

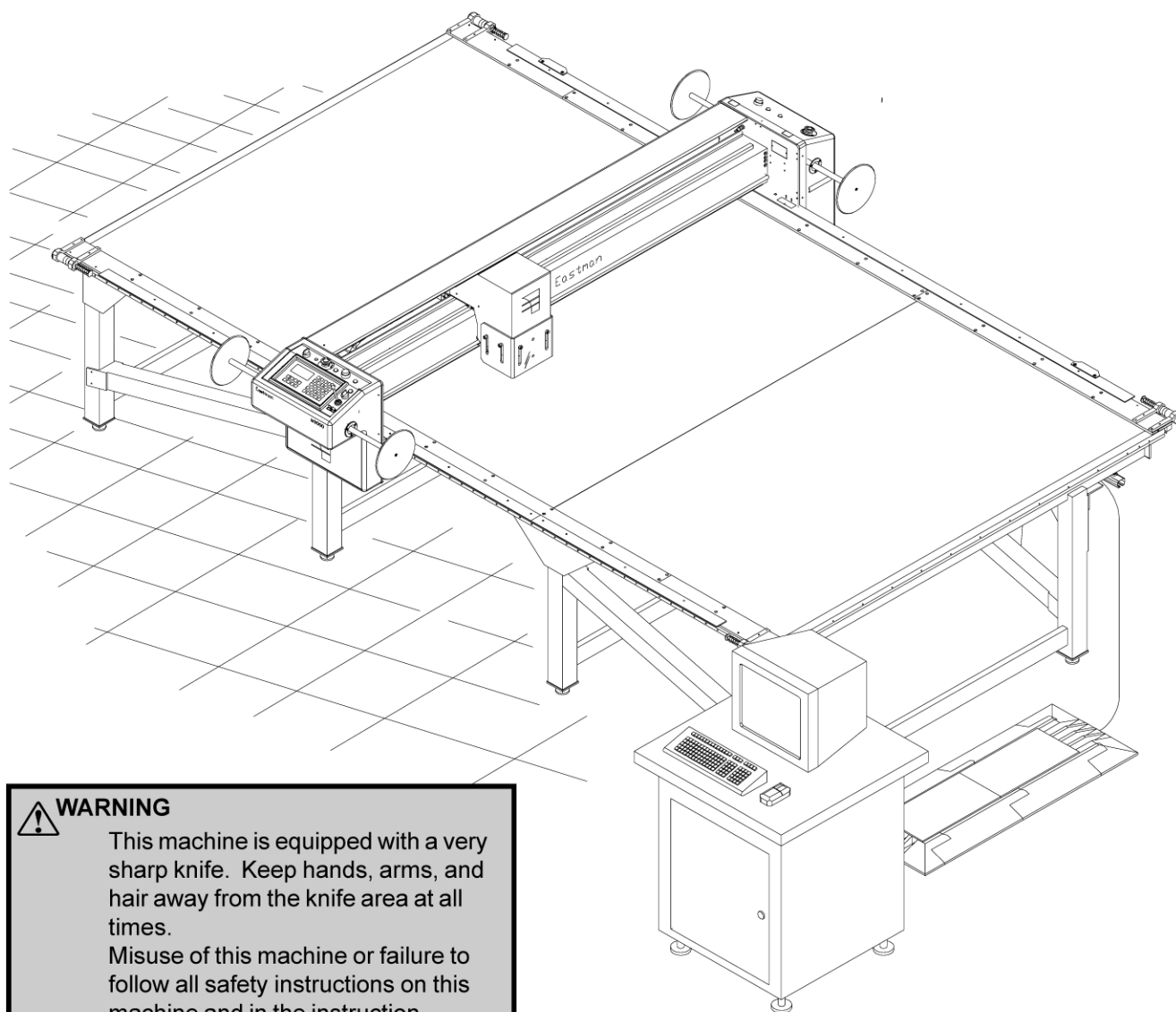
Eastman®

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**THE EASTMAN®  
M9000 Automatic Cutting System**

**Model: ETS-M9000**

**Instruction, Maintenance,  
& Service Manual**



**WARNING**

This machine is equipped with a very sharp knife. Keep hands, arms, and hair away from the knife area at all times.

Misuse of this machine or failure to follow all safety instructions on this machine and in the instruction manual may result in serious personal injuries.

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## Congratulations

Congratulations in selecting an Eastman M9000 Static Table. With over 100 years of experience in the cutting room, Eastman is a world leader in cutting equipment. Every Eastman employee takes pride in each machine we build and back it with unprecedented support. Our Technical Service department is made up of a dedicated staff of professionals with years of experience installing, troubleshooting and servicing the M9000 static table. Each technician is familiar with all aspects of the machine including mechanical, electrical and software.

Eastman Machine Company provides technical phone support and on-site service as required. We offer several affordable Extended Warranty plans that allows you to continue the superior technical support well after the machine is past our standard warranty. If you require on-site technical support or would like to schedule additional training, please call our headquarters in Buffalo NY to arrange for a technician.

### Technical Support:

Eastman Machine Company  
779 Washington Street  
Buffalo, NY 14203  
United State of America  
Phone: 716-856-2200  
Fax: 716-856-2068

**Limited Warranty.** Eastman warrants to the buyer that the equipment shall be free from defects in materials or workmanship for a period of 180 days commencing on the date of invoice. Any goods or parts claimed by the buyer to be defective must be returned to Eastman, freight charges prepaid, within the 180 day warranty period. If Eastman determines that the goods or parts are defective in materials or workmanship, Eastman's sole obligation under this warranty shall be, at Eastman's sole option, to repair or replace the defective goods or parts or to provide the buyer a credit equal to the portion of the purchase price allocable to the defective goods or parts. This warranty shall not apply if defects are caused by product misuse or neglect, if the machine has been altered or modified by the buyer, or if other than genuine Eastman belts, emery wheels, knives or parts are used in the machine. THIS WARRANTY IS THE ONLY WARRANTY APPLICABLE TO THIS PURCHASE. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

**Limitation of Liability.** Eastman's liability to the buyer, and the buyer's remedies from Eastman, whether in contract, negligence, tort, under any warranty or otherwise, shall be limited to the remedies provided in the foregoing Limited Warranty. In no event shall Eastman have any responsibility or liability to the buyer for (a) any special, indirect, incidental, or consequential damages, including, but not limited to, loss of use, revenue, or profit, even if Eastman has been advised of the possibility of such damages, or (b) any claim against the buyer by any third party. The price stated for the product sold is a consideration for limiting Eastman's liability.

## IMPORTANT

The purchaser must instruct all operators on the proper use of the equipment. All standard industrial safety measures and equipment should be provided to protect the operator. Operators must be cautioned that improper or careless use of this equipment may cause personal injury. If you do not have qualified operators to instruct new persons, contact your Eastman sales representative or Eastman factory direct.

Disconnect electrical power source from before proceeding with any installation, adjustment or repair of the M9000 Automated Cutting System.

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- 10/30/03 - Initial Release of the M9000 manual
- 9/28/04 - Added Pnuematic Diagram 31-9000-19

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## Safety Information

### **WARNING**

A warning contains critical information regarding potential safety hazards that can occur during proper use or misuse of the machine. Failure to follow these procedures may result in serious personal injury to the user.

### **CAUTION**

A caution contains instructions for the use or maintenance of the machine. Failure to follow these procedures may result in damage to the machine. Supplementary information may be given in a Note.

#### Safety And Identification

During the life of the machine, the purchaser agrees to provide to all machine users (including its own employees and independent contractors) all relevant safety information, including warning labels and instruction manuals. The purchaser also agrees to maintain the safety features and working condition of the machine, and to adequately train all users in the safe use and maintenance of the machine. The purchaser agrees to defend, protect, indemnify, and hold Eastman Machine Company and its subsidiaries harmless from and against all claims, losses, expenses, damages, and liabilities to the extent that they have been caused by the purchaser's failure to comply with the terms and instructions of this manual.

### **General Safety Precautions**

#### **WARNING**

This machine is equipped with very sharp and dangerous tools. Keep hands, arms, and hair away from the cutting area and drive system at all times. Safety gloves, glasses, and appropriate clothing may prevent serious personal injuries. Disconnect all power sources to the machine when it is not in use or during routine maintenance, including cleaning and lubrication. The purchaser must instruct all operators in the proper use of the machine according to the instructions in this manual. This training must include instruction on the potential safety hazards arising from the use or misuse of the machine. In addition to such training, the purchaser should provide written work instructions as necessary to ensure correct use of the machine for specific cutting applications.

#### **WARNING**

The purchaser must provide appropriate safety measures and equipment as recommended in this manual. Observe all statutory requirements concerning the use of hazardous machinery that apply to your location.

Do not modify this machine or disable safety features. Unauthorized modification may result in serious personal injuries to the user. A qualified electrician, familiar with applicable codes and regulations, must make electrical connections to this machine.

Misuse of this machine or use of this machine as part of another machine may result in serious personal injuries to the user.

Safety labels must be kept clean and legible at all times. Call the Eastman Machine factory to order replacement labels.

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## ⚠CAUTION

Eastman Technology Systems equipment is not designed for use in conditions of extreme temperature or humidity. Operating this equipment in an environment outside the specified ranges may result in damage and will void the warranty.

Acceptable operating temperature range: 10°C to 35°C (50° to 95°F).

Acceptable operating humidity range: 20% to 80% (non-condensing).

Altitude: We anticipate that the system will operate within all specifications at an altitude up to 1000 m above mean sea level.

Transportation: During transportation and storage, the system is capable of withstanding ranges from -25°C to 55°C and for periods not exceeding 24 hrs. at up to +60°C.

Lifting/Moving: The lifting or moving of this system must be in accordance with the installation requirements. Failure to adhere to these installation requirements may cause injury to persons or hinderance or the machine performance.

Hearing protection devices are recommended for prolonged exposure to the noise.

## Electrical Component Specifications

### Specifications

	<b>Voltage</b>	<b>Current</b>	<b>Frequency</b>	<b># of phases</b>
<b>Computer</b>	120 VAC	6 Amp	50/60 Hz	Single
<b>Gantry E-box</b>	120 VAC	10 Amp	50/60 Hz	Single
<b>7-1/2 HP Blower</b>	230 VAC	17.4 Amp	50/60 Hz	Three
	440 VAC	9.0 Amp	50/60 Hz	Three
<b>Gantry</b>	120 VAC	1.2 Amp	50/60 Hz	Single
<b>Low Voltage Power Supply</b>	5/12 VDC	2/3 Amp	50/60 Hz	Single

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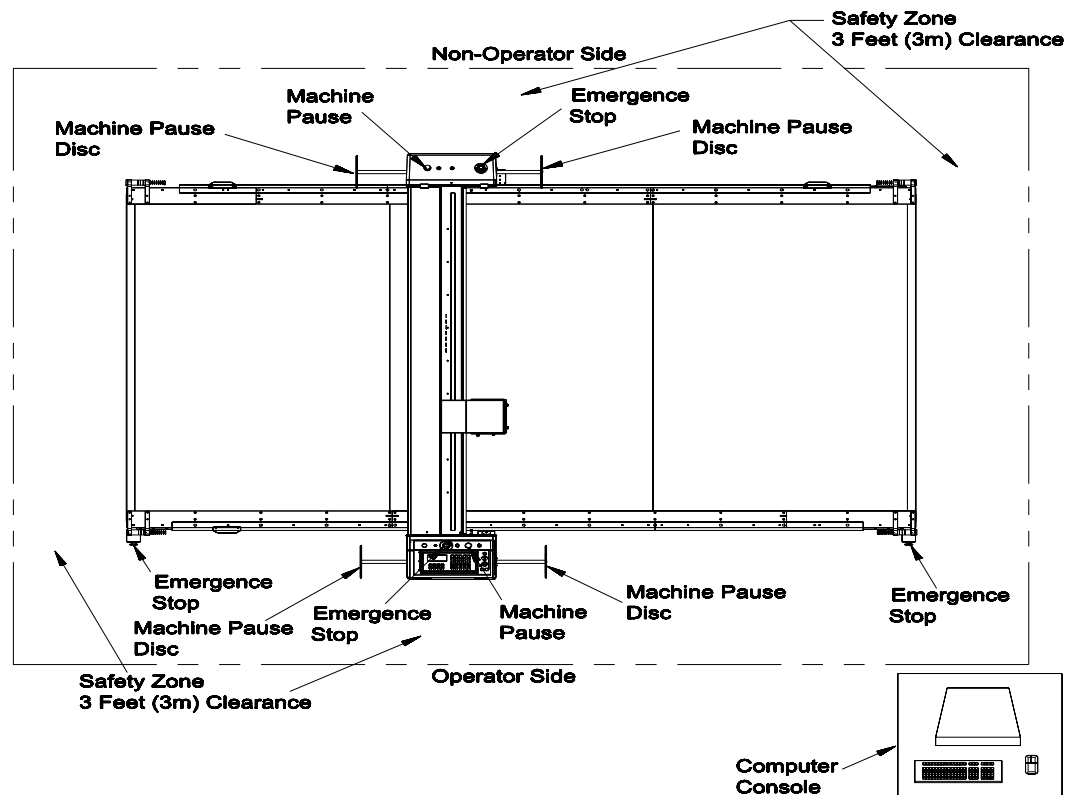
## Safety Zone and Stop Devices

### PAUSE Buttons/Disc

The yellow buttons above the control panel and on the non-operator side of the gantry as well as the pause discs on each side of the gantry will pause the machine. Activating either the button or the pause disc will execute a controlled stop of the plotter, with the machine remaining fully powered. After releasing the pause button or resetting the pause discs and pressing NEXT on the UIT keypad, the cutter will resume cutting the work in progress. Pressing ABORT will cancel the job.

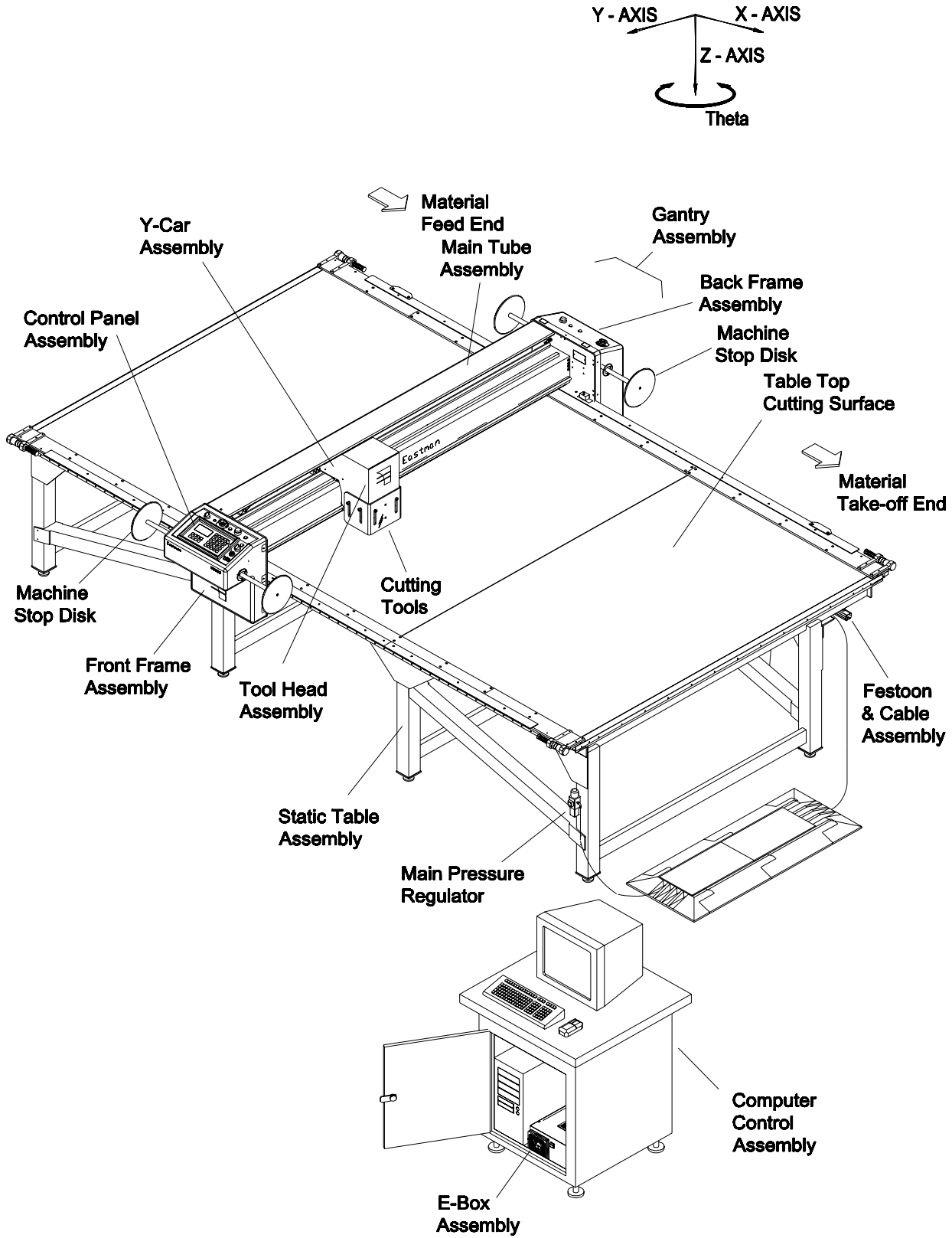
### EMERGENCY STOP Buttons

There are red Emergency Stop buttons located on each side of the gantry as well as on the operator side right and left ends of the table. Pressing any of the Emergency Stop buttons will execute a controlled stop of the gantry before cutting all power to the motors and e-box. To release an Emergency Stop condition, pull out the Stop button hit the ABORT key on the UIT keypad. The table must be re-homed by pressing the ZERO TABLE button before restarting the cutter. Emergency stop mats are also available as an option.



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## USER INTERFACE TERMINAL

The M9000 series Gantry is controlled by the UIT (User Interface Terminal) located on the operator side of the gantry. After plotting a marker file from the computer the UIT allows the user to operate the machine from the gantry. With it's push button keypad and four line LED display the operator can easily home the table, zero a panel or begin cutting a file. The LED display shows the current status of the cutter as well as any error messages.

Commands are sent to the plotter by pressing specific keys or key sequences on the UIT. Each key on the UIT has a function and up to two characters (note that not all keys have both a function and characters). The UIT can be set in one of three modes: *Function*, *Alt Left*, and *Alt Right*. On commands that require data entry following the pressing of a FUNCTION key the UIT will automatically set itself in either Alt Left or Alt Right in anticipation of the expected type of input. Alt modes can only be accessed during data entry.

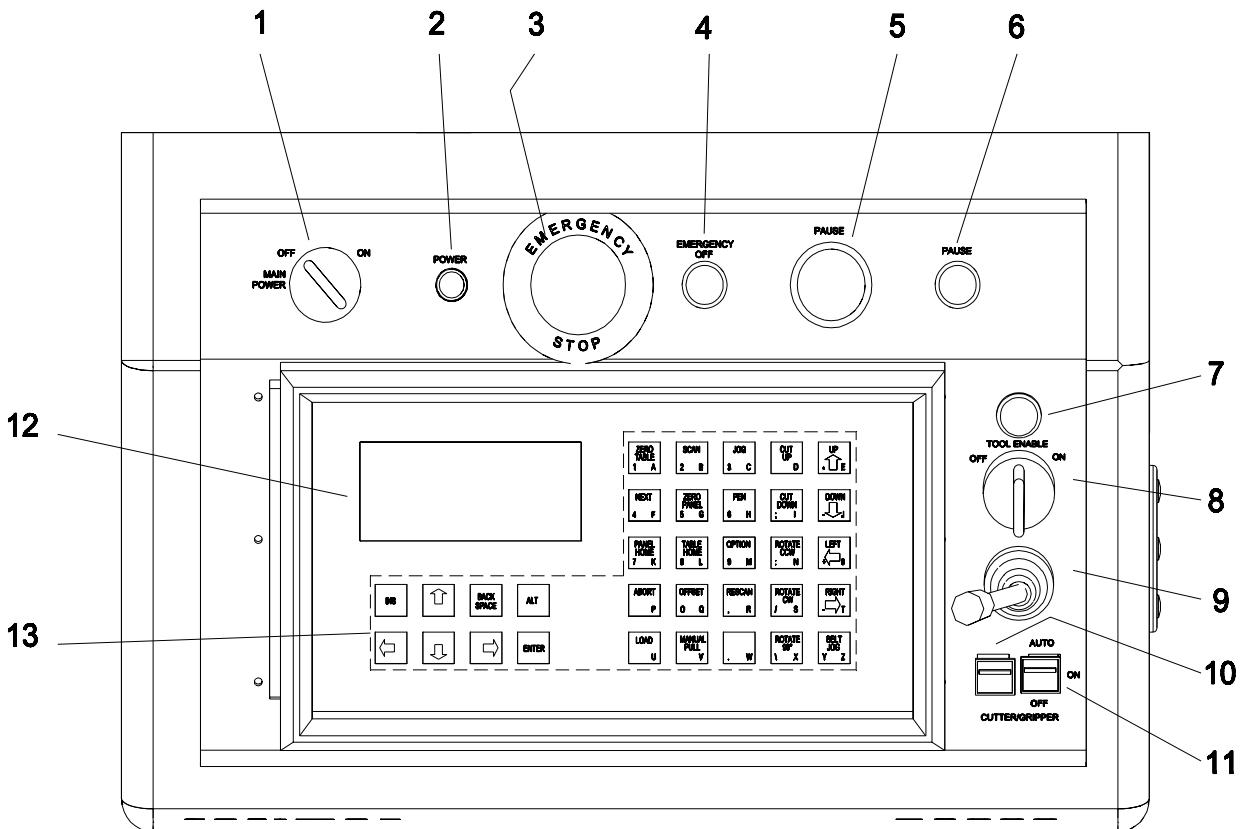
The commands are grouped as follows:

**Functions:** This is the default setting for the keypad. Pressing a key in this mode initiates the commands in bold face type at the top of a key. (e.g. <ZERO TABLE>)

**Alt Left:** Enables characters shown on the lower left side of a key during data entry.

**Alt Right:** Enables characters shown on the lower right side of a key during data entry.

Some commands require only one key to be pressed while other commands require multiple keystrokes and may sometimes prompt the operator for input.



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## UIT Controls:

- 1. Gantry Main Power Switch:** Turns the power to the gantry on or off.
- 2. Power Lamp:** Indicates if the gantry is on or off.
- 3. Emergency Stop Button:** When the Emergency Stop button is pressed the Gantry will decelerate to a stop and power will be cut to all axis of motion. The Stop Buttons are 12 VDC normally closed switches and are located on both the operator and non operator sides of the gantry as well as at each end of the machine. After releasing the emergency stop the gantry must be "Homed" before proceeding.
- 4. Emergency Stop Lamp:** Indicates if the Emergency Stop circuit is active. If the LED is lit, check each emergency stop button to make sure they are pulled out.
- 5. Pause Button:** The "Pause Buttons" are generally used to pause a cutting operation to clear material, make adjustments, inspect work, etc. Pausing the machine stops all axes of motion but does not cut power to the amplifiers. The servo motors are powered and maintain position. Yellow pause paddles are located on each side of the Gantry as well as pause buttons on the gantry and at each end of the machine. To resume cutting simply press the NEXT key on the gantry keypad and the program will resume where it left off.
- 6. Pause Lamp:** Indicates if the Pause circuit is active. If the LED is lit, check each of the pause buttons and paddles to make sure they are not active.
- 7. Tool Enable Lamp:** Shows if tool devices are enabled.
- 8. Tool Enable Switch:** Turns the tool head on and off and can be toggled at any time during machine operation. The tool head can be turned off to prevent the tools from coming down during test runs of a file.
- 9. Joystick:** The Joystick is used to jog the Gantry in the X or Y direction. A fast or slow jog speed can be selected using the jog button on the keypad. The gantry can only be jogged in either the X or Y direction at one time and is used to position the Gantry before zeroing the table.
- 10. EZ Pull Knife Switch:** The EZ Pull switch is used in conjunction with the EZ-Pull option for the M9000 table. (Reference the EZ-Pull manual if you have this option.)
- 11. EC3 Conveyor Switch:** The EC3 conveyor switch is used to lock the gantry to the cutting belt when jogging. This is used during calibration to insure the belt and gantry speeds are identical.
- 12. Display:** Is a four line 20 Character display used to communicate information between the machine and the operator. The display may request information from the operator as well as indicating current status and/or error codes.

### 13. Command Buttons:

Commands are sent to the plotter by pressing specific keys or key sequences on the UIT. Each key on the UIT has a function and can have up to two other characters related to that key (Note: not all keys have both a function and characters). The UIT can be set in one of three modes: **Function**, **Alt Left**, and **Alt Right**. On commands that require data entry following the pressing of a FUNCTION key the UIT will automatically set itself in either Alt Left or Alt Right in anticipation of the expected type of input. Alt modes can only be accessed during data entry.

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**The commands are grouped as follows:**

- Functions:** Default setting for UIT. Accesses the commands in bold face type at the top of a key.
- Alt Left:** Enables characters shown on the lower left side of a key during data entry.
- Alt Right:** Enables characters shown on the lower right side of a key during data entry.

Some commands require only one key to be pressed while other commands require multiple keystrokes and may prompt the operator for additional input.

**ABORT:** If running a cut file pressing the "ABORT" key causes the carriage to come to an immediate and controlled stop. Once stopped the UIT will prompt the operator to either press ABORT or NEXT. Pressing ABORT will exit from the current panel or motion. Pressing NEXT will continue the current panel or motion.

**ALT:** Toggles the current mode of the UIT. The ALT key is only active during data entry. Pressing the ALT key will toggle the UIT between ALT RIGHT and ALT LEFT to allow the user to access all alphanumeric characters on each of the keys. A left or right arrow in the upper right of the display shows the current mode.

**ALPHA-NUMERIC:** A thru Z. Active during data entry. Accessed by pressing ALT, LEFT or RIGHT.

**BACKSPACE:** Moves the cursor one position to the left when in data entry mode.

**CURSOR LEFT:** Moves the cursor one space to left and will erase the current character during data entry.

**CURSOR DOWN:** Not active.

**CURSOR RIGHT:** Not active.

**CURSOR UP:** Not active.

**CUT DOWN:** Drops the primary cutting tool to the cutting surface. This allows the operator to manual cut straight across the table using the "CUT DOWN" key and the joystick. If the cut direction is changed the tool will lift rotate and plunge to align the blade with the cut direction.

**CUT UP:** Lifts the primary cutter from the cutting surface. This key is used in conjunction with the "CUT DOWN" key when cutting manually.

**DOWN:** Jogs the gantry carriage in the negative Y-axis direction. (Towards the operator) The gantry carriage will move as long as the key is pressed or until the carriage encounters a limit switch. See "JOG" for speed change.

**ENTER:** Sends information from the UIT to the computer. It is only active during data entry mode.

**INS:** Not active

**JOG:** Toggles the carriage jog speed from fast to slow when using the joystick or jog keys. The high speed is the manual MOVE VELOCITY while the slow speed is the SLOW VELOCITY value in MACHINE.INI setting. When the program is first enabled the default slow manual move speed is set to MOVE VELOCITY from the MACHINE.INI file

**LEFT:** Jogs gantry to the negative X-axis direction. (To the operators left side) The gantry will move as long as the key is pressed or until the carriage encounters a soft limit. See "JOG" for speed change.


**LOAD:** Allows user to load a new CMD file from the UIT panel. After pressing LOAD the UIT will display the current file and prompt user for a new file name. Using the ALT mode the operator may then enter the new file name (.CMD extension need not be included) using a valid file in the current directory. When done typing the file name the user must press ENTER to accept the new file.

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- NEXT:** After zeroing the table the "NEXT" button is pressed to begin cutting, draw and or marking the current file plotted to the cutter. The first time "NEXT" is pressed the UIT displays the marker length while the second time the "NEXT" key is pressed the gantry begins cutting.
- OFFSET:** Moves the gantry carriage from it's current position to the offset position of the primary cutter. This effectively moves the primary cutter into position over the reference point (usually the pen device or laser pointer).
- OPTION:** Allows option mode commands to be entered in the UIT. Values are set by pressing a two letter key and then inputting a new value for a specific setting. The available commands are listed in the OPTIONS section in this manual.
- PANEL HOME:** Moves the gantry carriage to the current PANEL HOME position set either by the most recent PANEL ZERO or in the current cut file.
- PEN:** Toggles the pen tool up or down. The default is pen up.
- RESCAN:** Causes the cut file program to reset to the top of the current panel.
- RIGHT:** Jogs the gantry in the positive X-axis direction. (To the operators right side). The gantry will move as long as the key is pressed or until the carriage encounters a soft limit. See "JOG" for speed change.
- ROTATE 90:** Rotates the Z-axis Tool Spindle 90 degrees counter clockwise from it's current position.
- ROTATE CCW:** Rotates the Z-axis tool spindles counter clockwise. The tools will rotate as long as the key is held down. The rotation speed can be changed between fast and slow by toggling the "JOG" button.
- ROTATE CW:** Rotates the Z-axis tool spindles clockwise. The tools will rotate as long as the key is held down. The rotation speed can be changed between fast and slow by toggling the "JOG" button.
- SCAN:** Allows user to scan to a specific panel within the current cut file. Press scan and the UIT will prompt for a panel number. The UIT automatically go into ALT LEFT mode and allow user to select a panel number. Press ENTER to accept the panel number.
- TABLE HOME:** Moves the gantry carriage to the TABLE HOME position. The table home position is defined by the location the gantry, Y-car and tool spindles stop when using the "ZERO TABLE" function. The "TABLE HOME" key allows the operator to return to the zero position without the time required to zero the table.
- UP:** Jogs the gantry carriage in the positive Y-axis direction (away from the operator). The gantry carriage will move as long as the key is pressed or until the carriage encounters a limit switch. See "JOG" for speed change.
- ZERO PANEL:** Sets the current gantry and Y-car position as the home position. The cutter will use this position as it's zero reference point when cutting a file. The "ZERO PANEL" key should be used to position the cutting or marking tools on the material before pressing "NEXT" to begin cutting. The laser pointer is used to position the tool head on the material. The selected tool will begin cutting/marking at the referenced laser position.
- ZERO TABLE:** This function homes the gantry by moving each axis one at a time until they hit their respective home switches. This will square the Gantry as well as return each axes to it's known starting point. The Home Position can be offset from the home switches as determined in the Easicut software.

 **WARNING** The "ZERO TABLE" key must be pressed each time the system is Powered Up, Easicut is started or an E-STOP is activated. Failure to Zero Table can result in the Gantry and/or Y-car traveling past table limits and crashing into end stops.

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## OPTIONS Mode

Options mode is used to change plotter operation variables through the user interface terminal. Changes made using the options commands are not saved and are lost as the plotter program is exited. Should you wish to make a permanent change, (for example, offset calibrations) you must write them down and then enter them into the "Machine Setting" in Easicut.

To enter the options mode press the OPTION key on the UIT. The display will then prompt for a two-letter option. After typing the two letter command press the ENTER key and you will be prompted for a value or the action will take place immediately. If prompted, input the new value and press the ENTER key again. Note that if you do not enter a new value and press the ENTER key, the current value is maintained. Option codes values can also be entered on the computer keyboard in the plotter status window. The two letter option codes are not case sensitive.

- (AA) Change Acceleration:** Sets the acceleration rate of the carriage.
- (AB) Airbrush On/Off:** Activate and deactivates airbrush option. (If available.)
- (BB) Layer Names On/Off:** Toggles the layers names command on or off. With layer names turned off this allows CMD file formats that reference CUTN and CUTF commands to be compatible with the new motion control software.
- (CC) Change Laser Max Power:** For laser plotters only, it sets the maximum power for the laser. Expressed as a number between 0.0 and 1.0. This will adjust the cutting kerf for specific cut speeds. It should never be set above 0.95. This command is only available on machines that have a laser cutting tool. (Not Pointer)
- (DD) Digitizing Mode On/Off:** Enters or exits the pattern digitizing mode. (See the section on Digitizing in the EasiCut manual.)
- (EE) Change Overall Rate:**
- (FF) Laser Service Modes On/Off:** For laser cutting machines only. Sets the software mode to enable several power and alignment tests. (Not for laser pointers)
- (GG) Load Cut File:** This command loads the current CMD file active in the Easicut window to the plotter file for cutting. This is the same as plotting the file through the Easicut software from the computer terminal.
- (HH) Change Slow Speed:** Sets the slow JOG speed of the gantry, Y-car and Z-axis. This command can be used to slow down the gantry when trying to jog the laser pointer to a fixed point on the table.
- (HOME) Panel Home:** This does the same function as the ZERO TABLE key on the UIT. By typing this command into the Plotter Status window on the computer, you can zero the table without walking over to the gantry.
- (II) Change Time Interval:** Sets the update interval for the motion control card. There is no reason ever to adjust this value except during calibration of the M9000 system at the factory. Changing this variable will result in inaccuracies in cutting.
- (KK) Key Dump On/Off:** Enables or disables the key dump feature. Key dump is normally off. With it turned on the signature of the key pressed is displayed on the computer's screen. This is a valuable diagnostic tool that helps troubleshoot UIT keypad problems.
- (LL) Change Cut Speed:** Sets the top speed during manual use of the primary tool. Changing this variable does not effect the cutting speed when cutting in automatic mode.
- (NN) Next:** After plotting a file, this command starts the machine cutting or penning the active panel. Like pressing NEXT on the UIT this can be typed into the Plotter Status window at the computer.

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- (OO) Options:** Allows the operator to enter the "Options Mode" of the UIT from the computer terminal. This command is only available from the computer keyboard and duplicates the OPTIONS key on the UIT.
- (PP) Pause On/Off:** Toggles on or off any <PAUSE> command within the current CMD file. With pauses turned off the plotter will move from panel to panel without prompting for the NEXT command. This feature works in conjunction with CMD files that have pre-designated pauses in the file for product inspection. (This is **not** related to the pause buttons on the gantry.)
- (QQ) Exit Plotter W:** Exits the Easicut program. When reopening Easicut the table **must** be homed by pressing the ZERO TABLE button on the UIT keypad. Failure to home the system will result in the gantry running into the end stops and/or causing damage to the system.
- (RR) Set CMD repetitions:** Sets the number of times to repeat the current CMD file. Note that the next repetition of the CMD file will start from the plotter position at the end of the last repetitions of the CMD file. When repetitions are used zero marks are disabled.
- (SS) Change Scale Factor:** Sets the scale factor of the current CMD file. This allows user to expand or contract the size of the entities within a CMD file by an input coefficient. For example entering a value of 0.5 will yield parts 50% of normal, therefore entering a 2.0 will yield parts twice the normal size.
- (TT) Change Laser Minimum Speed:** Available on M90 Laser cutting machines only. Sets the minimum speed at which the laser tube will fire. This is useful for reducing cutting kerf as the gantry decelerates to a stop. If set to high, parts may not be cut all the way to side intersections.
- (UU) Tools On/Off:** Toggles the primary tool on or off. Works like Tool On/Off switch.
- (VV) Speed Change:** Sets the top speed during dry haul when the machine is neither marking nor cutting. It is the speed that the machine moves between cuts.)
- (WW) Pen Speed Change:** Sets the top speed during manual use of the pen device. Pressing the Option button followed by WW will change the speed that the pen will mark in manual mode. The pen must be down and the gantry jogged before it takes effect.
- (YY) Reference Mark On/Off:** Toggles all zero marks in a CMD file either on or off. Note that it affects both the <MARK> command and <VMARK> command present in many CMD files.
- (ZP) Zero panel:** Sets the current gantry and Y-car position as the home position. The cutter will use this position as it's zero reference point when cutting a file. (See ZERO PANEL button.)
- (ZZ) Set Display Units:** Toggles the UIT and computer display between different units of measurements like inches (IN), feet (FT), centimeters (CM). The current units setting is indicated in the upper right corner of the display.
- (11) X Offset Change:** Sets the X offset of the primary tool from the reference laser pointer. Setting the Offset from the UIT or Plotter Status screen is only temporary while the system is powered. The cutter will default to the original settings after software is exited or system is powered down. All offset setting need to be made on the calibration screen or in the Option/Machine menu to be permanently saved.
- (22) Y Offset Change:** Sets the Y offset of the primary tool from the reference laser pointer. Setting the Offset from the UIT or Plotter Status screen is only temporary while the system is powered. The cutter will default to the original settings after software is exited or system is powered down. All offset setting need to be made on the calibration screen or in the Option/Machine menu to be permanently saved.



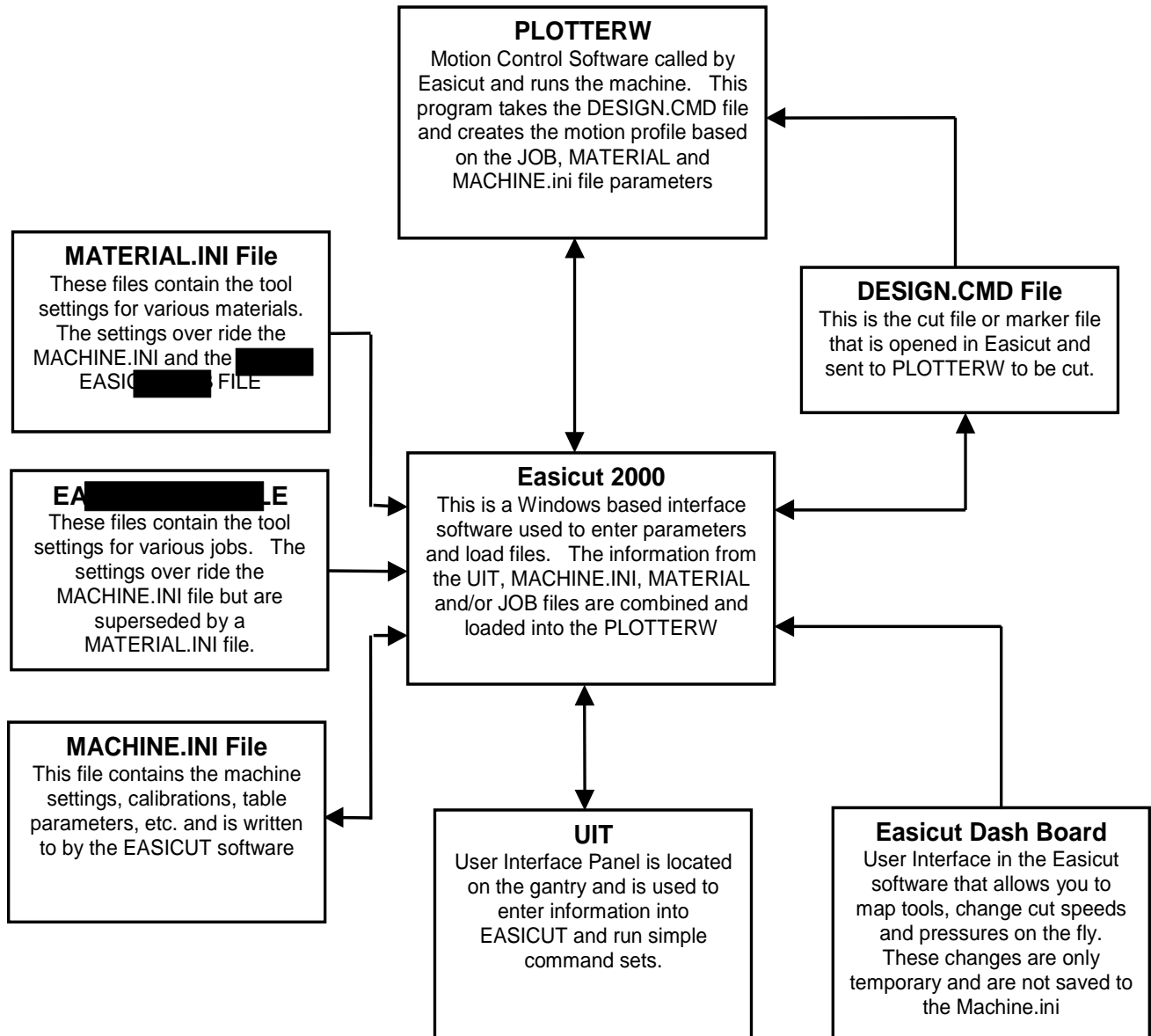
- 
- (33) Z Offset Change:** Sets the rotational offset of the primary tool from the sensing point. Setting the Offset from the UIT or Plotter Status screen is only temporary while the system is powered. The cutter will default to the original settings after software is exited or system is powered down. All offset setting need to be made on the calibration screen or in the Option/Machine menu to be permanently saved.
- (44) Cut Up Time Change:** Set the time delay from when the tool up command is set and the gantry begins to move. This prevents the gantry from moving and catching material while the tool is going up.
- (55) Cut Down Time Change:** Set the time delay from when the tool down command is set and the gantry begins to move. This prevents the gantry from moving and catching material while the tool is going down.

## Software File Relationships

Easicut is Eastman's Windows XP based plotter software (Other versions of Windows available). When opened, Easicut can read in several data file types to initialize the plotter's settings. These data files are ASCII text files with specific formats, which must be correct to be read. Some files can be edited through the Easicut software, while others may be accessed using Microsoft Notepad. All are located in the Eastman directory in the Easicut or Plotter folders. The following is a short description and a chart of the various files:

- PLOTTER.KEY:** Required on all machines using a UIT and on some older M90 models. This file maps the keypad data coming from the UIT to the plotter program.
- DESIGN.CMD:** The file containing a pattern's coordinates and commands read by PLOTTERW. The CMD file uses Eastman's proprietary file format. Easicut automatically converts several file formats to CMD files when operator selects and opens them in the software.
- MACHINE.INI:** Contains values pertaining to calibration, velocity profiling, table dimensions, and layer to tool mapping. Easicut writes to this file as changes are made in the Machine Setting window. MACHINE.INI is read by Easicut, modified as necessary (for example, to accommodate a change in tool offsets) and sent to PLOTTERW. It is important to always keep a copy of your latest MACHINE.INI so that you can always reload your machine setting if something becomes corrupt.
- PLOTTER.SRV:** Optional. Used only on plotters with laser cutting device. Contains default values for laser test firing and troubleshooting.
- PLOTTER.DRL:** Required only when <DRILL> function is called by CMD file. Contains default values used by <DRILL> function when specified in CMD file.
- MATERIAL.INI:** Contains tool control information relating to different material types. The JOB file temporarily overwrites the machine settings set in the MACHINE.INI file and takes precedence over the JOB.INI file.
- JOB.INI:** Contains tool control information relating to different material types and or cut files. The JOB file temporarily overwrites the machine settings set in the MACHINE.INI but does not take precedence over the MATERIAL.INI files.

## Motion Control Software Functions





## Machine Power UP Procedure

1. Turn on the Computer CPU and wait until computer is fully booted.
2. Turn on the Gantry using the gantry On/Off switch above the UIT panel.
3. Power the E-Box(es) on.
4. Start the EasiCut software by double-clicking on the Windows Desktop.

\*\*To power down the system, reverse the power up sequence starting with closing EasiCut

**⚠ WARNING** Power Up machine using the Machine Power Up Procedure to avoid unpredictable machine movement. Failure to follow this procedure may cause serious personal injury and/or damage to machine.

## Running A JOB

1. Spread material on the table, making sure it is straight and parallel with X-axis.
2. Press the TABLE ZERO button on UIT. This will bring the gantry to it's calibrated home position. (Only required when first powering up the machine or after hitting an E-Stop)
3. Position laser pointer to the edge of the material where you want to begin cutting.
4. Send the cut file to the gantry by pressing the "Cut" icon in Easicut.
5. Send the cut file to the gantry by pressing the "Cut" icon in Easicut. Press the ZERO PANEL button on UIT.
6. Close off large open sections of the table using Blast Gates (if installed on the M9000) or by covering open areas with a nonporous material. This will increase the vacuum and reduce the load and current draw on the blower motor(s). Leaving large sections of table uncovered can cause material to slip and/or damage blower motor(s).
7. Turn on the table vacuum switch.
8. Press "NEXT" on UIT. This will calculate the pattern length and width compared to the table length and width. If the pattern is larger than the cutting surface an error message will appear on the UIT. Pressing NEXT a second time will start job cutting.

9. To run same pattern, repeat steps 7 & 8.

## Setting up for a Different Materials

1. Remove all material from previous job.
2. Open cut file for new job
3. Change tools according to job requirements.
4. Adjust over cut setting in Easicut according to material thickness. \*
  - a) Go to | Options | Job | Layers |
  - b) Select tool from pull down menu

c) Change Over cut value in the Over cut window.

\* **NOTE:** The tool settings and cut pressures can be saved in a job file and loaded into the cutter for each material being cut. (See Easicut Manual or Help Screen for JOB files)

## Changing tools in tool head

1. Turn the power off to the gantry making sure it is unable to move.
2. Remove desired tools from tool mounts by:
  - a) Loosening the (2) allen head screws on the tool holder.
  - b) Carefully slide tool holder off tool mount.
3. Attach desired tools to empty tool mounts. If a different tool type is installed, re-map the new tool type to the tool holder. Reverse tool removal process.



### **CAUTION**

Failing to re-map a tool after changing tool types can result in damage to the table top, tool and or tool spindle. (Example: Changing a Punch to a Drag Knife)

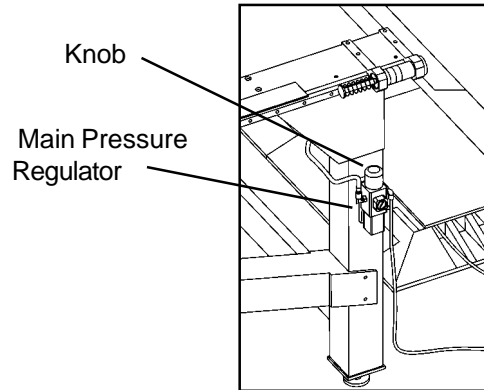
4. Open the job file in Easicut that corresponds to the current job and material.
5. Tools **DO NOT** need to be recalibrated unless cut accuracy is critical to .010 or less. If calibration is needed go to Tool Calibration section of this manual.

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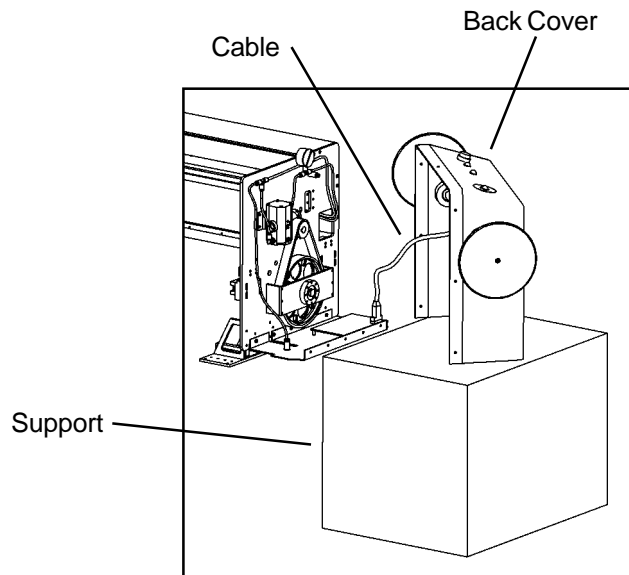
## M9000 Pressure Calibration

**Note:** Pressure calibration is set by an Eastman Service Technician at machine installation. Calibration settings should be changed by the customer **ONLY** if prior settings are found to be inaccurate.

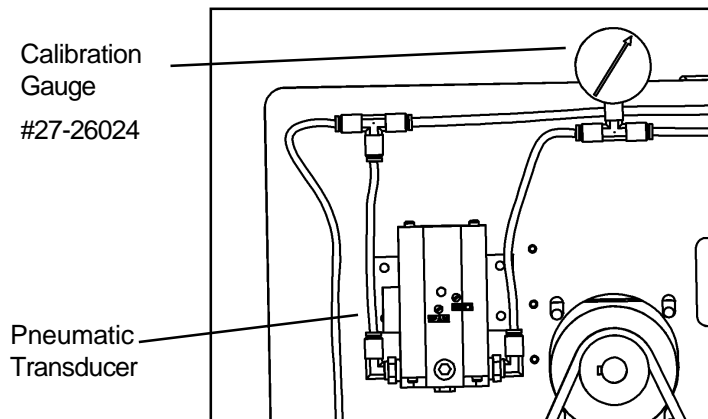
1. Set main pressure regulator to 125 psi by turning regulator knob.



2. Remove back cover and leave cable connected to PC board. Place on a support that will lift back cover to relieve strain on cable.



3. Remove tool head air tube from pneumatic transducer output port. Install calibration gauge at transducer output.



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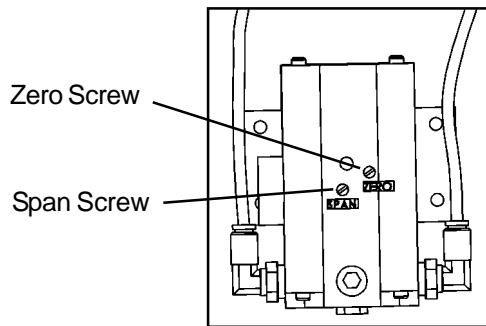
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4. Set Easicut cut pressure at 10 psi and adjust at regulator using zero screw adjustment. Pressure meter should read 10 psi at gauge.

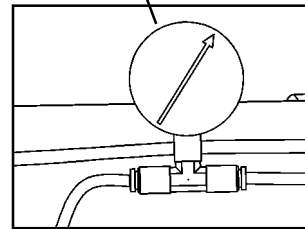
Pressure Slide Switch



5. Set Easicut cut pressure at 100 psi..
6. Push "cut up" and "cut down" on control panel UIT.
7. Adjust "span" screw until calibration gauge reads 100 psi.



Calibration Gauge  
#27-26024



Repeat steps 5 through 10 at least 3 times. Be sure to push tool up/down on control panel between each test calibration.

8. Compare Easicut cut pressures to calibration gauge pressures at 10, 20, 40, 60, and 100 psi.
9. Remove calibration gauge, attach tool head air tube to pneumatic transducer output port. Remove shunt wire connector and replace with rear cover connector. Attach back cover assembly.

---

The following calibration procedures are used to calibrate each machine tool to one another to insure accurate cuts between tools. The calibration are initially done at machine installation and should not need to be done unless a tool mount is changed. The calibration numbers are stored in the machine.ini file in the Easicut 2000 directory. A backup copy should be stored in that directory as well on a disk.

**The M9000 tool calibration should be performed in the following order:**

1. Pen X-Y offset.
2. Table sizing.
3. Automatic gantry squaring.
4. Tool mount X-Y for all tools.
5. Theta axis offset.
6. Tool Calibration (circles and squares).
7. Test Cut Using Design.cmd.
8. Test Cut Using Design.cmd and production material.

**Before beginning the calibration procedure:**

- Remove all cutting and punch tools from all tool mounts.
- Check that the pen tool is rigidly attached to the pen mount
- Open the Easicut 2000 software and "zero" the table by depressing the TABLE ZERO button on the operator UIT.

**Tools required :**

- 2.5" to 3.5" wide masking tape.
- High quality tape measure that has inch and centimeters.
- 60" to 72" Roll of paper for test cutting.
- Sample production material for test cutting.
- Tools that will be used in production cutting.
- #2 Pencil.

### **1. Pen X-Y offset-Pen mark (dot)**

This calibration procedure establishes the offset between the pen and the laser pointer. The laser pointer is considered the zero point for the machine.

- a) Put a small length of masking tape under the pen mount.
- b) Press "PEN" several times on the UIT to make a mark on the masking tape.
- c) Press "ZERO PANEL" on the UIT.
- d) Using the UIT joystick, move the gantry and tool head to position the laser pointer over the pen mark on the masking tape. For precise positioning of the gantry movement use "Option" HH on the UIT to set a very slow jog speed of about 0.1 cm/sec. (0.04 in/sec)
- e) Read the "X" and "Y" values on the UIT display and write them down.
- f) Click on Options/Calibration/Mount X-Y/Pen 1 in the Easicut 2 menu and enter the negative of the values for X-Y in their respective Offset windows.

**Example:** (If X=+0.27 on UIT then enter -0.27).

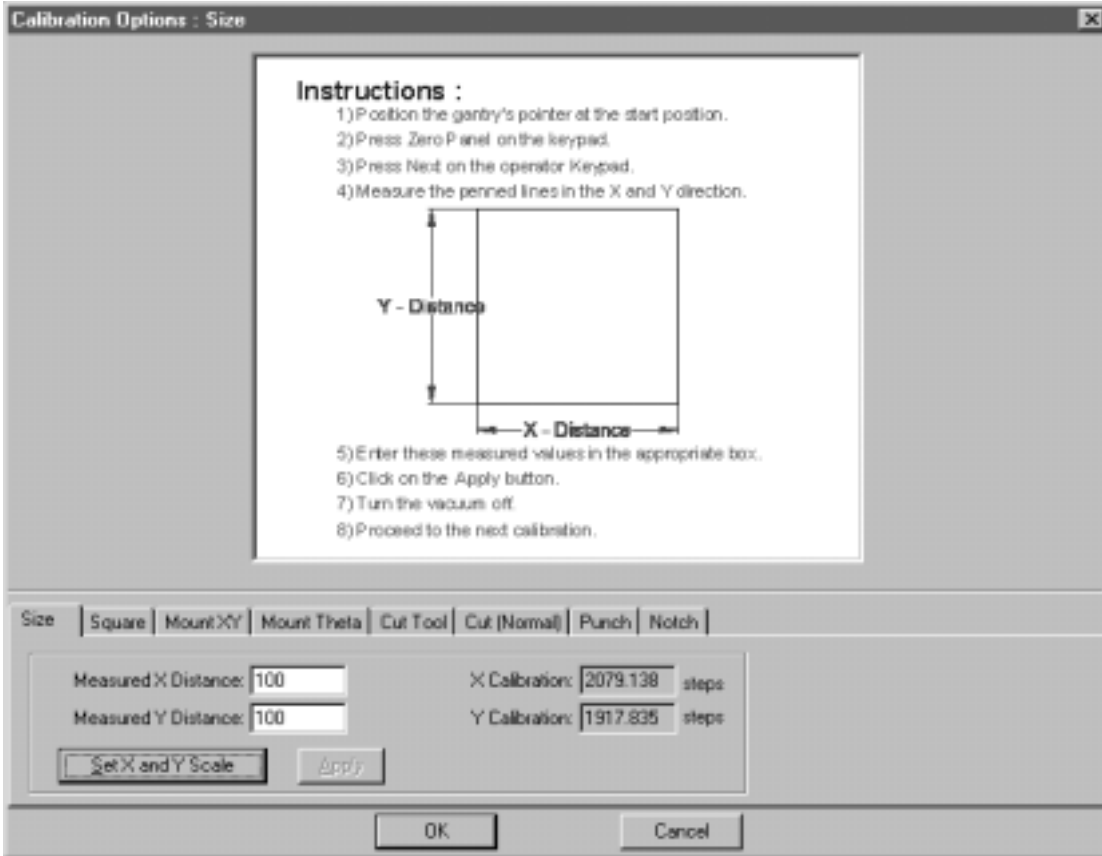
- g) Verify the Pen Mount X-Y offset by pressing "PANEL HOME" on the UIT. Press "PEN" and the mark should be exactly over the previous pen mark. If not repeat steps (a) through (e) again until you have calibrated the pen offsets correctly.
- h) Click "APPLY" then "OK" to save the changes. Press "CANCEL" to keep original settings.

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## 2. Size Calibration

The size calibration ensures that the machine will cut parts to the correct size specified by the CMD file. This calibration is important to make sure that the cut pieces are cut to the correct dimensions. The calibration must be performed when the cutting machine is first installed, when a new tool head or new tool mount is installed, or following any disassembly of cutting machine drive components.

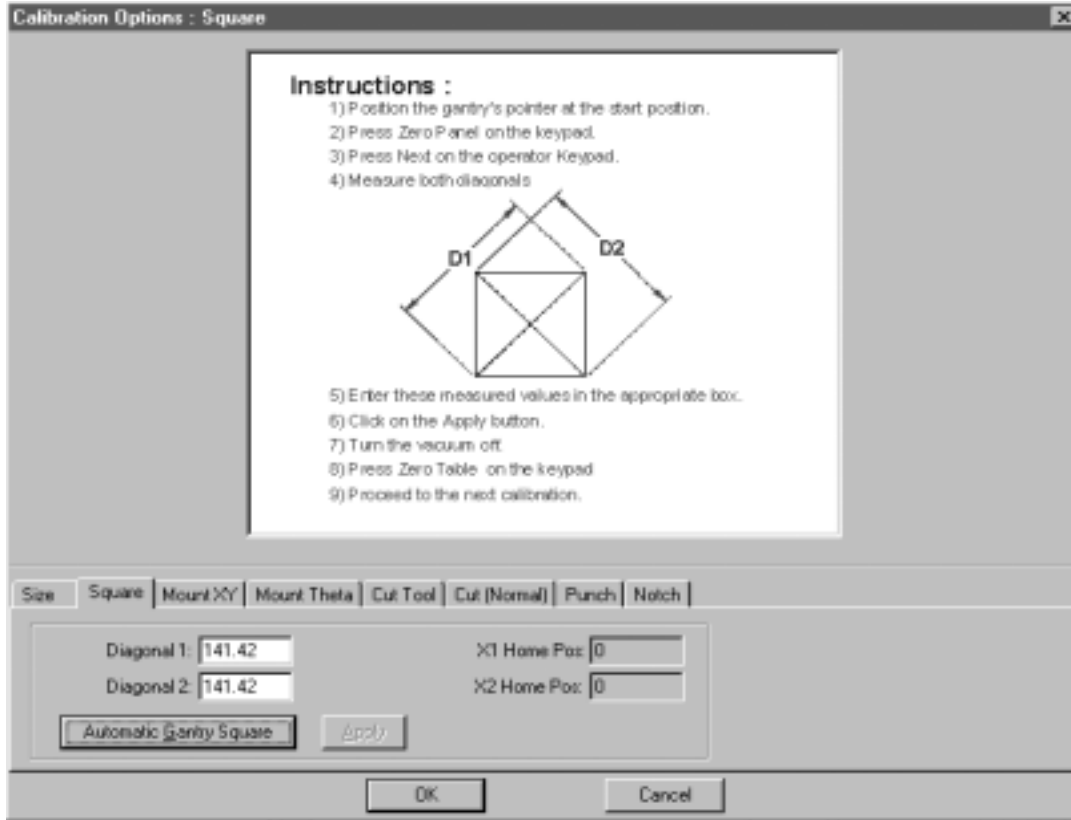


### Size Calibration Procedure:

- a) Open the Easicut 2000 software.
- b) On the menu bar click on Option/Calibration and select the "Size" tab on the calibration screen.
- c) Press the "**Set X and Y Scale**" button to load the Calibration test.
- d) Layout a sheet of paper about 1.2 x 1.2 meters onto the cutting surface and apply vacuum.
- e) Line the laser pointer to the lower left corner of the piece of paper and press the ZERO PANEL button on the UIT.
- f) Press the NEXT button on the UIT and let the machine run through the calibration. The machine will pen a 1-meter by 1-meter square onto the sheet of paper.
- g) Using a measuring tape, measure the length of the penna lines in both the X and Y direction, these should measure 100.00 cm (39.370 inches). If the lines do not measure this value, enter the measured value into the software in the correct box and click on the "Apply" button.
- h) Continue with steps (d) through (g) until both the X and Y measurements are correct.
- i) Press APPLY then OK to save the new values to the machine.ini file.

### 3. Square Calibration

The square calibration is done to ensure the gantry will run square to the table to prevent damage to the linear bearings and gantry side plates, this also ensures that the cut parts will be cut proportionally. The calibration must be performed when the cutting machine is first installed, when a new tool head or new tool mount is installed, or following any disassembly of cutting machine drive components.



#### Square Calibration Procedure:

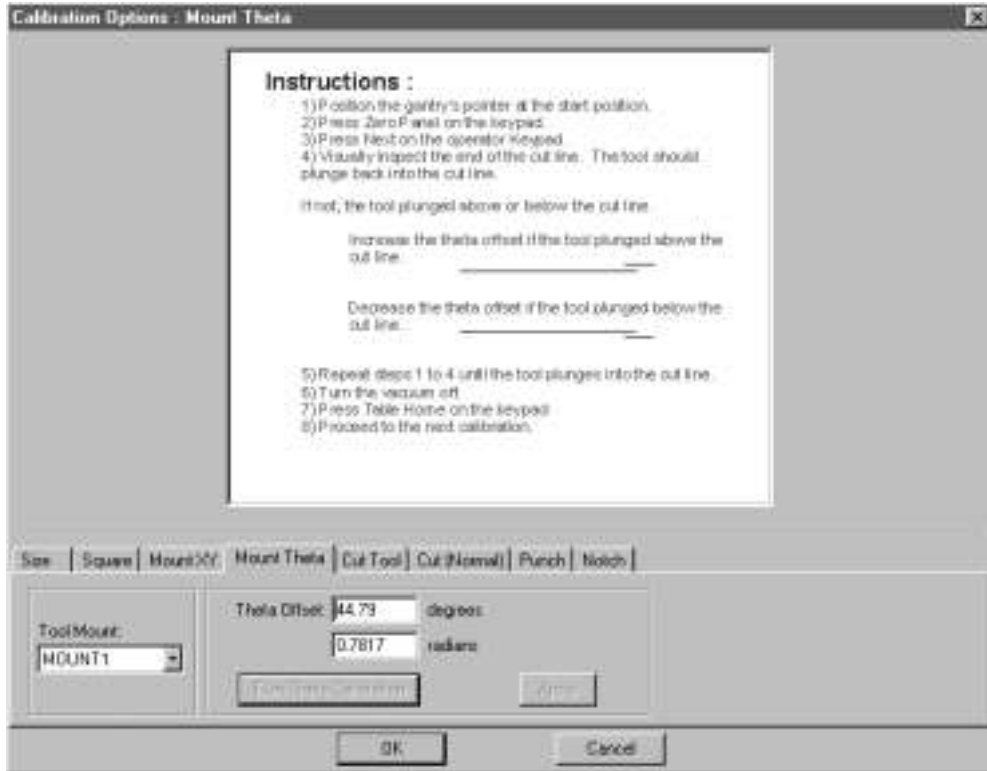
- a) Open the Easicut 2000 software.
- b) On the menu bar click on Option/Calibration and select the "Square" tab on the calibration screen.
- c) Select the "**Automatic Gantry Square**" button in the software to load the calibration test.
- d) Layout a sheet of paper about 1.2 x 1.2 meters onto the cutting surface and apply vacuum.
- e) Line the laser pointer to the lower left corner of the piece of paper and press the ZERO PANEL button on the UIT.
- f) Press the NEXT button on the UIT and let the machine run through the calibration. The machine should be penning a 1-meter by 1-meter square with diagonals connecting all four corners, onto the sheet of paper.
- g) Using a measuring tape, take a measurement of each of the diagonals D1 and D2 (D1 is from the lower left corner to the upper right corner, D2 is the lower right corner to the upper left corner.) These measurements should be 141.42 cm (55.677 inches), if the diagonals do not measure this value enter the measured value into the corresponding box in the software and click on "APPLY".
- h) Repeats steps (c) through (f) until both diagonals measure correctly.
- i) Press APPLY then OK to save the new values to the machine.ini file.

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## 4. Mount Theta Calibration

The Mount Theta calibration is done to check the squareness of each tool compared to the X motion of the gantry. This also ensures that all cuts line up when cutting from opposite directions. The calibration must be performed for each tool mount and should be done when the cutting machine is first installed, when a new tool head or new tool mount is installed, or following any disassembly of cutting machine drive components.



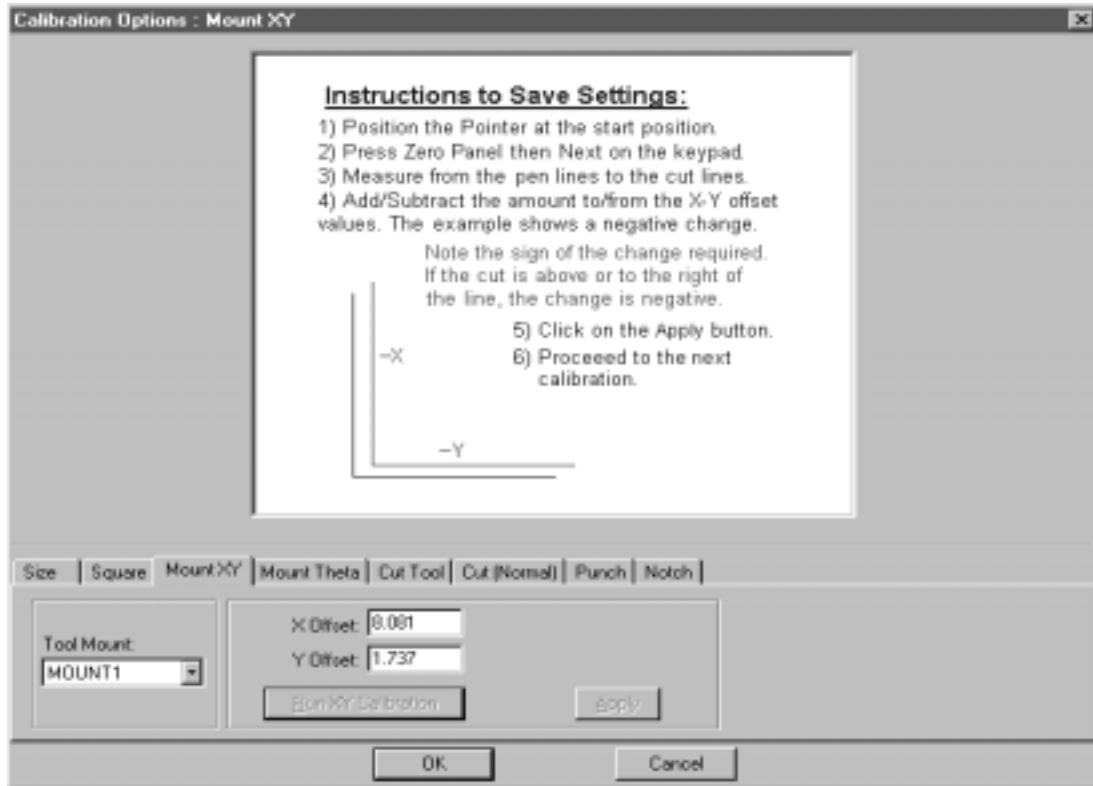
### Mount Theta Calibration Procedure:

- a) Open the Easicut 2000 software.
- b) On the menu bar click on Option/Calibration and select the "Mount Theta" tab on the calibration screen.
- c) Select the Mount that you wish to calibrate from the tool mount menu.
- d) Click the "**Run Theta Calibration**" button to load the calibration test.
- e) Lay out a 2 inch by 15-inch piece of masking tape in the X-axis and zero the panel in the lower left-hand corner of the tape.
- f) Press NEXT button on the UIT and run the calibration test.
- g) Lift the cut masking tape and observe the final cut, the final cut should be along the same line as the initial cut. If there is a deviation between the initial and final cuts adjust the Theta offset according to the instructions in the software.
- h) Reselect the mount and run the Theta calibration again to check the deviation in the two lines.
- i) Continue to run this calibration for all of the mounts.
- j) When finished with each mount Press APPLY then OK to save the new values to the machine.ini file.



## 5. Mount XY Calibration

The Mount XY calibration offsets the centerline of the each spindle to the laser pointer ensuring that all tools are working from the same point of origin. This allows the operator to switch between cutting tools during a cut and have all the cut lines line up regardless of which tool is used. The calibration must be performed for each tool mount and should be done when the cutting machine is first installed, when a new tool head or new tool mount is installed, or following any disassembly of cutting machine drive components.



### Mount XY Calibration Procedure:

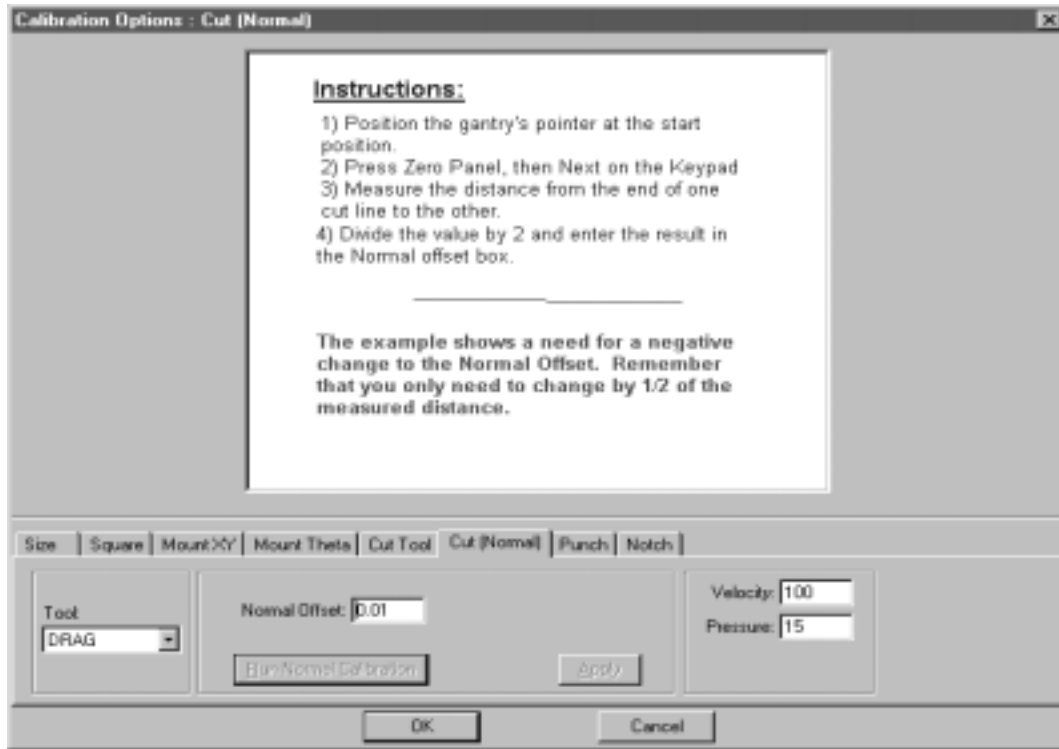
- a) Open the Easicut 2000 software.
- b) On the menu bar click on Option/Calibration and select the "Mount XY" tab on the calibration screen.
- c) Select the Mount that you wish to calibrate from the tool mount menu.
- d) Click the "**Run XY Calibration**" button to load the calibration test.
- e) Using 2" by 10" strips of masking tape create an "L" shape with the two pieces of tape intersecting in the corner of the "L".
- f) Line up the laser pointer in the lower left hand corner of the "L" shape and press the ZERO PANEL button and NEXT button on the UIT to run the calibration test.
- g) Observe the cut on the "L" shape masking tape surface, the cut line should split the pen line in half in both the X and Y direction.
- h) Make adjustments according to the guidelines in the software to adjust the cut line until the pen line is split.
- i) Once the X and Y offsets are determined for the first mount move on to the next mount by selecting Mount 2 from the tool mount menu. Continue until all mounts are calibrated.
- j) When finished with each mount Press APPLY then OK to save the new values to the machine.ini file.

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## 6. Cut Normal Calibration

The Cut Normal calibration is done to ensure that the machine knows the offset between the two sides of each cutting blade. This is important for shapes such as circles where the start and end point must connect to produce a cleanly cut part. The calibration must be performed for each tool mount and should be done when the cutting machine is first installed, when a new tool head or new tool mount is installed, or following any disassembly of cutting machine drive components.

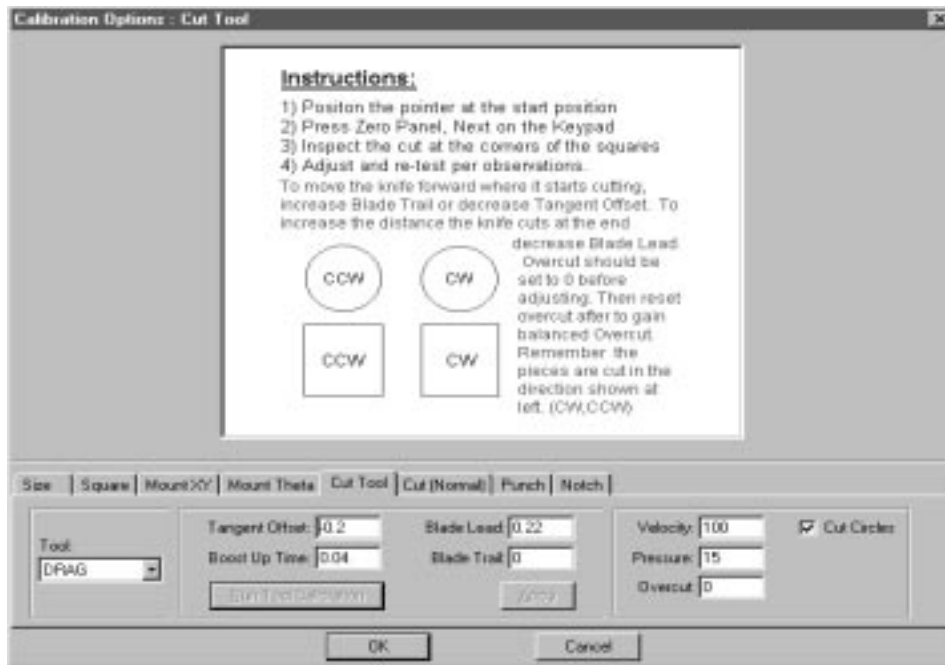


### Cut Normal Calibration Procedure:

- a) Open the Easicut 2000 software.
- b) On the menu bar click on Option/Calibration and select the "Cut (Normal)" tab on the calibration screen.
- c) Select the Tool that you wish to calibrate from the tool menu.
- d) Click the "**Run Normal Calibration**" button to load the calibration test.
- e) Layout a 2" by 10" piece of masking tape along the length of the table.
- f) Line up the laser pointer in the lower left hand corner of the masking tape and press the ZERO PANEL button and NEXT button on the UIT to run the calibration test.
- g) This test will cut two straight lines in the masking tape, the two lines should share a common midpoint.
- h) If there is any deviation in the alignment of this midpoint intersection, one half the measured difference will need to be entered into the software in the Normal Offset box.
- i) Once the two lines connect to make one straight long line and the difference between the two cut lines is zero, select the next tool from the tool menu and run the calibration again.
- j) When finished with each tool Press APPLY then OK to save the new values to the machine.ini file.

## 7. Cut Tool Calibration

The Cut Tool calibration is performed to determine the leading and trailing cutting edges of the cutting blade. This test also calibrates a tangent offset for each tool to guarantee that shapes such as circles will connect through the start and end points. The calibration must be performed for each tool mount and should be done when the cutting machine is first installed, when a new tool head or new tool mount is installed, or following any disassembly of cutting machine drive components.



### Cut Tool Calibration Procedure:

- Open the Easicut 2000 software.
- On the menu bar click on Option/Calibration and select the "Cut Tool" tab on the calibration screen.
- Select the Tool that you wish to calibrate from the tool menu.
- Click the "**Run Tool Calibration**" button to load the calibration test.
- Lay out a sheet of paper about 1 meter by 1 meter and apply vacuum. Position the laser pointer in the lower left-hand corner of the piece of paper and press the ZERO PANEL button on the UIT.
- Press the NEXT button on the UIT to run the calibration test.
- The calibration test will draw, and then cut two 10-cm circles and two 10-cm squares using the pen and the selected cutting tool. Measure both squares and circles to confirm size.
- The circles and squares should be able to be easily removed from the piece of paper. The internal corners of the cut out squares should be clean without any excess over cut and the circles should be easily removed without any hangers at the start/finish point of the circle.
- Any over cut in the corners should be removed by adjusting the Blade Lead and Trail settings according to the software instructions.
- The Tangent Offset setting should be adjusted to compensate for any material fragments left at the start/finish area of the 10-cm circle.
- Once the circles and squares can be cleanly removed from the piece of paper without excess over cut or material fragments, select the next tool from the tool menu and repeat steps (e) - (k).
- When finished with each tool Press APPLY then OK to save the new values.

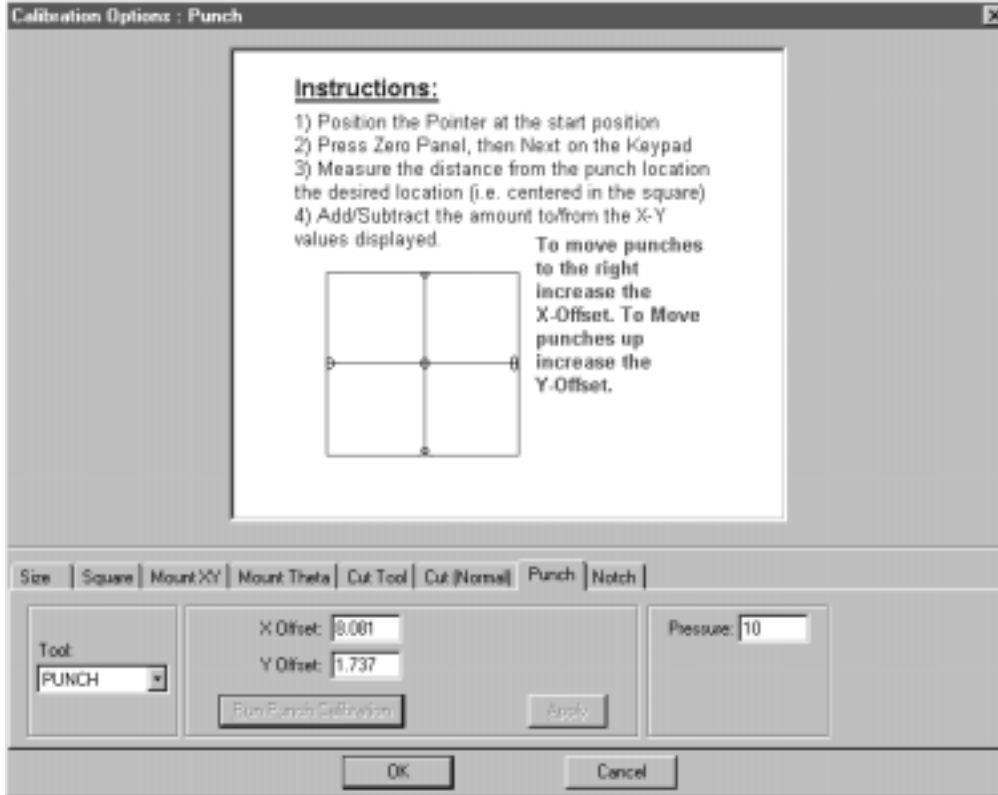
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## 8. Punch Calibration

This calibration test is done to offset the punch tool to the proper location. This is done by penning a 10-cm square with two lines connecting the midpoints of each line. The punch will then fall at the intersections of all of these lines. The difference between the projected punch area and the actual punch area will be factored into the X and Y punch offset.

**Note:** Not all applications require a punch. If your machine is not equipped with a punch you can skip this calibration procedure.



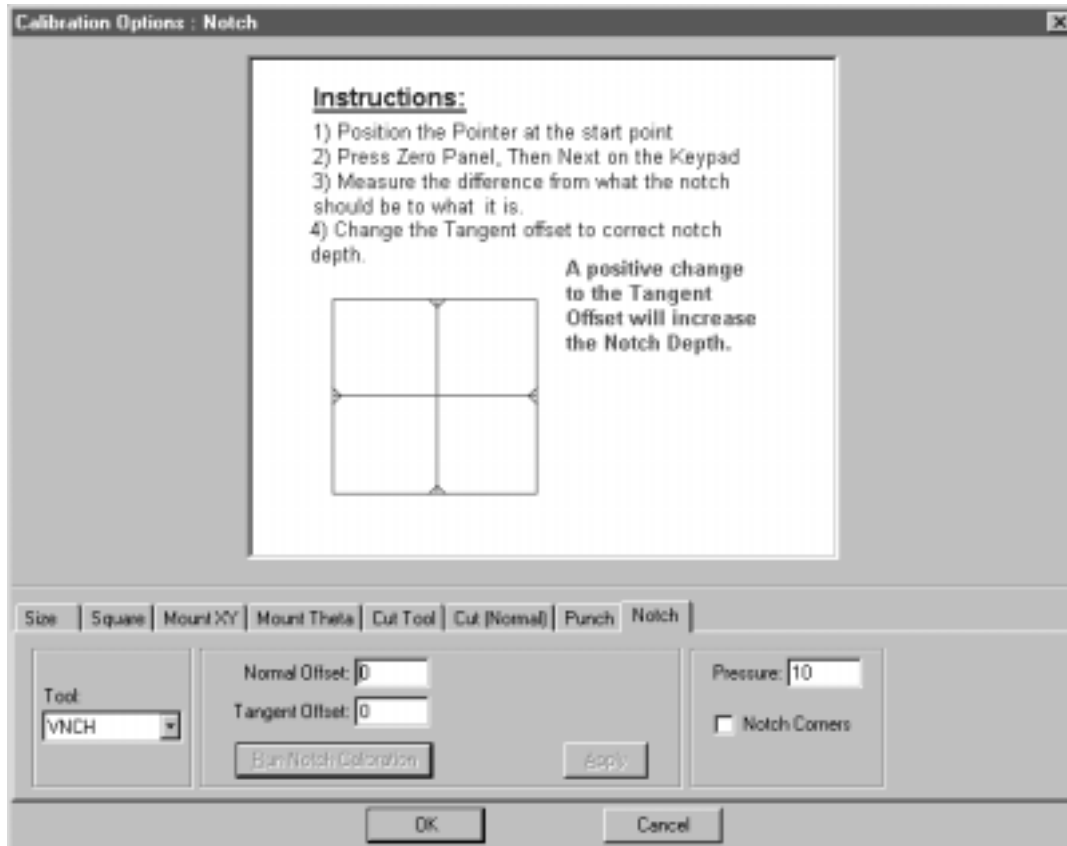
### Punch Calibration Procedure:

- Open the Easicut 2000 software.
- On the menu bar click on Option/Calibration and select the "Punch" tab on the calibration screen.
- Select "Punch" from tool menu.
- Click the "**Run Punch Calibration**" button to load the calibration test.
- Lay out a sheet of paper large enough to run several 10-cm squares. Position the laser pointer in the lower left hand corner of the sheet of paper, and press the ZERO PANEL button on the UIT.
- Press the NEXT button on the UIT to run the calibration test.
- Adjust the X and Y offsets to compensate for any differences between the projected punch point and the actual punch point.
- Reselect the punch tool from the tool menu and run the punch calibration again to check the X and Y calibration.
- When finished with the Punch calibration, Press APPLY then OK to save the new values to the machine.ini file.

## 9. Cut Tool Calibration

The V-Notch calibration allows the operator to set the depth of the V-Notching tool in the software and make adjustments to the orientation of the V-Notch. The V-Notch tool is used to cut a predetermined size V-Notch into a pattern.

**Note:** Not all applications require a V-Notch. If your machine is not equipped with a V-Notch you can skip this calibration procedure.



### V-Notch Calibration Procedure:

- Open the Easicut 2000 software.
- On the menu bar click on Option/Calibration and select the "Notch" tab on the calibration screen.
- Select "VNCH" from tool menu.
- Click the "**Run Notch Calibration**" button to load the calibration test.
- Lay out a sheet of paper large enough to run several 10-cm squares. Position the laser pointer in the lower left hand corner of the sheet of paper, and press the ZERO PANEL button on the UIT.
- Press the NEXT button on the UIT to run the calibration test.
- Adjust the normal and tangent offsets to compensate for any differences in the notch orientation and/or adjust the tool depth until you achieve the desired results.
- Reselect the notch tool from the tool menu and run the V-Notch punch calibration again to check the X and Y calibration.
- When finished with the V-Notch calibration, Press APPLY then OK to save the new values to the machine.ini file.

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## Calibration Trouble Shooting

**Tools will not come down when the calibration test is run:**

Verify:

1. The tools are on the correct spindles in the tool menu.
2. Tools are mapped correctly in the Easicut software. (Refer to the software manual or Help screens for Tool Mapping).

**Pen does not come down during calibration:**

1. From the menu bar click on Options/Job and choose the "Layers" tab, select the PENME layer from the layer menu. Make sure that the pen tool is setup for the PENME layer.
2. Verify that the pen tool is mounted to the pen mount in the tool menu.

**During the "Cut Tool Calibration" one set of circles and squares are larger:**

1. Check the cutting tool for proper setup, check to see if the blades are mounted on the correct side of the knife holder. Correct and rerun the calibration test.

**While running the "Mount Theta Calibration", the tool has an offset that cannot be corrected in the software:**

1. Check the tightness of the tool to the spindle mount.
2. Check for any slack in the Z axis belt, re-tension the Z axis belt if necessary and rerun the calibration test.
3. Check the knife bolt for any excess play between the depth limiter and the knife holder.

**Changes don't take effect on the position of the gantry when running the "Square Calibration":**

1. Zero the table and retry the calibration.
2. Run the calibration again and click on the "APPLY" and then "OK" button to accept calibration settings.

**UIT indicates, "Machine Done" without running the calibration test:**

1. Verify the tool called out in the tool pull down in the calibration window is also on the tool mount menu in the lower center of the Easicut screen. The machine will not run a tool specific calibration without the tool being placed on a mount in the software.

**Software not saving settings during calibration:**

1. Make Sure that after each calibration procedure click on "APPLY" then "OK" to save settings.

---

## Maintenance Schedule

**⚠ Caution** It is important to perform regular maintenance on the equipment . A daily, weekly and monthly schedule should be maintained. Failure to do so can result in more frequent breakdowns, damage to the equipment and/or injury.

Proper maintenance will help ensure the reliable operation of your M9000 digital cutting system. You should allow 5 to 10 minutes for daily inspection, 30 minutes for weekly inspection, an one hour for monthly inspection. Time invested on these tasks will minimize downtime due to machine problems. Eastman machine company is not liable for damage as a result of poor maintenance and any resulting damage would be repaired at the user's expense. All maintenance should be performed by qualified personnel, following all safety procedures. The following is a recommended Maintenance Schedule:

### Daily (Start of each shift)

1. Carefully inspect the machine and cutting table area. Look for any debris, loose cables or other obstructions that may interfere with the machine movement and cutting.
2. After switching on the computer and plotter carriage, start the plotter program. Check the X and Y-axis for motor torque and backlash. If backlash is excessive on either axis, adjust as required.
3. Check the pen lift. Pen should move smoothly up and down. Ensure pen is seated properly in mount, and that retaining strap is tight.
4. **⚠ Warning:** **Activate machine pause before performing this procedure . Failure to do so can result in damage to the equipment and/or serious personal injury.**

Check tool head. Check that tools are securely fastened to tool shaft. If the round knife blade is installed check that the blade mount rotates freely. Check the blade mounts for excessive side to side play. Check blade edge for nicks and replace as necessary. Check limiting disks relative to material thickness and requirements. If a drag knife is installed check cutting depth relative to material thickness and requirements. Adjust drag knife foot as necessary.

5. At the end of each work session make sure to turn both the computer and plotter carriage off. Remove any CD's or floppy disks from disk drives and clean up scrap materials from the cutting table.

### Weekly or every 40 hours:

**⚠ Warning:** **Before performing any of the weekly tasks make sure the gantry and computer are turned off at the disconnect and locked out. Failure to do so can result in damage to the equipment and/or serious personal injury.**

1. Turn off gantry and computer at the disconnect and lock out power to the machine per your lock out/tag out procedures.
2. Lubricate table rail linear bearings with Eastman lubricant 67-26324.
3. Lubricate air reciprocating cylinder couplings using Eastman lubricant 67-26009.
4. Lubricate reciprocating tool head shafts using Eastman lubricant 67-26009.

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5. Using compressed air, clean dust and debris from inside the carriage.
6. Use a clean cloth to wipe down the Y-axis rails and lubricate.
7. Tighten any loose fasteners on the carriage to specified torque values.
8. Remove the cover from the Y-car. Inspect the cutting head assembly.
9. Rotate the tool holders by hand. They should rotate freely without any play relative to each holder and the drive motor. If not, belt replacement or adjustment is required.

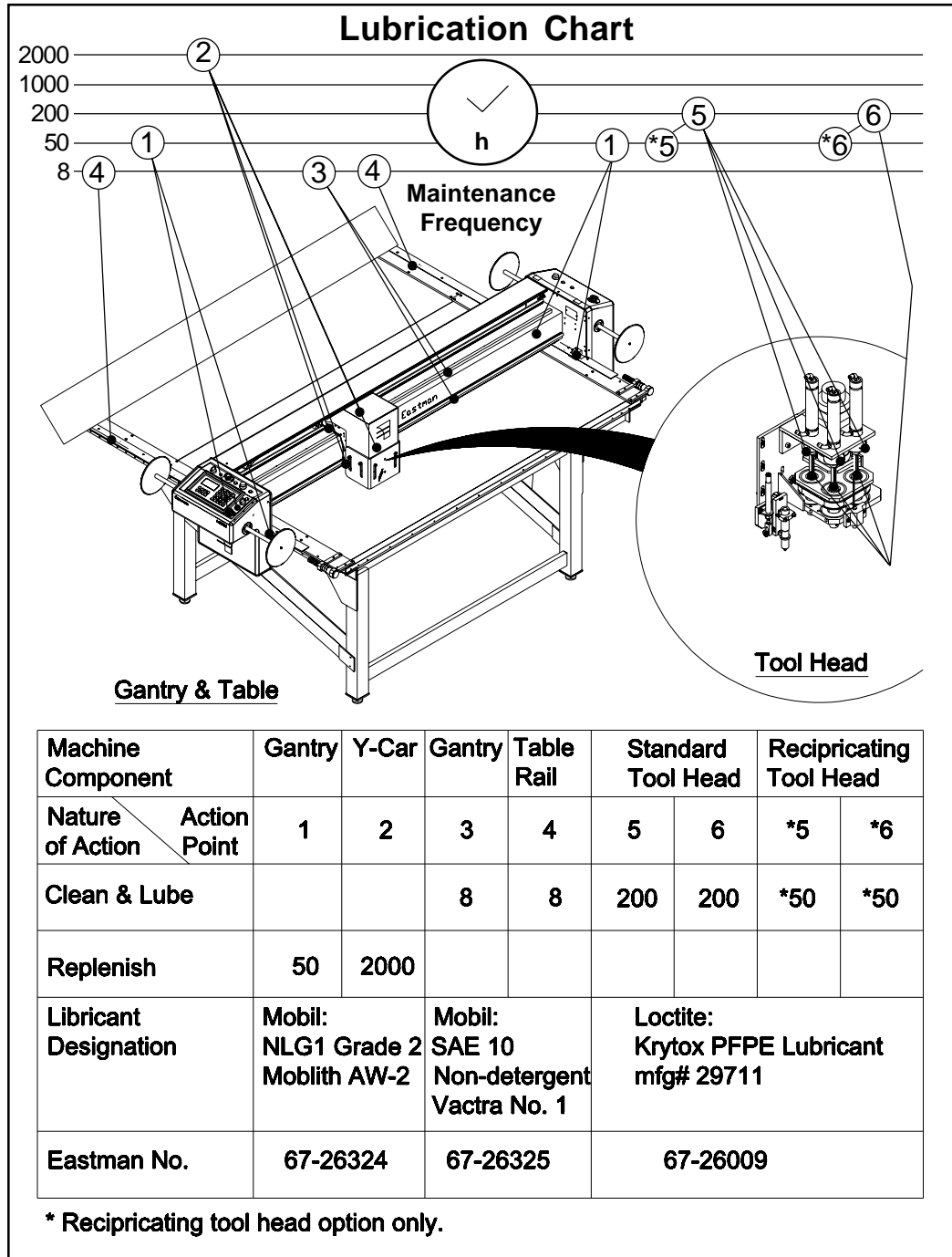
## Monthly (or every 200 hours):

**⚠ Warning:** Before performing any of the monthly tasks make sure the gantry and computer are turned off at the disconnect and locked out. Failure to do so can result in damage to the equipment and/or serious personal injury.

1. Turn off gantry and computer at the disconnect and lock out power to the machine per your lock out/tag out procedures.
2. Remove X-axis drive block covers.
3. Use compressed air to remove any dust and debris from the drive block.
4. Lubricate air cylinder couplings using Eastman lubricant 67-26009.
5. Lubricate tool head shafts using Eastman lubricant 67-26009.
6. Check drive belts for signs of wear such as cuts, frays, or missing teeth. Replace if required.
7. Check belt tension. Belts should be tight enough to eliminate excessive backlash between the driving and driven pulley. Overly tight belts will wear faster and place excessive loads on bearings. Adjust at motor mount by loosening screws and pulling timing belt pulley and tightening motor mount screws to specified torque.
8. Check all shafts and pulleys. The pulleys should be seated tightly on the shafts. Check pulleys set screws and tighten as needed to specified torque.
9. Move plotter manually by pushing on the Y-carriage. X-axis drives require two people. Carriage and drives should move with continuous smooth force. Listen and feel for "hard" spots that will indicate a failed linear bearing.
10. Check the Y-axis backlash (gear play). The Y-axis gear should be snug against the y-axis rack. To adjust backlash, loosen the (8) rail y-car backlash plate screws. Push the small y-car gear toward the y-car rack. Be careful not to bind the y-car gear with the y-car rack. When proper adjustment is reached tighten the backlash plate screws to specified torque. After adjusting the backlash the Y belt tension may need to be adjusted.
11. Check the X-axis backlash (gear play). The X-axis drive gear should be snug against the X-axis rack. To adjust backlash, loosen the (8) rail x-car connector screws enough to allow X-carriage to move. Turn the (2) backlash adjuster screws until there is no backlash (play) between carriage and table. Be careful not to bind the x-axis carriage with the x-axis rail. When proper adjustment is reached, tighten the (8) rail car connector screws to specified torque. Note that it is important to keep the carriage level. It is a good idea to place a bubble level on the carriage to ensure the carriage remains level as the carriage is raised and lowered. Perform this adjustment to both front and back x-cars. After adjusting the backlash the X belt tension may need to be adjusted.
12. Inspect carriage wheels for any material threads or debris wound up around the wheel shafts. Check wheels for debris and remove as needed.
13. Check all electrical plug connections to ensure they are securely fastened.
14. Inspect the x-festoon wire or e-chain (if so equipped) for wear and movement.



15. Replace drive block covers and secularly torque fasteners.
16. Check for unusual noises coming from blower assembly. If clicking or grinding noises heard then call Eastman service technician.



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**Yearly or every 2000 hours:**

Below is a recommended maintenance checklist for the M9000 static table. It provides a good guideline for yearly maintenance and can be copied and kept as a maintenance log.

The page numbers on the Check list references the M9000 Illustrated Parts List manual E-509.

**Example:**

~~Control Panel Assembly (Page 13) - Refers to Page 13 of the M9000 Illustrated Parts List.~~

<b>EASTMAN TECHNOLOGY SYSTEMS</b>		
<b>MAINTENANCE CHECKLIST FOR M9000 STATIC TABLE</b>		
<b>Festoon &amp; Cable Assembly: pg 8</b>	<b>Comments</b>	<b>Signoff</b>
Check & Secure festoon mounting track		
Check & Secure festoon roller track		
Check festoon end stop		
Check festoon track splice		
Check festoon trolley with webbing strap		
Check X-Axis cable festoon assembly (Loose connections or wear in cables)		
a) Main AC power cable		
b) X1/X2 power cable		
c) Y/Z p		
d) UIT cable		
e) Hall effect cable		
f) Encoder cable		
g) I/O cable		
h) Air hose		
<b>Front Cover Assembly: pg 11</b>	<b>Comments</b>	<b>Signoff</b>
Check & secure stop disks with rod		
Check limit switch & switch bracket		
Check slide bearings & bearing mounts		

<b>Back Cover Assembly: pg 12</b>	<b>Comments</b>	<b>Signoff</b>
Check & Secure stop disks with rod		
Check limit switch & switch bracket		
Check slide bearings & bearing mounts		
Check Emergency Stop switch & wiring		
Check Pause switch & wiring		

<b>Control Panel Assembly: pg 13</b>	<b>Comments</b>	<b>Signoff</b>
Check U.I.T. control assembly & cables		
Check Emergency Stop switch & wiring		
Check Pause switch & wiring		
Check Main Power switch & wiring		
Check joystick & cable/wiring		
Check tools on/off switch & wiring		
Check & Secure all screws		

<b>Front End Plate Assembly: pg 14</b>	<b>Comments</b>	<b>Signoff</b>
Inspect drive belt (cracks, thread separation)		
Check & oil large pulley bearings		
Check X1 home switch & wiring		
Check wiring for 5 & 12VDC power supply (Verify 5 and 12 VDC power)		
Check & Secure all set screws		
a) Large Pulley		
b) X1 Motor drive pulley		
c) Spur gear		
Remove & inspect THK linear bearings(2)		

Front End Plate Assembly: Cont'd	Comments	Signoff
Check & adjust backlash for X1		
Check & Secure all screws		
Back End Plate Assembly: pg 16	Comments	Signoff
Inspect drive belt (cracks, thread separation)		
Check & oil large pulley bearings		
Check X2 home switch & wiring		
Check X Limit switch & wiring		
Check & Secure all set screws		
a) Large Pulley		
b) X1 Motor drive pulley		
c) Spur gear		
Remove & inspect THK linear bearings(2)		
Check Electrical Regulator for calibrated output pressure		
Inspect & clean X-axis card		
a) Check all MTE connections		
b) Check DB-15 Encoder connectors		
Inspect all cables wired into electrical pan		
a) X1/X2 power cable		
b) Y/Z power cable		
c) Main AC power cable		
d) U.I.T. cable		
Check pull bracket, cable mount & E-chain mount		
Check & adjust backlash for X2 motor assembly		
Check & Secure all screws		

<b>Main Tube Assembly: pg 18</b>	<b>Comments</b>	<b>Signoff</b>
Check Y-Home switch		
Check Y-Limit 1 & 2 switch		
Check Y E-chain cables		
a) Multi-tool & Y I/O cable		
b) Y power & encoder cable		
c) Z power & encoder cable		
d) Airline tubing		
Check & Secure linear Thompson Rail		
a) Oil or grease		
Check & Secure white gear rack		
Check & Secure all screws		
<b>Y-Carriage Assembly: pg 20</b>		
<b>Y-Carriage Assembly: pg 20</b>	<b>Comments</b>	<b>Signoff</b>
Inspect drive belt (cracks, thread separation)		
Inspect & clean Y-axis I/O card		
a) Check all MTE connections (wiring)		
- Multitool, Sol 1,2,3, Pen, Laser, Boost		
- Y I/O cable		
Check Y Motor disconnect plug		
Examine Solenoid Block		
a) Use manual trigger to fire each solenoid		
b) Check for air leaks		
Check & Secure all set screws		
a) Large Pulley		
b) Y Motor drive pulley		
c) Spur gear		
Inspect Thompson Linear bearings		
Adjust Y-motor assembly backlash		
Check & Secure all screws		

<b>Tool Head Assembly: pg 22</b>	<b>Comments</b>	<b>Signoff</b>
Inspect drive belt (cracks, thread separation)		
Grease 16mm bearings(3) for air cylinders - Use Loctite High performance grease		
Check Z Motor disconnect plug		
Inspect & oil Pen lift bearing assembly		
Test Z-Home proximity sensor		
a) Check MTE connection on Y axis I/O		
Secure Z Motor drive pulley set screws		
Examine cylinder motion - Fire cylinders manually via solenoid block		

<b>Rack &amp; Rail Assembly: pg 24</b>	<b>Comments</b>	<b>Signoff</b>
Clean & oil THK rails		
Check Rack & Rail gap(s)		
Check Rack & Rail for wear		
Secure all screws		
a) Tighten 1/4-20 2" Rack plate screws		
b) Tighten #10-32 1/2" Rack button screws		
c) Tighten M3x16 Rail screws		
d) Tighten 1/4-20 3/8" Dust cover screws		
e) Tighten #8-32 3/8" Cam(limit) screws		
f) Tighten 1/4-20 3" Shock mount screws		

<b>Static Table Assembly: pg 26</b>	<b>Comments</b>	<b>Signoff</b>
Secure 3/8-16 1" Frame screws		
Secure angle brace(s)		
Examine Porex and/or Lexan surface		
Check table square and level		

<b>Vacuum Components: pg 28</b>	<b>Comments</b>	<b>Signoff</b>
Examine PVC vacuum plumbing		
a) Check Silicon seals		
b) Vacuum leaks		
Examine 7.5HP blowers		

<b>E-box Assembly: pg 30</b>	<b>Comments</b>	<b>Signoff</b>
Clean fan filter		
Use dry air to clean inside		
Tighten all screw terminals		
Secure all plugs and connections		
Check Vdc at X1,X2,Y & Z amp 162-185Vdc		

<b>Software: Easicut v. 2.2.17 PlotterW</b>	<b>Comments</b>	<b>Signoff</b>
Calibrate M9000 & Tools		
Save Machine.ini, Job & material files		
Save Machine & Job defaults		
Upgrade Software		

**Additional Comments**

Inspectors Signature \_\_\_\_\_

Date \_\_\_\_\_

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## Replacing Linear Bearings

The below is a step by step procedure on how to replace the THK linear bearings on the M9000 Static Table or EC3 Conveyor cutting system. Replacement of the linear bearings will not only restore the performance of your machine, but it will also prevent other problems such as increased spur gear wear, decreased cutting performance, and increased THK rail wear.

**Note:** All work should be performed by a qualified technician with power turned off to the machine in accordance with companies lockout procedures.

### Removing Linear Bearings:

1. Power the machine down using the proper shut down/lockout procedure.
2. Remove the fiberglass cover from both the operator and non-operator side of the gantry. Use caution when removing the covers, the wires connecting the pause and emergency stop switches can be damaged if not disconnected.
3. Remove the shock absorbing mounts from one end of the machine.
4. Place 2 x 4 blocks under the each end of the gantry for support when the bearings are removed.
5. Remove the four 10-32 screws holding the linear bearing block to the side plate. Repeat this step until all four linear bearings unbolted.
6. Unscrew the backlash adjusting screw from the backlash-adjusting block and slide the bearings out.
7. Remove the four M4 x 12-mm screws holding the bearing to the aluminum backlash-adjusting block.
8. The bearings can now be slid off the rail toward the end where the shock absorber mount was removed.

### Installing the New Bearings:

1. Remove bearings from the package, and press the Zerk fitting provided, into the bearing. Using a grease gun and the grease gun adapter that was included with the machine, fill the bearings with white or clear lithium grease.
2. Slide the bearings onto the THK rail, reinstall the aluminum backlash adjusting block back onto the bearing using the M4 x 12mm screws.
3. Position the bearing and bearing block directly under the backlash-adjusting block and replace the 10-32 screws into the bearing block finger tight.
4. Begin screwing the backlash adjusting screws into the backlash-adjusting block. Use a 6-inch level across the top of the side plate to ensure that both backlash-adjusting screws are being adjusted evenly.
5. Adjust the backlash adjusting screws until the spur gear contacts the gear rack. The backlash adjusting screws should be adjusted until the backlash between the gear and the gear rack can no longer be felt. Making the spur gear too tight can cause increased wear on the entire gantry drive train, so it is critical that this tolerance be set perfectly.
6. Tighten the 10-32 screws holding the bearing block to the side plate and recheck the gear backlash. Readjust if necessary.



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## Replacing Porex Plastic Table Surface

This procedure outlines the proper operation for changing the Porex table surface on the M9000 Static cutting system. Adhering to the following steps will reduce costly down time and ensure that the machine will operate properly when the procedure is complete. A clean and true cutting surface will guarantee that the machine can perform to its optimum level and that the cut parts will come out clean and precise.

**Note:** Always consult a trained Eastman Technician for the required size and the number of Porex table surfaces that are needed for your individual application.

### Removing the Porex Surface:

1. Remove the aluminum table end covers from both ends of the machine. If the machine is equipped with a Blue Jay End cutter it must also be removed.
2. Starting from one end of the machine begin scraping the Porex surface from the wooden tabletop using a flat wide putty knife. Be careful not to damage the wood surface underneath.
3. Remove all pieces of the Porex material until only the wooden tabletop remains.
4. Scrape the remaining glue from the wooden tabletops. A solvent may be required in areas where glue is built-up and difficult to remove.
5. Mask off the table rack and rail using plastic drop cloths and masking tape. This is important to keep glue over spray off of the precision ground rails. The cutting gantry should also be covered using additional plastic drop cloths.

### Replacing the Porex:

1. Carefully remove the Porex sheets from the shipping container, use caution in material handling as the sheets can easily be cracked and broken through careless handling.
2. Stack the Porex sheets onto the table at the end where gluing will start.
3. Test fit the first piece onto the table by lining the sheet up with the table edge. Using a pencil mark the edge of the sheet on the table.
4. Flip the sheet upside down with rough side up and place it on the far side of the mark you just made.
5. Using 3M Super 77 Spray Glue apply a medium coat of glue on the table surface, holding the can about 12"-14" away. Spray the glue in an even pattern back and forth the width of the sheet marked on the table. This coat should be even, not too wet and have a frosted appearance. Repeat the process by going back and forth across the table surface in a slow sweeping motion to ensure the entire table surface is coated. (This coat should also have a frosted appearance.) An entire can of spray adhesive is required to ensure enough glue is on the table surface.

**WARNING**

When applying the spray adhesive it should be done in a well ventilated area. Anyone working in the area is required to wear a respiratory to prevent inhalation of glue. Follow all safety instruction and cautions on spray can.

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**Caution** If the area the machine is located has a high humidity (above 40%) use a fan over the prepared table surface to prevent moisture from setting on and reacting with the 3M adhesive applied to table and Porex surfaces. Allow enough room between sheets for Porex to expand and contract based on the high and low seasonal temperatures of the factory.

6. Using about half a can of glue per sheet, spray a light dusting of glue onto the rough side of the Porex sheet. This will provide a tacky surface for the glue already applied to the table to adhere too.
7. With the assistance of another person carefully line up the Porex sheet with the end of the tabletop. Leave equal distance between the rack plate and the Porex sheet on either side of the machine. Once the sheet is lined up it can be set in place. Using a tile roller, roll the entire surface of the Porex sheet making sure that the sheet is completely bonded to the table surface.
8. Utilizing another drop cloth, cover the surface that was just laid down and prepare the next sheet of Porex for application. Leave about an 1/8" between the first and second sheet of Porex. Mark the edge of the second sheet.
9. Remove the sheet and prepare the surface for gluing.
10. Follow the procedure outlined above for all additional Porex sheets.
11. Any Porex overhanging at the end of the table can be trimmed off using a sharp knife.
12. Any additional accessories that were removed from the machine (Blue Jay End Cutter) can now be reinstalled.

## Seam Gluing Procedure:

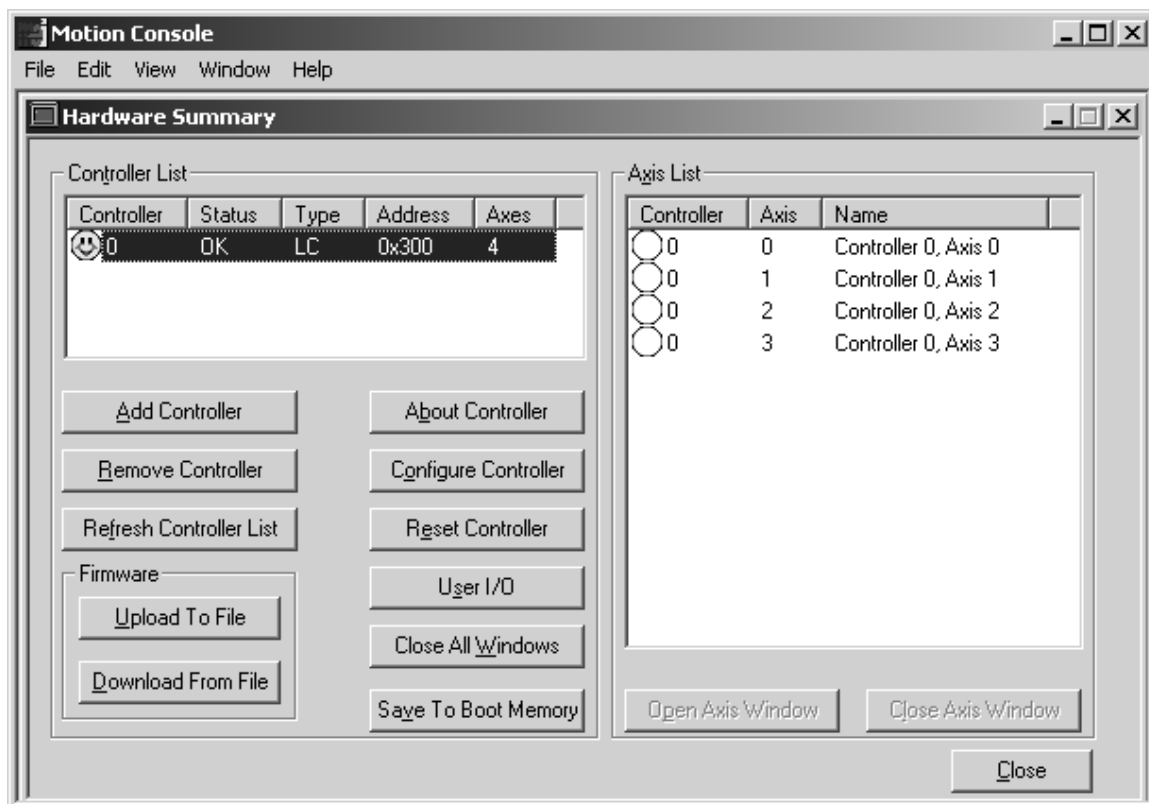
1. Once all the panels are glued in place, the drop cloths and masking tape can be removed from the machine.
2. Using a hot glue gun (67-26035) and Eastman Special Porous Plastic Glue Sticks (67-26034), fill in the seams left between panels. Make sure that the glue penetrates the entire seam from the table surface to the top of the Porex sheet. Fill in all of the seams between sheets but leave the gaps between both the rack plates and the Porex sheet empty.
3. Using a sharp putty knife or straight knife, scrape the excess glue from the top of the seam.
4. Continue this procedure until all seams are filled and scraped.

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## Loading ABS File to the MEI Board

The MEI board is a 4 axes Servo control board located in the cutter computer. The ABS file contains all the default settings for the MEI program that interfaces with both the Easicut and Plotterw software. The ABS file contains factory default tuning for each axis of motion on the automated cutter. Changes to the default settings on the MEI board or if the ABS file becomes corrupt will affect machine operation and can cause errors during normal operation. The factory defaults are loaded in the Eastman Directory located on your Easicut computer, they can also be found on the original software CD supplied with the machine. When installing a new MEI board or if the ABS file becomes corrupt you can load the ABS file from disk using the MEI program supplied on the cutting computer.

1. Power-up the M9000 using the proper start-up sequence:
  - a. Turn on the computer and let it fully boot up.
  - b. Turn on E-box(s) .
  - c. Turn on cutting gantry.
  - d. Start Easicut software.
2. Close Easicut software and open MEI software (MC\_DSP\_95).

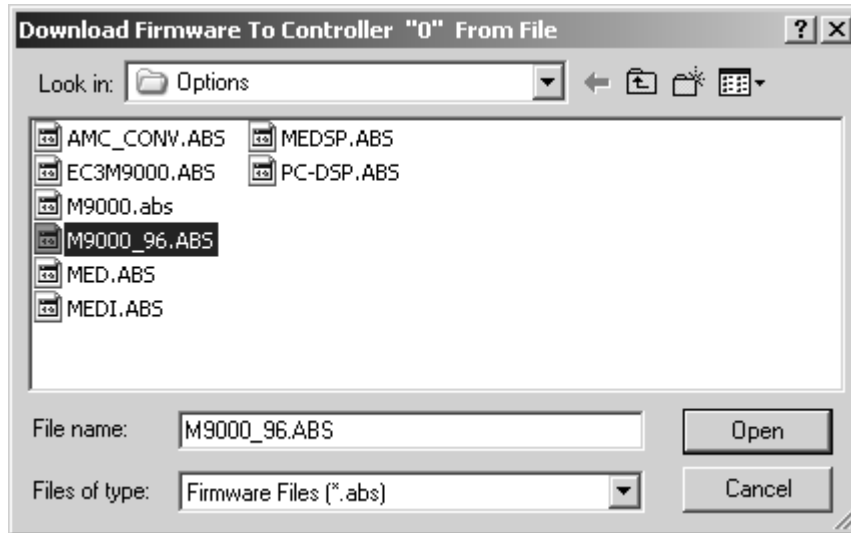


3. With the MEI software open go to the *View* menu on the top tool bar. Click on the Hardware Summary option.

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4. This will open a window that will show a controller list.
5. Select the "Download From File" option located in the lower left corner of the hardware summary window.



AMC_CONV.ABS	- For Medium Speed Conveyor MEI Board without Belt Encoder
EC3M9000.ABS	- For Conveyor Gantry MEI Board
M9000.ABS	- For M90 Gantry (Old Style Gantry) MEI Board
M9000_96.ABS	- For M9000 Gantry MEI Board
MED.ABS	- Not Used
MEDI.ABS	- Not Used
MEDSP.ABS	- Not Used
PC-DSP.ABS	-Standard MEI setting from factory

**⚠ WARNING** Loading the wrong ABS file can result in damage to the motors or cause the gantry and/or Y-car to runaway. Care should be taken when restarting Easicut after reloading the ABS file. Be ready to press an E-STOP in case of problems.

6. If you have an M9000 cutter, select the M9000\_96.abs file from the C:\Program Files\Eastman\Easicut 2000\Options directory. If you have something other than an M9000 machine, select the correct ABS file from the list. Otherwise consult factory.
7. Click on the "OPEN" button.
8. Click "YES" to replace the existing ABS file.
9. Close the MEI Setup program and reopen Easicut.

---

## User Interface Terminal Error Messages

Any troubleshooting or maintenance performed on the machine should be done by a qualified technician. Before performing any work follow proper electric lockout procedure for your facility, All power to the machine should be off and proper care taken to prevent damage to the machine and/or injury.

**⚠ WARNING** Failure to remove power to the machine and take proper safety precautions when performing maintenance and/or troubleshooting can result in injury or death. Any work should be performed by a qualified technician!

### UIT Error Messages

#### Abort X1 Axis Fault

#### Abort X2 Axis Fault

#### Abort Y Axis Fault

#### Abort Z Axis Fault

The "Abort Axis Fault" error codes indicate a fault with one of the gantry servo axes located in the gray E-box. There are a variety of problem which can cause this error. By perform the following test, it will help identify the source of the error.

1. Verify there is power to the servo amplifiers by removing the E-box cover and locating the set of (4) Servo Amplifiers.
  - a) A GREEN LED on the servo amplifier indicates the amplifiers are powered and ready. Press the ENTER key on the UIT, "Zero the Table" and continue with cutting. If the problem persists contact an Eastman Machine technician.
  - b) A RED LED on the amplifiers indicates the amplifier has power but is faulted.
- \* Check the voltage going from the High Voltage Power supply to the amplifiers. The voltage should be approximately 165 VDC. If the voltage is less than 140 VDC, check your incoming AC voltage.
- \* If the incoming AC Voltage to the E-box is correct, but the DC voltage to the amplifier is less than 140 VDC, unhook the DC power to each amplifier one at a time. Measure the DC voltage from at the High Voltage power supply to see if it measures 165 VDC.
- \* If your able to isolate one amplifier pulling down the High Voltage Power supply swap the bad amplifier with it's counterpart. (X1 and X2 amplifiers can be swapped and Y and Z amplifiers can be swapped) Determine if the problem stays with the amplifier or with the motor/cables) Swap the 16 pin connector and the A, B and C motor power leads between amplifiers. Make sure that you wire the A, B and C wires in the correct order.
- \* If the problem follows the amplifier the amplifier is bad. If the problem stays with the motor/cables, the motor/cables are bad.
- \* If you unhook all the amplifiers from the High Voltage Power supply and the DC voltage does not return to 165 VDC then the power supply is bad.

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**Abort X1 Axis Fault**

**Abort X2 Axis Fault**

**Abort Y Axis Fault**

**Abort Z Axis Fault**

- c) If none of the amplifiers are lit, verify 165 VDC input power to the amplifiers.
  - \* If there is no DC input voltage present then check the (2) 15 Amp fuse located in E-box and incoming AC voltage to E-box.
  - \* If the fuses are good and there is 115 VAC coming into the High Voltage Power Supply then the power supply is bad.
  - \* If there is AC Voltage coming into the E-box but not to the High Voltage Power Supply, verify all E-Stops are off and the (2) 15 Amp fuses are good.
  - d) If one amplifier is not lit swap the amplifier with another to verify it is the amplifier and not the cabling or motor. (X1 and X2 amplifiers can be swapped and Y and Z amplifiers can be swapped) Swap the 16 pin connector and the A, B and CW motor power leads between amplifiers. Make sure that you wire the A, B and C wires in the correct order.
  - \* If the problem follows the amplifier the amplifier is bad. If the problem stays with the motor/cables, the motor/cables are bad.
2. Remove the gantry cover from the non-operator and verify the 5-12 VDC power supply is working properly.
    - a) Measure the voltage between the BLACK and RED leads to verify it is between 4.8 - 5.2 VDC. If the voltage is outside this range, adjust the potentiometer until it falls within acceptable levels.
    - b) Measure the voltage between the BLACK and White leads to verify it is between 11.8 - 12.2 VDC. If the voltage is outside this range, adjust the potentiometer until it falls within acceptable levels.
    - c) If there is no 5 or 12 VDC power present, then replace the power supply.
  3. If the problem is intermittent or happens at the same spot on the table, check motor cables for broken wires. Power the system up and with the gantry sitting still, move and twist all the cables to see if you can create a fault.
  4. Check the MEI board by reloading the ABS file.
  5. Verify amplifier tuning by making sure the current limit and gain potentiometers are set properly. Consult factory for proper settings.
  6. If the AXIS FAULT error occurs at power up and can not be cleared, check each of the limit switches to verify they are not active.
    - a) Push each limit switch in and out verifying that they are functioning properly.
    - b) Remove the Non-operator side cover to verify that the X and Y limit switch LED's are lit on the X-axis board.
    - c) Verify all E-Stops are not active (See "Emergency Stop" Trouble Shooting).

**Abort X1 Error Limit**  
**Abort X2 Error Limit**  
**Abort Y Error Limit**  
**Abort Z Error Limit**

The "ERROR LIMIT" indicates the following error between the command position and the actual position for that axes was greater than the limit set on the MEI board. This typically indicate that the acceleration or velocity is set higher then the machine can perform. It may also indicate a problem with one of the servo drive or a mechanical problem in the axis.

1. Verify accelerations and velocity in Easicut and the JOB file. If the problem occurs at the same spot each time a particular file is run then decrease the acceleration.
2. Power down the system and push the gantry across the full length of the table to verify that both side move freely. Move the Y-Car by hand verifying it moves smoothly across the entire width of the table.
  - a) If one or both sides of the gantry or Y-Car do not move smoothly check:
    - \* Linear bearing making sure they are not damaged or clogged with material.
    - \* Remove the gantry end covers and check all pulleys and belts for wear or signs of slipping.
3. Shut down the Easicut software and start the MEI program on the PC. With the Gantry turned off, reset the encoder counts and push the Gantry and/or Y-Car by hand to verify the encoders are counting properly. You will need to click on each smiley face to pull up the individual axis. (Axis 0 - X1, Axis 1 - X2, Axis 2 - Y and Axis 3 - Z):
  - a) If the "Actual" and "Error" positions for each axes are not equal but opposite signs (+/-) then reload the ABS file to the MEI board.
  - b) If problem persists check, motor cables for continuity and verify solder joints and crimps at each motor connector. Check Hall and Encoder wires with a volt meter to verify 0 and 5 VDC when slowly spinning the motor.
  - c) Verify encoder is not damaged by swapping motor cables at the X-Axis board and rerunning test with power turned off to the gantry. Make sure the cables are switched back before powering up system. (Swap X1 and X2 or Y and Z)
4. In the MEI program, if the actual and commanded encoder counts are off by more than 100 counts and the cables are good then the MEI board may be bad.

**Emergency Stop**

The "EMERGENCY STOP" indicates that one or more of the red Emergency Stop buttons are active. The switches are normally closed and activated when the button is pressed or from an open circuit. This may be the result of a pressed button, bad switch, broken wire, or bad 12 VDC power supply.

1. Check all E-Stop buttons on both sides of the Gantry and any remote buttons. Push each E-STOP button in and out to verify they are off.
2. Check to see if the red E-Stop light on the operator and Non-operator side of the Gantry is lit. If one of the red lights are lit check E-STOP Button and wiring on that side of gantry. This will verify the gantry E-Stop buttons are working.
3. Remove operator side cover of gantry. Verify the low voltage power supply is properly adjusted. (5 VDC between Red and Black wires, 12 VDC between White and Black wires) If voltage is too high or low adjust the potentiometer on the power supply board. Reinstall the gantry cover making sure to reconnect E-STOP circuit.

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<p><b>Emergency Stop Continued</b></p>	<ol style="list-style-type: none"> <li>4. Remove Non-operator side cover on Gantry while keeping the E-STOP circuit connected and check the X-Axis board. There should be (2) Green LED's lit on the front center of the board. If only one green LED is lit, check the button and wiring on Non-operator side of gantry. If neither green LED's are lit check the button and wiring on operator side of the gantry. This will verify the E-STOP signal is getting to the X axis board.</li> <li>5. Unplug the "Table Remote" cable from the back of the Computer. Jumper pins 4 and 8. If the E-Stop condition can be cleared by pressing "Enter" on the UIT then the table remote E-Stop boxes are bad. Check wiring and E-STOP buttons on all remote E-STOPS.</li> <li>6. Unplug the conveyor E-box to computer cable and jumper pins 10 and 12. This will bypass the whole E-Stop circuit. If the E-Stop condition can be cleared by pressing "Enter" on the gantry then this will point to a bad cable or button in the E-STOP circuit. With an ohm meter, check the continuity of the wires and switches back through the circuit. (See Wiring Schematic 31-9000-6 page 2 of 4)</li> </ol>
<p><b>Pause Active</b></p>	<p>When a Pause Button or Paddle is active the gantry will decelerate and stop. The operator will be unable to jog the gantry or execute any commands from the UIT other than "NEXT" or "ABORT". This may be a result of a button or paddle being active, wiring or a bad/ loose switch.</p> <ol style="list-style-type: none"> <li>1. Check all PAUSE buttons and PADDLES on both sides of gantry and remote "PAUSE BUTTONS to verify they are not activate. Push each button and paddles in and out to verify they are off.</li> <li>2. Check to see if the green Pause light on the operator and Non-operator side of the Gantry is lit. If one of the lights are lit check the switch and/or wiring on that side of gantry. This will verify the gantry Pause buttons are functioning.</li> <li>3. Press "NEXT" on the UIT to continue with the active cut program loaded in the plotter program. Press "ABORT" to stop cutting and plot another cut file from the PC.</li> </ol>
<p><b>Axis not Square</b></p>	<p>The "AXIS NOT SQUARE" error message indicates the gantry is twisted. When "Zeroing the Table", if the second X-axis limit switch does not activate within a fixed distance of the first X-axis limit switch the table is considered out of square.</p> <ol style="list-style-type: none"> <li>1. Verify that both CAM plates for the end of travel limits are located the same distance from the end plate to insure gantry is squared.</li> <li>2. Verify both X-axis limit switches activate when touching CAM plates.</li> <li>3. If gantry is damaged and is no longer square it may taking pushing the "ZERO TABLE" button twice to square the gantry.</li> </ol>



<p><b>No Frames</b></p>	<p>The MEI (Motion Control Board) is waiting for move information from the PlotterW program. This is an indication that the Computer CPU may not be fast enough to process the information or may be tied up with another task.</p> <ol style="list-style-type: none"> <li>1. Reduce the Marker File size.</li> <li>2. Turn off the machine and reboot the computer.</li> <li>3. Add RAM to the computer.</li> </ol>
<p><b>X1 Axis Not Enabled</b>  <b>X1 Axis Not Enabled</b>  <b>Y Axis Not Enabled</b>  <b>Z Axis Not Enabled</b></p>	<p>The "AXIS NOT ENABLED" error indicates the amplifier for the corresponding axis did not receive the input from the block relay in the E-box to enable.</p> <ol style="list-style-type: none"> <li>1. Open up E-box to determine if any of the amplifiers are enabled by observing a Green LED on each Servo Amplifier. If none of the amplifiers are enabled then: <ol style="list-style-type: none"> <li>a) Verify the Enable relay block located in Gantry E-box is functioning.</li> <li>b) Verify Enable signal from I/O board in computer. Remove Computer cover and locate amplifier enable LED on I/O board.</li> </ol> </li> <li>2. If only one amplifier is not enabled check wiring between the Enable relay block located in Gantry E-box and the amplifier. (Pins 2 &amp; 9 on the amplifier) .</li> </ol>
<p><b>X Home Not Found</b>  <b>Y Home Not Found</b>  <b>Z Home Not Found</b></p>	<p>The "HOME NOT FOUND" fault indicates the home sensor in the given axis was not activated during the ZERO TABLE sequence. This could be caused by several problems including a stuck limit switch or bad home sensor.</p> <ol style="list-style-type: none"> <li>1. Remove the Non-operator side Gantry cover and locate LED's on the X-axis board. While pushing the home switch, verify the corresponding LED turns on and off. If LED does not turn on: <ol style="list-style-type: none"> <li>a) Check switch to determine if it is operating correctly.</li> <li>b) Verify wiring by swapping connector on X-axis board with another switch. IF LED comes on then wiring is good. <ul style="list-style-type: none"> <li>* If LED does not come on then wiring or switch is bad.</li> <li>* If LED does not come on then switch or X-axis board is bad.</li> </ul> </li> </ol> </li> <li>2. If while homing the Gantry is moving slow in the X direction away from the Home Switch check the X-Axis Limit Switches. This is an indication that the limit is active.</li> </ol>

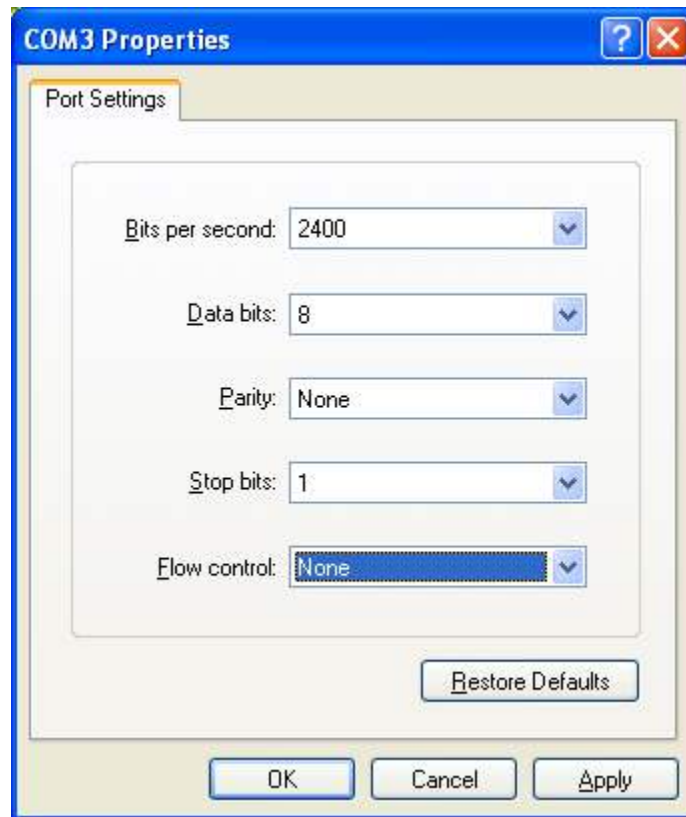
The M9000 may also develop mechanical or electrical problems that may not be displayed on the user interface. Below is additional troubleshooting for problems that may occur without providing an error message.

## Additional Troubleshooting

<p>UIT not Lit</p>	<ol style="list-style-type: none"> <li>1. Remove operator side gantry cover and verify on the low voltage power supply that there is 5 VDC between both red leads and either black lead.               <ol style="list-style-type: none"> <li>a) If no voltage verify AC power to board or replace power board.</li> <li>b) If voltage is above 5.2 or below 4.8 VDC then adjust the potentiometer through the hole in the plexiglass cover.</li> <li>c) If voltage is between 4.8 and 5.2 VDC.:                   <ul style="list-style-type: none"> <li>* Verify there is 5 VDC at the UIT.</li> <li>* If 5 VDC present at UIT then UIT is damaged and needs to be replaced.</li> </ul> </li> </ol> </li> </ol>
<p>Any Button Pressed on UIT displays same message.</p>	<ol style="list-style-type: none"> <li>1. One of the buttons on the UIT is stuck down. UIT must be replaced. To verify that button is stuck, type a few commands directly into the "Plotter Status" window in Easicut and verify that machine responds.</li> </ol>
<p>Tools do not come down when operating in manual mode.</p>	<ol style="list-style-type: none"> <li>1. Verify that the tools are on the correct spindles in the tool menu.</li> <li>2. Verify tools are mapped correctly in the Easicut software. (Refer to the software manual or Help screens for Tool Mapping)</li> </ol>
<p>Gantry Runs to end of File and Displays JOB COMPLETE without cutting the file.</p>	<ol style="list-style-type: none"> <li>1. Verify layer name appears underneath the picture of the cut tool at the bottom of the Easicut window. If the layer name does not appear under a tool then the layer is not mapped.</li> <li>2. In Easicut 2 and later versions you can drag and drop the Layer Name to the cut tool in the bottom of the Easicut window.</li> </ol>
<p>The UIT Displays a Blinking Cursor</p>	<ol style="list-style-type: none"> <li>1. System may have been powered up in wrong order. Turn on Gantry, close Easicut and reopen Easicut.</li> <li>2. The UIT to Computer RS-232 line may have bad connection.               <ol style="list-style-type: none"> <li>a) Close Easicut and start windows "Hyper-terminal by clicking on the Windows Start Button/All Programs/Accessories/Communication/Hyper-terminal.</li> <li>b) Name the new connection Comport 2 and click OK.</li> <li>c) In the Connect To" window select the "Connect Using" as COM2.</li> <li>d) In the Port Setting Window:                   <ul style="list-style-type: none"> <li>* Set "Bits per Second" to 2400.</li> <li>* Set "Data Bits" to 8.</li> <li>* Set "Parity" to None.</li> </ul> </li> </ol> </li> </ol>

The UIT Displays a Blinking Cursor

- \* Set "Stop Bits" to 1.
- \* Set "Flow Control" to None then click OK.



3. Type on the computer keyboard and see if the characters appear on the UIT screen. Also push different buttons on the keypad and see if you get different symbols on the Hyper-terminal screen.
4. If you do not get characters on the UIT or on the Hyper-terminal, verify the connection between UIT and computer.
  - a) Disconnect UIT from the Comport in back of computer .
  - b) Jumper pins 2-3 on the computer comport by touching them together with a paper clip or metal screw driver.
  - c) Type on computer keyboard and make sure what ever is typed shows up on computer screen. If no characters show up on Hyper-terminal then comport 2 is bad or not properly configured.
5. If you do get characters on the Hyper-terminal screen, then reconnect the comport to the computer and unplug the UIT connector from the bottom pan of the non-operator side gantry and repeat steps (a) through (c) above. If you do not get characters back then the UIT to Computer cable has a bad connection.
6. If you do get characters on the Hyper-terminal screen, reconnect the comport to the gantry and unplug the RS-232 connector from the bottom of the UIT and repeat steps (a) through (c) above. If you do not get characters back then the UIT to Non-operator side gantry cable has a bad connection. If the characters appear on Hyper-terminal then the UIT is bad.


**Eastman®**

*Over a Century of Cutting Expertise*

<p>Slivers in Y Direction</p>	<ol style="list-style-type: none"> <li>1. Check backlash in the Y axis by physically trying to move the Y-car with gantry powered. If there is backlash power down the gantry and remove tool cover.             <ol style="list-style-type: none"> <li>a) Inspect all pulleys for signs of slippage on the shaft.</li> <li>b) Tighten the Y-axes motor belt by loosening motor mounting screws and sliding motor until the belt is tight.</li> <li>c) With the power to the gantry off move the Y-car along the Delron rack. Make sure that the spur gear makes good contact with the rack from one side of the gantry to the other. If the spur gear does not make full contact loosen the screws holding down the Y-axis rack. Position the Y-car on one side of the table. As the Y-car passes each screw make sure that the rack makes full contact with the spur gear before tightening down the screw. Push the Y-car across the entire width of the table until all screws are tightened.</li> </ol> </li> <li>2. Inspect all pulleys on the Y-car for any indication it is slipping on the shaft. Mark the pulley and shaft with a marker and cut a file. When the machine stops, check the mark to verify pulley did not slip.</li> </ol>
<p>As the table cuts the Y-axes Home position begins to move to one side</p>	<ol style="list-style-type: none"> <li>1. Inspect all pulleys on the Y-car for any indication it is slipping on the shaft. Mark the pulley and shaft with a marker and cut a file. When the machine stops, check the mark to verify pulley did not slip.</li> <li>2. Verify there is no RF interference which may be causing the encoder signal to be off.</li> <li>3. The Y-axes motor may have a bad encoder and needs to be replaced.</li> <li>4. MEI board may be going bad and picking up or losing encoder counts.</li> </ol>
<p><b>No Display on UIT</b></p>	<ol style="list-style-type: none"> <li>1. Check 5-12 VDC Power Supply P/N 31-12660-1 on operator side of gantry. Verify that there is 5 VDC on pins 2 and 4 on power supply and J1 pins 1 and 4 on UIT. If voltage is not between 4.7 VDC and 5.3 VDC adjust the potentiometer on the power supply. If voltage is 0 replace power supply.</li> <li>2. Check continuity of wires going from power supply to UIT board.</li> <li>3. If 5 VDC present at UIT connector replace UIT unit.</li> </ol>
<p><b>Buttons on UIT do no Work. Display is lit.</b></p>	<ol style="list-style-type: none"> <li>1. Verify continuity of pins 2, 3 &amp; 5 from computer to pins 2, 3 &amp; 7 on UIT for the RS-232 cables. If you have no continuity check individual cables and connectors.</li> <li>2. Verify computer comport by jumping pins 2 and 3 at back of computer while running Windows Hyper-terminal Terminal.</li> <li>3. With power off locate the jumpers on underside of the UIT board. Move the jumper from pin 20 to pin 21 then power up the UIT. The UIT will run through a self diagnostic program.</li> </ol>
<p>Motors Do Not Power-up</p>	<ol style="list-style-type: none"> <li>1. Verify Gantry is powered.</li> <li>2. Remove cover from E-box and verify all amplifiers are powered and have a green light.</li> <li>3. Verify the motor power cables are connected. Continuity check the cables for broken leads.</li> </ol>

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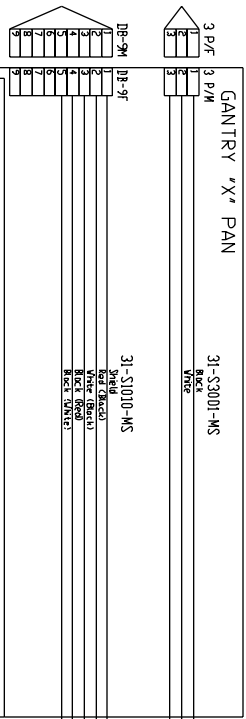
The following electrical drawings are for reference only. Eastman maintains the right to change electrical specification without notice. Any modification to machine wiring without written permission from Eastman Machine Company shall void any warranties.

 **WARNING** All electrical work should be performed by a trained technician familiar with electrical lockout procedures. Electrical Boxes contain high voltage electricity and can cause injury or death if proper precautions are not taken.

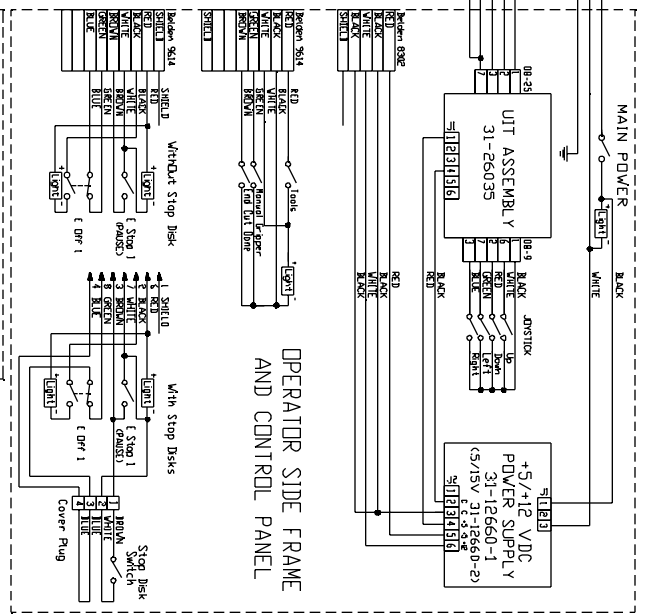


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31-B1013-CL

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PORT  
31-S1005-CL



X-AXIS PC ASSEMBLY 10-00903-02

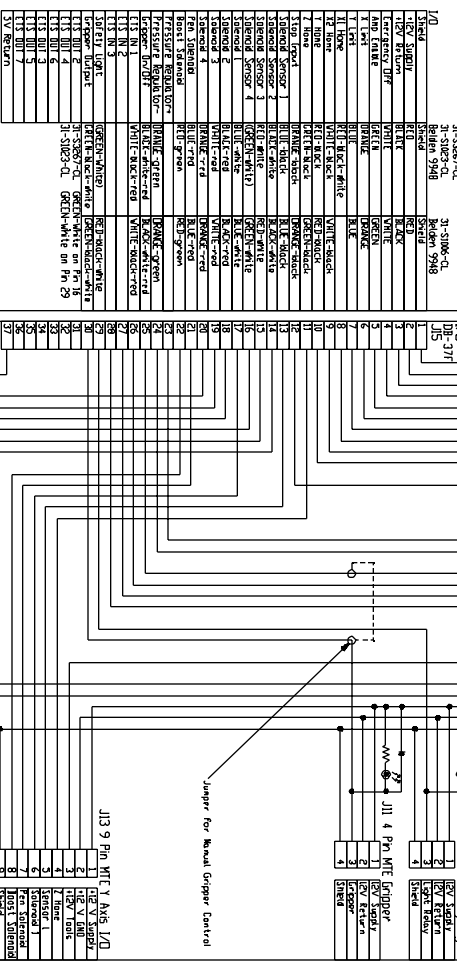


OPERATOR SIDE FRAME  
AND CONTROL PANEL

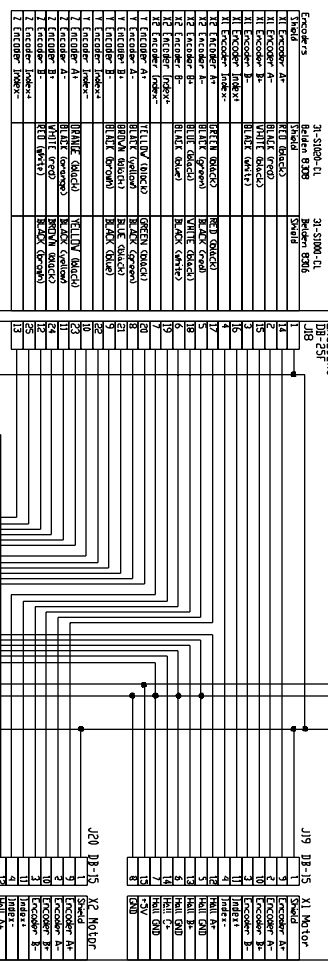
31-9000-6 REV-C  
Static Table  
Sheet 1 of 4

ELECTRICAL SCHEMATICS

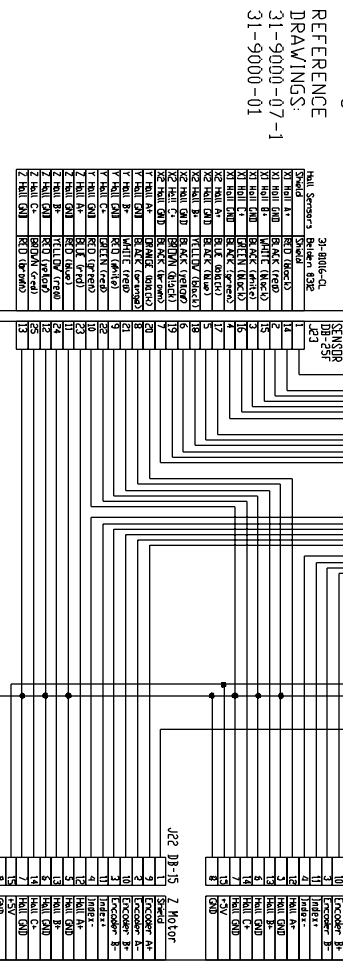
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MACHINE I/O  
CABLE : 31-S1023-CL  
(See Page 2)



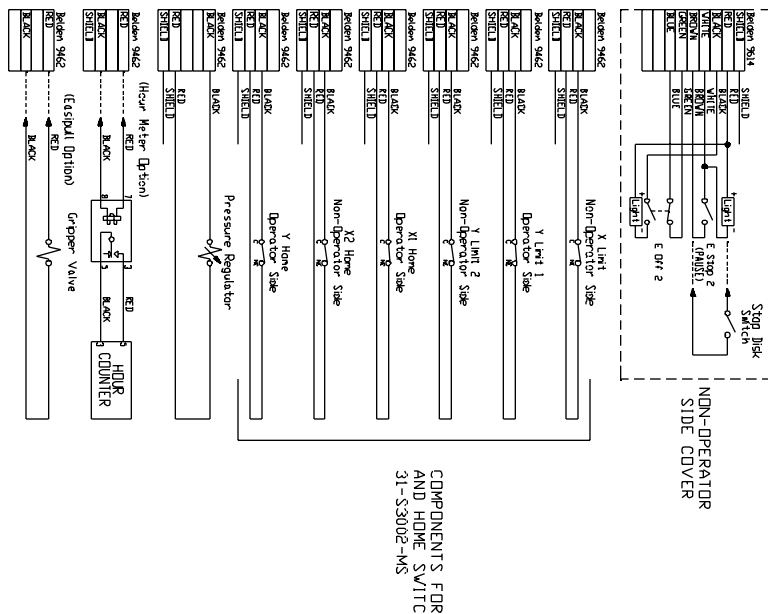
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MOTOR ENCODERS  
CABLE: 31-S1020-CL  
(See Page 2)



TD E-BOX  
MOTOR HALL SENSORS  
CABLE: 31-B1016-CL  
(See Page 3)



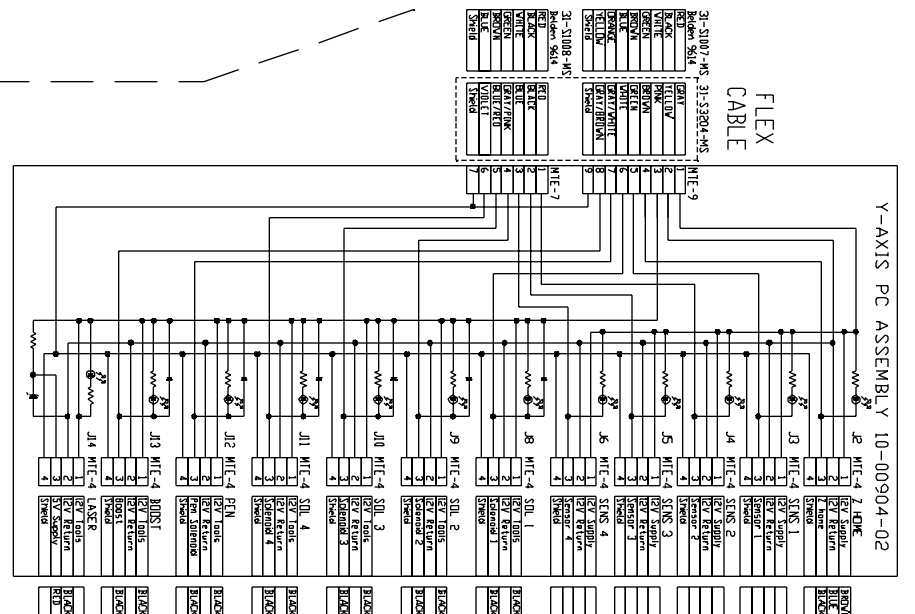
REFERENCE  
DRAWINGS:  
31-9000-07-1  
31-9000-01



NON-OPERATOR  
SIDE COVER

COMPONENTS FOR MOTOR LIMIT  
AND HOME SWITCH WIRING  
31-S3002-MS

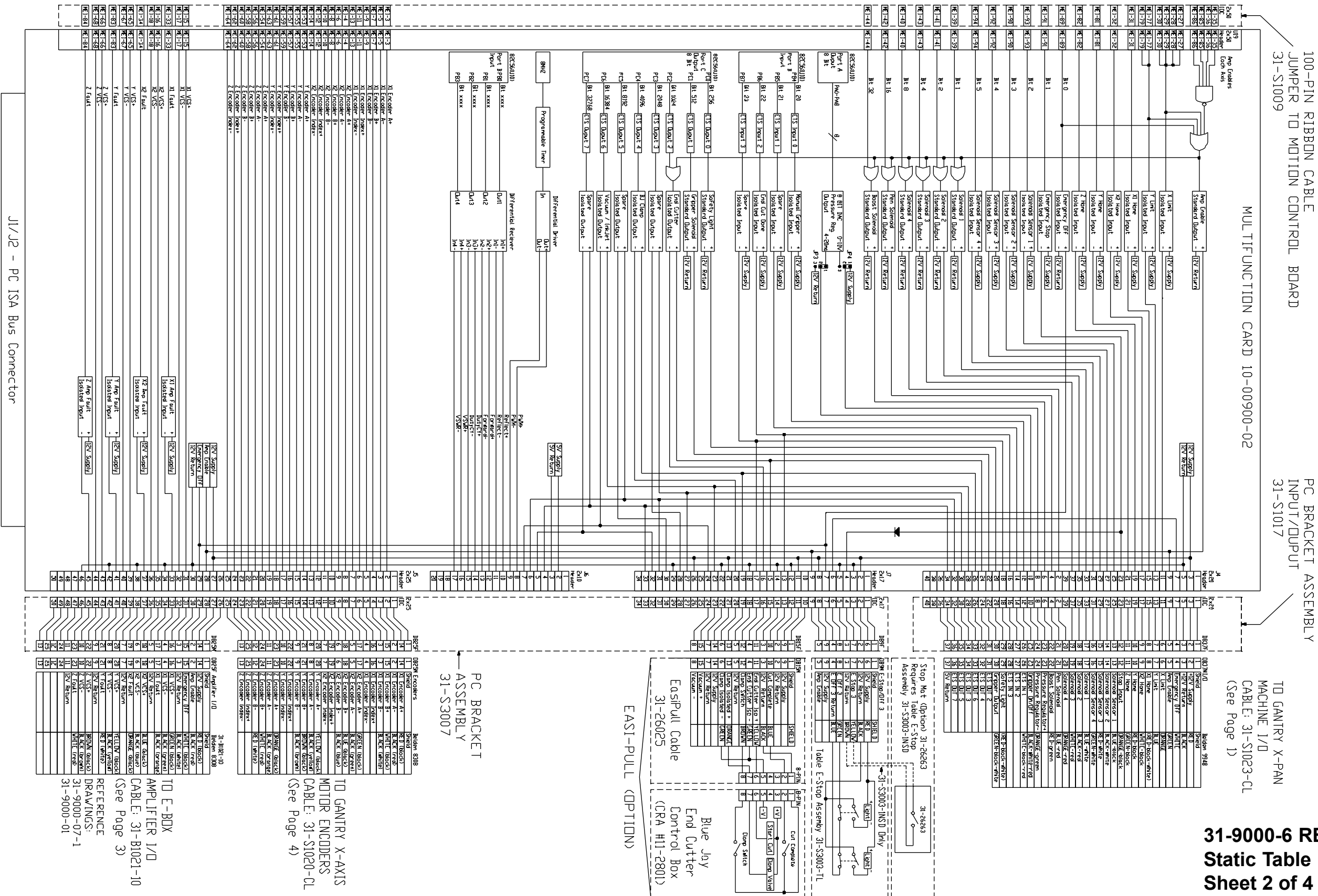
FLEX  
CABLE



Y-AXIS PC ASSEMBLY 10-00904-02

MOTOR POWER  
AND FEEDBACK  
WIRING  
SEE PAGE 4

MULTIFUNCTION BOARD ASSEMBLY SCHEMATIC/WIRING.  
 THIS BOARD IS MOUNTED INSIDE THE PC ASSEMBLY  
 FOR DETAILED SCHEMATIC OF MULTIFUNCTION CARD,  
 REFER TO SCHEMATIC: 10-00900-02



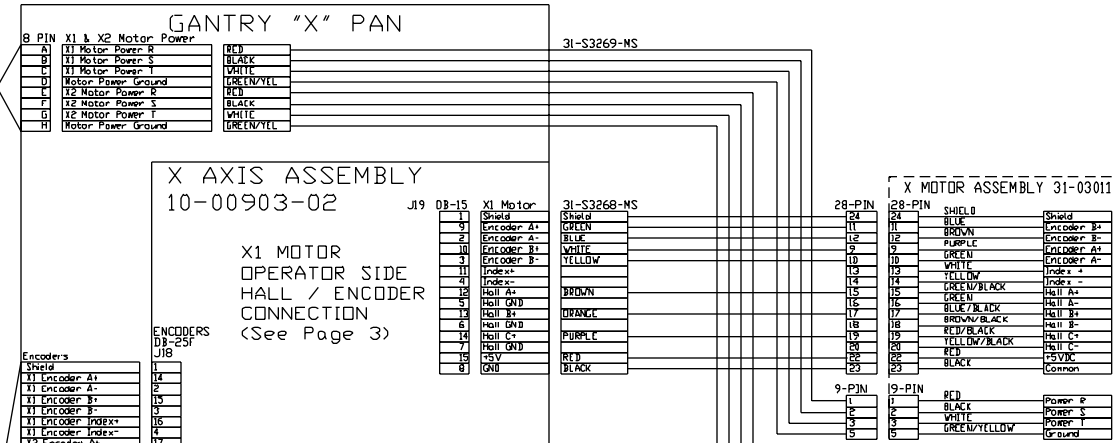




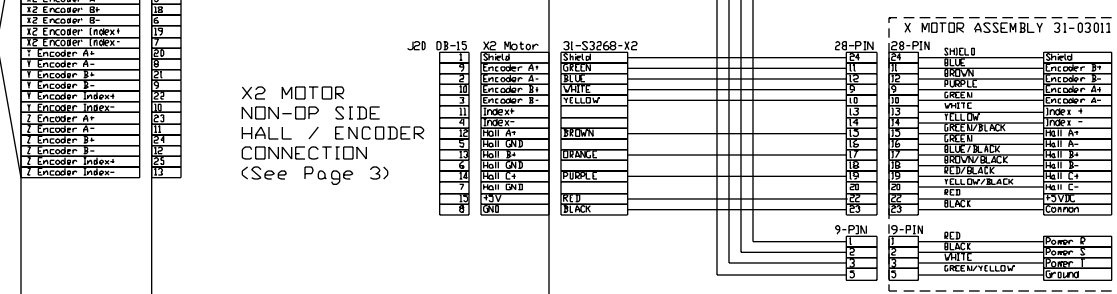
# FLEX CABLE / CONNECTOR VERSIONS

# HARD-WIRED VERSIONS

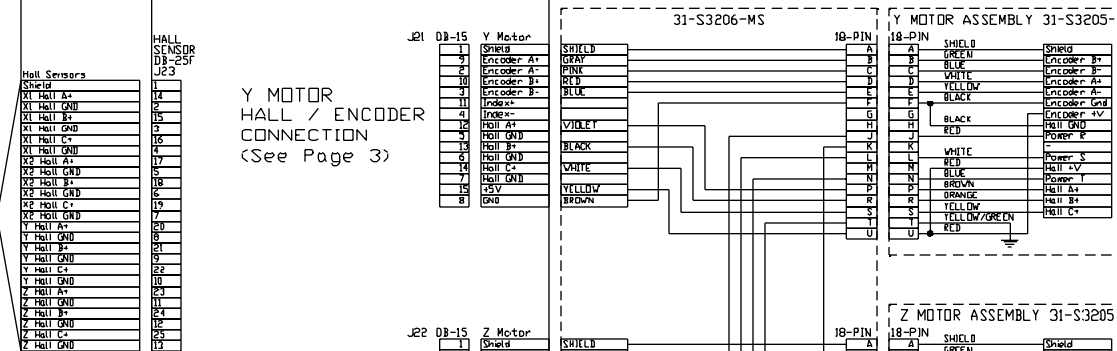
TO E-BOX  
X MOTOR POWER  
CABLE: 31-B1022-TL  
31-26210-CL (FLEX)  
(See Page 2)  
ALSO DRAWINGS:  
31-9000-07-1  
31-9000-01



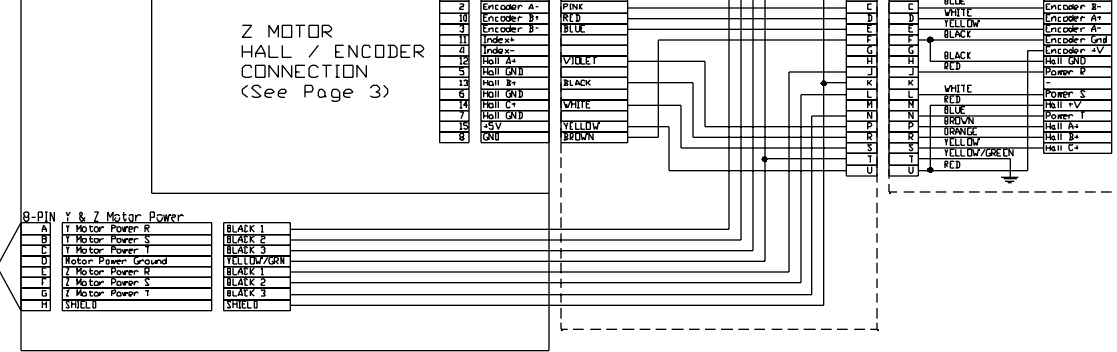
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MOTOR ENCODERS  
CABLE: 31-S1020-CL  
(See Page 1)



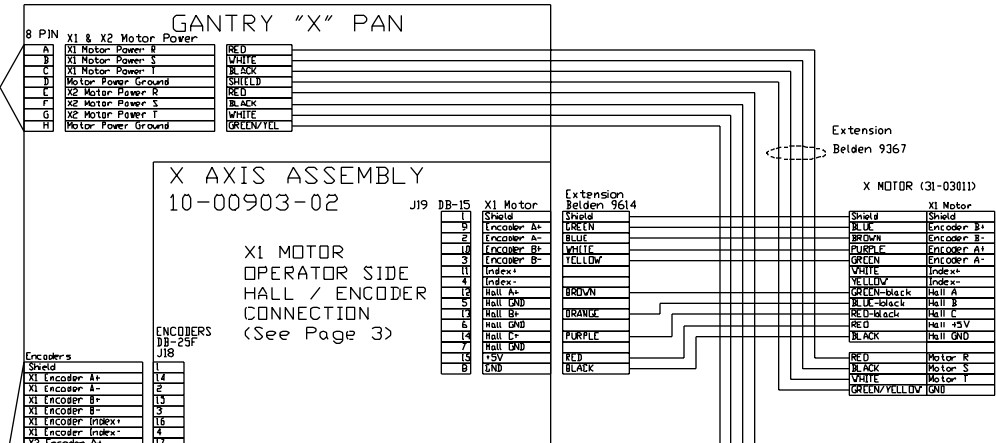
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HALL SENSORS  
CABLE: 31-B1016-CL  
(See Page 2)  
SEE DRAWINGS:  
31-9000-07-1  
31-9000-01



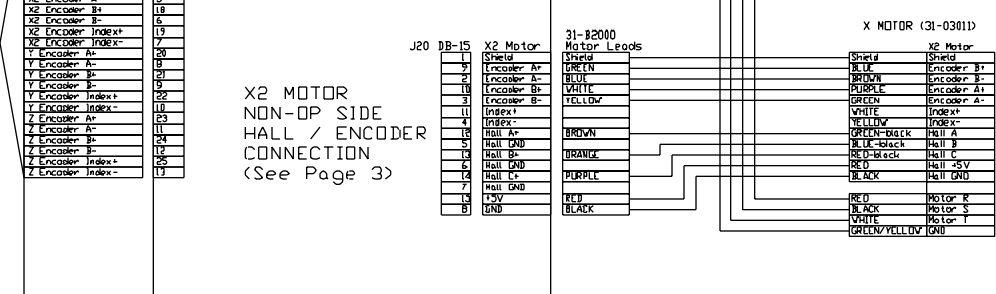
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31-26211-CL (FLEX)  
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31-9000-01



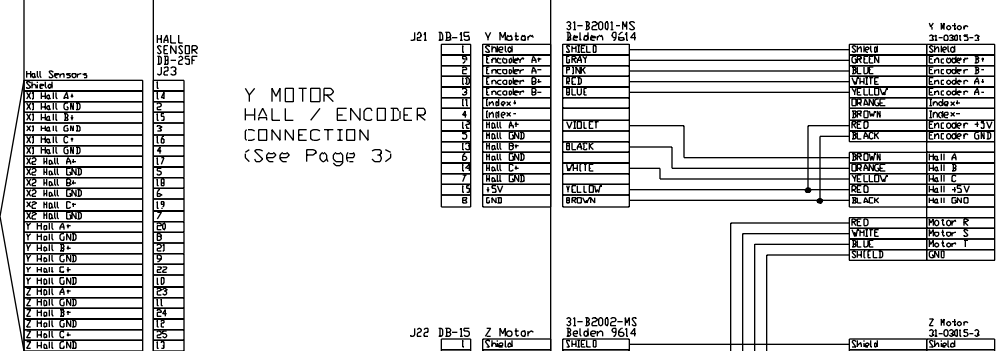
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X MOTOR POWER  
CABLE: 31-B1022-TL  
31-26210-CL (FLEX)  
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ALSO DRAWINGS:  
31-9000-07-1  
31-9000-01



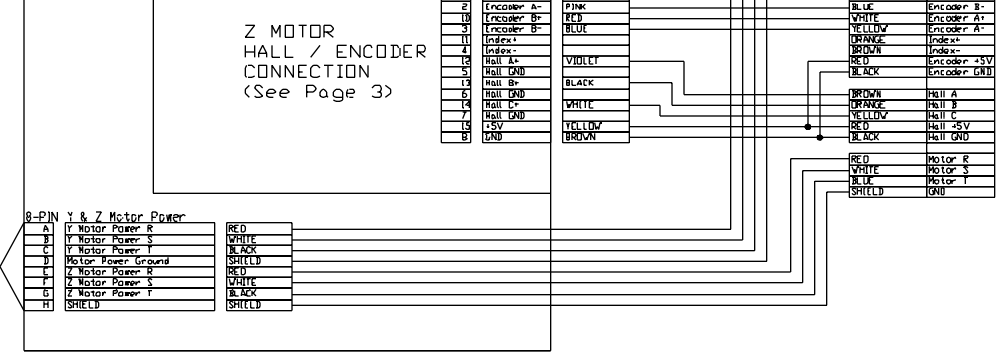
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MOTOR ENCODERS  
CABLE: 31-S1020-CL  
(See Page 1)



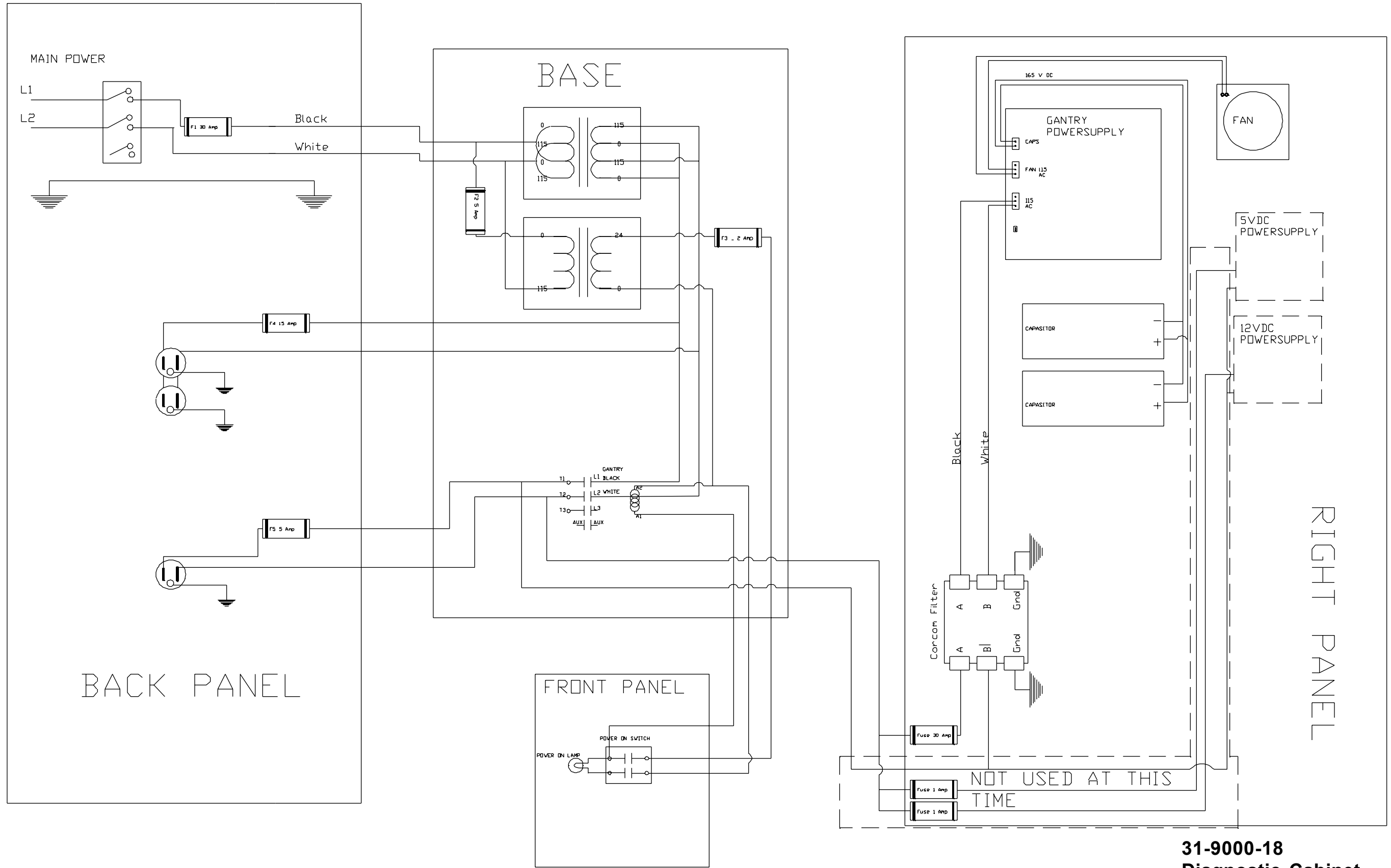
TO E-BOX  
HALL SENSORS  
CABLE: 31-B1016-CL  
(See Page 2)  
SEE DRAWINGS:  
31-9000-07-1  
31-9000-01



TO E-BOX  
Y/Z MOTOR POWER  
CABLE: 31-B1019-TL  
31-26211-CL (FLEX)  
(See Page 2)  
ALSO DRAWINGS:  
31-9000-07-1  
31-9000-01



31-9000-6 REV-C  
Static Table  
Sheet 4 of 4



31-9000-18  
Diagnostic Cabinet

## Technical Data EASTMAN® ETS-M9000

### ETS-M9000

Maximum Machine Speed*	60 in/sec. (150 cm/sec.)
Maximum Table Length	None
Cut Accuracy*	+/- .015" (+/- .4 mm)
Gantry Weight	Approx. 200 lbs. (145 kg)
M9000 Operating Voltage	110V; 60hz
Blower Operating Voltage	220V; 60hz
Power Requirement (M9000)	110V/20A
(Blowers)	220V/25A
Minimum Operating Pressure	75 PSI
Volume of Air Service	5 SCFM

Information based on a standard 72" Maximum cutting capacity machine.

\* Relative to the type and quality of fabric, Cutting speed, Pulling mode, Operational Settings etc.

Machine Size	Working Width	Table Width (Including Rack & Rail)	Overall Machine Width
60" (1530 mm)	58.6" (1488 mm)	72" (1830 mm)	91" (2310 mm)
66" (1680 mm)	64.6" (1641 mm)	78" (1980 mm)	97" (2464 mm)
72" (1830 mm)	70.6" (1793 mm)	84" (2130 mm)	103" (2616 mm)
78" (1980 mm)	76.6" (1946 mm)	90" (2290 mm)	109" (2770 mm)

Please allow 3 ft working clearance on all sides.

\* For all other sizes consult factory.

**Limited Warranty.** Eastman warrants to the buyer that the equipment shall be free from defects in materials or workmanship for a period of 180 days commencing on the date of invoice. Any goods or parts claimed by the buyer to be defective must be returned to Eastman, freight charges prepaid, within the 180-day warranty period. If Eastman determines that the goods or parts are defective in materials or workmanship, Eastman's sole obligation under this warranty shall be, at Eastman's sole option, to repair or replace the defective goods or parts or to provide the buyer a credit equal to the portion of the purchase price allocable to the defective goods or parts. This warranty shall not apply if defects are caused by product misuse or neglect, if the machine has been altered or modified by the buyer, or if other than genuine Eastman belts, emery wheels, knives or parts are used in the machine. THIS WARRANTY IS THE ONLY WARRANTY APPLICABLE TO THIS PURCHASE. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

**Limitation of Liability.** Eastman's liability to the buyer, and the buyer's remedies from Eastman, whether in contract, negligence, tort, under any warranty or otherwise, shall be limited to the remedies provided in the foregoing Limited Warranty. In no event shall Eastman have any responsibility or liability to the buyer for (a) any special, indirect, incidental, or consequential damages, including, but not limited to, loss of use, revenue, or profit, even if Eastman has been advised of the possibility of such damages, or (b) any claim against the buyer by any third party. The price stated for the product sold is a consideration for limiting Eastman's liability.