AMBI-TECH

Chipper-Stopper

Installation/Setup Instructions

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1. INTRODUCTION

The CHIPPER-STOPPER electronic motor brake permits rapid stopping of AC motors by DC injection, which creates a stationary magnetic field within the motor. Braking action is smooth, adjustable and frictionless.

Braking begins automatically when the motor is turned off.

A **Torque** adjustment permits matching the braking rate to almost any machine requirement.

A **Time** adjustment controls the length of the braking cycle.

The CHIPPER-STOPPER has no effect on normal machine performance, operation or motor life.

**** FEATURES ****

- ❑ FRICTIONLESS BRAKING
- ❑ TORQUE IS FULLY ADJUSTABLE
- ❑ NO MECHANICAL CONNECTIONS
- ❑ INTERNAL FUSES

2. APPLICATIONS

The CHIPPER-STOPPER works with all AC motors other than "universal" types. Each CHIPPER-STOPPER model covers all motor sizes up to its rating for horsepower and amps.

Standard units are completely satisfactory for most massive equipment such as chippers, centrifuges, re-saws, hogs, etc.

Other applications are to replace worn-out mechanical brakes, to minimize maintenance, and to provide adjustable stopping rates. Retrofitting older machines is easy since no mechanical connection is required.

3. SAFETY NOTES

Lock tool or blade securely: Saws and grinders are often fastened with left-hand threaded nuts which tend to loosen when the machine is stopped too quickly.

Use double nuts, or other positive locking methods to prevent such loosening. Test for safe operation during braking and check locking from time to time.

Power interruption or fuse failure: The CHIPPER-STOPPER uses AC line power to achieve its braking action. Thus if the power fails or is disconnected, or a fuse opens, the motor will coast to a stop without braking.

Failure of internal fuses may also disable the interlock, preventing motor starting.

Holding against a load: The CHIPPER-STOPPER cannot be used as a positive brake against overhauling loads after the motor stops. In such applications a positive lock, a pin, or a separate mechanical brake must be used to provide for holding at rest. See Section 6.6 on Option **-BR**.

Motor types: The CHIPPER-STOPPER will work with all 3 phase and single phase induction motors, including wound rotor types. It *will not work* with DC or universal motors.

It is up to the user to insure that the motor will be protected from excessive heat rise, whether from extremes of running, starting or braking.

Don't tamper with wiring or components: Once installed and adjusted, the CHIPPER-STOPPER box cover should be closed securely. Tampering with internal components can cause damage not covered by the warranty.

Power factor capacitors: Power factor capacitors must NOT be used across the LOAD controlled by the CHIPPER-STOPPER. Move any such capacitors to the LINE side of the starting contactor, per N.E.C. procedures.

4. RATINGS

A CHIPPER-STOPPER may usually be used up to its published ratings of horsepower or current - whichever is less.

Nominal voltage ranges (at 60 Hz) are:
220-240, 440-480, 550-600.

Foreign and other voltages and frequencies are also available

Applications involving exceptionally high inertia, such as press flywheels, extractors, etc., may also require oversized units, or extended braking Time or Torque.

For information on applications such as these, please consult the factory or your local Ambi-Tech sales rep.

All CHIPPER-STOPPER units may be used within an ambient temperature range of 32°F to 110°F. The maximum temperature at the hottest part of the heat sink should not exceed 158°F (70°C).

CHIPPER-STOPPER units have fuses. Some are special, fast-acting semiconductor fuses. Replacement fuses must be the same type as originally supplied. If an **Interlock** fuse is used, it will be a 2 amp Type 3AG. Using improper fuses in the CHIPPER-STOPPER will void the warranty.

5. INSTALLATION

5.1 Mounting

The CHIPPER-STOPPER may be mounted in any convenient location and in any orientation, although vertical is preferable. Keep it away from sources of vibration, dust, dirt and extremes of temperature. Once mounted, it normally needs no maintenance.

5.2 Wiring

All wiring should conform with national and local electrical codes.

> **!** DISCONNECT AND LOCK OUT POWER TO CHIPPER-STOPPER TERMINALS 1 AND 2 BEFORE SERVICING.

All wiring to the CHIPPER-STOPPER is done to the terminals provided. In general, the wires connected to Terminals **1, 2, 5** and **6** must be able to carry half the full motor *running* current.

Wires connected to Terminals **3, 4** and to any terminals provided for the use of *optional features,* will carry control currents only. These may be of the same gauge as the control wires for the motor starting contactor.

5.3 Signal Wiring

5.3.1 Contactor Interlock-Terminals 3 & 4

> **!** THIS IS THE MOST IMPORTANT PART OF THE INSTALLATION. IF THIS WIRING IS NOT DONE CORRECTLY, THE WARRANTY IS VOID.

During normal running operation, the interlock is closed and conduction takes place between Terminals **3** and **4**.

During braking, this interlock circuit opens up, locking out the starter contactor. If the interlock is not connected properly, it may be possible to energize *both* the starter contactor and the brake at the same time. This will damage the CHIPPER-STOPPER.

Terminals **3** and **4** must be connected IN SERIES with the motor starting contactor coil(s). This can be done by putting Terminals **3** and **4** IN SERIES with the motor overload protection contacts, or IN SERIES with the control system STOP button.

Figures 5.3.1 show some typical systems, indicating various ways in which this may be done.

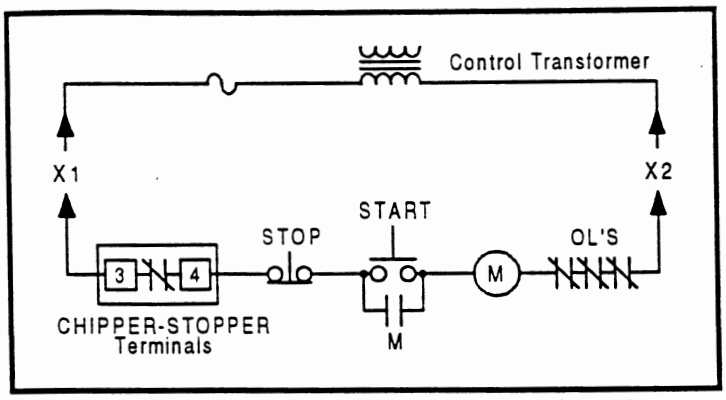


Figure 5.3.1-A Single Direction With Control Transformer

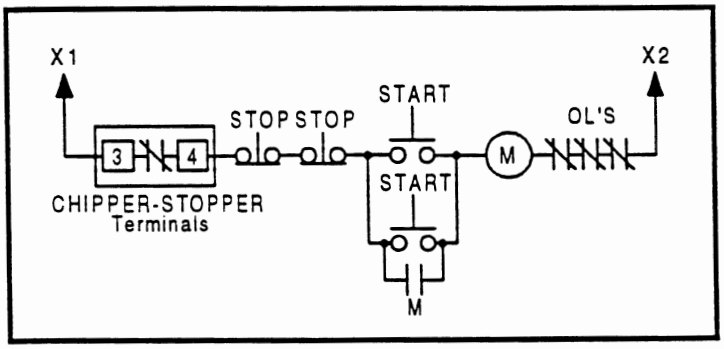


Figure 5.3.1-B Multiple Station Control

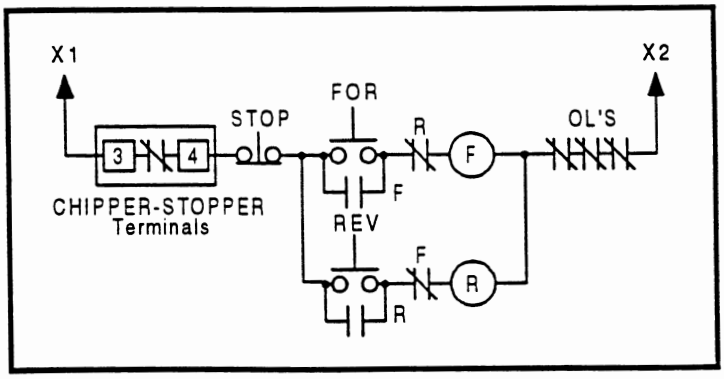


Figure 5.3.1-C Forward / Reverse System

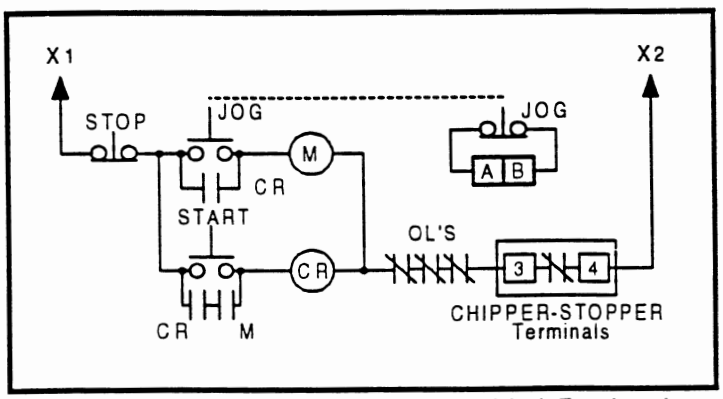


Figure 5.3.1-D Brake Disabled, For Jogging

WARNING

Control voltage must not exceed 240 VAC.

Never connect Terminals **3** and **4** across (in *parallel* with) the motor starter contactor coil, or across the power line!

The motor starter contactor must not be manually operated when the CHIPPER-STOPPER is connected, as this will blow fuses and damage the unit.

After making the connection to the Interlock Terminals **3** and **4**, the following test must be performed to insure that the wiring is indeed correct:

1. Be certain that main power is OFF.
2. Make sure Terminals **1,2,5** and **6** are NOT connected at this time.
3. Lift wire from Terminal **4**, and insulate it.
4. Turn power ON. Try to start motor with every start button or start signal that can possibly start the motor. It should NOT start. If it does start, YOUR WIRING IS NOT CORRECT.
5. If this test is passed, turn main power OFF and reconnect the wire to Terminal **4**. Then continue with Section 5.4.

If the test is NOT passed, TURN MAIN POWER OFF, re-read the material in this section, check and revise the wiring, and try again.

It is madness to proceed until you have correctly wired the interlock to pass this test !!!

5.4 Power Wiring - 3 Phase Motors

The CHIPPER-STOPPER will be damaged if power factor or other capacitors are present across the motor leads. If capacitors are used, they must be on the *line* side of the motor starter.

Power conductors to Terminals **1, 2, 5** and **6** should be sized to carry at least one-half the motor running current.

5.4.1 Single Direction, Single Speed

The power wiring may be done only after the interlock has been correctly connected and the mandatory test has been passed.

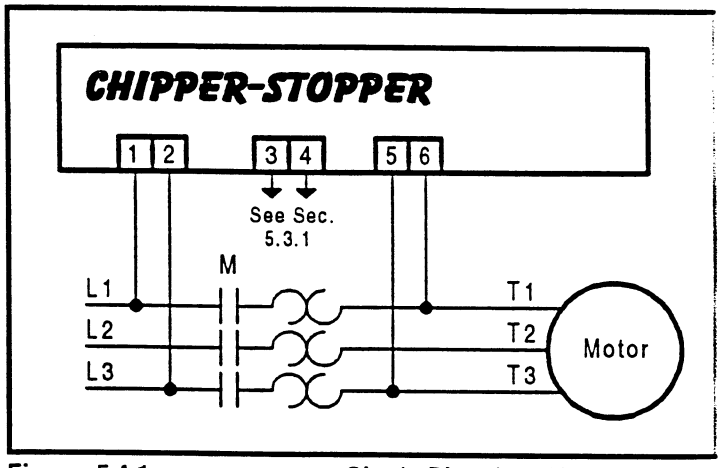


Figure 5.4.1 **Single Direction, Single Speed**

5.4.2 Forward and Reverse

As can be seen from Figure 5.4.2, the power wiring for a bi-directional system is essentially the same as for the basic single direction installation.

Please refer back to Section 5.3.1, to insure that the interlock is connected so as to lock out BOTH the forward and the reverse motor starters during braking.

Braking will normally take place when stopping from either direction.

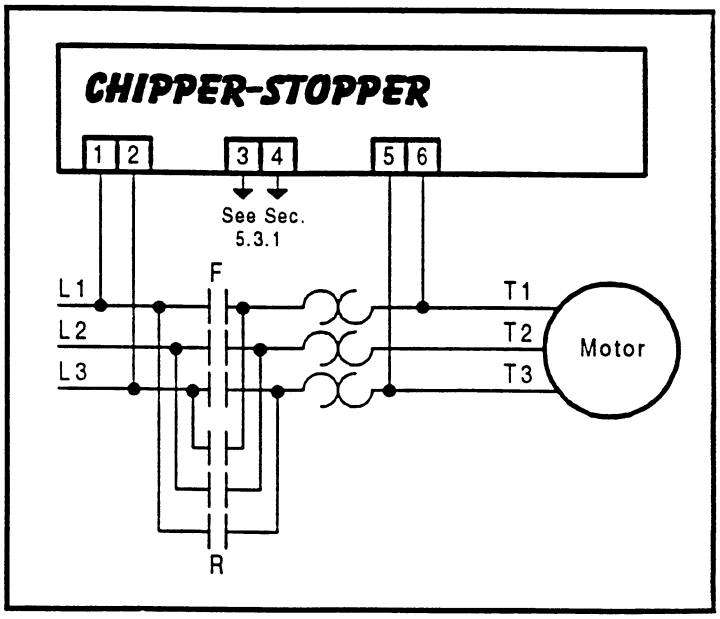


Figure 5.4.2 **Forward and Reverse**

5.4.3 Multiple Speed Application

Note: **Option -W** is required for this application. Do not attempt to install the CHIPPER-STOPPER with a multi-speed motor unless it is equiped with **Option -W** (see section 6.1.) Refer to Section 5.3.1 for correct **Interlock** wiring.

Power wiring for a multi-speed motor is in principle the same as for any other motor. The high speed winding must be used for braking.

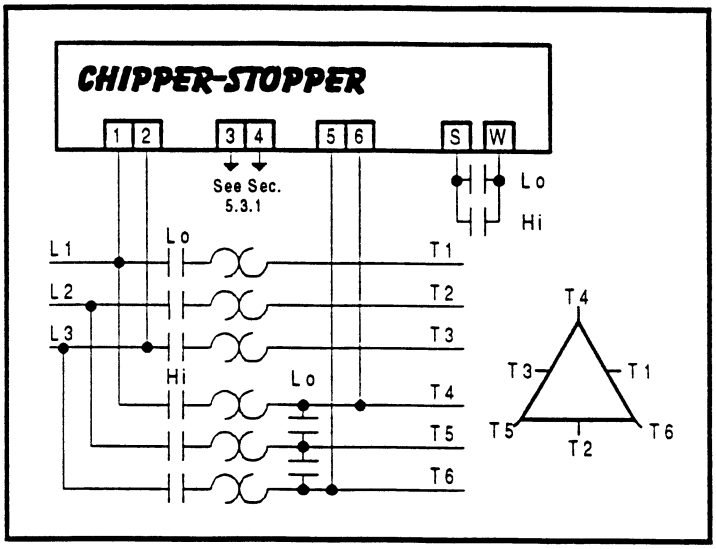


Figure 5.4.3 Multiple Speed Applications

5.4 Electronic Drives

When used with electronic drives such as motor accelerators, solid state starters, variable frequency inverters etc., an isolating contactor must be installed between the motor and the electronic drive device, per Figure 5.4.4.

The coil of the isolating contactor must be interlocked with Terminals **3** and **4** of the CHIPPER-STOPPER, as shown in Section 5.3.1.

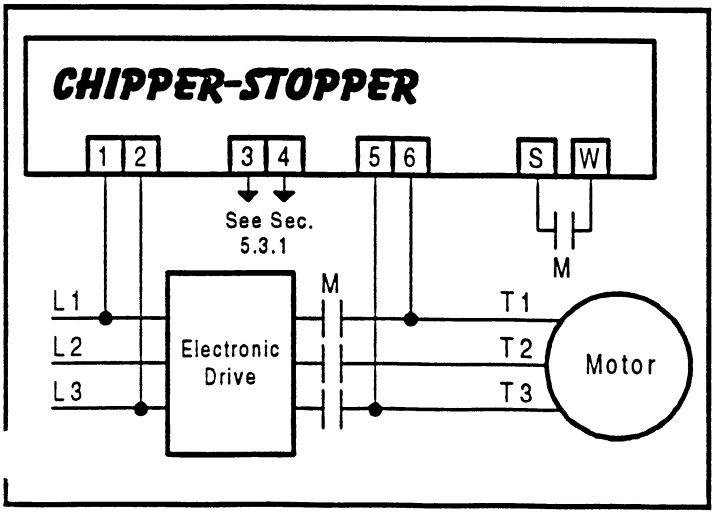


Figure 5.4.4 With Electronic Drives

5.4.5 Wound Rotor (Slip Ring) Motors

Wound rotor motors, since they are also induction motors, can be used with the CHIPPER-STOPPER. Minimum or lowest rotor resistance should be used during braking. Any motor wired with the CHIPPER-STOPPER must, of course, be used with a magnetic starter so that the interlock can be wired correctly.

5.4.6 Drum Switch Controller

If the motor is controlled with a drum switch *only*, **Option -XNJ** is required. Refer to Figure 5.4.6 and Section 6.9.

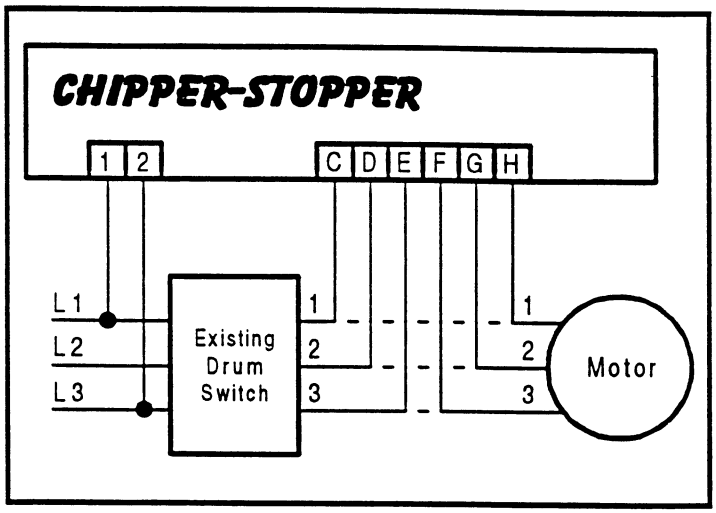


Figure 5.4.6 Drum Switch Application

5.4.7 Wye-Delta Option -X18F

As illustrated in Figure 5.4.7, a Wye-Delta starter has both ends of each motor winding brought out - six wires in all. In the WYE configuration, one end of each winding is connected to the power line, and the remaining ends are shorted together by means of an "S" contactor. In the DELTA configuration, each winding is connected across a pair of power line phases. In the OFF mode, all windings are disconnected.

Option -X18F provides four additional Terminals, **X, K, C1** and **C2**. The internal contacts between Terminals **X** and **K** close only during braking and are used to operate the "S" contactor. The sensor between Terminals **C1** and **C2** confirms that the "S" contactor is closed before braking is activated.

5.5 Power Wiring - Single Phase Motors

Wiring is identical to 3 phase connections for the motor starter. Power input is connected to Terminals **1** and **2**, and motor load to Terminals **5** and **6**. A magnetic starter must be used and interlocked per Section 5.3.1.

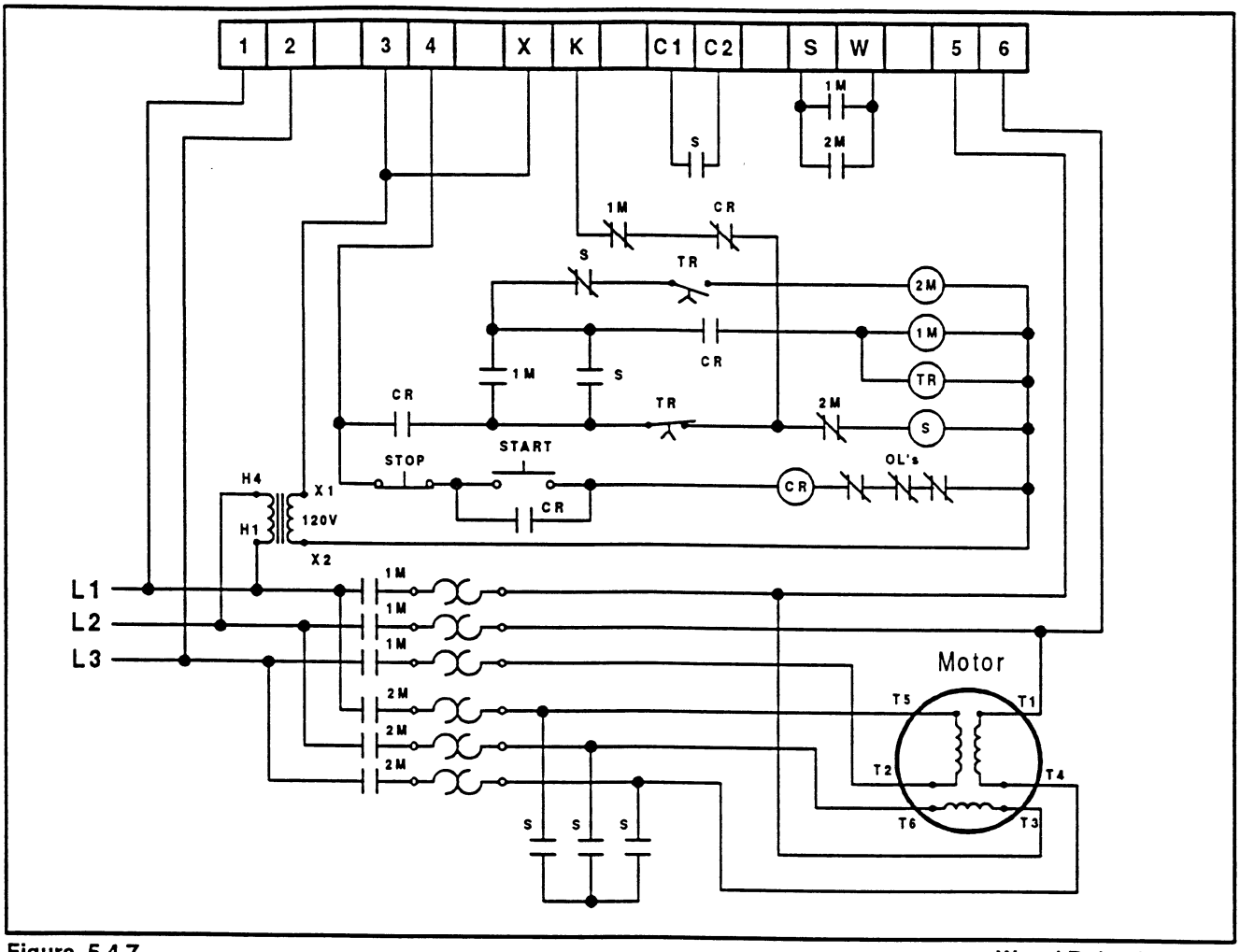


Figure 5.4.7 **Wye / Delta Starter**

6. OPTIONAL FEATURES

6.1 Option -W

This option permits braking to be controlled by a separate set of auxiliary contacts on the motor starter(s), and is required for the following installations:

1. Multi-speed motors
2. Motors operated from variable voltage sources such as variable frequency or soft-start drives.
3. Motors operated from frequency sources other than 50~60 Hz.

Connect Terminals **S** and **W** to a dry normally open (N/O) auxiliary contact on *all* starter contactors.

Closure of the auxiliary contact(s) 'primes' the CHIPPER-STOPPER, and tells it the motor is running. The next time the contacts are *opened*, braking will start.

Note: **Option -W** may also be used when braking is desired under restricted conditions (only one speed or direction) or to reduce brake pickup time when the motor is turned off.

6.2 Option -BD (Brake Disable)

This option permits the brake to be disabled for certain purposes, such as during jogging or setup.

Opening the external contact connected across Terminals **A** and **B** will prevent the brake from engaging.

The opening of a contact connected across **A** and **B** during a brake cycle will not terminate that cycle.

When used for safety, a key switch is suggested, so that only authorized personnel may disable the brake.

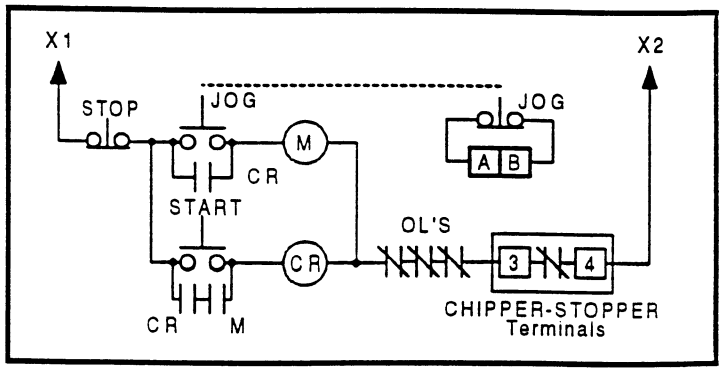


Figure 6.2 **Option -BD (Disabling Brake for Jogging)**

6.3 Option -S (For greater than normal Torque)

This option is not available with the Chipper-Stopper. If greater torque is required, the Short-Stop should be used.

4 Option -X45D (Dual Torque)

This option provides an adjustable low level of braking when the motor is turned off *with existing controls* and a fixed, high level of braking when Terminals **P** and **S** are closed.

An additional set of contacts must be used to disengage the starter contactor before Terminals **P** and **S** are closed. See Figure 6.4. When wired per Figure 6.4 any time Terminals **P** and **S** are closed a brake cycle will begin, even if the motor is at rest.

When Option **-BD** is used, and its Terminals **A** and **B** are open, no brake cycle will occur.

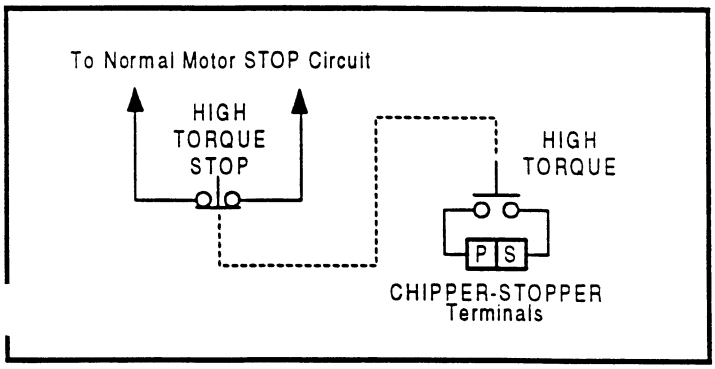


Figure 6.4 Option -X45D (Dual Torque)

6.5 Option -D (Dual Voltage Operation)

This option permits a 460 volt type CHIPPER-STOPPER to be used on either a 230 or 460 volt line. The unit is shipped from the factory set for 460 volt operation. If set improperly, damage to the CHIPPER-STOPPER or lack of braking or both will result. Disconnect power before making any changes.

To convert from one voltage to the other, both the selector switch provided and the links on the control transformer must be set to the correct position for the voltage used.

6.6 Option -BR (Releases a customer supplied spring-actuated brake.)

Option -BR (through its N/O contacts which are connected to Terminals **B** and **R**) enables the use of a mechanical "fail safe" brake as a holding brake, applying it *after* the CHIPPER-STOPPER electronic brake cycle is completed. In the event of a power failure, the mechanical brake will be applied immediately.

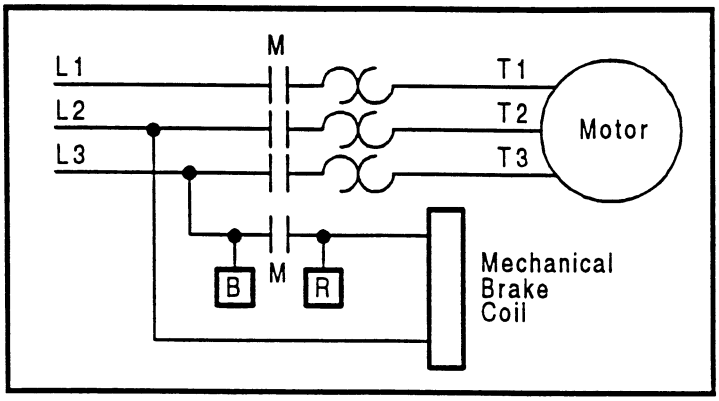


Figure 6.6 Option -BR

6.7 Option -R (Braking using 3 motor windings)

This option is not available with the Chipper-Stopper.

6.8 Option -Y (Early brake timeout)

This option allows the brake cycle to be shortened (terminated prematurely before the internal timer times out) by connecting a dry contact or switch across Terminals **Y** and **Z**. Closure of the switch or contact causes immediate termination of the braking cycle.

This option is often used on high inertia loads in conjunction with a zero speed switch to minimize motor heating.

6.9 Option -XNJ (Use with Drum-Switch Control)

In any drum-switch application, power to the motor must be fully locked out during a brake cycle. This option is not required if the existing starter already includes a contactor with a similar function. In this case, use a standard CHIPPER-STOPPER with **Option -W.**

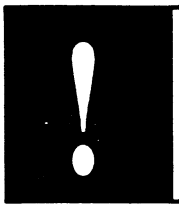
7. ADJUSTMENTS

7.1 Description of the Adjustments

Adjustable **Torque** and **Time** controls are provided on the CHIPPER-STOPPER. They determine the amount of braking power (**Torque**) applied to the motor and the length of time this power is applied (**Time**). Standard maximum **Time** is 5 minutes.

The **Torque** control is a single turn potentiometer, which can be set with a screwdriver. (An insulated screwdriver is recommended.) It is at minimum when turned fully counter-clockwise. Do not force the adjustment past the end stop!

Once set for a particular application, the controls should not have to be re-adjusted.



WITH HIGH TORQUE SETTINGS, THIS BRAKE CAN LOOSEN TOOLS BY RAPID STOPPING. SEE SEC. 3

7.2 Setting the Adjustments

1. Set **Time** control to mid-range.
2. Set **Torque** control to minimum (Full Counter clockwise)
3. Turn main power ON.
4. Turn motor ON. After full speed is reached, turn motor OFF.
5. Adjust **Torque** control in 1/8 turn steps to reach desired safe braking rate. Braking action is indicated by a slight hum from the motor.
6. Adjust **Time** control so that braking hum stops soon after motor stops.
7. Repeat steps 4 to 6 above until a satisfactory stopping time is reached. The maximum tolerable stopping time should be used.

When the motor reaches its equilibrium temperature, the winding resistance will increase. This may require a longer application of braking current. Therefore, set the **Time** control either with the motor hot, or so as to "hang on" for about a second after stopping a cold motor. Line voltage variations will also cause changes in **Torque**, requiring re-adjustment of the controls.

Applying the brake for a longer time than is necessary serves only to increase motor heating.

8. HOW THE CHIPPER-STOPPER WORKS

8.1 Basic Concept

The principle used by the CHIPPER-STOPPER to achieve braking is the injection of a controlled amount of DC (Direct Current) into an AC motor. The DC current in the motor stator sets up a stationary magnetic field in which the rotor is turning. The interaction between the rotor and this magnetic field tries to align the rotor with the field. Thus the CHIPPER-STOPPER actually drives the rotor to zero speed.

Retarding torque is proportional to the field strength, and hence to the braking current. By varying the braking current, the braking strength (torque) can be set.

8.2 Operation

When any START button is depressed, the motor will start instantly, provided a brake cycle is not in progress. When the motor starts, the presence of AC on the motor is detected by the CHIPPER-STOPPER and the brake is primed.

When the STOP button is depressed and the starter contactor is released, AC is no longer detected at the motor. After a short delay, the CHIPPER-STOPPER will activate, beginning the brake cycle.

The length of the brake cycle is determined by the **Time** control and the amount of braking is determined by the **Torque** control.

If during the run to brake transition, Terminals **A** and **B** (Option **-BD**) are found to be open, the brake will not activate and the motor will coast to a stop.

9. IF YOU HAVE A PROBLEM

No adjustments are provided or required other than those described in Section 7.1.

9.1 Checks and Verifications

If there is a problem on initial installation, or if the brake should fail to function properly, the following checks should be made:

A. Check that **Time** and **Torque** controls are set properly, and are not at minimum.

B. Check that any options, such as **-W**, **-BD** are correctly wired, and are operated from the proper type of auxiliary contacts.

C. Verify that the CHIPPER-STOPPER rated motor voltage is present at Terminals **5** and **6** WHEN THE MOTOR RUNS. If there is NO voltage at Terminals **5** and **6** with the motor running, the unit is installed incorrectly.

D. Verify that there is normal line voltage (CHIPPER-STOPPER rated voltage) across Terminals **1** and **2**, and that there is 120 volts at the output of the control transformer in the CHIPPER-STOPPER if one is present. Lack of voltage at these places may indicate a blown line fuse. If the line fuses blow at high torque settings, the brake should be removed from the motor line and operated from a separate fused disconnect.

WARNING

Turn Power Off Before Proceeding

Check for blown fuses in the supply line and in the CHIPPER-STOPPER.

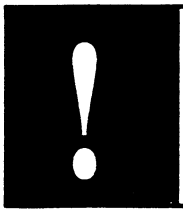
Possible reasons for blown fuses are:

A. The **Interlock** is not operating properly. The most likely cause is that it is wired wrong, or NOT AT ALL!

P Overloading of the CHIPPER-STOPPER. Replace fuses, and try operating at low braking torque. If fuses do not blow until torque is turned up, the CHIPPER-STOPPER chosen was probably too small for the application.

C. Power factor capacitors, if used, MUST NOT be across the load.

Fuses in the CHIPPER-STOPPER are designed to protect the internal components. They are of a special fast-acting semiconductor protecting type, and MUST be replaced with the same type of equal current rating.



THE USE OF INCORRECT REPLACEMENT FUSES WILL VOID THE WARRANTY, AND MAY RESULT IN FURTHER DAMAGE TO THE EQUIPMENT.

D. Check for open **Interlock** circuit (if starter will not engage).

E. Check for continuity between Terminals **3** and **4**. If there is no continuity, then there is trouble with the interlock circuit. The most likely reason is that power has been put directly across Terminals **3** and **4**, instead of in series with the starter coil(s).

9.2 Before Returning ANY Unit to the Factory:

1. Measure and record the voltage across Terminals **1** and **2**. (Power Input).

2. Measure and record the voltage across Terminals **5** and **6**, with motor running.

3. Record motor operating voltage and current as well as nameplate horsepower and phase.

4. REQUEST PERMISSION FOR THE RETURN, specifying all the above, plus the type of application or use. Be sure to supply the unit Serial Number, Model Number, and to list all options provided.

5. PACK THE UNIT CAREFULLY, so that there will be no damage during shipment.

6. Be sure to include your name, address, telephone number, Purchase Order number and the address to which the repaired unit is to be sent.

7. When returning any unit, include a brief description of the problem, as well as the results of any other tests you have made.

10. LIMITED WARRANTY

Each CHIPPER-STOPPER is warranted by the factory for one year to be free from defects in materials and workmanship.

Repairs (or replacement at our discretion) will be made at the factory, on products which are returned, freight prepaid, to the factory after authorization for return is granted.

The warranty is VOID if the unit has been tampered with; if fuses of an incorrect type or rating have been used; if power has been incorrectly applied to the interlock Terminals **3** and **4**, or for any other type of misuse.

Aside from the above statement of warranty, AMBI-TECH INDUSTRIES, Inc., its agents, employees, dealers and distributors assume NO LIABILITY, AND SPECIFICALLY assume NO LIABILITY FOR ANY CONSEQUENTIAL DAMAGE due to malfunction, failure to function, improper application, or improper operation of these products.

No allowance can be made for removal or installation costs, machine down-time, transportation, etc.

THE USER ASSUMES FULL APPLICATION RESPONSIBILITY.

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