter
10	65482212	6	#8-32 x 1/2 hex SLT HD T/C screw
11	70007001	16	Rivet, pop 5/32 x 3/8 GSMD 54S



Sampling chute assembly

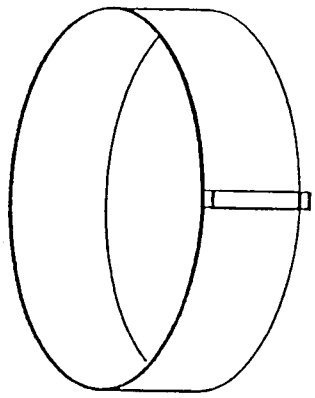
Complete part # 92000239

Item no.	Part number	Quantity	Description
1	11196150	1	6" Sentry sampling chute
2	11196160	4	4" Sentry sampling chute
3	90000135	1	Sentry sample chute door welded assembly
4	70007001	15	Pop rivets
5	80006514	1	Decal - mill screen removal



Sentry screen options

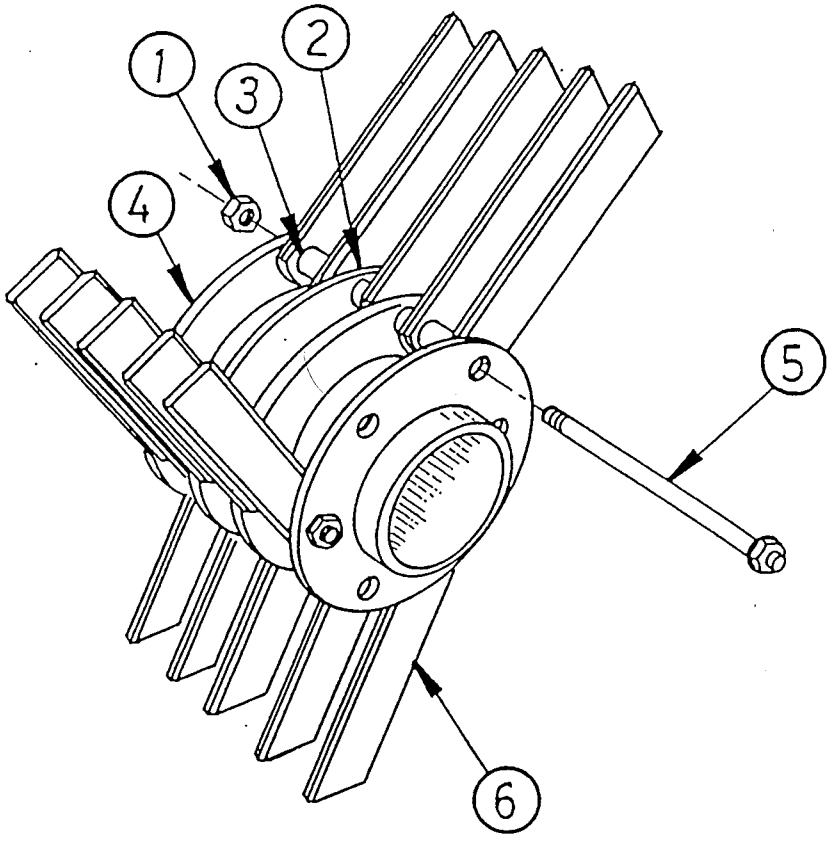
Item no.	Part number	Quantity	Description
1	92001071	1	18" diameter screen with 3/32" holes
	92000221	1	18" diameter screen with 1/8" holes
	92000211	1	18" diameter screen with 5/32" holes
	92000212	1	18" diameter screen with 3/16" holes
	92000214	1	18" diameter screen with 1/4" holes
	92000215	1	18" diameter screen with 5/16" holes
	92000216	1	18" diameter screen with 3/8" holes
	92000218	1	18" diameter screen with 1/2" holes
	92000219	1	18" diameter screen with 5/8" holes
	92000220	1	18" diameter screen with 3/4" holes



Beater hub assembly

Complete part # 92000234

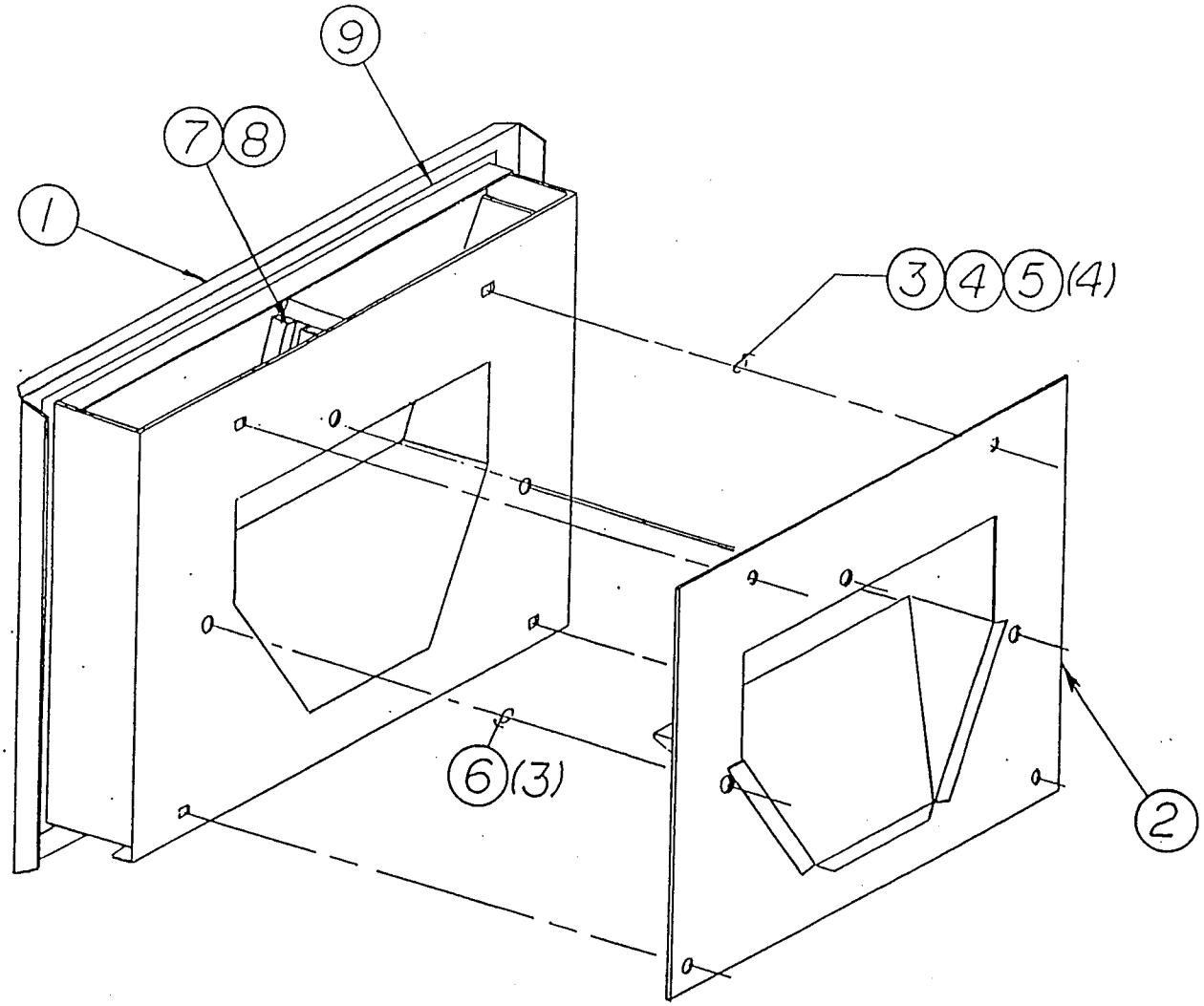
Item no.	Part number	Quantity	Description
1	66754500	3	3/8-16 hex jam locknut
2	80013501	12	Hub spacer (.40625)
3	80013502	6	Hub spacer (.8125)
	Note: Items nos. 2 and 3 are packaged together in part no. 92000582		
4	90000104	1	Beater hub welded assembly
5	90000297	3	Hub stud welded assembly
6	92000278	1	Hammers (set of 15)



Door assembly - Sentry 1000, 2000

Complete part # 92000799

Item no.	Part number	Quantity	Description
1	90000870	1	Grinder door subassembly
2	90000440	1	Wear plate assembly
3	60283317	4	1/4-20 x 3/4 carriage bolt
4	66443300	4	1/4 lock washer
5	66083300	4	1/4-20 hex nut
6	65483312	3	1/4-20 x 1/2 hex slt hd t/c screw
7	80008001	2	Ceramic steel mill magnet
8	65483317	2	1/4-20 x 3/4 hex slt hd t/c screw
9	80014007	7.5 ft.	Tape, polyurethane 3/8 x 1/2

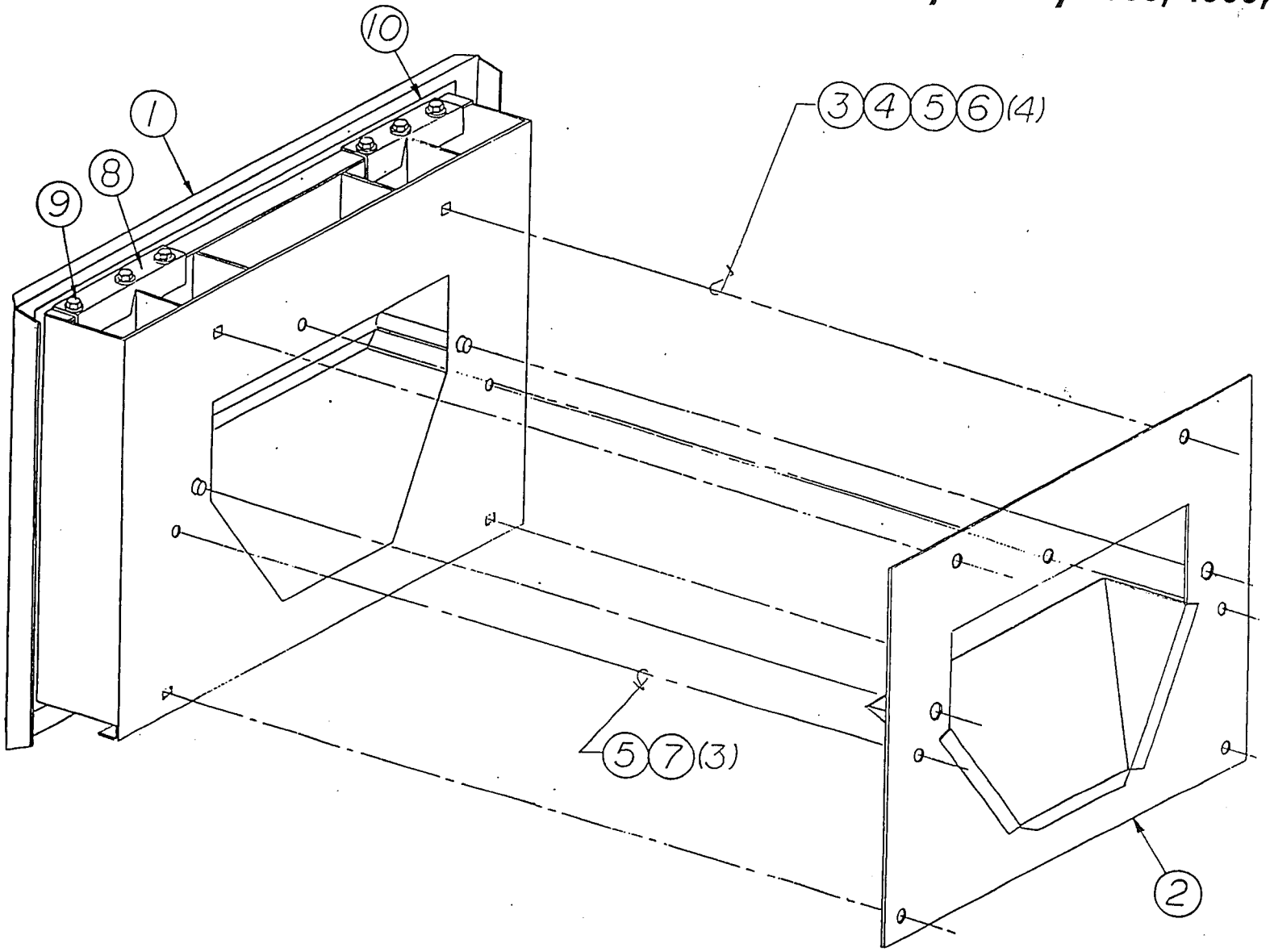


Door assembly - Sentry 3000, 4000, 5000

Complete part # 92001276

Item no.	Part number	Quantity	Description
1	90000993	1	Sentry mill door weldment assembly
2	90000440	1	Wear plate assembly
3	60283317	4	1/4-20 x 3/4 carriage bolt
4	66403300	4	1/4 flat washer
5	66443300	7	1/4 lock washer
6	66083300	4	1/4-20 hex nut
7	66083312	3	1/4-20 x 1/2 hex slt ds t/c screw
8	11217210	2	Sentry mill bypass valve retainer
9	65502208	6	8-32 x 3/8 hex washer hd t/c screw
10	80014007	7.5 ft.	Tape, polyurethane 3/8 x 1/2

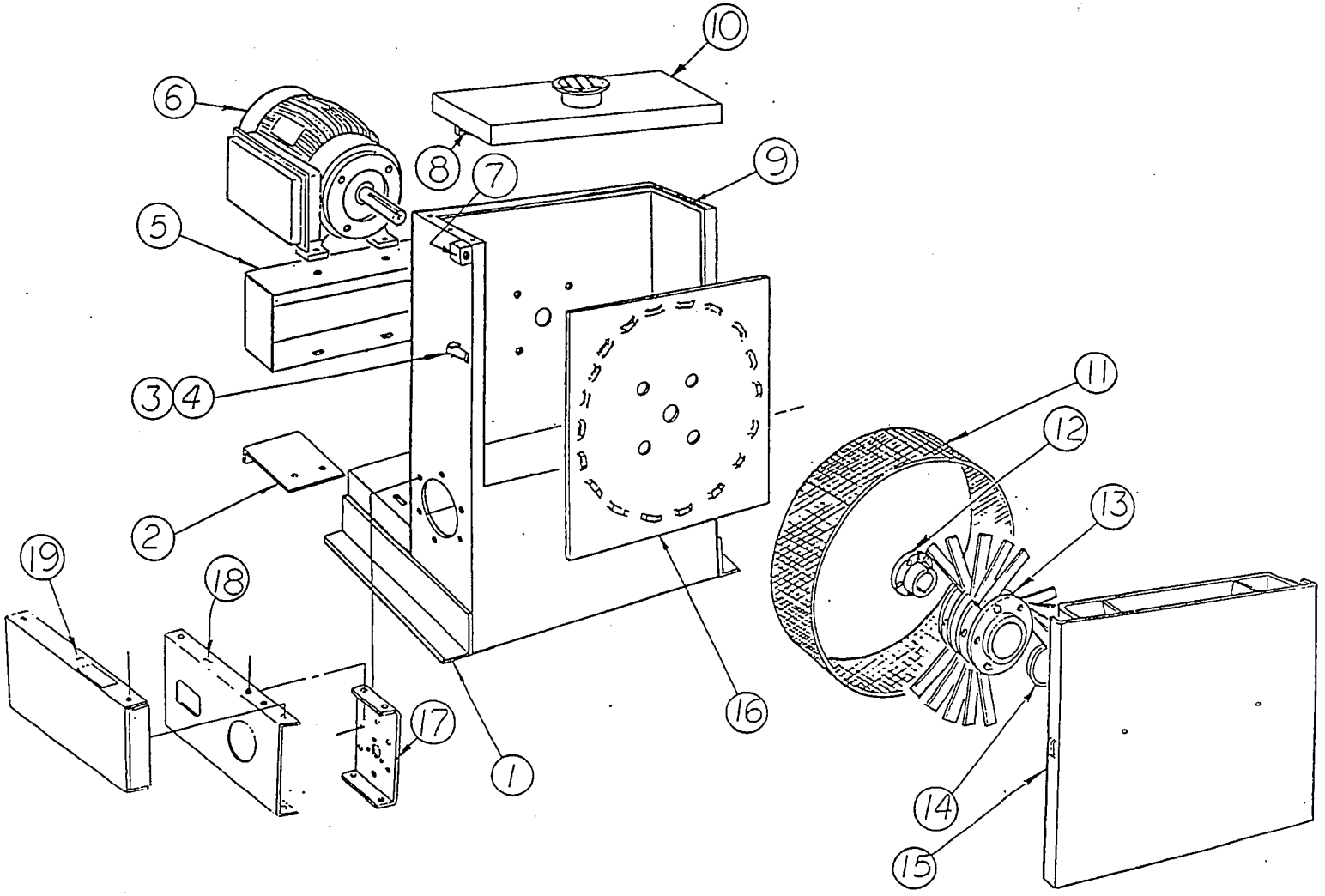
Door assembly - Sentry 3000, 4000, 5000



General mill assembly - Sentry 1000

Item no.	Part number	Quantity	Description
1	90001146	1	Housing weldment - Sentry mill
2	90001190	1	Adjustment plate assembly
3	70004506	2	Sentry mill door latch
4	F83200011	4	Rivet, pop SDS 64 .188 x .125 x .250
5	11221530	1	Motor stand 20 HP Sentry mill(20 HP mill only)
6	33000601	1	Mill motor, 5 HP, 1 phase option
6	33000602	1	Mill motor, 7-1/2 HP, 1 phase option
6	33000603	1	Mill motor, 10 HP, 1 phase option
6	33000701	1	Mill motor, 5 HP, 3 phase option
6	33000702	1	Mill motor, 7-1/2 HP, 3 phase option
6	33000703	1	Mill motor, 10 HP, 3 phase option
6	33000705	1	Mill motor, 20 HP, 3 phase option
6	33000708	1	Mill motor, 5 HP, 575 volt option
6	33000709	1	Mill motor, 7-1/2 HP, 575 volt option
6	33000710	1	Mill motor, 10 HP, 575 volt option
6	33000712	1	Mill motor, 20 HP, 575 volt option
7	31008025	1	Microswitch door
8	80014003	2 ft.	Sponge rubber .313 x .750
9	80014001	4 ft.	Polyurethane tape 3/16 x 1/2
10	90000871	1	Top inlet assembly
11	92000212	1	Screen welded assembly 3/16 diamete
12	44010712	1	Bushing, QD SD 1.125 bore (5 HP mill)
12	44010716	1	Bushing, QD SD 1.375 bore (7-1/2 & 10 HP mill)
12	44010720	1	Bushing, QD SD 1.625 bore (20 HP mill)
13	92000234	1	Sentry beater hub assembly
14	80010509	1	Caplug Sentry hub
15	92000799	1	Door assembly Sentry mill
16	11195910	1	Sentry back wear plate
17	11217660	1	Sentry gd. mnt. bearing plate (standard on 20 HP mill only - 6" discharge)
17	11217670	1	Sentry gd. mnt. offset bearing plate (standard on 5, 7-1/2 & 10 HP mills - 3-1/2" discharge)
18	11221780	1	Gd. back, Sentry discharge auger
19	11221750	1	Gd. cover, Sentry discharge auger

General mill assembly - Sentry 1000

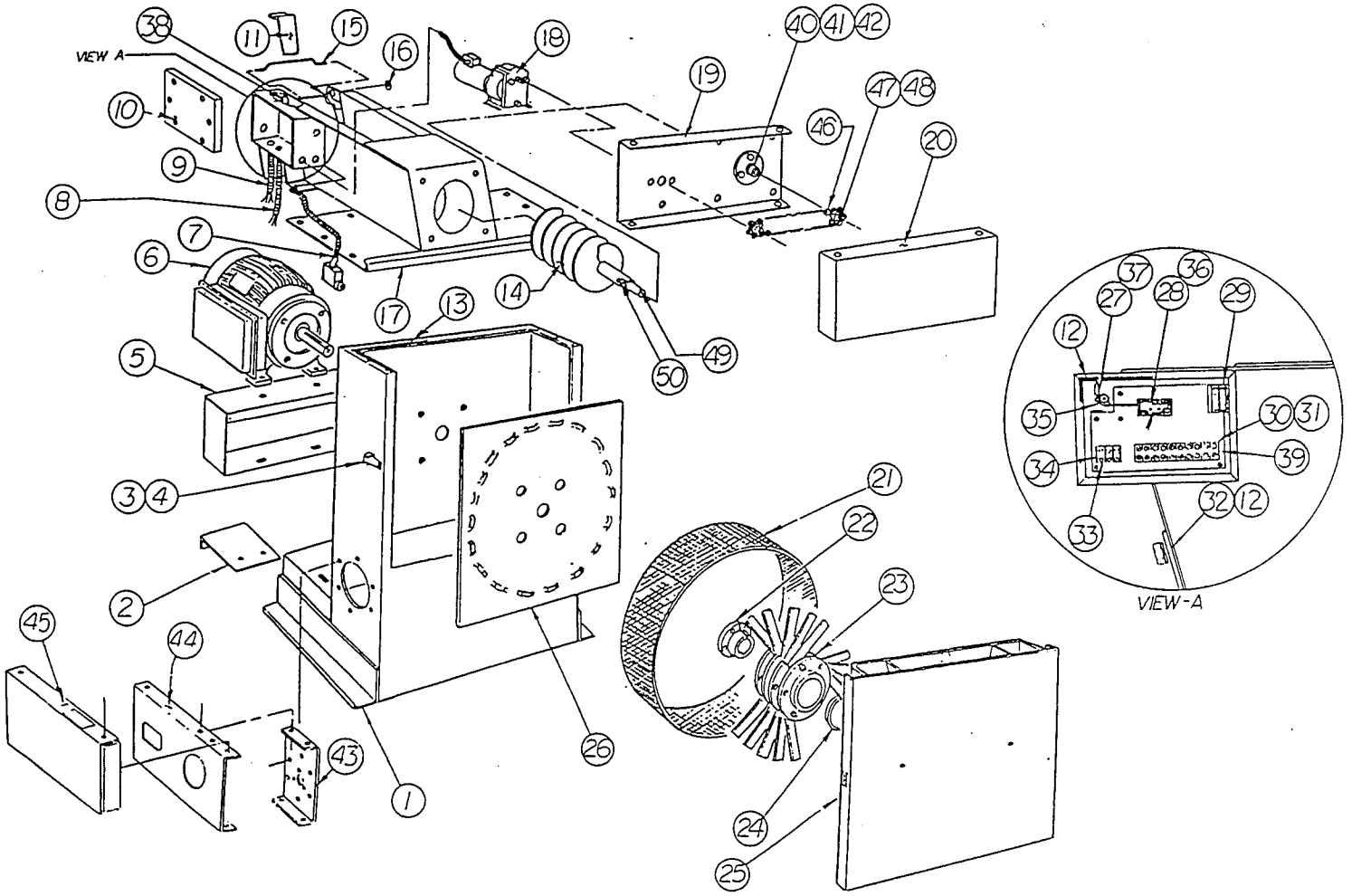


General mill assembly - Sentry 2000

Item no.	Part number	Quantity	Description
1	90001146	1	Housing weldment - Sentry mill
2	90001190	1	Adjustment plate assembly
3	70004506	2	Sentry mill door latch
4	F83200011	4	Rivet, pop 3/16 x 1/8-1/4
5	11221530	1	Motor stand 20 HP Sentry mill(20 HP mill only)
6	33000601	1	Mill motor, 5 HP, 1 phase option
6	33000602	1	Mill motor, 7-1/2 HP, 1 phase option
6	33000603	1	Mill motor, 10 HP, 1 phase option
6	33000701	1	Mill motor, 5 HP, 3 phase option
6	33000702	1	Mill motor, 7-1/2 HP, 3 phase option
6	33000703	1	Mill motor, 10 HP, 3 phase option
6	33000705	1	Mill motor, 20 HP, 3 phase option
6	33000708	1	Mill motor, 5 HP, 575 volt option
6	33000709	1	Mill motor, 7-1/2 HP, 575 volt option
6	33000710	1	Mill motor, 10 HP, 575 volt option
6	33000712	1	Mill motor, 20 HP, 575 volt option
7	91000192	1	Wire harness (door switch)
8	91000346	1	Wire harness, auger motor, 1 phase
8	91000347	1	Wire harness, auger motor, 3 phase
9	91000349	1	Wire harness, mill motor, 1 phase
9	91000136	1	Wire harness, mill motor, 3 phase
10	11222110	1	Cover, junction box - Sentry
11	90000131	1	Switch, paddle assembly
12	80014001	11 ft.	Polyurethane tape 3/16 x 1/2
13	80014002	4 ft.	Polyurethane tape 3/8 x 1/2
14	90000997	1	6" auger
15	11208340	1	Trip rod
16	70006002	1	Push-on fastener
17	90001170	1	Prop hopper, welded, Sentry 2000
18	33999801	1	DC motor
19	11208310	1	Mount plate, gear motor
20	11208320	1	Drive cover
21	92000212	1	Screen, welded assembly 3/16 dia.
22	44010712	1	Bushing, QD SD 1.125 bore (5 HP mill)
22	44010716	1	Bushing, QD SD 1.375 bore (7-1/2 & 10 HP mill)
22	44010720	1	Bushing, QD SD 1.625 bore (20 HP mill)
23	92000234	1	Sentry beater hub assembly
24	80010509	1	Caplug Sentry hub
25	92000799	1	Door assembly Sentry mill
26	11195910	1	Sentry back wear plate
27	70008003	1	Spring, micro switch
28	31008001	1	Micro switch #BA-2RU-A2
29	106163	1	Reversing switch (required on 1 phase mills only)
30	31009007	1	Terminal block 10 term

31	80006537	1	Label, terminal block N-11
32	90001103	1	Assembly, 6" prop hopper rear
33	31009026	2 or 3	Terminal block #22Z (2 req'd on 3 phase mills, 3 req'd on 1 phase mills)
34	100711	1	Terminal block end
35	90000123	1	Trip assembly, micro switch
36	11195950	1	Insulation, switch
37	61662705	1	10-32 x 1/4 hex sckt hd set screw
38	80005008	1	Grommet, 15/32" diameter hole
39	11223060	1	Insert junction box, Sentry mill
40	40000016	2	Stamping
41	40000017	1	Roller bearing (includes lock collar)
42	40000018	1	Lock collar
Note:	Item nos. 40, 41 and 42 are packaged in part no. 93022900		
43	11217660	1	Sentry gd. mnt brg plate (standard on 20 HP mill only, 6" discharge)
43	11217670	1	Sentry gd. mnt offset brg plate (standard on 5, 7-1/2 & 10 HP mills, 3-1/2" discharge)
44	11221780	1	Gd. back, Sentry discharge auger
45	11221750	1	Gd. cover, Sentry discharge auger
46	48005045	1	#40 roller chain (1/2" pitch, 45 pitches)
47	46131004	2	Sprocket, lot #40 x .625" bore
48	49000416	1	Key, 3/16" square x 1.000
49	11222610	1	End shaft, Sentry prop
50	70008505	1	3/16 x 1 spring pin

General mill assembly - Sentry 2000

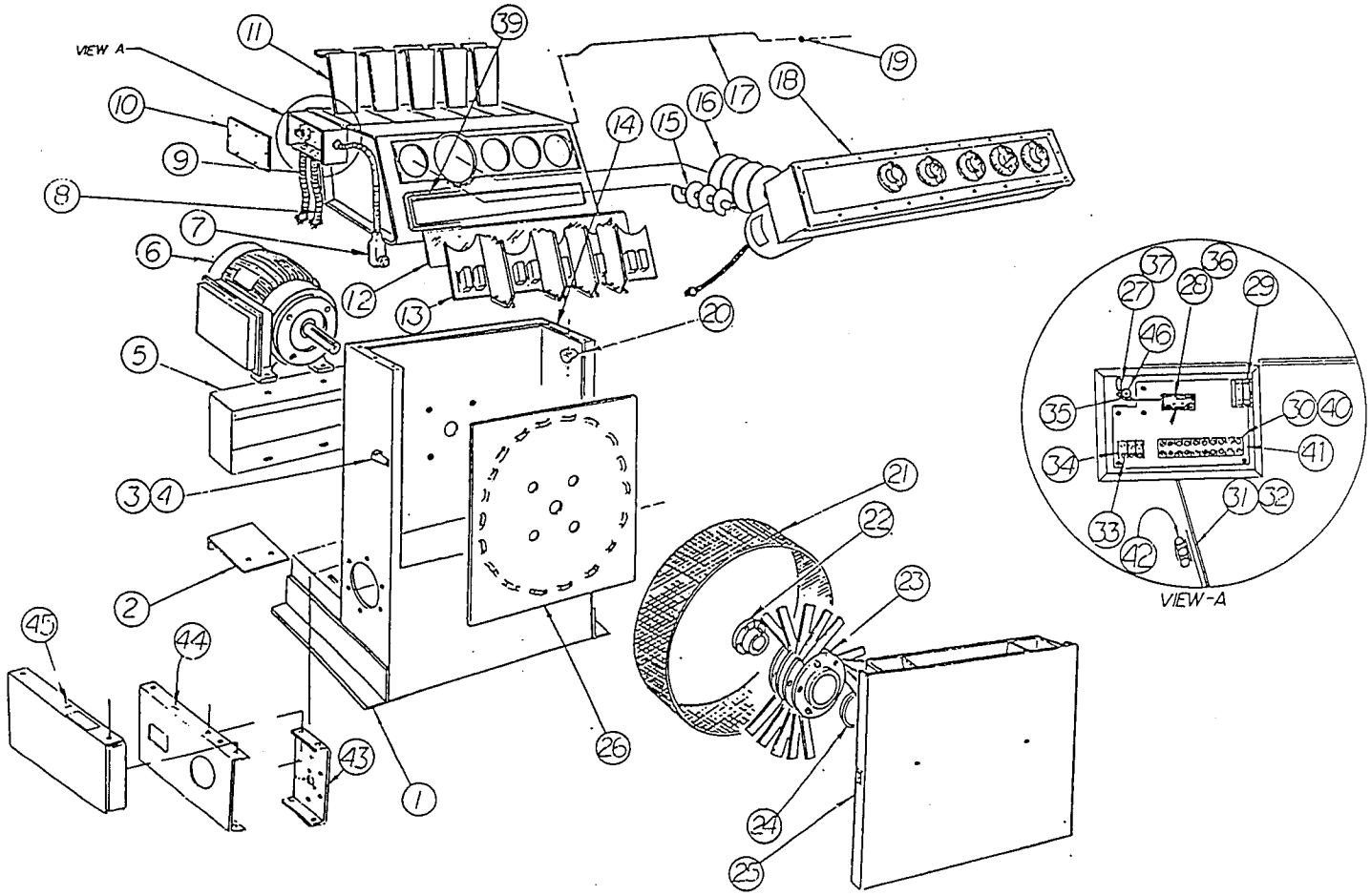


General mill assembly - Sentry 3000, 4000, 5000

Item no.	Part number	Quantity	Description
1	90001146	1	Housing weldment - Sentry mill
2	90001190	1	Adjustment plate assembly
3	70004506	2	Sentry mill door latch
4	F83200011	4	Rivet, pop 3/16 x 1/4
5	11221530	1	Motor stand 20 HP Sentry mill(20 HP mill only)
6	33000601	1	Mill motor, 5 HP, 1 phase option
6	33000602	1	Mill motor, 7-1/2 HP, 1 phase option
6	33000603	1	Mill motor, 10 HP, 1 phase option
6	33000701	1	Mill motor, 5 HP, 3 phase option
6	33000702	1	Mill motor, 7-1/2 HP, 3 phase option
6	33000703	1	Mill motor, 10 HP, 3 phase option
6	33000705	1	Mill motor, 20 HP, 3 phase option
6	33000708	1	Mill motor, 5 HP, 575 volt option
6	33000709	1	Mill motor, 7-1/2 HP, 575 volt option
6	33000710	1	Mill motor, 10 HP, 575 volt option
6	33000712	1	Mill motor, 20 HP, 575 volt option
7	91000138	1	Wire harness (DC motor)
8	91000346	1	Wire harness, auger motor, 1 phase
8	91000347	1	Wire harness, auger motor, 3 phase
9	91000349	1	Wire harness, mill motor, 1 phase
9	91000136	1	Wire harness, mill motor, 3 phase
10	11222110	1	Cover, junction box - Sentry
11	90000131	5	Switch paddles
12	80022002	1	Sentry magnet window
13	92000237	1	Magnet plate
14	80014002		Polyurethane tape 3/8 x 1/2
15	90000996	4	4" auger
16	90000997	1	6" auger
17	11195690	1	Sentry Trip rod
18	92001424	1	Assembly, Sentry prop with motor
19	70006002	1	Push-on fastener
20	11195940	2	Sentry magnetic clips
21	92000212	1	Screen, welded assembly 3/16 dia.
22	44010712	1	Bushing, QD SD 1.125 bore (5 HP mill)
22	44010716	1	Bushing, QD SD 1.375 bore (7-1/2 & 10 HP mill)
22	44010720	1	Bushing, QD SD 1.625 bore (20 HP mill)
23	92000234	1	Beater hub with hammers, Sentry
24	80010509	1	Caplug Sentry lug
25	92001276	1	Sentry mill door assembly
26	11195910	1	Sentry back wear plate
27	70008003	1	Spring, micro switch
28	1195950	1	Insulation, switch
29	106163	1	Reversing switch (1 phase mills only)
30	31009007	1	Terminal block, 10 term

31	90001102	4	Assembly, 4" hopper rear
32	90001103	1	Assembly, 6" prop hopper rear
33	31009026	2 or 3	Terminal block #222 (2 req'd on 3 phase mills, 3 req'd on 1 phase mills)
34	100711	1	Terminal block end
35	90000123	1	Trip assembly, micro switch
36	31008001	1	Micro switch #BA-2RV-A2
37	61662705	1	10-32 x 1/4 hex sckt hd set screw
38	90001150	1	Hopper, Sentry prop welded assembly
39	80014001		Polyurethane tape 3/16 x 1/2
40	80006537	1	Label terminal block N-11
41	11223060	1	Insert junction box, Sentry mill
42	F80006003	4	Knob, plastic fluted 5/16-18
43	11217660	1	D. gd. mnt brg plate (standard on 20 HP mill only, 6" discharge)
43	11217670	1	D. gd. mnt offset brg plate (standard on 5, 7-1/2 & 10 HP mills, 3-1/2" discharge)
44	11221780	1	Gd. back, Sentry discharge auger
45	11221750	1	Gd. cover, Sentry discharge auger
46	80005008	1	Grommet, 15/32" dia. hole (hidden behind item 35)

General mill assembly - Sentry 3000, 4000, 5000



Discharge packages

3 1/2" x 12" Discharge package, Sentry hammer mill – Part no. 92001447

Item no.	Part number	Quantity	Description
1	93048021	1	Support assembly
2	90001105	1	Tube and offset plate, Sentry 12"
3	90002152	1	3 1/2" shaft and flight assembly LH
4	11217670	1	3 1/2" bearing mounting plate
5	93022900	1	5/8" bore, dust proof ball bearing assembly
	Note: Items nos. 4 and 5 are shipped mounted on the Sentry mill		
6	301102	1	Sheave, pressed steel, 10.0", .625" bore, w/keyway
7	F91162042	1	V belt, B-42
8	301097	1	Sheave, 3" OD, .625" bore, keyway/2 screws

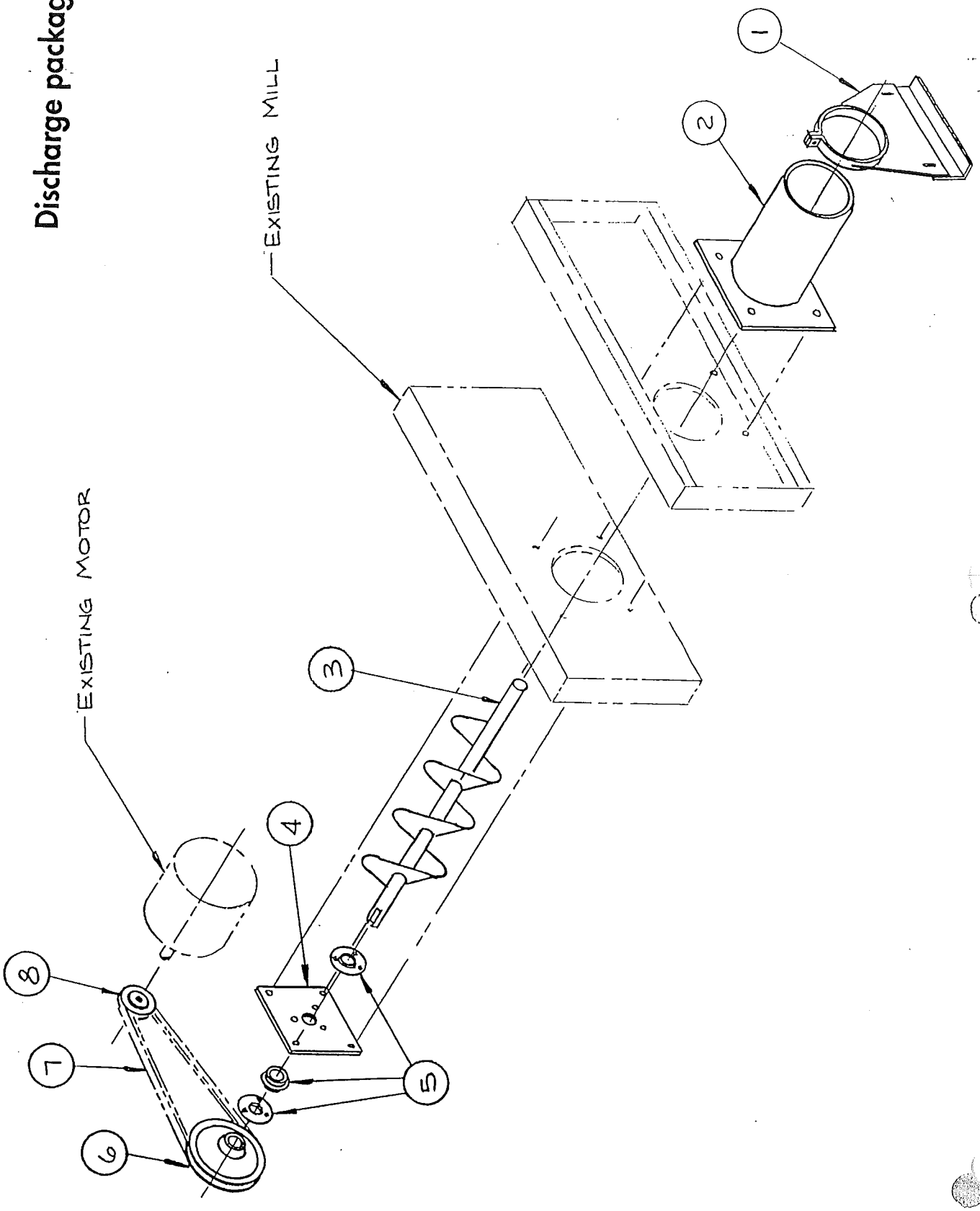
3 1/2" x 50" Discharge package, Sentry hammer mill – Part no. 92001448

Item no.	Part number	Quantity	Description
1	93048021	1	Support assembly
2	90001106	1	Tube and offset plate, Sentry 50"
3	90002153	1	3 1/2" shaft and flight assembly LH
4	11217670	1	3 1/2" bearing mounting plate
5	93022900	1	5/8" bore, dust proof ball bearing assembly
	Note: Items nos. 4 and 5 are shipped mounted on the Sentry mill		
6	301102	1	Sheave, pressed steel, 10.0", .625" bore, w/keyway
7	F91162042	1	V belt, B-42
8	301097	1	Sheave, 3" OD, .625" bore, keyway/2 screws

6" x 12" Discharge package, Sentry hammer mill – Part no. 92001449

Item no.	Part number	Quantity	Description
1	106136	1	6" corner support
2	90001107	1	Tube and offset plate, Sentry 6" x 12"
3	90000943	1	Cross auger 6"
4	11217660	1	6" bearing mounting plate
5	93032230	1	1 1/16" bore, dust proof ball bearing assembly
	Note: Items nos. 4 and 5 are shipped mounted on the Sentry mill		
6	301106	1	Sheave, pressed steel, 10.0", 1.063" bore, kw/2 scw
7	F91162042	1	V belt, B-42
8	301097	1	Sheave, 3" OD, .625" bore, keyway/2 screws

Discharge packages



Appendix A

Book value of common feed stuffs on "as fed" basis

Ingredient	% Protein	% Moisture	% Calcium	% Phosphorus
Corn	8.5	14	0.05	0.25
Corn, High Moisture	7.4	27	0.04	0.22
Oats	11.0	10	0.10	0.35
Barley	11.5	11	0.08	0.42
Wheat	13.5	12	0.05	0.41
Mixed Grain	11.3	12	0.09	0.39
Brewers Grains, Dried	27.0	7	0.30	0.60
Soybeans, Raw Full-fat	37.0	13	0.25	0.60
Soybeans, Roasted	38.0	10	0.25	0.60
Soybean Meal, Western	46.5	12	0.30	0.60
Soybean Meal, Lo Protein	44.0	12	0.25	0.60
Soybean Meal, Hi Protein	48.0	12	0.20	0.65
Corn Glutten Feed	21.0	12	0.20	0.90
Corn Glutten Meal	60.0	10	0.20	0.70
Corn Distillers	27.0	9	0.35	1.30
Limestone	0.0	2	38.00	0.00
Molasses, Dried	7.0	9	1.20	0.90

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