

jobber Plus e-Cam
Variable Speed Supplement



December 1, 2000

**METAL
TECH
CONTROLS CORP.**

7355 Utilities Road - Punta Gorda, FL 33982

Phone 800-516-5516 Fax 888-731-8725

Table of Contents

Jumpers	3
Direction of Rotation	3
Mounting The jobber Plus	3
E-Cam Installation	3
Installation Instructions	3
Palm Buttons	4
Air Pressure Switches	4
Grounding	4
Dual Solenoid	4
Programming	4
E-Cam Programming	5
Variable Speed Machines:	8
Adjusting TDC	9
Optional Lubricator Output	11
Stop Time Test	12
Adjusting the STOP MAX	12
Setting and Adjusting Lost Motion Detection	12
Controller Board Layout	13
DC Voltage I/O Wiring Diagram	14
Wiring Terminal Diagram	15
110/220 Volt AC Wiring Diagram	16
Diagnostics	17
Inputs by number *	17
Encoder Diagnostics	18

Blank

Installation Instructions

If you follow this step by step procedure, you will find that installing the **jobber Plus e-Cam** is easier than any other punch press control on the market.

Jumpers

{1} Do NOT remove any of the factory installed jumpers until the control is installed and functioning without any additional components. i.e. Light Curtains, Foot Switches, Remote Top Stop or E-Stop buttons, Tonnage Monitors, Die Protection, etc. In this way you know that the control is operating properly before you add additional components. You can pull the necessary wires for these additional components, but don't hook them up until the machine is operating properly without them. When adding them, do so one at a time, testing the machine and the control's operation after each one is wired.

Direction of Rotation

{2} Determine the machine's direction of rotation , CW or CCW. You will need this information later during the installation process. Rotation is determined by facing the front surface of the E-Cam chain sprocket.

{3} Move the ram to TDC (top dead center).

Mounting The jobber Plus

{4} Determine where on the machine you want to mount the **jobber Plus**. Always mount the control so that the control is easily accessible to the operator and easy to view the display. Use the shock mounts supplied with the control. **Failure to shock mount the jobber Plus will void the warranty!**

Mounting brackets are available for both side mounting and for mounting from the rear of the control.

E-Cam Installation

{5} With the machine **positioned at TDC** install the E-CAM. Be certain that the drive chain and sprockets are secure and aligned properly. Do NOT load the E-CAM drive shaft. There should be some slack in the chain so that the bearings are not overloaded. The E-CAM is supplied pre-wired from the factory with a 12 foot long cable and connectors (longer length cables are available). Do not, under any circumstances remove the E-CAM cover or alter the wiring in any way. **Doing so will void the warranty!** Connect the E-CAM cable to the control. Make sure the connectors are tightened properly.

Palm Buttons

{6} Wire the operator palm buttons to the control. **NOTE: All inputs to the blue terminals are 12 vdc.** Terminals labeled No. 21 are 12 vdc positive and should be used for dc voltage inputs. The palm button inputs require a normally open contact for each palm button and a normally closed contact. (The normally closed contacts are wired in series).

Air Pressure Switches

{7} Wire the air pressure switches. Again using 12 vdc - No. 21 to the switch's normally open (held closed) contacts and back to the air pressure input #14. If there is a pressure switch for a counter balance, wire that to input #15 otherwise jumper #15 to #21.

Remember: Do not remove any of the jumpers from the user side of the wire terminals until the control has been tested and is working properly.

Grounding

{8} Connect the supply line voltage; 110 volt positive should be connected to the tan fuse block, the common is wired to orange terminal #3. A separate ground wire should be connected to the orange and green ground wire terminal. The **machine MUST have a true earth ground and the control transformer must be grounded to the machine.**

Dual Solenoid

{9} Connect the dual solenoid coils to terminal Nos. 4 and 5 for the load side (**NOTE!! You MUST wire both coils separately**) use terminal #2 for the common coil connection.

Double check the wiring. Turn the power on with the fuse block open. Check for proper voltage. Close the fuse block, turn the key to 'ON'. If it does not come on check the fuse and wiring.

If you have not removed any of the jumpers from the user side of the terminals the control should come on and be ready for setting up the E-CAM.

Programming

{10} Programming the machine setup is done from a special setup menu. To get to this menu, turn the On/Off Key Switch to OFF, toggle the switch located on the top controller board and then turn the Key to ON. The following menu will appear.

PROGRAM SWITCH = EXIT
SET TDC<--- STOP TEST
EDIT TDC EDIT STOP
LUBE MOTION

Machine Program Screen

To move through the menu press the Top-Stop button (here after referred to as TS). Each time you press the TS button the selector arrow will move to the next function. To select a function for further action, move the arrow to the desired function and press the Continuous Arm button (here after referred to as CA). A new function menu will appear with it's own instructions.

E-Cam Programming

{11} Programming the E-CAM for machine operation. This function is used to program the machine's top dead center, direction of rotation and top stop settings. It also allows you to test the machine for proper stopping at TDC. If it is a variable speed machine, you will be prompted to program cam settings for the machine's speed ranges.

THE MACHINE MUST BE AT IT'S TDC POSITION TO PERFORM THIS FUNCTION!

Place the Arrow on SET TDC and press CA. The following menu will appear. Choose the direction that the machine rotates, clock wise or counter clock wise.

ROTATION SETTING CCW
Select Rotation Dir

TS=CWise CA=CCWise

You select the correct rotation by pressing the TS or CA button. **Note:** Direction of rotation is determined by facing the front of the E-Cam and looking at the chain sprocket. Once the selection has been made the screen will display "Ctr Clock Saved" or "Clock Wise Saved". A new screen will appear advising you that the ram must be at TDC.

TDC POSITION SETUP
Ram must be at TDC
Press E_STOP when OK
to complete setup.

Press the E-Stop button to confirm that the machine is at TDC. A message advising that the TDC cam setting has been saved will be displayed.

The next menu that appears will ask you if the machine is a single or if it is a variable speed machine. (Has an adjustable speed range)

MACHINE SPEED TYPE
Make Selection
TS=Single Speed
CA=Variable Speed

Press the appropriate switch to make your selection.

SINGLE SPEED SETUP

If you selected “Single Speed” you will be asked to cycle the machine for a number of times until the control has determined that the machine is stopping within 5 degrees of TDC.

**Cycle machine until
it stops at Mach TDC
PRESS PALM BUTTONS
HOLD UNTIL PRESS TDC**

Because of limited space on the display instructions are sometimes truncated to fit the screen. The display above is asking you to cycle the machine by pressing the palm buttons and holding them until the machine attempts to stop at TDC. When it stops, the display will show the angular position in degrees.

Mach. Pos. Angle 008
**PRESS PALM BUTTONS
HOLD UNTIL PRESS TDC**

You will be required to repeat cycling the machine until the control is satisfied that it is stopping within 5 degrees of TDC. The control determines the correct stopping angle by mathematical calculations.

**Mach. Pos. Angle 008
Stop angle is within
5 degrees of TDC
CYCLE AGAIN TO TEST**

Once it is satisfied you may be asked to cycle the machine four more times to confirm it is indeed stopping within the limits.

**TDC stop angle has
been determined for
machine speed #1
RELEASE E-STOP TO SAVE**

The stopping angle test for a single speed machine has been determined. Release the E-Stop push button to save the settings to memory.

**SPEED SETTING No. 1
HAS BEEN SAVED**

The above screen will be displayed confirming that the settings have been saved.

Variable Speed Machines:

The controller requires 4 speed tests for variable speed machines. You will need to divide the machine's speed range into four parts - slowest speed, highest speed and two speeds in the middle. You do not need to know the actual SPM (strokes per minute) If the machine has a SPM or RPM indicator then write down the speed settings:

EXAMPLE: Low speed - 40 SPM, 2nd speed - 60 SPM, third speed - 90 SPM, highest speed - 120 SPM.

If you do not have a digital speed readout, mark the dial for the lowest speed, the 2nd speed, the third speed, and the highest speed. When changing from one speed to the next, simply move the dial to the next speed mark and follow the instructions.

Start with the slowest speed setting. The machine **MUST BE AT TDC!** Do exactly as described previously for single speed machines for the first variable speed (slowest speed).

Once the slowest speed has been entered the following screen will appear.

**Set the motor for next
speed setup. No. 2
Press E-STOP when OK
to continue setup.**

Change the machine's speed to the next speed setting. (Second speed)

**SPEED SETUP FOR No. 2

READY
PRESS PALM BUTTONS**

Just as with the first (slowest setting) done previously, cycle the machine until the control determines the proper stopping angle.

You will be asked to prepare for the next two speeds by increasing the machine's speed to the third and fourth speed range until all four settings are determined.

**MACHINE SPEED SET UP
COMPLETED
RELEASE E-STOP**

Adjusting TDC

{12} **There** may be times when you will need to make adjustments to the stop angle factor programmed into the Jobber Plus E-Cam. But before you do, answer these questions:

Did you check to see if you have the proper counter balance pressure set? Proper counter balance pressure improves your stopping time and therefore the stopping angle can be more accurate. It also reduces the wear on the clutch and brake.

Have you gotten machine stop time errors? If so you probably need to perform maintenance on the machine's clutch and or brake or - your counter balance pressures are not set correctly.

Have you had to change the stop time setting that was determined in the machine's initial setup? If you had to change the stop time settings the cause is in the clutch/brake or improper counter balance air pressures.

To make adjustment to a single speed machine follow the instructions from the E-CAM programming section to get to the programming menu.

PROGRAM SWITCH	=EXIT
SET TDC	STOP TEST
EDIT TDC<---	EDIT STOP
LUBE	MOTION

Position the arrow on EDIT TDC and press CA (continuous arm button)

TO ADJUST TOP STOP
PRESS E-STOP NOW

Press the E-Stop button.

ADJUSTING ACTS # 1
Cont Arm=+ T-Stop=-
Top Stop Offset 289
RELEASE E-STOP TO SAVE

Use CA to increase the angle or use TS to decrease the value. Once the value has been change to your satisfaction, release the E-Stop button to save the new setting.

WARNING: You cannot set the stop angle less then 212 degrees. It will not show but any setting below 212 degrees is automatically reset to 212 degrees. If the machine is taking this long to stop, it is unsafe and should be repaired!

NEW OFFSET SAVED

VARIABLE SPEED MACHINES:

The Jobber Plus E-Cam version provides automatically compensated top stop, “ACTS”. ACTS is only available when the user has selected VARIABLE SPEED from the machine setup menu.

When you entered the four speed ranges during the initial machine setup the control automatically created a speed table by inserting additional angle settings between the four speed ranges, creating a total of seven speed ranges. These seven angle settings can be adjusted in the same way as for a single speed machine. For variable speed machines the following menu will appear after setting the first speed range.

PRESS E-STOP - NEXT

Display after pressing E-Stop:

ADJUSTING ACTS # 2
Cont Arm=+ T-Stop=-
Top Stop Offset 296
RELEASE E-STOP TO SAVE

Optional Lubricator Output

A optional single pole double throw (SPDT) relay is provided for timed lubricator output. The output can provide lubrication based on a pre-programmed number of strokes and the duration of the lubrication cycle can also be programmed. The maximum settings are 300 strokes and 30 seconds. If you program in more than these limits, the control will change them to the default maximum settings.

Programming the Lubricator Output:

It is not often that lubrication settings need to be changed. Therefore the manner in which programming is done has been made as easy as possible while using machine function push buttons to accomplish the programming task.

You can only program one function at a time. After programming one of the functions you must start over again to program the next setting.

1. Turn the **ON/OFF** switch to OFF.
2. Toggle the switch located on top of the controller board.
3. Using the TS button move the arrow to LUBE press the CA button.

PROGRAM SWITCH	=EXIT
SET TDC	STOP TEST
EDIT TDC	EDIT STOP
LUBE<---	MOTION

Press the TS button to change the strokes between lubrication cycles.

Press the CA button to change the lubrication cycle time.

The LCD will display the previous setting. To increment the setting, press the CA button. To decrease the setting, press the TS button.

To save the new setting, release the E-Stop button.

If you made a mistake or changed your mind, turn the **ON/OFF** switch to OFF. {Do not release the Emergency Stop push button.} The setting will be unchanged from the original setting.

Continue following the displayed instructions, adjusting the speed ranges your require. When you are finished the display will return to the setup menu.

PROGRAM SWITCH	=EXIT
SET TDC	STOP TEST
EDIT TDC<---	EDIT STOP
LUBE	MOTION

Stop Time Test

{13} This function performs a stop time test at 90 degrees of the machines stroke for determining the worst case stop time. It is advisable to mount your heaviest upper die to the ram for the most accurate test. Make sure the machine is at TDC, then select STOP TEST. Follow the instructions on the screen, you will make 10 strokes. Each time the machine will be stopped at 90 degrees. When the test is completed the stop time is averaged and the maximum averaged stop time will be stored in EEPROM for reference each time the machine's ram is stopped. If the stop time should exceed this parameter a STOP-TIME ERROR will be displayed and the machine will have to be reset. If this occurs it is an indication that the stopping time of the machine is erratic and the clutch/brake system should be serviced.

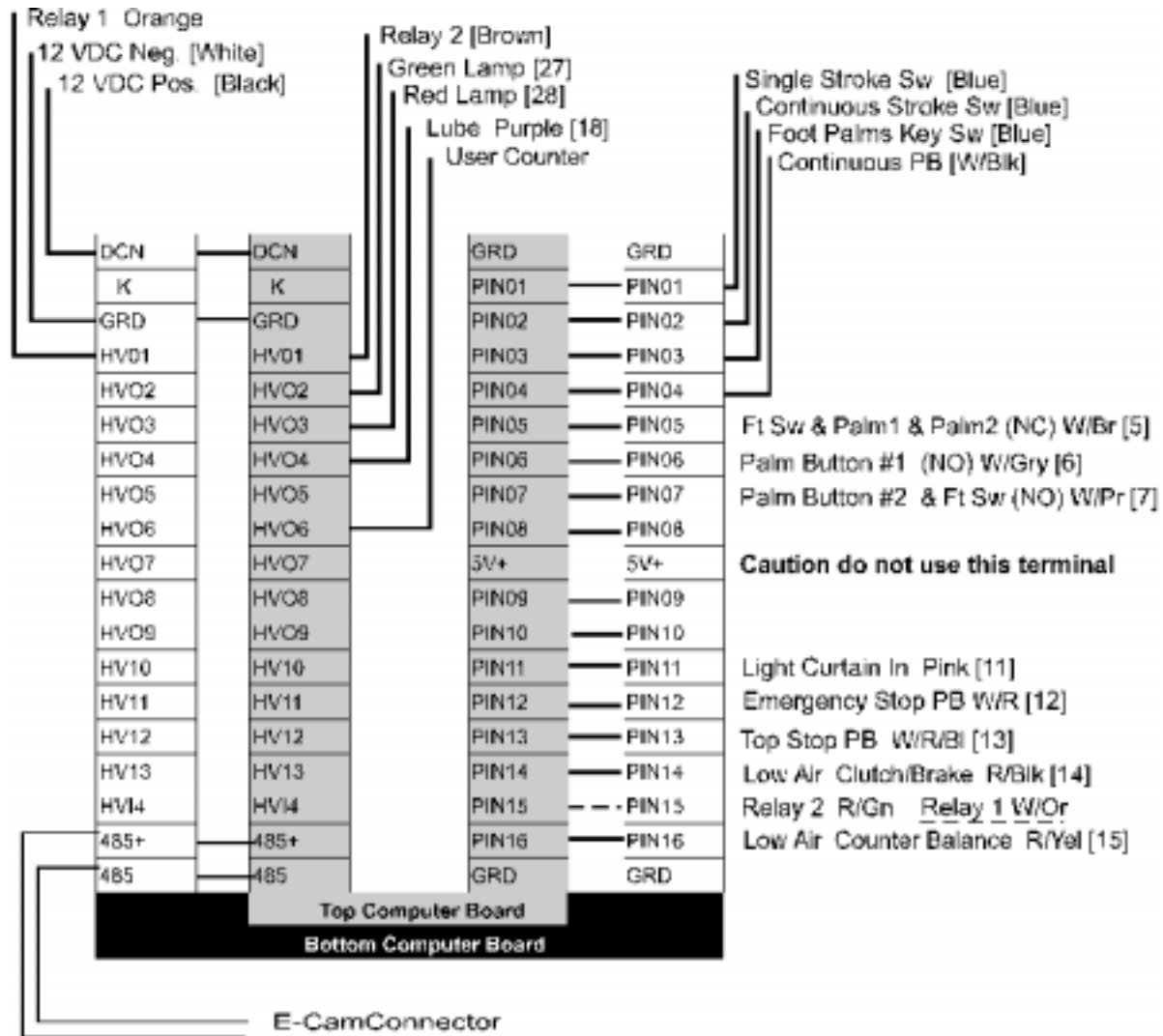
Adjusting the STOP MAX

{14} If after operating the machine you find that the stopping time is higher than determined by the test (usually caused by the normal heating of the brake lining during use), you can adjust the setting by entering the SETUP menu as previously described and selecting function EDIT STOP. A new screen will appear. Follow the instructions, use the CA and TS buttons to advance or decrease the STOP setting. Save the new setting to EEPROM as instructed.

Setting and Adjusting Lost Motion Detection

{15} The lost motion function is used to determine if the E-CAM is functioning properly. E-CAM failures can have several causes. A broken chain drive. A chain sprocket could be slipping or the cable and even the E-Cam itself could be defective.

The reason the lost motion time can be programmed is because every machine has some delay before it starts moving after the press is initiated. Obviously the quicker any of these errors are detected the safer the machine will be. If the factory default of 350 milliseconds causes lost motion faults. Try setting the time to 450 milliseconds. Test cycle the machine several times. If there are no lost motion errors, reduce the time by half. If there is a lost motion error, increase the time by half and test cycle the machine. Continue until you obtain the lowest possible setting without causing a lost motion error.

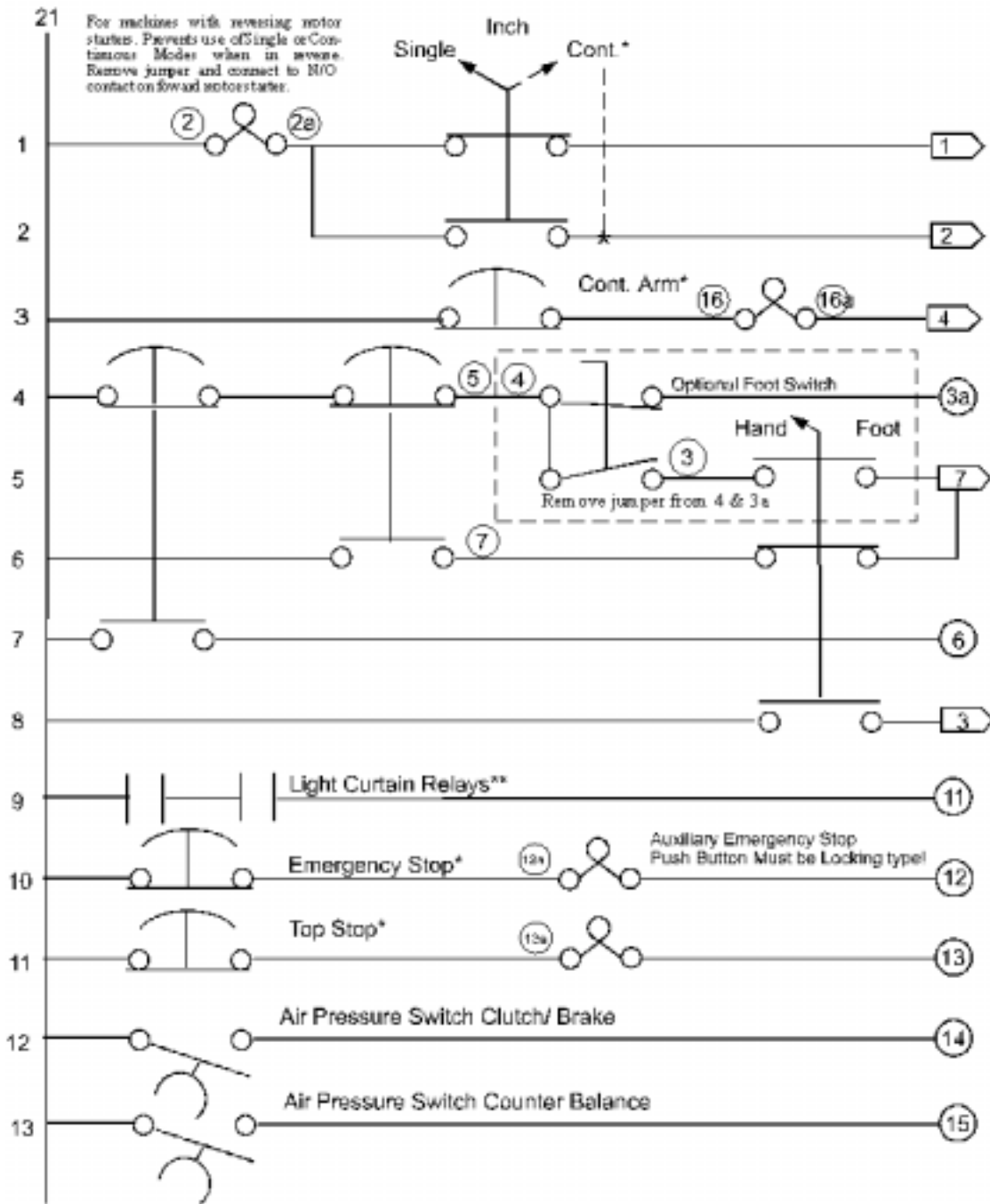


[xx] = Terminal number

Controller Board Layout

DC Voltage I/O Wiring Diagram

12vdc Pos.



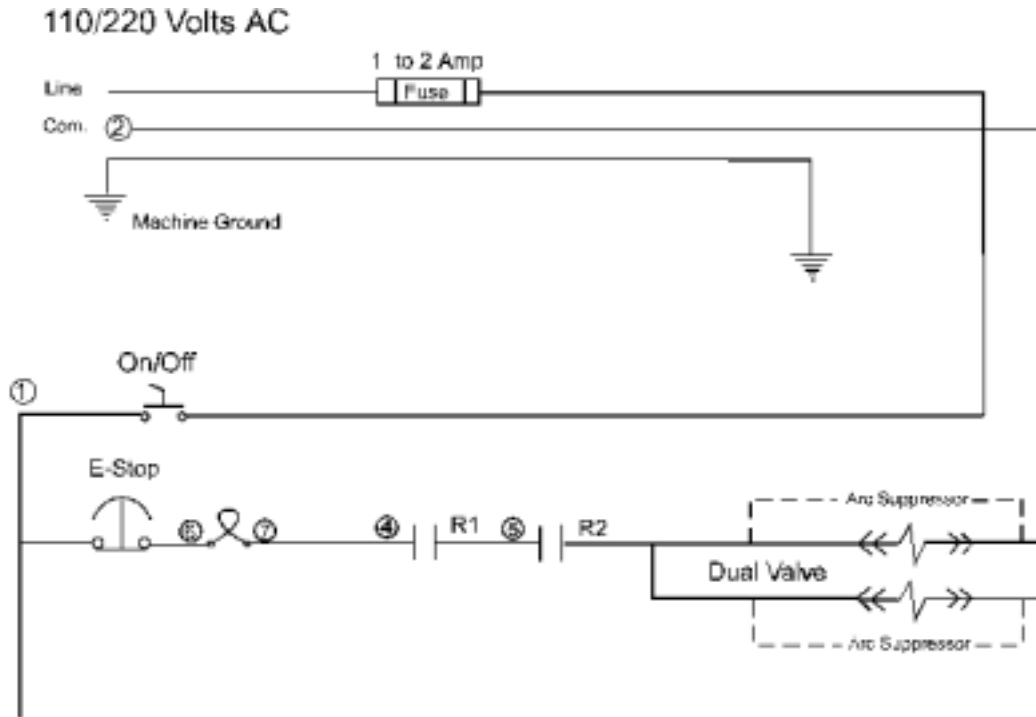
*Panel Mounted

**If no light curtains jumper to 21

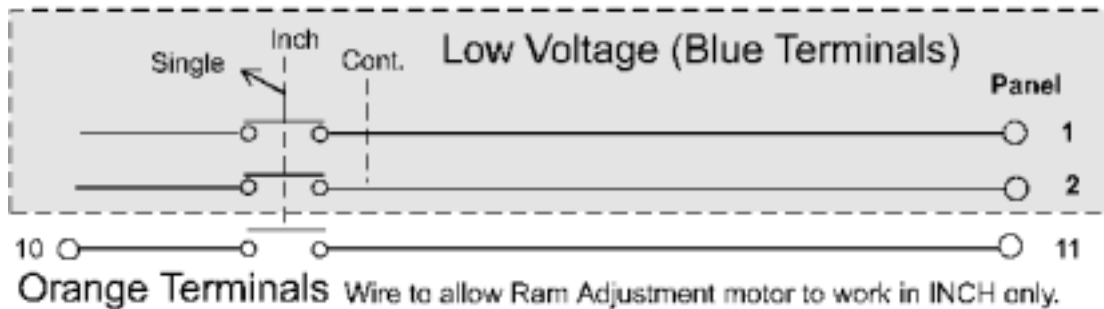
Denotes Board Terminal 
 Denotes Blue Terminal Strip 

JPP W5

110/220 Volt AC Wiring Diagram



OPTIONAL: Ram Adjust Switch Circuit



Diagnostics

A method of viewing the state of inputs is provided for trouble shooting and diagnostics. To turn 'ON' the diagnostic screen the control must be in Inch Mode. Toggle the switch located on the top controller board.

CAUTION: Use of the diagnostic screen functions slow the processor down. This function should only be used to test the machine's inputs. Turn the function off to run the machine in INCH for normal use.

INPUTS	1=ON	0=OFF
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6		
0 0 0 1 0 0 1 1 0 1 0 1 0 1 1 0		
ENCODER HOLD CA & TS		

The inputs, 1 through 16 are shown on the second line. The state of the input is indicated by a '1' or '0' on the third line. A '1' indicates that the input is on and a '0' indicates that the input is off.

Inputs by number *

Control Board

1. Single Stroke Key Switch Contact
2. Continuous Stroke Key Switch Contact
3. Foot/Palm Key Selector Switch
4. Continuous Arm Push Button
5. Palm Button 1 & 2 N/C Circuit
6. Palm Button #1
7. Palm Button #2
- 8.
- 9.
- 10.
11. Light Curtain
12. Emergency Stop Push Button (Low Voltage Side)
13. Top Stop Push Button
14. Low Air Pressure Switch (Clutch/Brake)
15. Low Air Pressure Switch (Counter Balance)
16. Dual Valve Relay Contact Monitor

* Input numbers are controller board terminal inputs marked PIN01-16

Encoder Diagnostics

ENCODER DIAGNOSTICS				
TLS L		TLS T		DWE
	INIT		STOP	
340	340	070	035	090

To access the encoder diagnostic screen hold down the CA button and then press the TS button. The above screen will appear.

TLS L is Top Stop Limit Switch leading edge. **TLS T** is the trailing edge. The two make up the electronic dwell of the Top Limit Switch Functions. **DWE** is the dwell in degrees. **INIT** is the position in degrees when the controller sent the stop signal to the machine. **STOP** is the degree position where the machine came to a full stop.

By holding in the palm buttons, cycle the machine until it stops at the top of the stroke. Release the buttons and then read the display. (The **STOP** position is not displayed until the buttons are released) The difference between the **INIT** degree subtracted from 360 plus the **STOP** degree reading is how far the machine travelled in degrees. ($360-340=20+35=55$) in the above example the machine took 55 degrees to come to a stop. Keep in mind that distance travelled is not necessarily a function of the stop time in milliseconds. A 160 strokes per minute press will travel 55 degrees in a lot less time than a machine doing 60 SPM. If you find that the machine is travelling an excessive distance before stopping you should consider adjusting and or rebuilding the clutch and brake. Another possibility is the dual air valve. If it is not sized properly or the exhaust port is restricted the machine will be slow to stop.

A press should stop in less than 45 degrees otherwise the machine is being stressed and could be unsafe.

Other Diagnostic Error Messages:

Whenever an error occurs, the red indicator light will come on and an error message along with a helpful hint as to how to find the cause of the error will be displayed. There will be times when an error occurs and is cleared so rapidly that the error message is replaced by the next appropriate message i.e. SINGLE STROKE MODE This is caused by the extremely fast scan time of the processors. To help with this situation a special diagnostic tool is provided. Each time an error occurs the message is stored in the controller's memory. You can access this message by pressing the Top-Stop button while the machine is idle. Do not turn the power off before reading the message. If you do, you will get the message POWER FAILURE, which was the last error to occur.

Blank