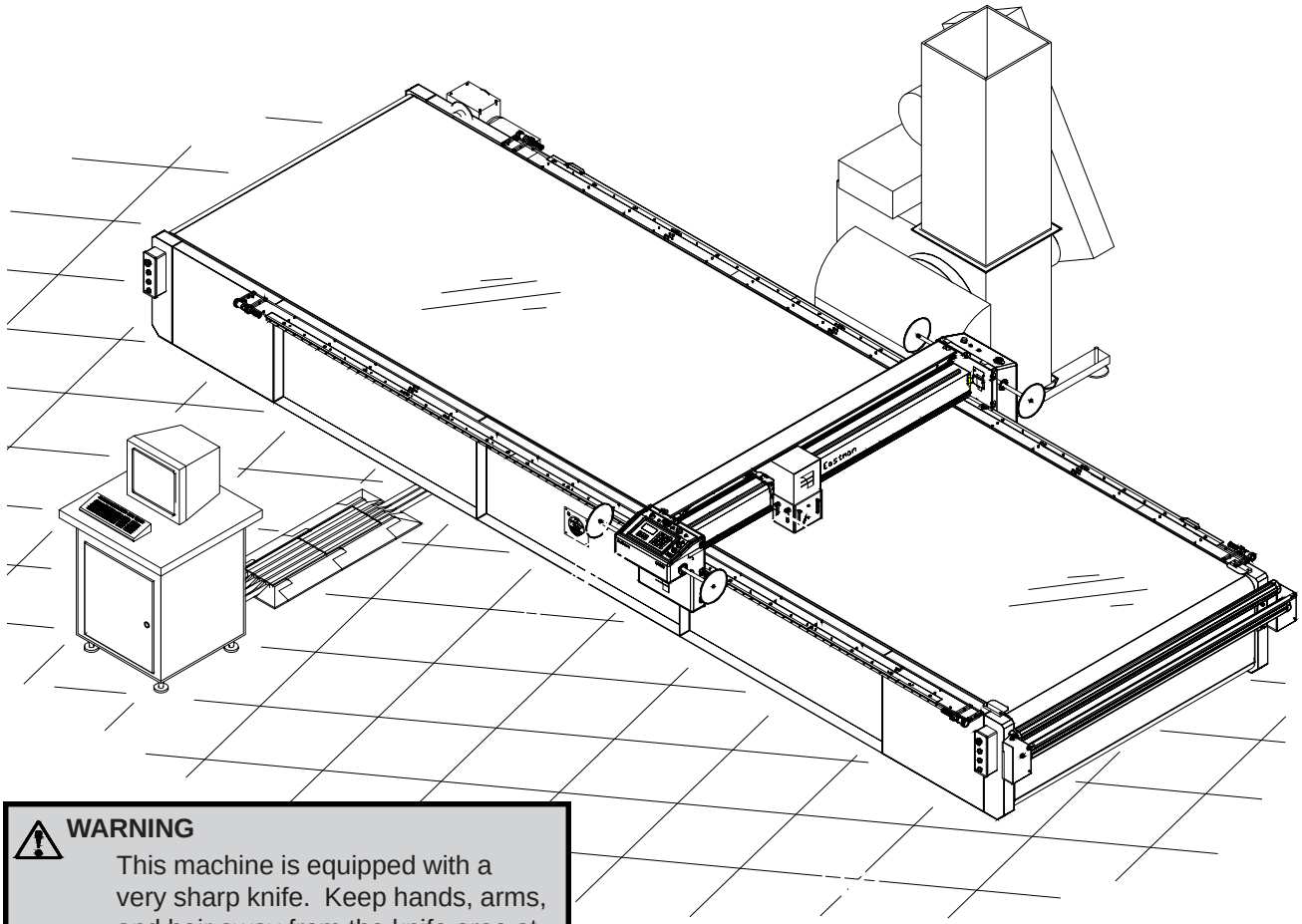
Eastman

THE EASTMAN ®
EC3 Conveyor Automatic Cutting System
Model: ETS-EC3

Instruction, Maintenance, & Service Manual

Technical Support
1-800-872-5595



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.

Eastman AUTOMATED SYSTEMS

779 Washington St., Buffalo, N.Y. 14203-1396 U.S.A. • (716)856-2200 • Fax (716)856-1140 or (716)856-2068
Manufacturers of Eastman Cloth Cutting and Cloth Spreading Machines
Website: www.EastmanCuts.com

Form E-526

Congratulations

Congratulations in selecting an Eastman EC3 Conveyor. With over 100 years of experience in the cutting room, Eastman is a world leader in cutting equipment. Every Eastman employees 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 EC3 Conveyor 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 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
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Buffalo, NY 14203
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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 EC3 Automated Cutting System.

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REVISION PAGE

12/30/2003 - Initial Release of the EC3 manual

1/31/2004 - Revision of the EC3 manual

9/28/04 - Added Pnuematic Diagram 31-9000-19

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.

⚠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: 10ºC to 35ºC (50º to 95ºF).

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 -25ºC to 55ºC and for periods not exceeding 24 hrs. at up to +60ºC.

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

	Voltage	Current	Frequency	# of phases
Computer	120 VAC	6 Amp	50/60 Hz	Single
Gantry E-box	120 VAC	10 Amp	50/60 Hz	Single
25 HP Blower	230 VAC	60 Amp	50/60 Hz	Three
	440 VAC	30 Amp	50/60 Hz	Three
Gantry	120 VAC	1.2 Amp	50/60 Hz	Single
Low Voltage	5/12 VDC	2/3 Amp	50/60 Hz	Single
Power Supply				

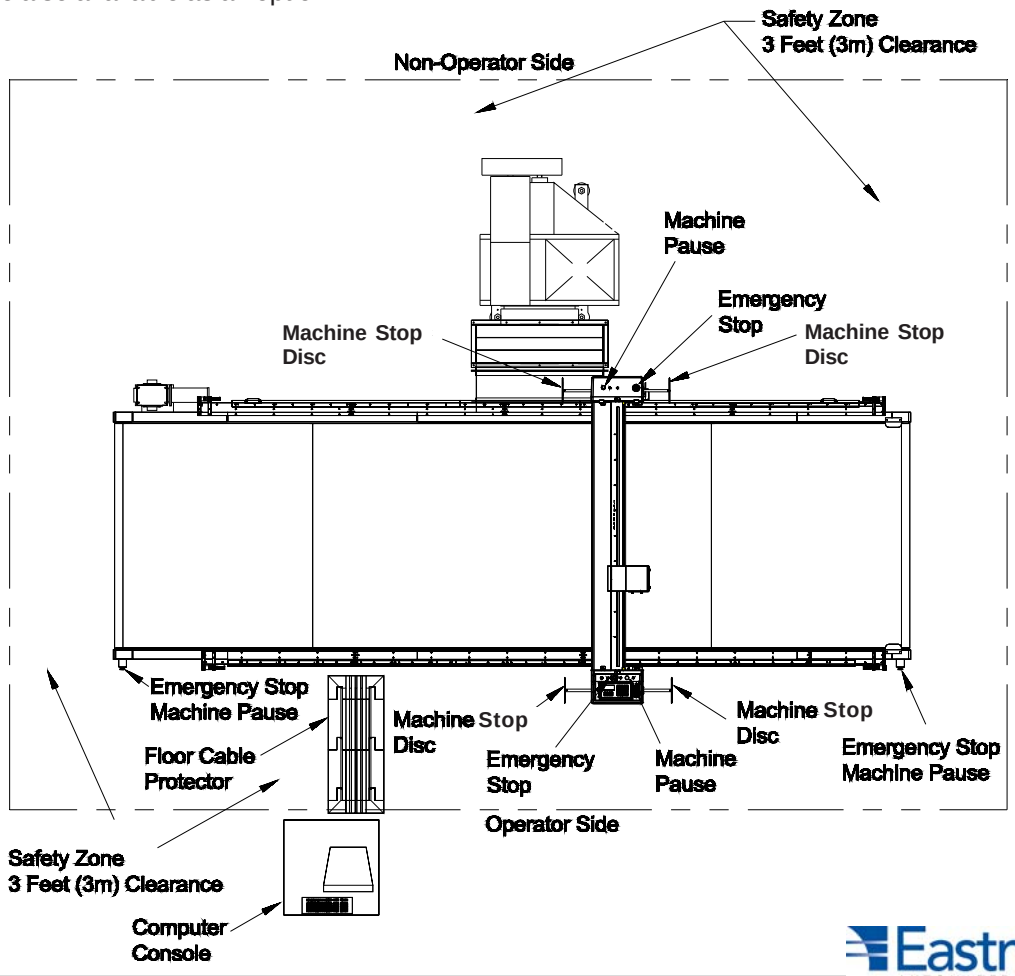
Safety Zone and Stop Devices

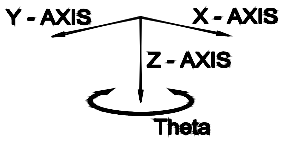
PAUSE Buttons/Stop Discs

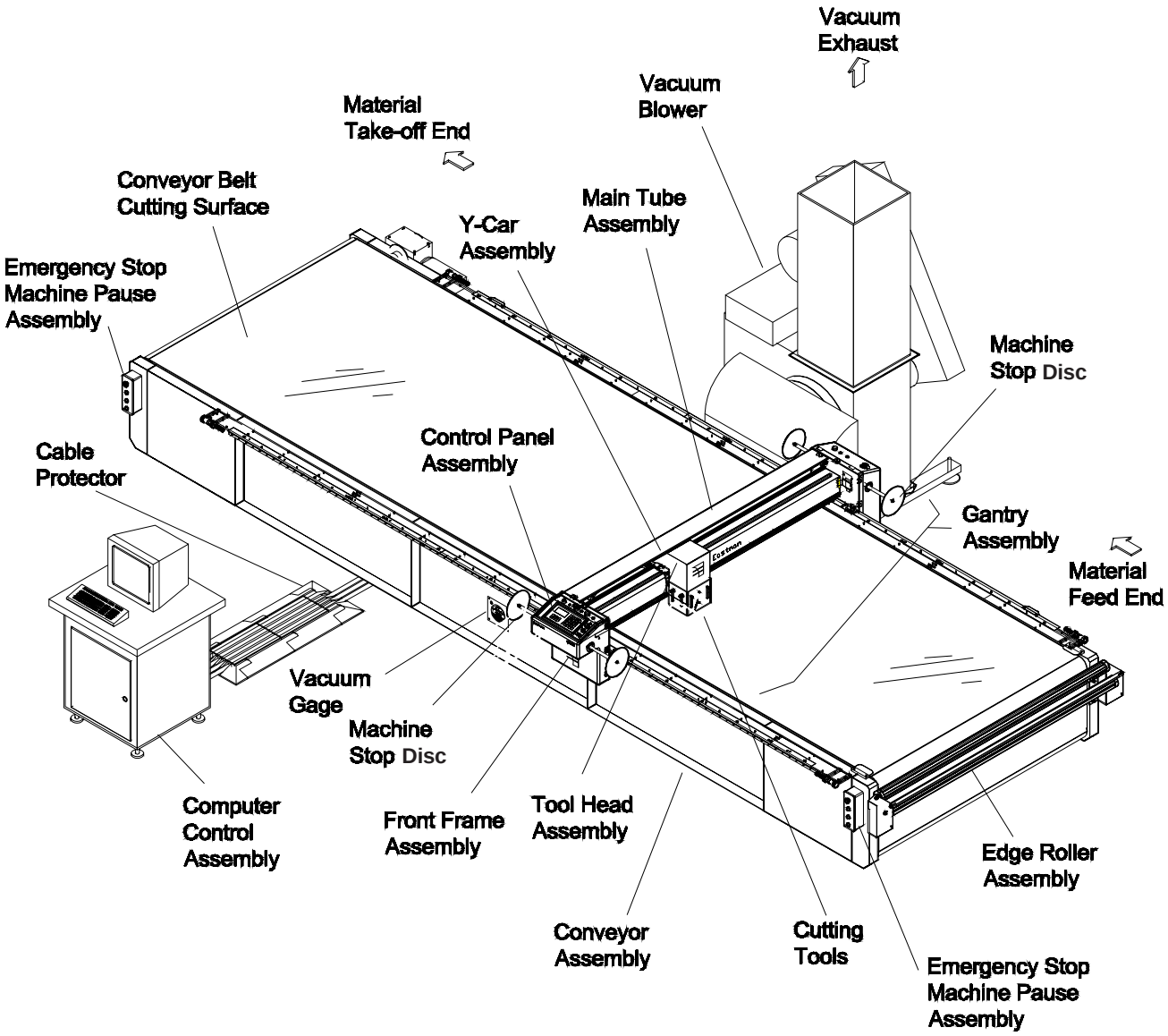
The yellow buttons above the control panel and on the nonoperator side of the gantry as well as the stop discs on each side of the gantry will pause the machine. Activating either the button or the stop disc s will execute a controlled stop of the plotter, with the machine remaining fully powered. After releasing the pause button or resetting the stop 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 conveyor. 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 floor mats are also available as an option.




Y - AXIS
X - AXIS
Z - AXIS
Theta


Vacuum Exhaust
Vacuum Blower
Material Take-off End
Conveyor Belt Cutting Surface
Main Tube Assembly
Y-Car Assembly
Emergency Stop Machine Pause Assembly
Machine Stop Disc
Control Panel Assembly
Cable Protector
Gantry Assembly
Material Feed End
Vacuum Gage
Machine Stop Disc
Computer Control Assembly
Front Frame Assembly
Tool Head Assembly
Edge Roller Assembly
Conveyor Assembly
Cutting Tools
Emergency Stop Machine Pause Assembly

User Interface Terminal

The EC3 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.

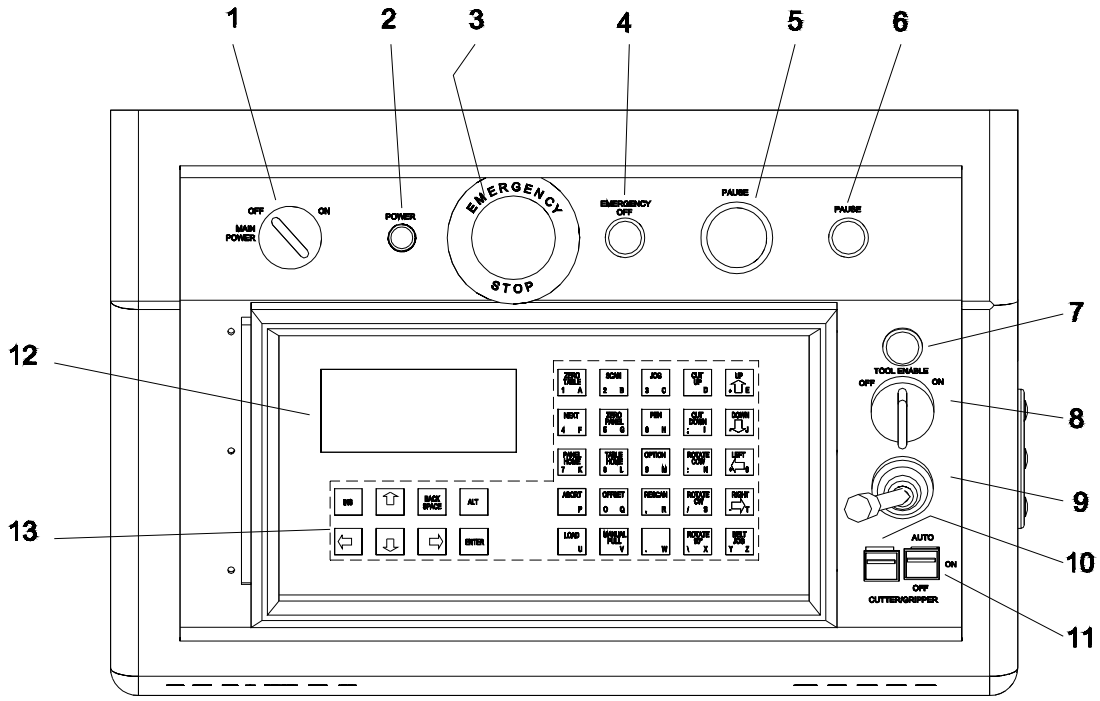
The commands are grouped as follows:

***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 axes 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 should 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 stop discs 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 stop discs 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.

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.

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.

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.

(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 up command is set and the gantry

Software File Relationships

Easicut is Eastman Technology'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.

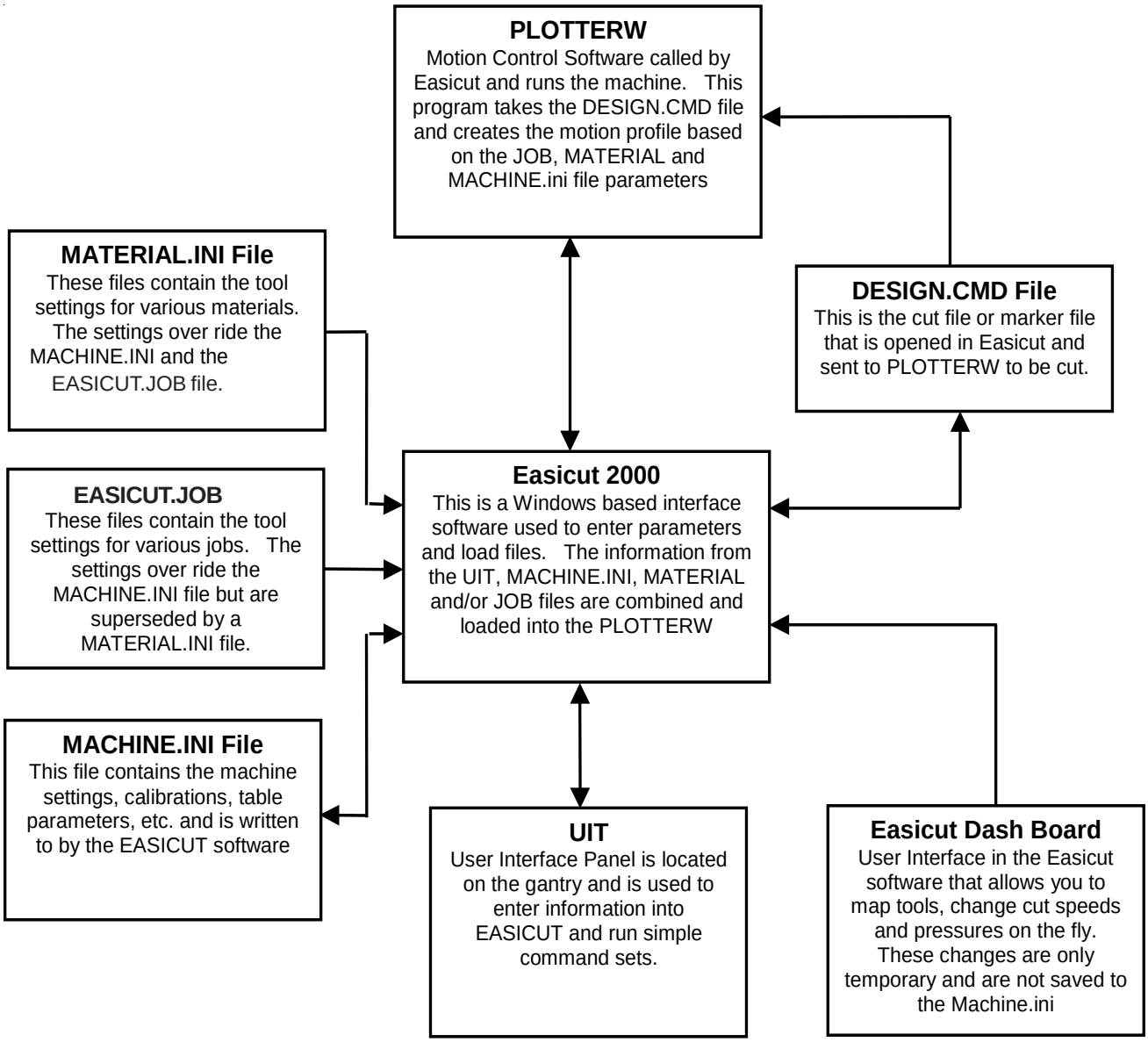
PLOTTER.SRV: Optional. Used only on plotters with laser cutting device. Contains default values for laser test firing and troubleshooting.

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



EC3 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 Gantry and Conveyor E-Boxes.
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

Running A JOB

1. Spread material on the feed end of conveyor, 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. Turn on the convey vacuum to hold material down.
4. Jog belt 12-24 inches to remove slack in the gray link belt. If the belt is not jogged after starting the blower and before cutting, it can result in patterns overlapping after he first conveyor pull.
5. Position laser pointer to the edge of the material where you want to begin cutting.
6. Send the cut file to the gantry by pressing the "Cut" icon in Easicut.
7. Press the ZERO PANEL button on UIT.
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 Overcut value in the Overcut 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.

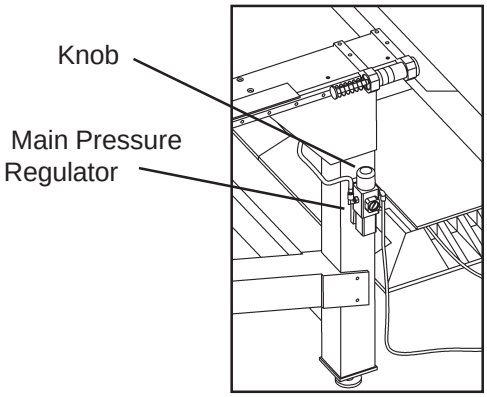
> ⚠ **CAUTION** Failing to re-map a tool after changing tool types can result in damage to the belt, tool and/or tool spindle.
>
> Example: Changing a Punch to a Drag Knife ill cause punch to drag across the belt.

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.

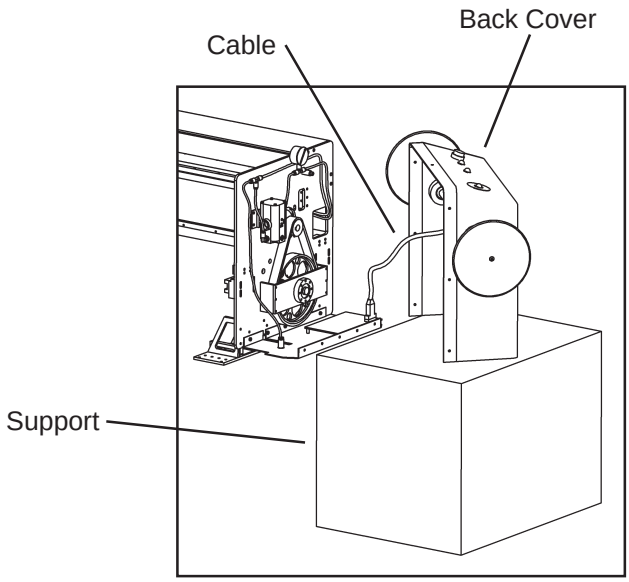
EC3 Conveyor Pressure Calibration

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.

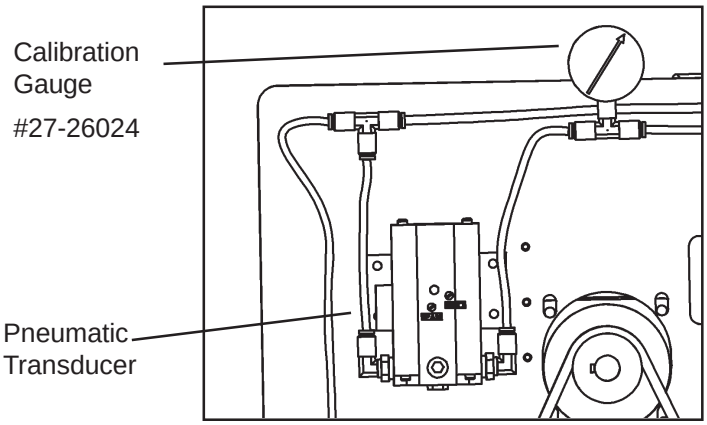
1. Set main pressure regulator to 125 psi by turning regulator knob.



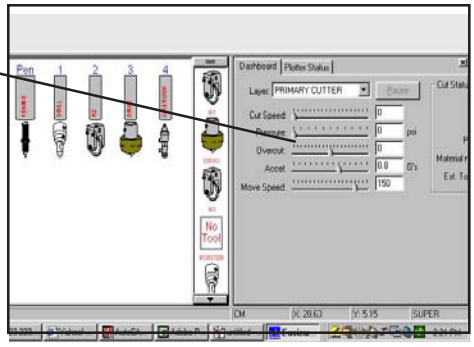
2. Remove back cover and leave cable connected to PC board. Place on a support that will lift back cover to relieve strain on cable.



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



Pressure Slide Switch



4. Set Easicut cut pressure at 10 psi and adjust at regulator using zero screw adjustment.

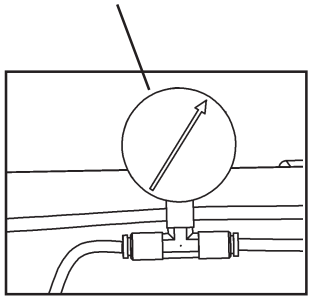
   Pressure meter should read 10 psi at gauge.

5. Set Easicut cut at 100 psi..

6. Push "cut up" and "cut down" on control panel UIT.

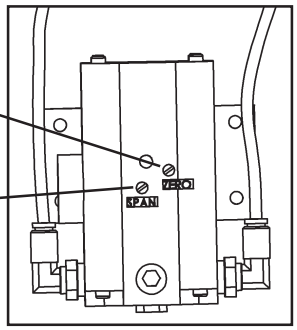
7. Adjust "span" screw until calibration gauge reads 100 psi..

Calibration Gauge #26024



Zero Screw

Span Screw



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.

CALIBRATION PROCEDURE

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 EC3 tool calibration should be performed in the following order:

1. Pen X-Y offset.
2. Calibrate Gantry in X-axis.
3. Calibrate Gantry to Belt.
4. Calibrate Secondary Encoder to Belt (If Applicable).
5. Fine Tune Secondary Encoder for Long Lengths (If Applicable).
6. Table sizing.
7. Automatic gantry squaring.
8. Tool mount X-Y for all tools.
9. Theta axis offset.
10. Tool Calibration (circles and squares).
11. Test Cut Using Design.cmd.
12. 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 inches and cm.'s.
- 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.

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.

Calibrate Gantry in X-Axis

This calibration procedure establishes the proper calibration for the movement of the Gantry in the X-Axis. This will insure that the cut piece are cut accurately in the X direction. If this calibration is off the cut piece can become longer or shorter. (Calibration of the Y-axis will be done later in the calibration procedure.)

a) Press the "ZERO TABLE" button on UIT to Home the conveyor.

b) Move the Gantry to far right of conveyor.

c) Place a piece of brown masking tape under the pen.

d) Press the "PEN DOWN" button on the UIT.

e) Using the Joystick or "JOG" button, mark the piece of tape in the "Y" direction only

f) Using the Joystick or "JOG" button, Jog the Gantry to the far left about 3 meters.

g) Press the Slow Jog key on the UIT and jog the gantry until the UIT reads an exact multiple of 1 cm.

h) Make a mark on a second piece of tape by repeating steps c, d and e.

i) Measure the length between the two marks.

j) If the measurement is not exactly equal to the measurement on the UIT then:

- On the menu bar click on OPTION/MACHINE then on the "SIZE" tab
- Increase the "X Calibration" number to increase the length between lines. Decrease the number to decrease the distance between lines. (Note: Use very small increments for fine tuning)
- Open a file and click on the "CUT" icon for new data to take effect.
- Repeat procedure until measurement is within 0.01 cm

Calibrate Gantry to Belt

This calibration calibrates the movement of the Gantry with the movement of the cutting belt. If this calibration is off, every time the conveyor pulls more material on to the cutting belt piece size and cuts will be off in the X-direction. It can cause pieces to overlap.

a) Move the Gantry to far right of conveyor and turn on the vacuum.

b) Jog the belt approximately 5-6 feet to remove any slack in the system.

b) Place a piece of masking tape below the laser pointer. Using a pen or pencil mark the laser on the piece of tape.

c) Push the "EC3 Conveyor Switch", located on the bottom right hand side of the gantry panel to the down position. This will lock the gantry to the cutting belt when jogging the belt.

d) Press the "BELT JOG" button on the UIT. Both the gantry and belt will jog down the table together.

e) Watch the laser with respect to the mark on the masking tape. The laser pointer may initially jump ahead of the mark by as much as an 1/8" but should remain constant throughout the length of the table. When the "JOG BELT" button is released the laser should line back up with the mark.

f) If the laser drifts down the table or the mark does not line up when the "BELT JOG" button is released then:

- On the menu bar click on OPTION/MACHINE then on the "SIZE" tab.
- Increase the "Conveyor Calibration" number if the pointer drifted ahead. Decrease the number to if the laser pointer drifted behind the mark.

Note: Use very small increments for fine tuning (+/-1 count).

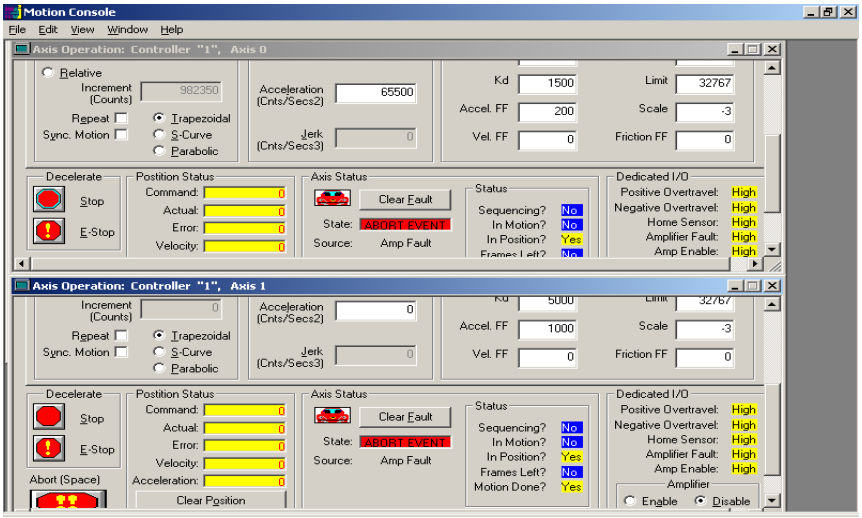
- Open a file and click on the "CUT" icon for new data to take effect.
- Repeat procedure until laser pointer no longer drifts.

Calibrate Secondary Conveyor Encoder

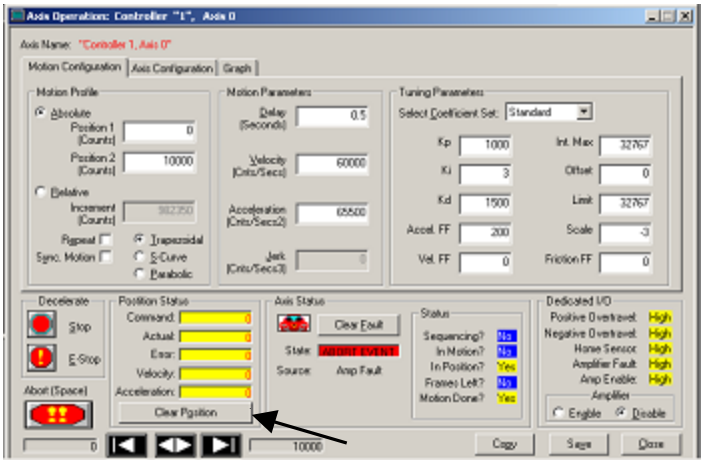
The secondary conveyor encoder is an option which increases the cutting accuracy in the X direction of the conveyor. The encoder tracks actual cutting belt movement in order to compensate for initial slack in the link belt or slip in the cutting belt. This calibration procedure calculates the counts/cm movement of the cutting surface. Not all machines are equipped with these feature. If your machine does not have a secondary encoder function you can skip this step.

> **⚠ Caution** The Secondary encoder calibration should be performed when the belt or any rollers are replaced. Periodically checking the encoder calibration will insure the cutting accuracy.

a) Minimize Easicut 2 and open the MEI setup program. (Located in c:/Program Files/Eastman/Options/setup.exe).
b) Click on address 0x320 so that it is highlighted.
c) Double click on Axis 0 and Axis 1 to open up both axis windows. If you do not see an Axis 1 then you may not have a secondary encoder and you can move on to step 6..

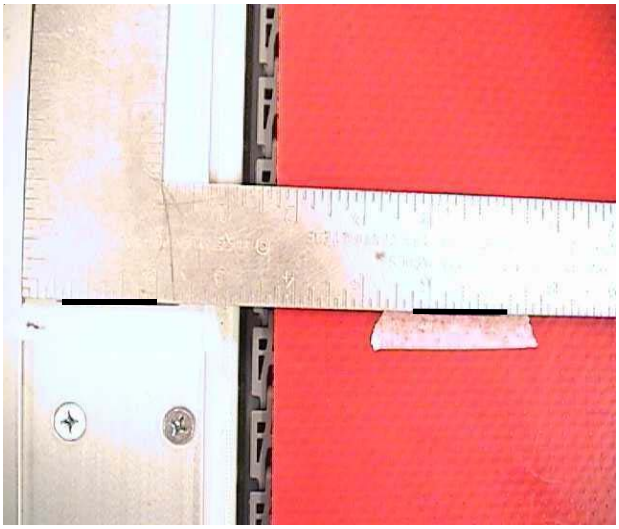


d) On Axis 1 click the "Clear Position" button to reset the axis.



e) Turn the conveyor vacuum on, open Easicut and go to the operator side of gantry to do a manual pull. Press the MANUAL PULL button, then press 3-0-0 and the ENTER key. The belt will begin to move 300cm, taking out any slack in the link and cutting belts.

f) Using a right angle rule, mark the rack plate and the belt (or a piece of tape) with a fine pen to indicate the belt starting position. Mark the belt and rack plate approximately 100 cm (3 ft.) from the right hand side of machine.



g) Go back to MEI program and clear Axis 1.

h) Click on Easicut 2 and do a manual pull of 160 cm by going to the UIT and pressing the MANUAL PULL button. Press 1-6-0 then the ENTER key to begin the manual pull.

i) Using the right angle square, put another piece of tape on the belt in line with the initial start position on the rack plate. Mark the new position of the belt on the tape using the pen. Measure the distance the belt moved between the initial mark and the new mark. Measure in centimeters starting at the 10 cm mark to eliminate variations in the tape measure. Remember to subtract the 10 cm from your final measurement. (Example: 170.07 cm -10cm = 160.07)

j) Record the number of encoder counts from MEI axis 1 and the measured belt distance in cm. (Measure to the nearest 0.01 cm)

k) Repeat steps (g) through (j) 10 times recording each measured move distance and encoder count.

Test Number	Encodr Counts From MEI	Measured Distance	Encoder Counts/cm
1	524,441	160.05	3276.73
2	524,402	160.02	3277.10
3	524,672	160.12	3276.74
4	524,721	160.15	3276.43
5	523,754	159.85	3276.53
6	524,362	160.02	3276.85
7	525,064	160.23	3276.94
8	524,784	160.14	3277.03
9	524,458	160.05	3276.84
10	524,492	160.07	3276.64

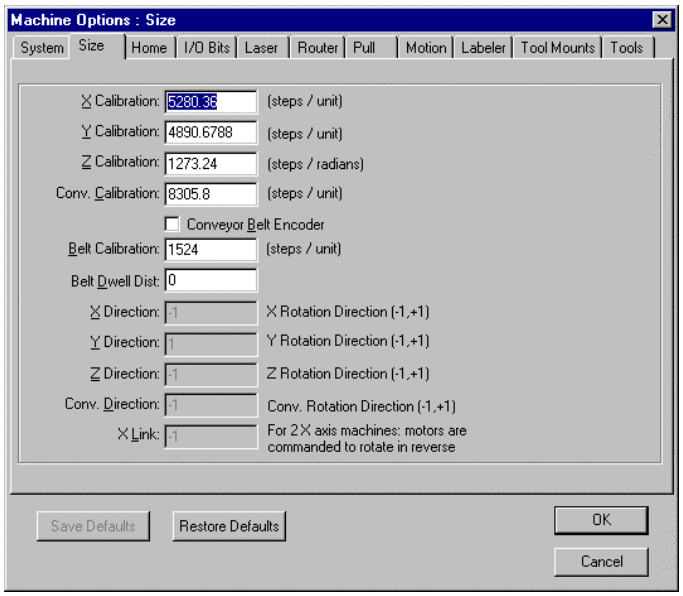
l) For each encoder and distance measurement, divide the encoder counts by the distance measured. This will give you a value of counts/cm.

m) Average all 10 reading be adding up all the counts/cm and dividing by 10.

Example:

In the table above the last column adds up to 32767.85 Encoder Counts/cm. Dividing by 10 gives you an average of 3,276.79 Encoder Counts/cm.

n) Click on OPTIONS then MACHINE in the menu and open up the SIZE tab. Enter the average number of counts/cm in the "Belt Calibration" box.



o) Open up a file and click on the CUT icon for the new data to take effect.

Fine Tuning Secondary Conveyor Encoder for Long Length Pieces

The secondary conveyor encoder is an option which increases the cutting accuracy in the X direction of the conveyor. The encoder tracks actual cutting belt movement in order to compensate for initial slack in the link belt or slip in the cutting belt. This calibration procedure fine tunes the calibration number calculated in step 4, when cutting long pieces greater than 10 ft. If your machine does not have a secondary encoder function you can skip this step.

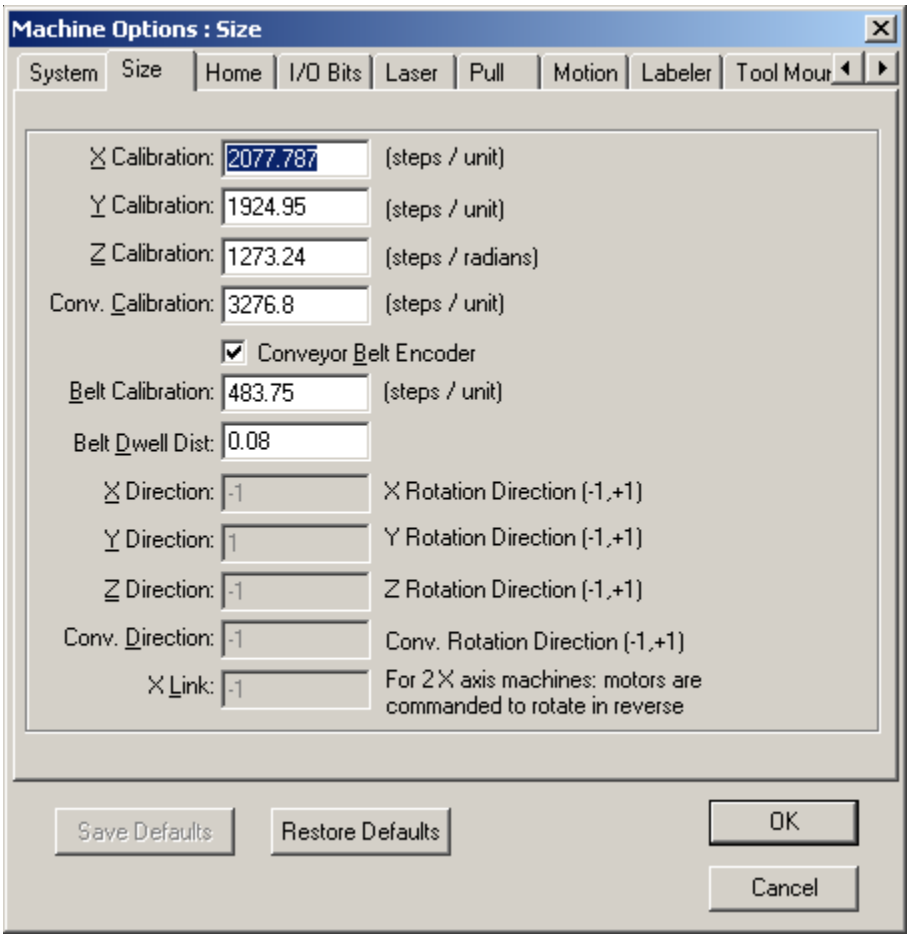
> ⚠ **Caution** The Secondary encoder calibration should be performed when the belt or any rollers are replaced. Periodically checking the encoder calibration will insure the cutting accuracy.

a) Create a cut file with a long cut piece of approximately the same length as your longest piece. (Minimum of about 12 meters (40 Feet).
b) Cut the file using paper or a non stretch material. (It is important to use a material that does not stretch so that material stretch does not effect the calculations.)
c) Divide the required piece length from the cut file with the actual measured piece length. This number will be greater than 1 if the piece was short and larger than 1 if the piece was long.

Example:
Required Length - 40' (480 in)
Actual Length - 40' 1-1/2" (481.5 in)

480 in / 481.5 in = 0.9969

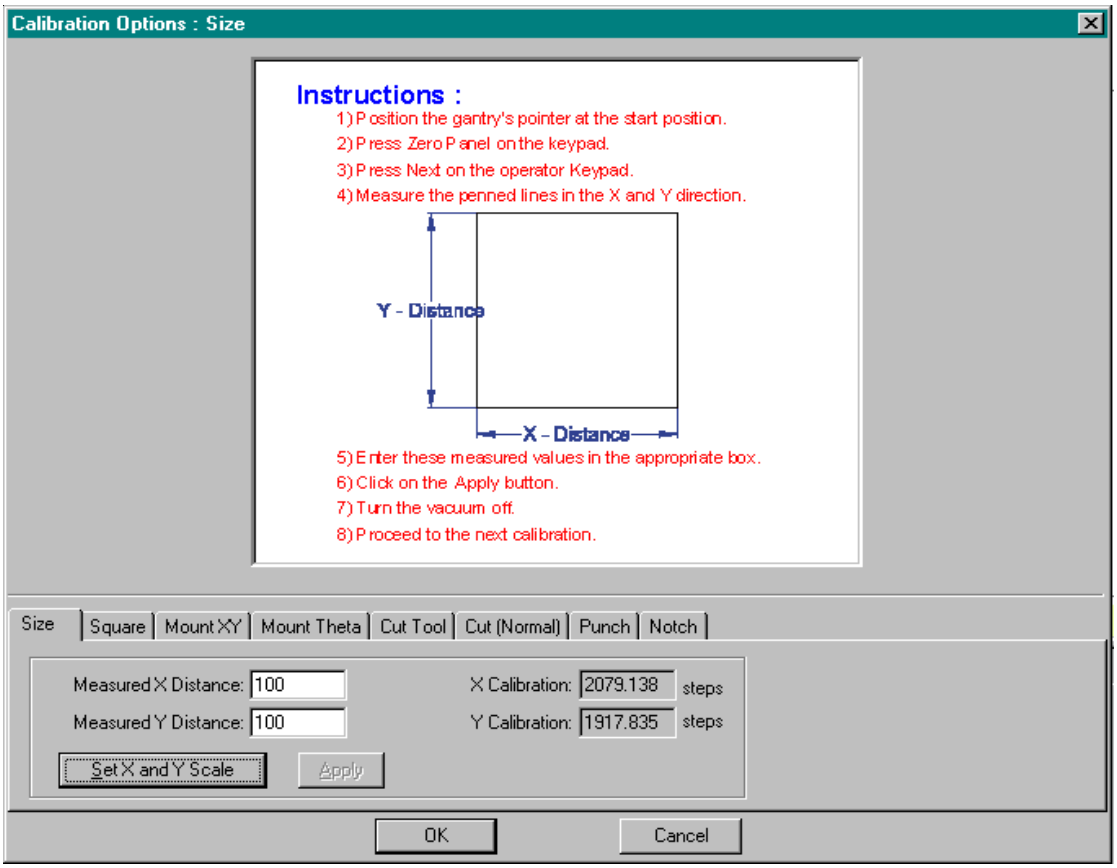
d) Click on OPTIONS then MACHINE in the menu and open up the SIZE tab. Multiple the "X Calibration" number by you calculated correction and enter the new number.. Then multiply the "Belt Calibration" number by the calculated correction and enter the new number.



e) Repeat steps (b) through (d) until the overall length is within the machine tolerances.

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.

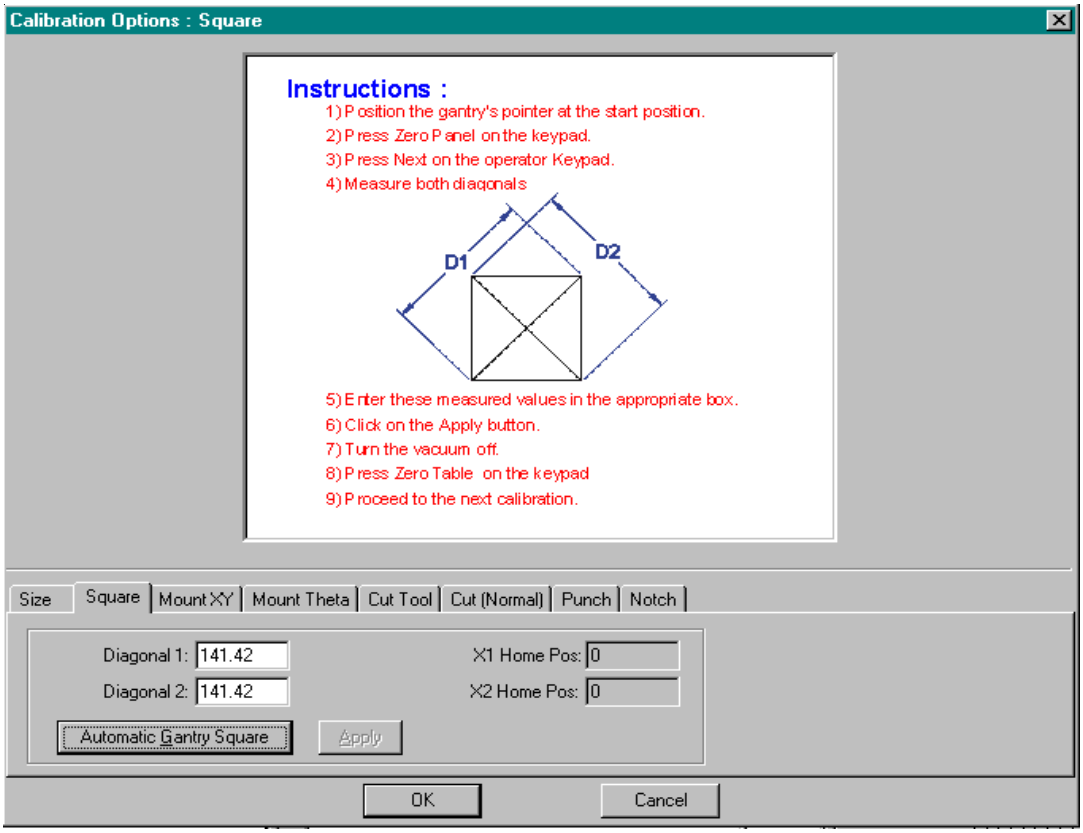
g) Using a measuring tape, measure the length of the penned lines in both the X and Y direction, these should measure 100.00 cm (39.370 inches). If the lines do not measure this value, enter the measured value into the software in the correct box and click on the “Apply” button.

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.

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.

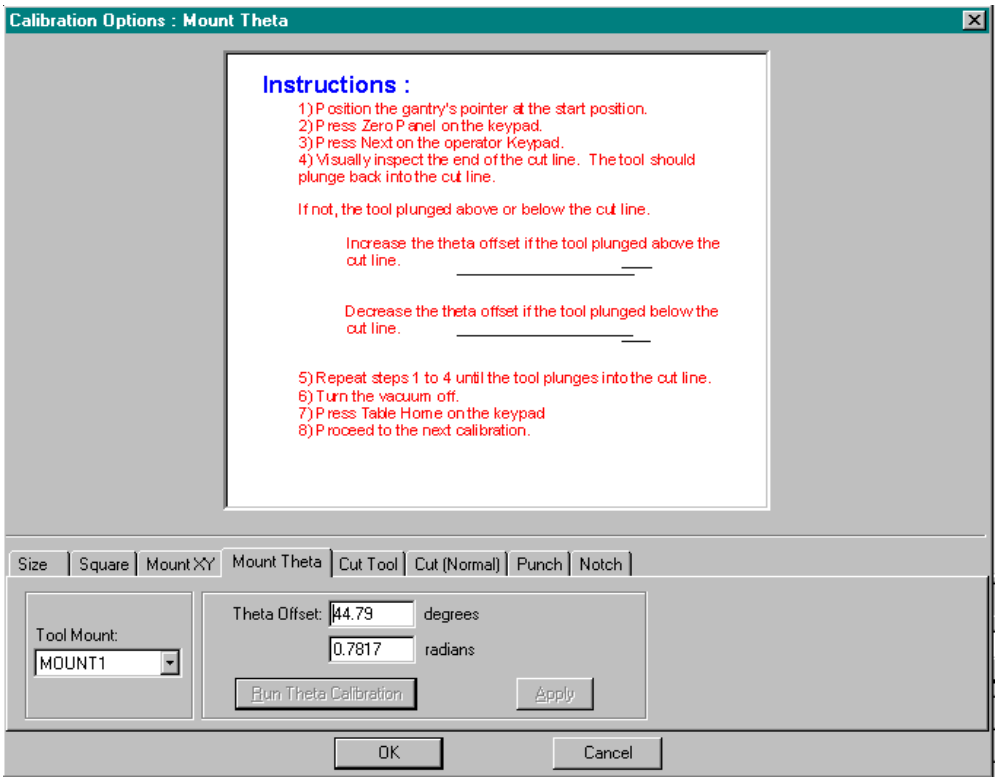
g) Using a measuring tape, take a measurement of each of the diagonals D1 and D2 (D1 is from the lower left corner to the upper right corner, D2 is the lower right corner to the upper left corner.) These measurements should be 141.42 cm (55.677 inches), if the diagonals do not measure this value enter 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.

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.

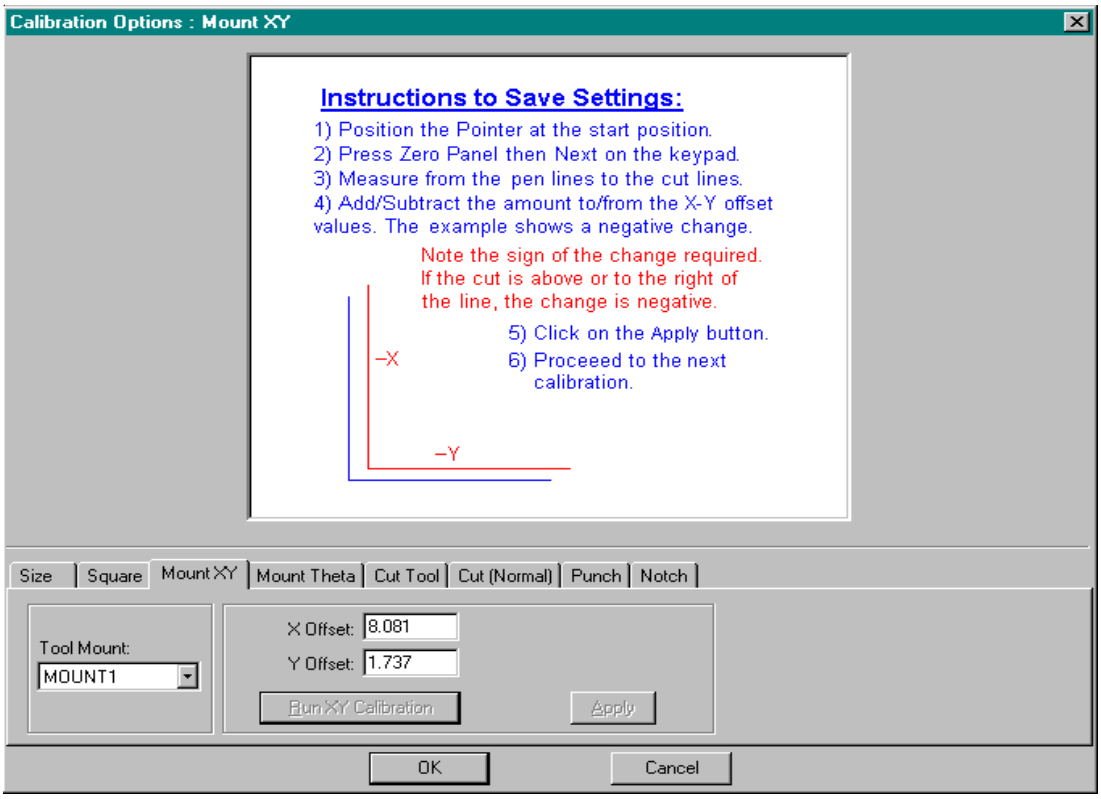
h) Re-select the mount and run the Theta calibration again to check the deviation in the two lines.

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.

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.

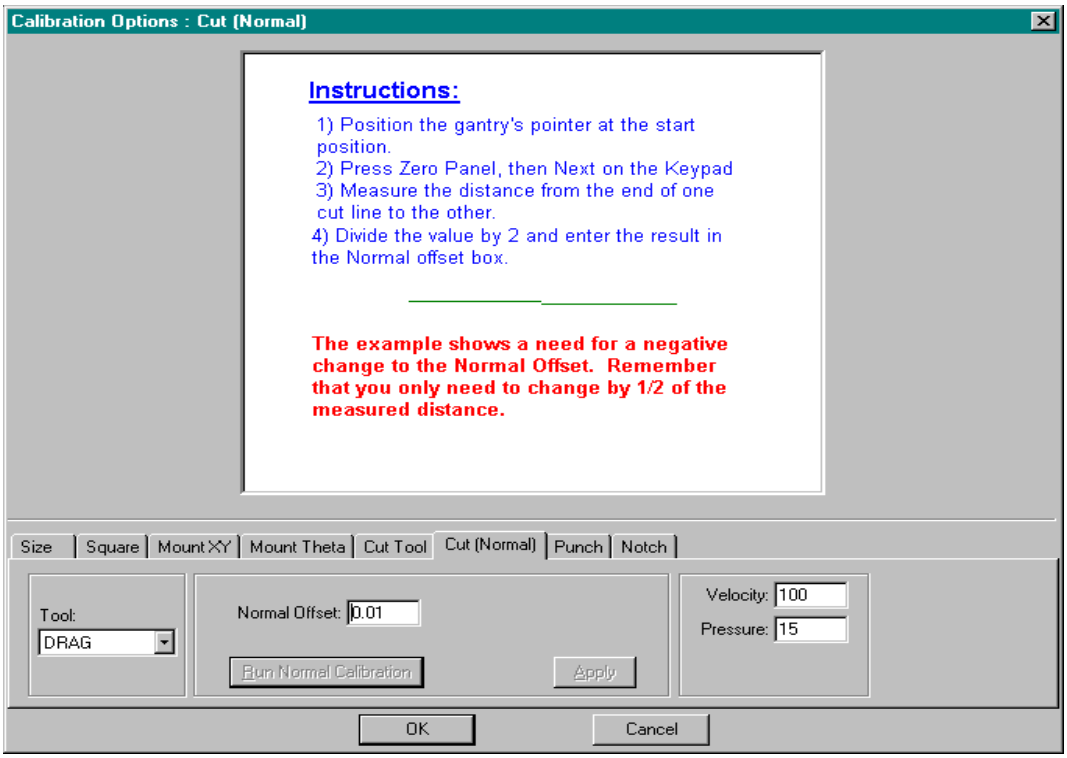
h) Make adjustments according to the guidelines in the software to adjust the cut line until the pen line is split.

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.

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.

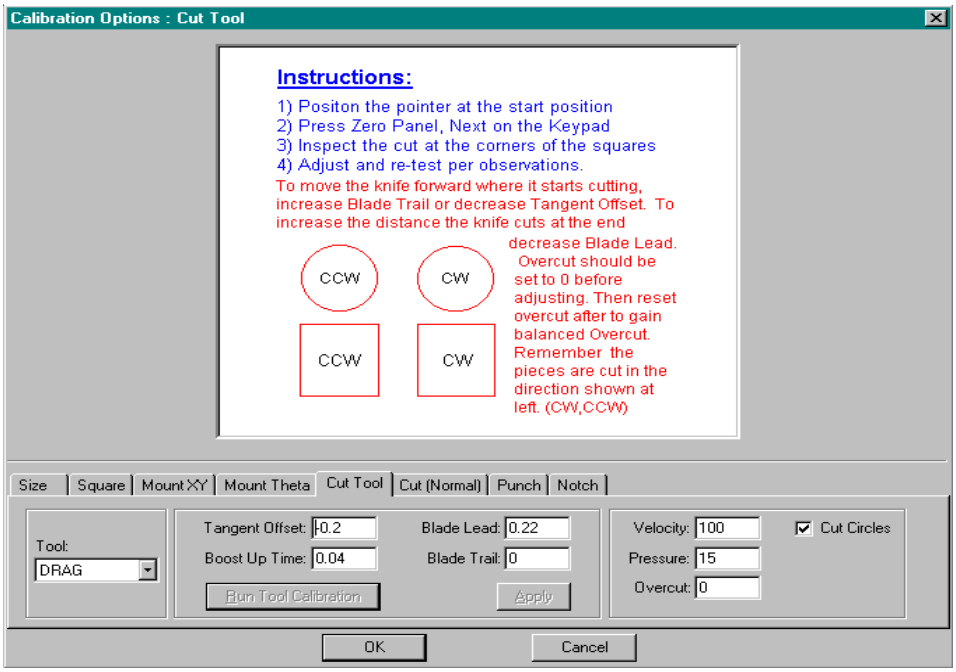
h) If there is any deviation in the alignment of this midpoint intersection, one half the measured difference will need to be entered into the software in the Normal Offset box.

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.

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:

a) Open the Easicut 2000 software.

b) On the menu bar click on Option/Calibration and select the “Cut Tool” tab on the calibration screen.

c) Select the Tool that you wish to calibrate from the tool menu.

d) Click the “***Run Tool Calibration***” button to load the calibration test.

e) 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.

f) Press the NEXT button on the UIT to run the calibration test.

g) 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.

h) 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.

i) Any over cut in the corners should be removed by adjusting the Blade Lead and Trail settings according to the software instructions.

j) The Tangent Offset setting should be adjusted to compensate for any material fragments left at the start/finish area of the 10-cm circle.

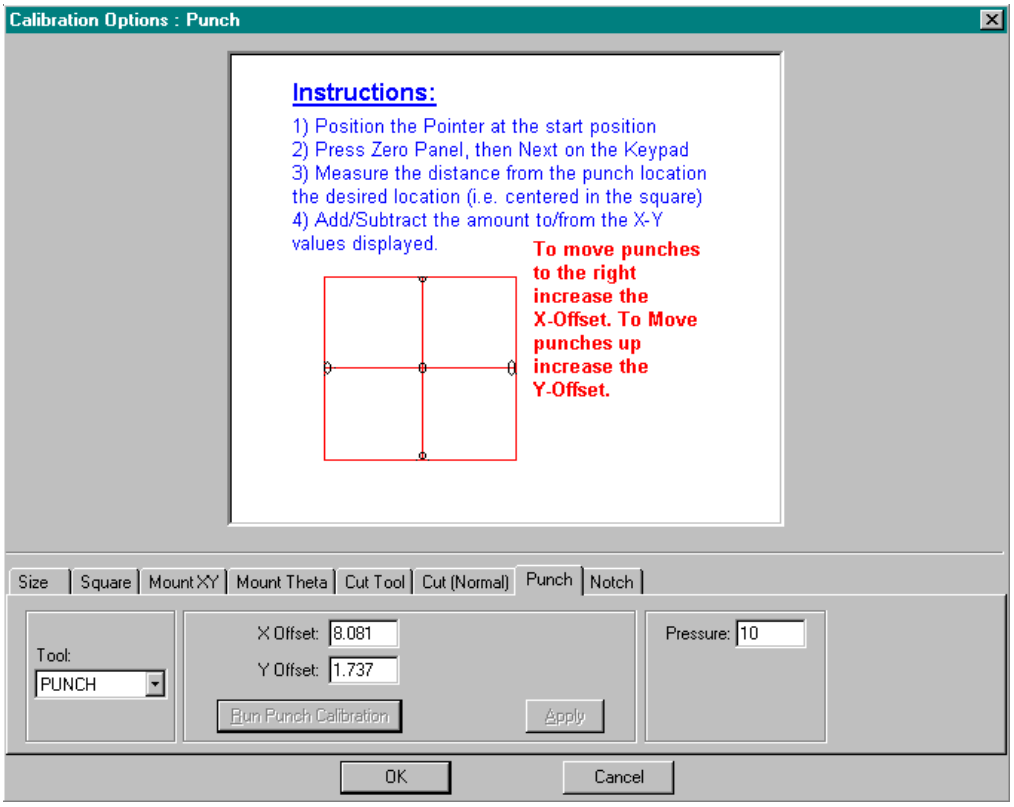
k) Once the circles and squares can be cleanly removed from the piece of paper without excess over cut or material fragments, select the next tool from the tool menu and repeat steps (e) - (k).

l) When finished with each tool Press APPLY then OK to save the new values.

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:

a) Open the Easicut 2000 software.

b) On the menu bar click on Option/Calibration and select the “Punch” tab on the calibration screen.

c) Select “Punch” from tool menu.

d) Click the “***Run Punch Calibration***” button to load the calibration test.

e) 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.

f) Press the NEXT button on the UIT to run the calibration test.

g) Adjust the X and Y offsets to compensate for any differences between the projected punch point and the actual punch point.

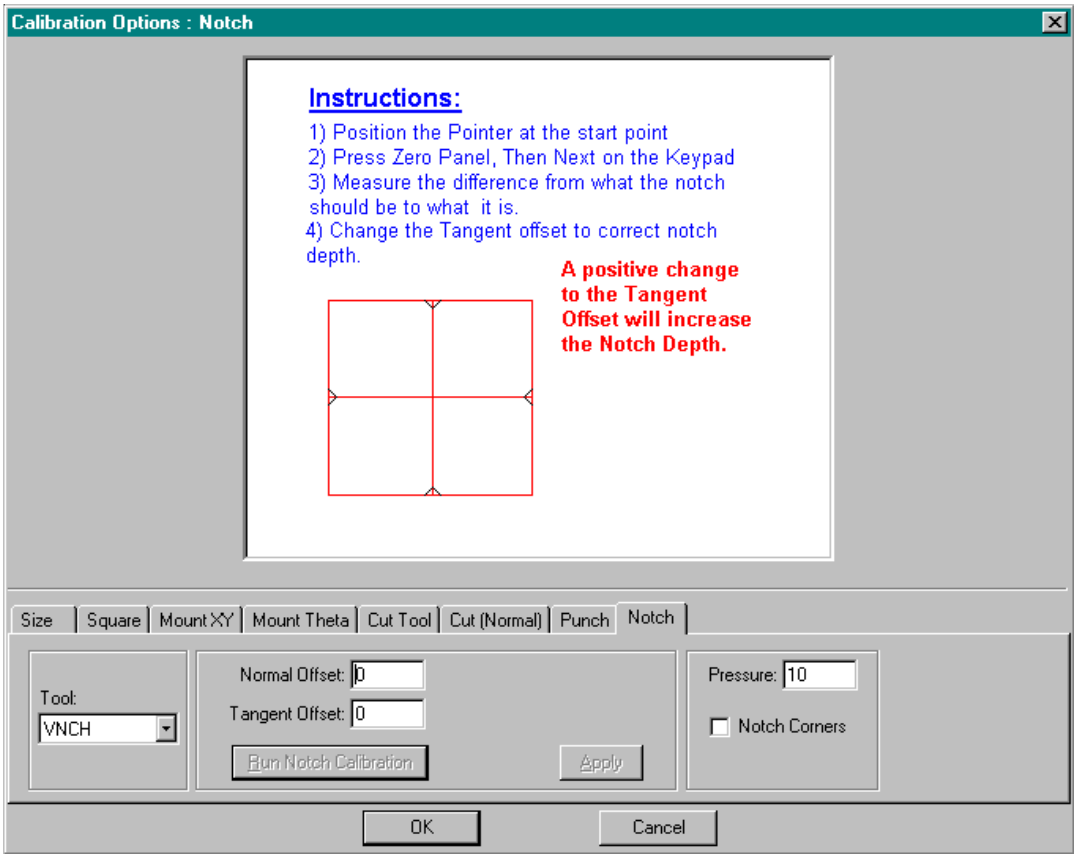
h) Re-select the punch tool from the tool menu and run the punch calibration again to check the X and Y calibration.

i) When finished with the Punch calibration, Press APPLY then OK to save the new values to the machine.ini file.

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:

a) Open the Easicut 2000 software.

b) On the menu bar click on Option/Calibration and select the “Notch” tab on the calibration screen.

c) Select “VNCH” from tool menu.

d) Click the “***Run Notch Calibration***” button to load the calibration test.

e) 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.

f) Press the NEXT button on the UIT to run the calibration test.

g) 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.

h) Re-select the notch tool from the tool menu and run the V-Notch punch calibration again to check the X and Y calibration.

i) When finished with the V-Notch calibration, Press APPLY then OK to save the new values to the machine.ini file.

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 EC3 Conveyor 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 belt 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, conveyor 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, conveyor and computer at the disconnect and lock out power to the machine per your lockout/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.

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.

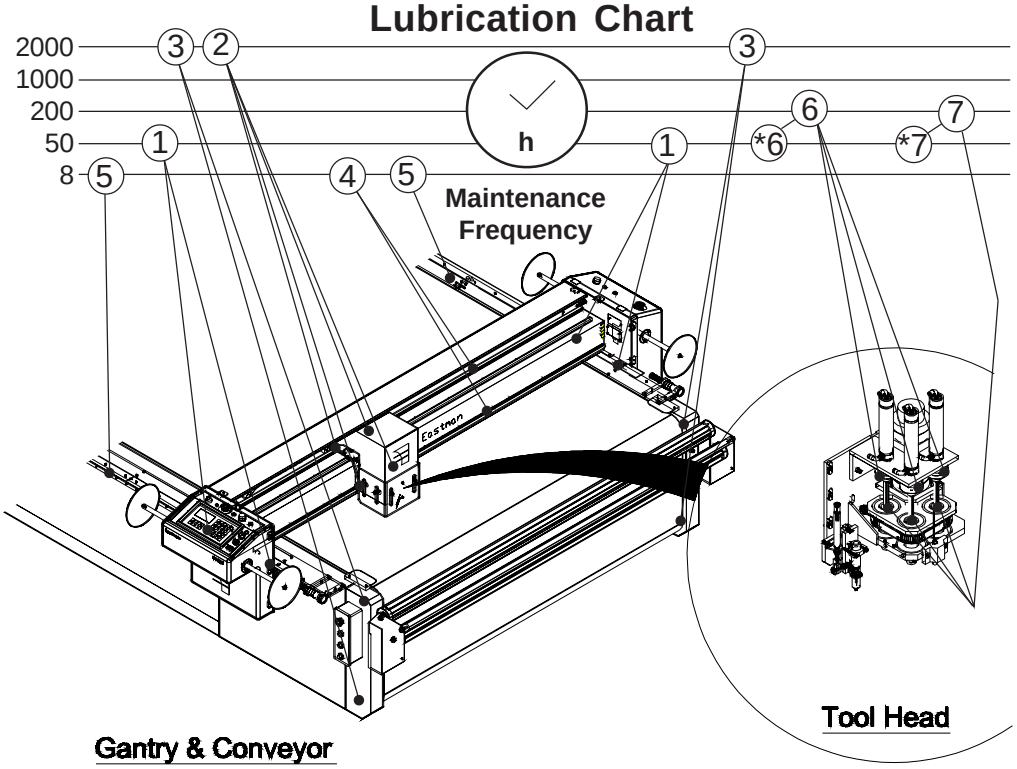
Monthly (or every 200 hours):

⚠ **Warning: Before performing any of the monthly tasks make sure the gantry, conveyor 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, conveyor 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 adjusted 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. Checks 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.
17. Inspect cutting belt for deep cuts or bad wear areas. Repair belt where ever necessary using belt weld stick (67-26037) and concentrated weld heat gun (67-26032). To order a complete belt repair kit, order Eastman #96-26006.
18. Check vacuum gage and verify that the vacuum with table uncovered is less than 5" of water,

Lubrication Chart



Machine Component	Gantry	Y-Car	Conveyor Base	Gantry	Conveyor Rail	Standard Tool Head		Recipricating Tool Head	
Nature of Action / Action Point	1	2	3	4	5	6	7	*6	*7
Clean & Lube				8	8	200	200	*50	*50
Replenish	50	2000	2000						
Libricant Designation	Mobil: NLG1 Grade 2 Moblith AW-2			Mobil: SAE 10 Non-detergent Vactra No. 1		Loctite: Krytox PFPE Lubricant mfg# 29711			
Eastman No.	67-26324			67-26325		67-26009			

* Recipricating tool head option only.

Yearly or every 2000 hours:

Below is a recommended maintenance check list for the EC3 Conveyor. It' provides a good guideline for yearly maintenance and can be copied and kept as a maintenance log.

⚠ **Warning: Before performing any of the following tasks make sure the gantry, conveyor 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.**

Maintenance Check List for EC3 Conveyor

Cable Assembly	Comments	Signoff
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 power cable		
d) UIT cable		
e) Hall effect cable		
f) Encoder cable		
g) Secondary Encoder cable (If Applicable)		
h) I/O cable		
i) Air hose		

Front Cover Assembly	Comments	Signoff
Check & secure stop disks with rod		
Check limit switch & switch bracket		
Check slide bearings & bearing mounts		

Back Cover Assembly	Comments	Signoff
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		

Control Panel Assembly	Comments	Signoff
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		

Front End Plate Assembly	Comments	Signoff
Inspect drive belt (cracks, thread separartion)		
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	Comments	Signoff
Check & adjust backlash for X1		
Check & Secure all screws		

Back End Plate Assembly	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		

Main Tube Assembly	Comments	Signoff
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		

Y-Carriage Assembly	Comments	Signoff
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		

Tool Head Assembly	Comments	Signoff
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 card		
Secure Z Motor drive pulley set screws		
Examine cylinder motion - Fire cylinders manually via solenoid block		

Rack & Rail Assembly	Comments	Signoff
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		

Conveyor	Comments	Signoff
Examine Belt for Deep Cuts		
Check Vacuum Pressure (Under 5" Water with Table Uncovered)		
Examine 25 HP blowers		
Check Conveyor Level and Adjust as Required		

E-boxes Assembly	Comments	Signoff
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		

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

Additional Comments:

Inspectors Signature _____ Date _____
Inspectors Signature _____ Date _____
Inspectors Signature _____ Date _____
Inspectors Signature _____ Date _____
Inspectors Signature _____ Date _____
Inspectors Signature _____ Date _____

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 2x4 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 12 mm 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.

Changing Conveyor Belt

This procedure outlines the proper operation for changing the cutting belt on an Eastman EC3 Conveyor. Adhering to the following steps will reduce costly down time and ensure that the machine will operate properly once the belt is replaced. A new cutting belt will increase vacuum and provide a clean cutting surface to insure that the machine performs 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 belt material that are needed for your individual application.

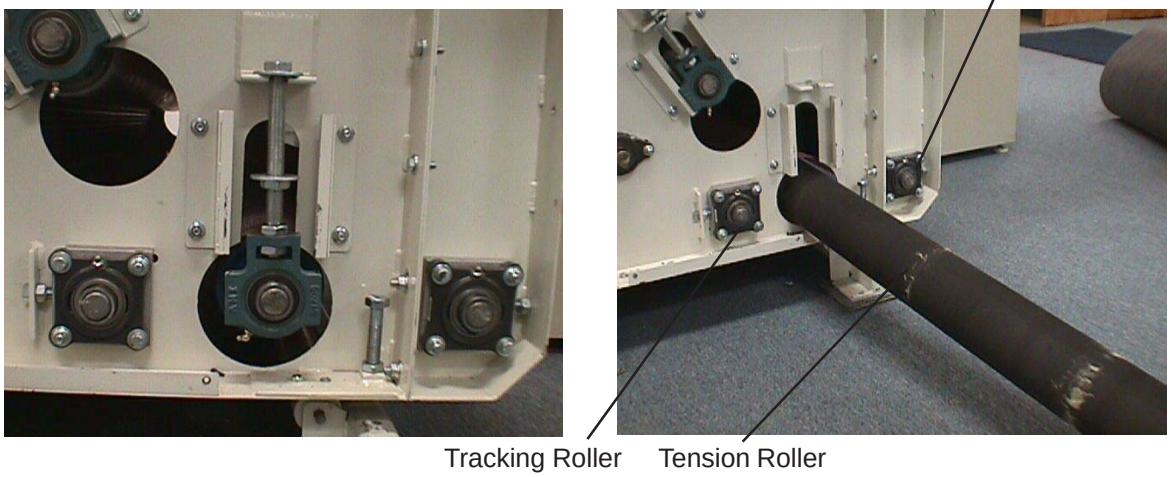
Removing Old Belt:

1. Power system down in the proper order:
    a. Shut down Easicut software.
    b. Turn the gantry power switch to the OFF position.
    c. Turn the power to the E-Boxes to the OFF position.
    d. Shut the computer down using the proper Windows shut down procedure.
    e. Remove and Lock Out all power to system while working on machine. Follow the facilities standard lockout procedures.

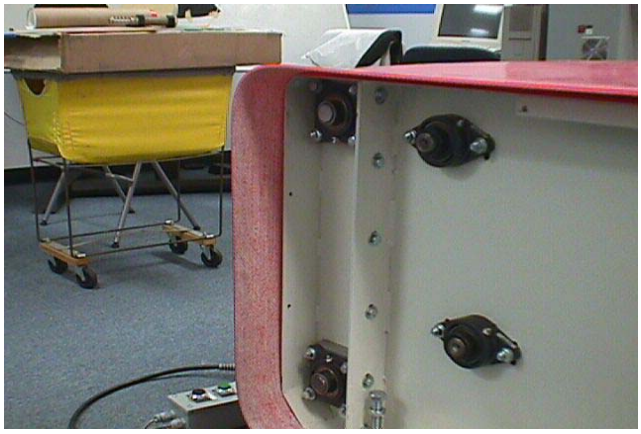
> ⚠ **Warning** It is important to follow all Electrical Lockout procedures. Failing to follow proper lockout procedures can result in damage to the machine, injury or death.

2. Remove all feed rollers, remote start-stop switches, spring stops, and side pan covers.
3. Remove the gantry from the EC3 conveyor system:
    a. Remove fiberglass covers from both the operator and non-operator side of the machine.
    b. Remove all plugs and air lines from the non-operator side x-pan.
    c. Push the gantry down to the feed end of the machine and carefully slide the gantry off the THK rails, keep gantry level as it is being taken off the rails to ensure that the THK bearings are not damaged.
    d. Rest the gantry on a pair of sawhorses or a similar support away from the machine so the gantry is not damaged while working on the EC3 conveyor.
4. Raise all leveling screws on the front of the EC3 conveyor system until the bottom of the screws are flush with the bottom of the machine.

5. Loosen and remove red or green belt tension roller from feed end of the machine.



6. Enough slack is now available in the belt to be able to slide it over the front of the machine.

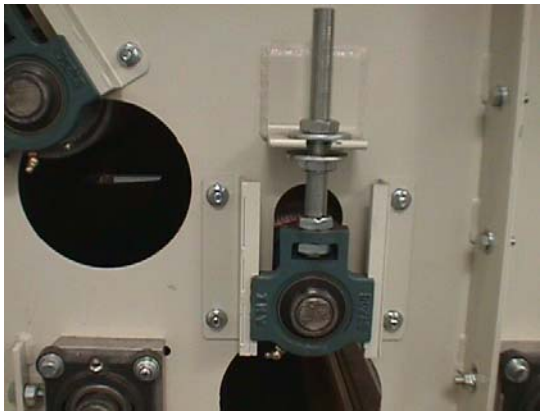


7. Start pulling the belt toward the operator side of the machine, over the rack plate. Work the belt from both ends of the machine, and slide the belt evenly off the conveyor.

Installing New Belt:

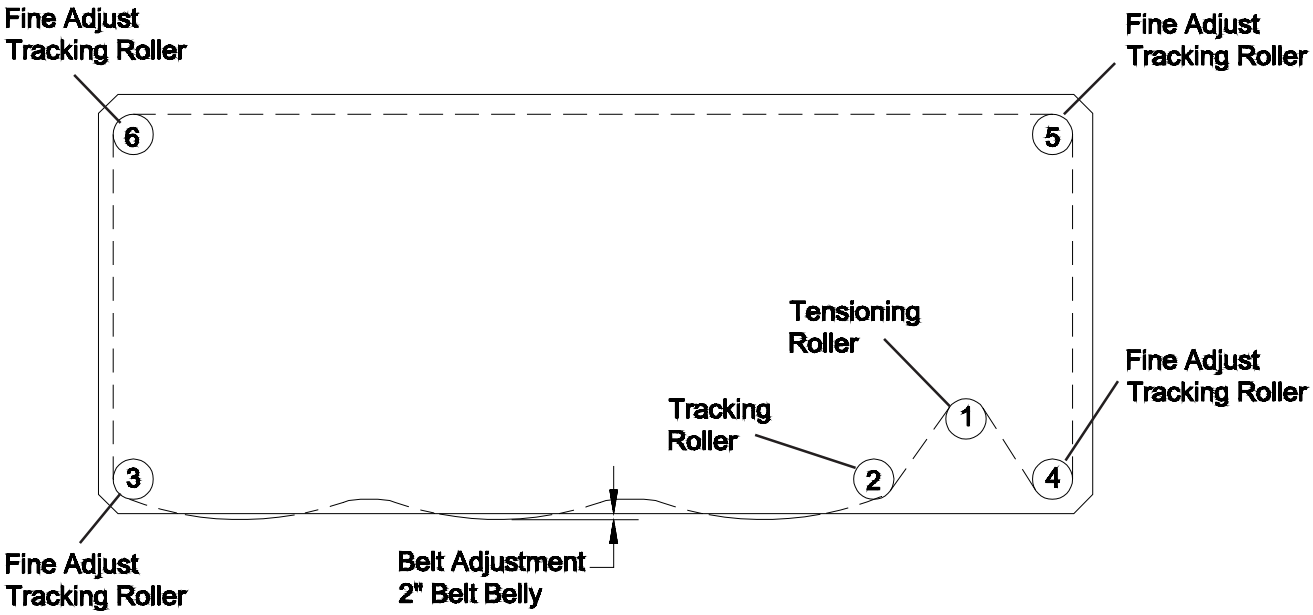
1. Unroll replacement belt, and lay the belt out on the floor in front of the machine. Lift the top half of the belt and catch it on the top edge of the machine. While holding the top half of the belt in place, slide the bottom edge of the belt on top of the cantilever feet.
2. Now work both ends of the belt back and forth onto the machine until it is fully seated onto the gray link belt.
3. Replace tension roller on feed end of the machine. Tighten tension roller evenly on both sides of the machine until a uniform belt tension is achieved. The belt is designed to drag over the cantilever feet rollers so the tension roller should not be tightened all the way, just enough to keep the belt from dragging on the floor. See belt threading diagram.

4. Lower the leveling screws on the front of the machine and using a four-foot level, level the machine in both the X and Y direction.



5. Prepare the gantry for reinstallation by removing all four of the THK bearings from the gantry side plates. Adjust the backlash adjusting screws all the way out, so the bottom of the screw is flush with the bottom of the block.
6. Place the first THK bearing onto the THK rail at the feed end of the conveyor, be sure to keep the grease fitting toward the outside of the gantry so it can be easily accessed.
7. Position the gantry at the feed end of the machine and evenly slide it onto the first bearing already placed onto the THK rail.

8. Seat the second THK bearing onto the THK rail and position under the backlash-adjusting block. Adjust backlash bolt on gantry side plate until no slop or bind is felt in the spur gear. Tighten THK bearing bolts and recheck the backlash in the gear again.
9. Replace the edge roller assembly, remote stop pause assembles, and spring stops.
10. Plug all connectors back into the non-operator side pan in the correct positions.
11. Power entire system back up.



Belt Threading Diagram

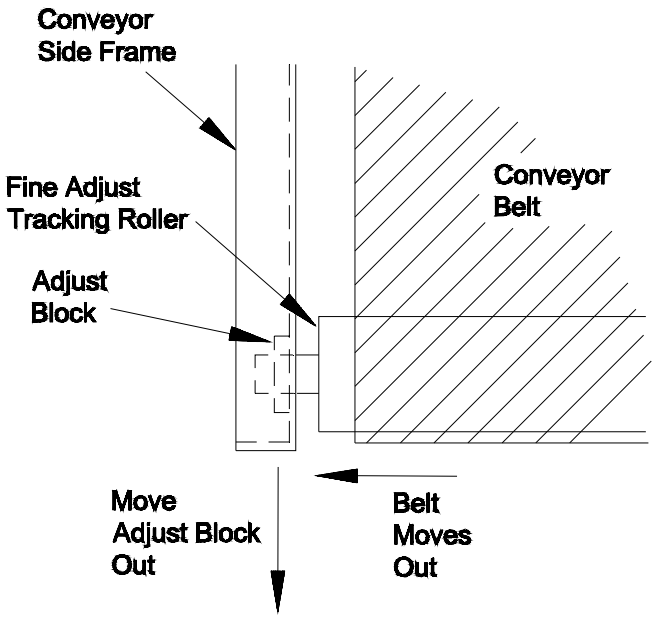
Belt Tracking Procedure:

1. After starting Easicut software, select the manual pull option from the UIT, set manual pull for 5000 and allow the belt to find its home position.
2. After the belt has gone a sufficient amount of revolutions, adjust rollers (if required) to center belt between the conveyor side frames. Refer to belt threading diagram for roller adjustment sequence. To adjusted belt, loosen the roller mounting block nuts located on each end of rollers. While the conveyor belt is moving, adjust the blocks to shift the conveyor belt across the table, see belt adjusting diagram. The belt should be tracked to the center of the machine with equal amounts of the gray link belt showing on either side of the conveyor belt.

Belt Tracking Fine Adjustment Procedure:

Fine adjustment of belt tracking is essential for accurate cutting while the conveyor is in motion.

1. To check belt tracking accuracy, move the gantry to the feed side of the conveyor. Place a piece of masking tape on the belt surface. Draw a small line on the tape in the "X" direction using the gantry and gantry pen.
2. Jog (move) the belt to the take-off side of the conveyor. Draw a small line on the masking tape. The two lines must over lap. If the lines DO NOT overlap, adjust rollers 5 and 6 as required, see belt adjusting diagram.
3. After getting the belt to run straight and true down the table, lock the belt tracking blocks in place and replace the side pan covers.

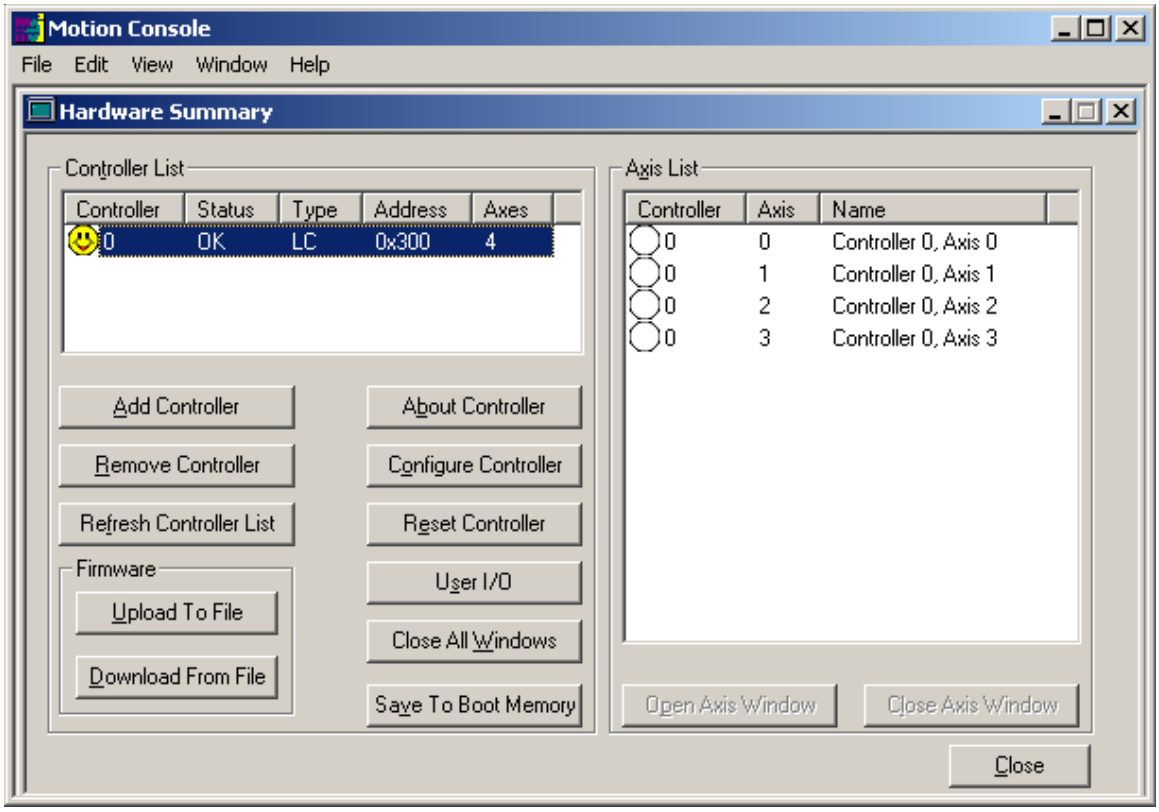


⚠ Caution When changing a belt it may require recalibration of the secondary belt encoder if this option is part of your system. The Secondary Belt encoder tracks the movement of the cutting belt with respect to the link belt. Belt thickness and other variances between belts can cause this calibration to be off slightly.

Loading ABS File to the MEI Board

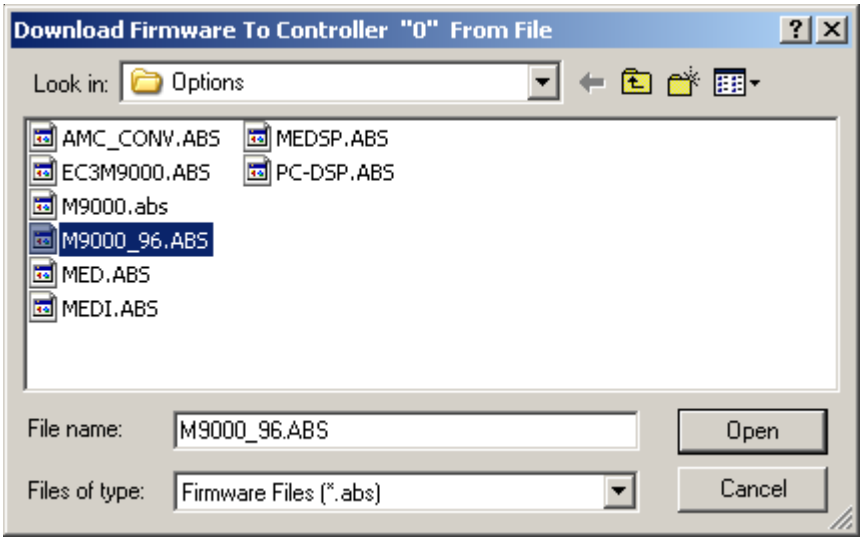
The MEI board is a 4 axes Servo control board located in the cutter computer. The ABS file contains all the default settings for the MEI program that interfaces with both the Easicut and Plotterw software. The ABS file contains factory default tuning for each axis of motion on the automated cutter. Changes 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.

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) 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

Abort X1 Axis Fault
Abort X2 Axis Fault
Abort Y Axis Fault
Abort Z Axis Fault

the DC voltage does not return to 165 VDC then the power supply is bad.

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 nonoperator 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 Nonoperator 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 Conveyor Fault

The "Abort Conveyor Fault" error code indicates a fault with the Conveyor servo axis located in the large 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 amplifier by removing the Large E-box cover and locating the Servo Amplifiers.

a) A GREEN LED on the servo amplifier indicates the amplifier is 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 AC Voltage to amplifier. It should read between 200 and 240 VAC single phase or three phase.

* If AC voltage at amplifier is correct, ohm out motor feedback and encoder cables looking for broken wires.

* Uncouple motor from gearbox, start the MEI program on the PC and click on address 0x320. With power on to the Conveyor E-box on and Red LED on conveyor amplifier lit, slowly rotate the motor and verify encoder counts.

* If you have encoder counts, amplifier may be bad.

* If you do not have encoder counts verify encoder cable, reload ABS file for address 0X320 and/or the MEI board may be bad.

c) If the LED on the conveyor amplifier is not lit.

* Verify power going to Conveyor E-box is 230 VAC single or 3 phase.

* Verify all 3 fuses in Conveyor E-box are good and fuse holders are good.

* Remove amplifier cover and verify all 3 fuses in located on back side of cover are good.

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.

Abort X1 Error Limit **Abort X2 Error Limit** **Abort Y Error Limit** **Abort Z Error Limit** Continued	* 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.
Conveyor Error Limit	The "ERROR LIMIT" indicates the following error between the command position of the conveyor and the actual position is greater than the limit set on the MEI board. This typically indicate that the conveyor acceleration and/or velocity is set higher then the machine can perform. It may also indicate a problem with the servo drive or a mechanical problem in the conveyor. 1 Look for material wrapped around conveyor rollers or jammed underneath conveyor. Remove all scraps from under machine. 2 Check the vacuum gage on front of conveyor. It should read approximate 3-5 in-water with conveyor uncovered and a maximum of 10 in-water with conveyor covered. If vacuum is too high, reduce the air flow by adjusting the damper on the blower. * If vacuum is too high with conveyor uncovered it maybe time too replace cutting belt due to clogged holes. 3 Verify material is feeding freely on to the belt. Make sure that material roll is not pulling on the conveyor belt. 4 Remove the MEI to Conveyor cable that runs between computer and conveyor E-box. Verify pins are not bent or connectors cracked then re-seat connectors. 5 Check power to conveyor E-box. Power should be between 200 - 240 VAC single or three phase. If voltage is less then check power source. (If using single phase it can reduce maximum conveyor speed by up to 30%) 6 Power down system and remove conveyor motor from gearbox. Start-up system and jog belt and see if motor rotates smoothly without load. 7 Power down system and check all 5 fuses in the conveyor E-box. Verify that all fuses and fuse holders are good by using an ohm meter and check continuity.

	8 With system powered down remove cover of servo amplifier and verify the (4) fuses in amplifier are good by removing them and checking continuity by using an ohm meter.
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 nonoperator 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. 4 Remove nonoperator 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 nonoperator 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. 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 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)
Pause Active	When a Pause Button or stop disc has been activated 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 stop disc being active, wiring, or a bad/ loose switch. 1 Check all PAUSE buttons and STOP DISCS on both sides of gantry and remote "PAUSE BUTTONS to verify they are not activate. Push each of the buttons and discs in and out to verify they are off. 2 Check to see if the green Pause light on the operator and nonoperator 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. 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.

Axis not Square	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. 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. 2 Verify both X-axis limit switches activate when touching CAM plates. 3 If gantry is damaged and is no longer square it may taking pushing the "ZERO TABLE" button twice to square the gantry.
No Frames	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. 1 Reduce the Marker File size 2 Turn off the machine and reboot the computer. 3 Add RAM to the computer.
X1 Axis Not Enabled **X1 Axis Not Enabled** **Y Axis Not Enabled** **Z Axis Not Enabled**	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. 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: a) Verify the Enable relay block located in Gantry E-box is functioning. b) Verify Enable signal from I/O board in computer. Remove Computer cover and locate amplifier enable LED on I/O board. 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 & 9 on the amplifier) .
X Home Not Found **Y Home Not Found** **Z Home Not Found**	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. 1 Remove the Nonoperator 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: a) Check switch to determine if it is operating correctly. b) Verify wiring by swapping connector on X-axis board with another switch. IF LED comes on then wiring is good. * If LED does not come on then wiring or switch is bad. * If LED does not come on then switch or X-axis board is bad. 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.

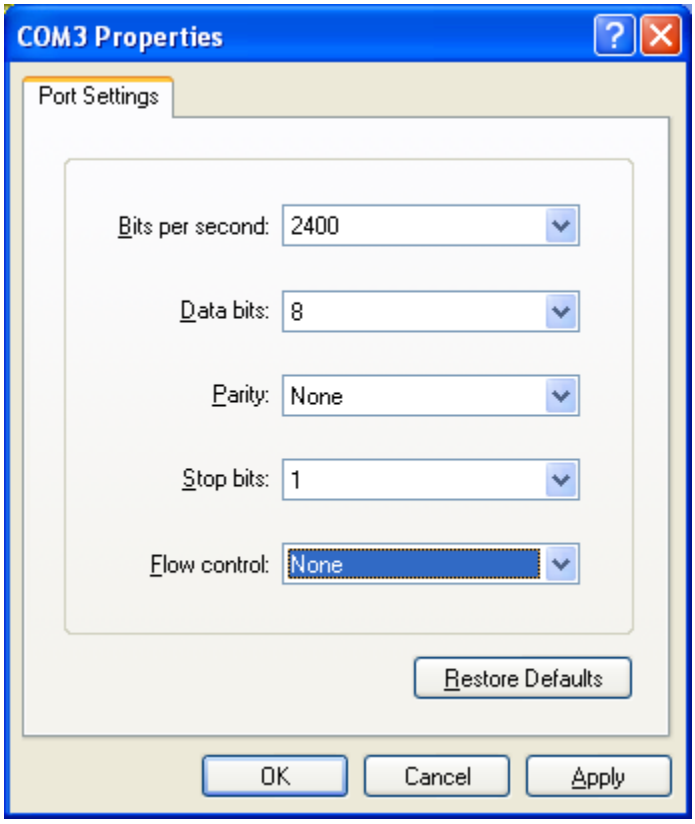
The EC3 Conveyor may also develop mechanical or electrical problems that are not be displayed on the user interface. Below is additional troubleshooting for problems that may occur without providing an error message.

Additional Troubleshooting

UIT not Lit	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. a) If no voltage verify AC power to board or replace power board. b) If voltage is above 5.2 or below 4.8 VDC then adjust the potentiometer through the hole in the plexiglass cover. c) If voltage is between 4.8 and 5.2 VDC. * Verify there is 5 VDC at the UIT. * If 5 VDC present at UIT then UIT is damaged and needs to be replaced.
Any Button Pressed on UIT displays same message.	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.
Tools do not come down when operating in manual mode.	1 Verify that the tools are on the correct spindles in the tool menu. 2 Verify tools are mapped correctly in the Easicut software. (Refer to the software manual or Help screens for Tool Mapping)
Gantry Runs to end of File and Displays JOB COMPLETE without cutting the file.	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. 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.
The UIT Displays a Blinking Cursor	1 System may have been powered up in wrong order. Turn on Gantry, close Easicut and reopen Easicut 2 The UIT to Computer RS-232 line may have bad connection. a) Close Easicut and start windows "Hyper-terminal by clicking on the Windows Start Button/All Programs/Accessories/Communication/Hyper-terminal b) Name the new connection Comport 2 and click OK c) In the Connect To" window select the "Connect Using" as COM2 d) In the Port Setting Window: * Set "Bits per Second" to 2400. * Set "Data Bits" to 8 * Set "Parity" to None

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 nonoperator side gantry cable has a bad connection. If the characters appear on Hyper-terminal then the UIT is bad.

Slivers in Y Direction	1 Check backlash in the Y axis by physically trying to move the Y-car with gantry powered. If their is backlash power down the gantry and remove tool cover. a) Inspect all pulleys for signs of slippage on the shaft. b) Tighten the Y-axes motor belt by loosening motor mounting screws and sliding motor until the belt is tight. 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. 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. 3 Inspect the conveyor belt to make sure that it is riding straight on the gray link belt. If the cutting belt is shifting from side to side adjust the alignment rollers.
As the table cuts the Y-axes Home position begins to move to one side	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. 2 Verify there is no RF interference which may be causing the encoder signal to be off. 3 The Y-axes motor may have a bad encoder and needs to be replaced. 4 MEI board may be going bad and picking up or loosing encoder counts.
No Display on UIT	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. 2 Check continuity of wires going from power supply to UIT board. 3 If 5 VDC present at UIT connector replace UIT unit.
Buttons on UIT do no Work. Display is lit.	1 Verify continuity of pins 2, 3 & 5 from computer to pins 2, 3 & 7 on UIT for the RS-232 cables. If you have no continuity check individual cables and connectors. 2 Verify computer comport by jumping pins 2 and 3 at back of computer while running Windows Hyper-terminal Terminal. 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.

Motors Do Not Power-up	1 Verify Gantry has power and the Gantry power switch is rotated to "ON". 2 Remove cover from E-box and verify all amplifiers are powered and have a green light. 3 Verify the motor power cables are connected. Continuity check the cables for broken wires.
Improper Length of pieces in X Direction	1 If pieces aer coming up short: a) Verify that the gantry and conveyor belt are synchronized together. Run the Gantry to Belt calibration. (See Calibration section) b) Verify that cutting belt is not slipping on grey link belt. * Check for material caught between belts. * Verify cutting belt is centered on table and not rubbingalong edge . * Verify vacuum on front gage. Vacuum should be a minimum 2-1/2" of water. * Make sure belt is jogged a minimum of 2 feet after vacuum is first applied to conveyor. This removes the slack in the system 2 Watch for material slippage when cutting. Make sure material is properly held down to surface. * Materials with high porosity may require plastic overlay to provide proper vacuum and prevent slipping. * Try adjusting the blower damper to provide greater airflow . * If your cutting small pieces, you may need to optimize your cutting path in easicut. (See OPTIONS/MACHINE and click on "OptimizeTool Path" tab) * Verify material is not stretching and snapping back. For elestic materials the material should be fed on to conveyor with a powerfeeder or other means to reduce pull of material. 3 If machine has a secondary conveyor encoder, confirm calibrations.

ELECTRICAL SCHEMATICS & PNUEMATIC DIAGRAM

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.

31-9000-13 REV-A
EC3 w/ Panasonic Labeler
Sheet 1 of 7

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

100-PIN RIBBON CABLE
JUMPER TO MOTION CONTROL BOARD
31-S1009

PC BRACKET ASSEMBLY
INPUT/OUPUT
31-S1017

TO GANTRY X-PAN
MACHINE I/O
CABLE: 31-S1023-CL
(See Page 3)

MULTIFUNCTION CARD 10-00900-02A

U19 2x50 Header — IDC MEI-35/36/85/86 — Amp Enables Each Axis

MEI		Function
MEI-27	MEI-27	Amp Enable — Standard Output — 12V Return
MEI-28	MEI-28	X Limit — Isolated Input — 12V Supply
MEI-29	MEI-29	Y Limit — Isolated Input — 12V Supply
MEI-30	MEI-30	X1 Home — Isolated Input — 12V Supply
MEI-77	MEI-77	X2 Home — Isolated Input — 12V Supply
MEI-79	MEI-79	Y Home — Isolated Input — 12V Supply
MEI-31	MEI-31	Z Home — Isolated Input — 12V Supply
MEI-32	MEI-32	Emergency Off — Isolated Input — 12V Return
MEI-81	MEI-81	Emergency Stop — Isolated Input — 12V Return
MEI-82	MEI-82	Solenoid Sensor 1 — Isolated Input — 12V Supply
MEI-89	MEI-89	Solenoid Sensor 2 — Isolated Input — 12V Supply
MEI-91	MEI-91	Solenoid Sensor 3 — Isolated Input — 12V Supply
MEI-93	MEI-93	Solenoid Sensor 4 — Isolated Input — 12V Supply
MEI-90	MEI-90	Solenoid 1 — Standard Output — 12V Return
MEI-92	MEI-92	Solenoid 2 — Standard Output — 12V Return
MEI-94	MEI-94	Solenoid 3 — Standard Output — 12V Return
MEI-39	MEI-39	Solenoid 4 — Standard Output — 12V Return
MEI-41	MEI-41	Pen Solenoid — Standard Output — 12V Return
MEI-43	MEI-43	Boost Solenoid — Standard Output — 12V Return
MEI-40	MEI-40	
MEI-42	MEI-42	
MEI-44	MEI-44	

Bit 0 / Bit 1 / Bit 2 / Bit 3 / Bit 4 / Bit 5 / Bit 1 / Bit 2 / Bit 4 / Bit 8 / Bit 16 / Bit 32

82C56(U10) Port A Output 8 Bit — PA0-PA8 — 8 BIT DAC Pressure Reg Output 0-10V 4-20mA — JP4 12V Supply — JP3 12V Return

82C56(U10) Port B Input — PB4 Bit 20 ETS Input 0 — Manual Gripper — 12V Supply
PB5 Bit 21 ETS Input 1 — Spare — 12V Supply
PB6 Bit 22 ETS Input 2 — End Cut Done — 12V Supply
PB7 Bit 23 ETS Input 3 — Spare — 12V Supply

82C56(U10) Port C Output 8 Bit

PC0	Bit 256	ETS Ouput 0	Safety Light — Standard Output — 12V Return
PC1	Bit 512	ETS Ouput 1	Gripper Solenoid — Standard Output — 12V Return
PC2	Bit 1024	ETS Ouput 2	End Cutter — Isolated Output
PC3	Bit 2048	ETS Ouput 3	Spare — Isolated Output
PC4	Bit 4096	ETS Ouput 4	BJ Clamp — Isolated Output
PC5	Bit 8192	ETS Ouput 5	Spare — Isolated Output
PC6	Bit 16384	ETS Ouput 6	Vacuum / InkJet — Isolated Output
PC7	Bit 32768	ETS Ouput 7	Spare — Isolated Output

8MHZ — Programmable Timer — Differential Driver (In / Out+ / Out-)

82C56(U10) Port B PB0 Input — Differential Reciever

PB1	Bit xxxx	Out1	In1+ / In1-
PB2	Bit xxxx	Out2	In2+ / In2-
PB3	Bit xxxx	Out3	In3+ / In3-
	Bit xxxx	Out4	In4+ / In4-

PWM+ / PWM- / Reflect+ / Reflect- / Forward+ / Forward- / DutyCY+ / DutyCY- / VSWR+ / VSWR-

SYNCH / MEI COM

X1 Encoder A+ / X1 Encoder A- / X1 Encoder B+ / X1 Encoder B- / X1 Encoder Index+ / X1 Encoder Index- / X2 Encoder A+ / X2 Encoder A- / X2 Encoder B+ / X2 Encoder B- / X2 Encoder Index+ / X2 Encoder Index- / Y Encoder A+ / Y Encoder A- / Y Encoder B+ / Y Encoder B- / Y Encoder Index+ / Y Encoder Index- / Z Encoder A+ / Z Encoder A- / Z Encoder B+ / Z Encoder B- / Z Encoder Index+ / Z Encoder Index-

12V Supply / Amp Enable / Emergency Off / 12V Return

MEI-15	MEI-15	X1 VCS+	
MEI-17	MEI-17	X1 VCS-	
MEI-33	MEI-33	X1 Fault	X1 Amp Fault — Isolated Input — 12V Supply
MEI-16	MEI-16	X2 VCS+	
MEI-18	MEI-18	X2 VCS-	
MEI-34	MEI-34	X2 Fault	X2 Amp Fault — Isolated Input — 12V Supply
MEI-65	MEI-65	Y VCS+	
MEI-67	MEI-67	Y VCS-	
MEI-83	MEI-83	Y Fault	Y Amp Fault — Isolated Input — 12V Supply
MEI-66	MEI-66	Z VCS+	
MEI-68	MEI-68	Z VCS-	
MEI-84	MEI-84	Z Fault	Z Amp Fault — Isolated Input — 12V Supply

J1/J2 - PC ISA Bus Connector

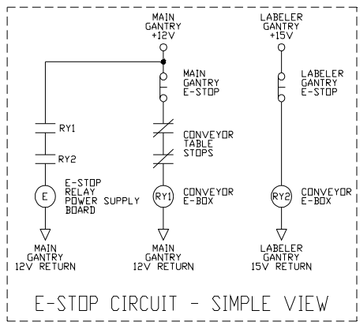
J4 2x20 Header — 12x20 IDC — DB37F — DB37M I/O — Belden 9948

Pin	DB37F	DB37M I/O	Belden 9948
1	1	Shield	Shield
2	2	+12V Supply	RED
3	3	+12V Return	BLACK
4	4	Emergency Off	WHITE
5	5	Amp Enable	GREEN
6	6	X Limit	ORANGE
7	7	Y Limit	BLUE
8	8	X1 Home	(RED-black-white)
9	9	X2 Home	WHITE-black
10	10	Y Home	RED-black
11	11	Z Home	GREEN-black
12	12	E-Stop (PAUSE) Input	ORANGE-black
13	13	Solenoid Sensor 1	BLUE-black
14	14	Solenoid Sensor 2	BLACK-white
15	15	Solenoid Sensor 3	RED-white
16	16	Solenoid Sensor 4	GREEN-white
17	17	Solenoid 1	BLUE-white
18	18	Solenoid 2	BLACK-red
19	19	Solenoid 3	WHITE-red
20	20	Solenoid 4	ORANGE-red
21	21	Pen Solenoid	BLUE-red
22	22	Boost Solenoid	RED-green
23	23	Pressure Regulator+	
24	24	Pressure Regulator-	ORANGE-green
25	25	Gripper On/Off	BLACK-white-red
26	26	ETS IN 1	WHITE-black-red
27	27	ETS IN 2	
28	28	ETS IN 3	
29	29	Safety Light	(RED-black-white)
30	30	Gripper Output	GREEN-black-white
31	31	ETS OUT 2	
32	32	ETS OUT 4	
33	33	ETS OUT 6	
34	34	ETS OUT 3	
35	35	ETS OUT 5	
36	36	ETS OUT 7	
37	37	5V Return	

J7 2x17 Header — 2x17 IDC — DB15F — DB15M — Encoders — Belden 8308

Pin	DB15F	DB15M	Encoders	Belden 8308
1	1	1	E-Stop (PAUSE)	RED (black)
2	9	9	12V Return	BLACK (red)
3	2	2	E-OFF	WHITE (black)
4	10	10	E - OFF	BLACK (white)
5	3	3	SYNCH	GREEN (black)
6	11	11	MEI COM	BLACK (green)
7	4	4	-	SHIELD
8	12	12	+12V	BLUE (black)
9	5	5	12V Return	BLACK (blue)
10	13	13	ETS IN2 (NEXT)	YELLOW (black)
11	6	6	12V Return	BLACK (yellow)
12	14	14	Out 2+	BROWN (black)
13	7	7	Out 2-	BLACK (brown)
14	15	15	ETS IN3 (JOG)	ORANGE (black)
15	8	8	+12V Return	BLACK (orange)

TO CONVEYOR E-BOX
REMOTE I/O
CABLE: 31-26031
(See Page 5)



E-STOP CIRCUIT - SIMPLE VIEW

PC BRACKET
ASSEMBLY
31-26032

J6 2x10 Header

J5 2x25 Header — 12x25 IDC — DB25F — DB25M — Encoders — Belden 8308

Pin	DB25F	DB25M	Encoders	Belden 8308
1	1	1	Shield	Shield
2	14	14	X1 Encoder A+	RED (black)
3	2	2	X1 Encoder A-	BLACK (red)
4	15	15	X1 Encoder B+	WHITE (black)
5	3	3	X1 Encoder B-	BLACK (white)
6	16	16	X1 Encoder Index+	
7	4	4	X1 Encoder Index-	
8	17	17	X2 Encoder A+	GREEN (black)
9	5	5	X2 Encoder A-	BLACK (green)
10	18	18	X2 Encoder B+	BLUE (black)
11	6	6	X2 Encoder B-	BLACK (blue)
12	19	19	X2 Encoder Index+	
13	7	7	X2 Encoder Index-	
14	20	20	Y Encoder A+	YELLOW (black)
15	8	8	Y Encoder A-	BLACK (yellow)
16	21	21	Y Encoder B+	BROWN (black)
17	9	9	Y Encoder B-	BLACK (brown)
18	22	22	Y Encoder Index+	
19	10	10	Y Encoder Index-	
20	23	23	Z Encoder A+	ORANGE (black)
21	11	11	Z Encoder A-	BLACK (orange)
22	24	24	Z Encoder B+	WHITE (red)
23	12	12	Z Encoder B-	RED (white)
24	25	25	Z Encoder Index+	
25	13	13	Z Encoder Index-	

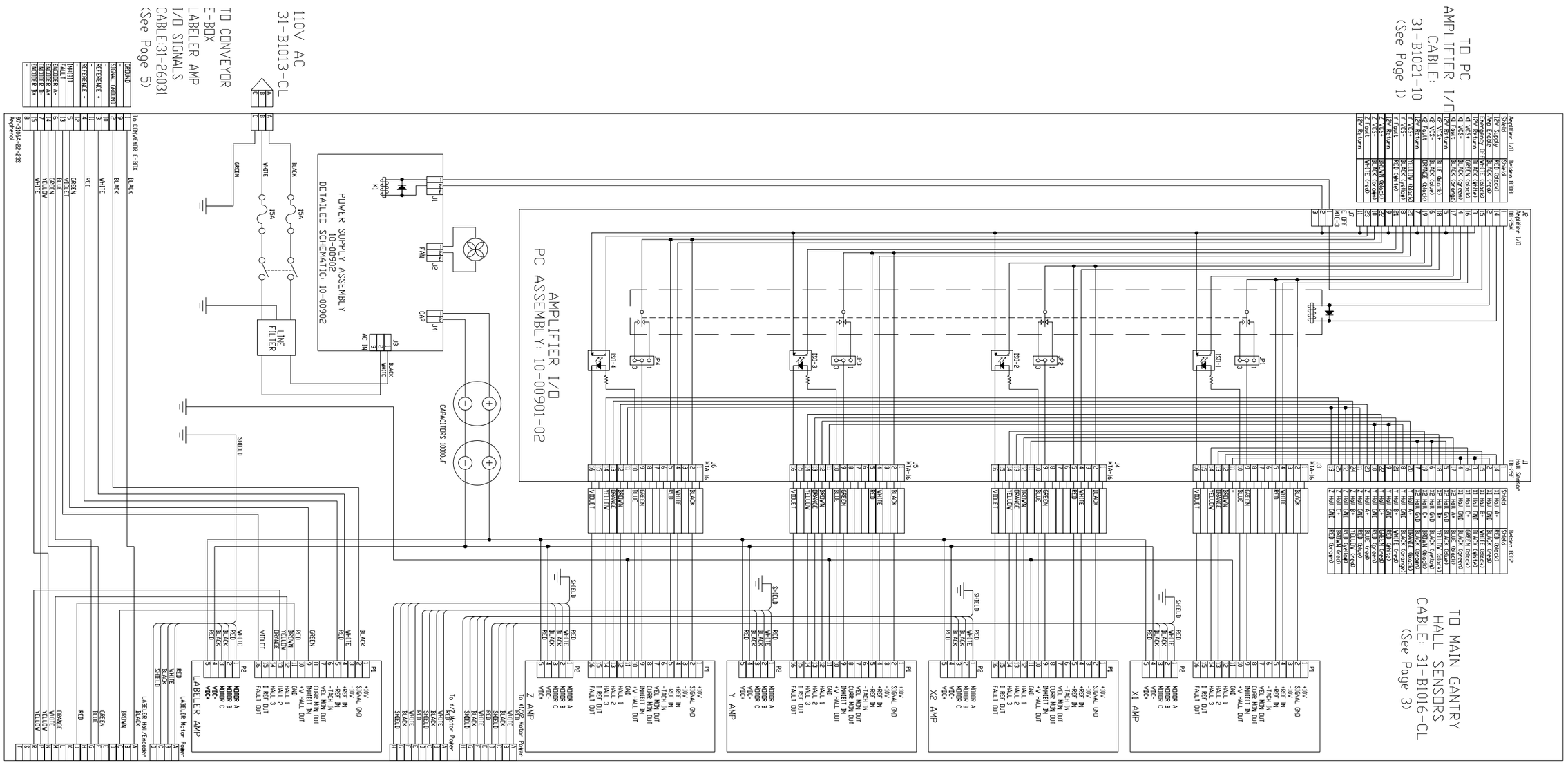
TO GANTRY X-AXIS
MOTOR ENCODERS
CABLE: 31-S1020-CL
(See Page 4)

DB25M — DB25F Amplifier I/O — 31-B1021-10 Belden 8308

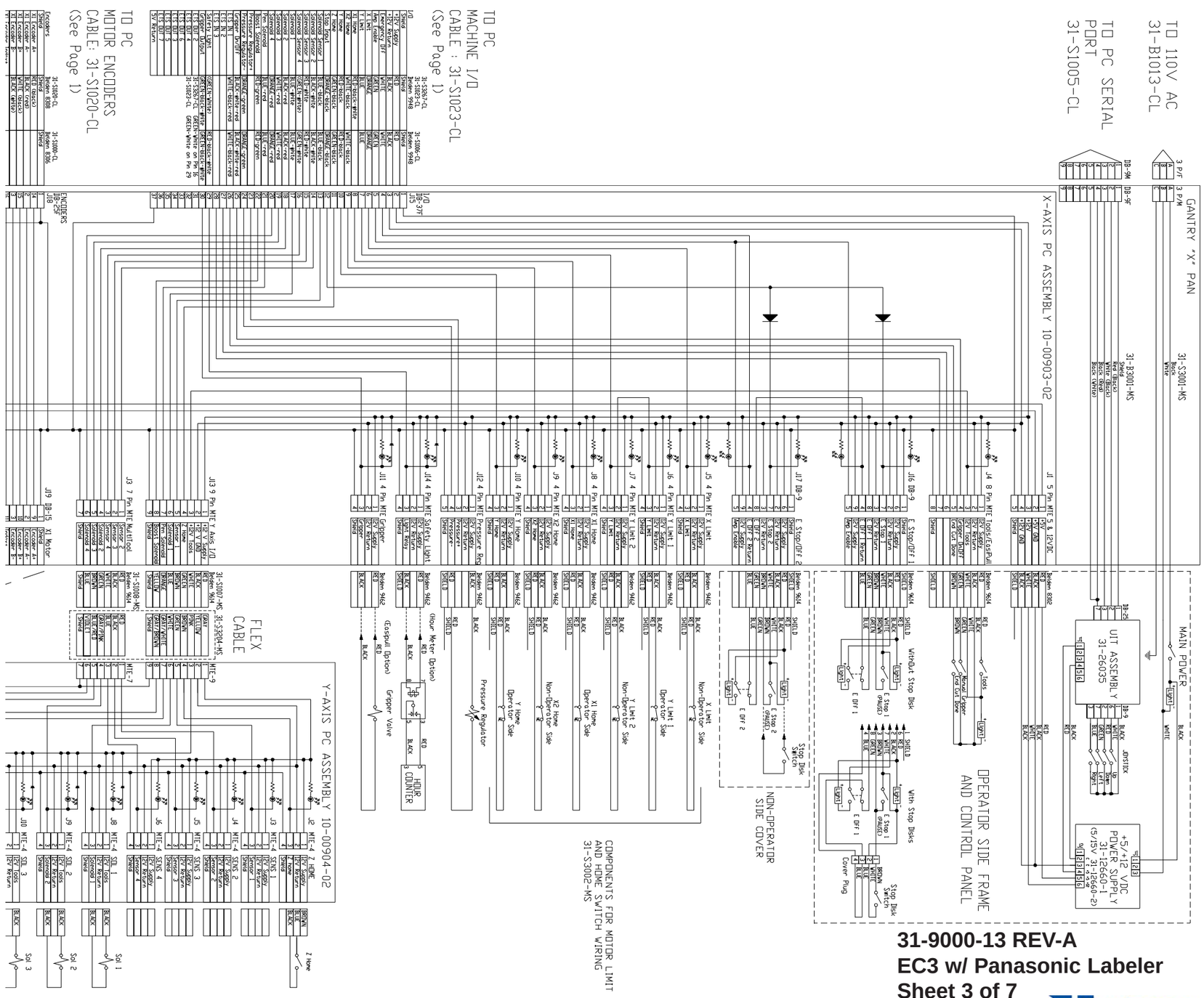
Pin	DB25M	DB25F Amplifier I/O	31-B1021-10 Belden 8308
1	1	Shield	Shield
2	14	12V Supply	RED (black)
3	2	Amp Enable	BLACK (red)
4	15	Emergency Off	WHITE (black)
5	3	12V Return	BLACK (white)
6	16	X1 VCS+	GREEN (black)
7	4	X1 VCS-	BLACK (green)
8	17	X1 Fault	BLACK (orange)
9	5	12V Return	
10	18	X2 VCS+	BLUE (black)
11	6	X2 VCS-	BLACK (blue)
12	19	X2 Fault	ORANGE (black)
13	7	12V Return	
14	20	Y VCS+	YELLOW (black)
15	8	Y VCS-	BLACK (yellow)
16	21	Y Fault	RED (white)
17	9	12V Return	
18	22	Z VCS+	BROWN (black)
19	10	Z VCS-	BLACK (brown)
20	23	Z Fault	WHITE (red)
21	11	12V Return	
22	24		
23	12		
24	25		
25	13		

TO E-BOX
AMPLIFIER I/O
CABLE: 31-B1021-10
(See Page 2)

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

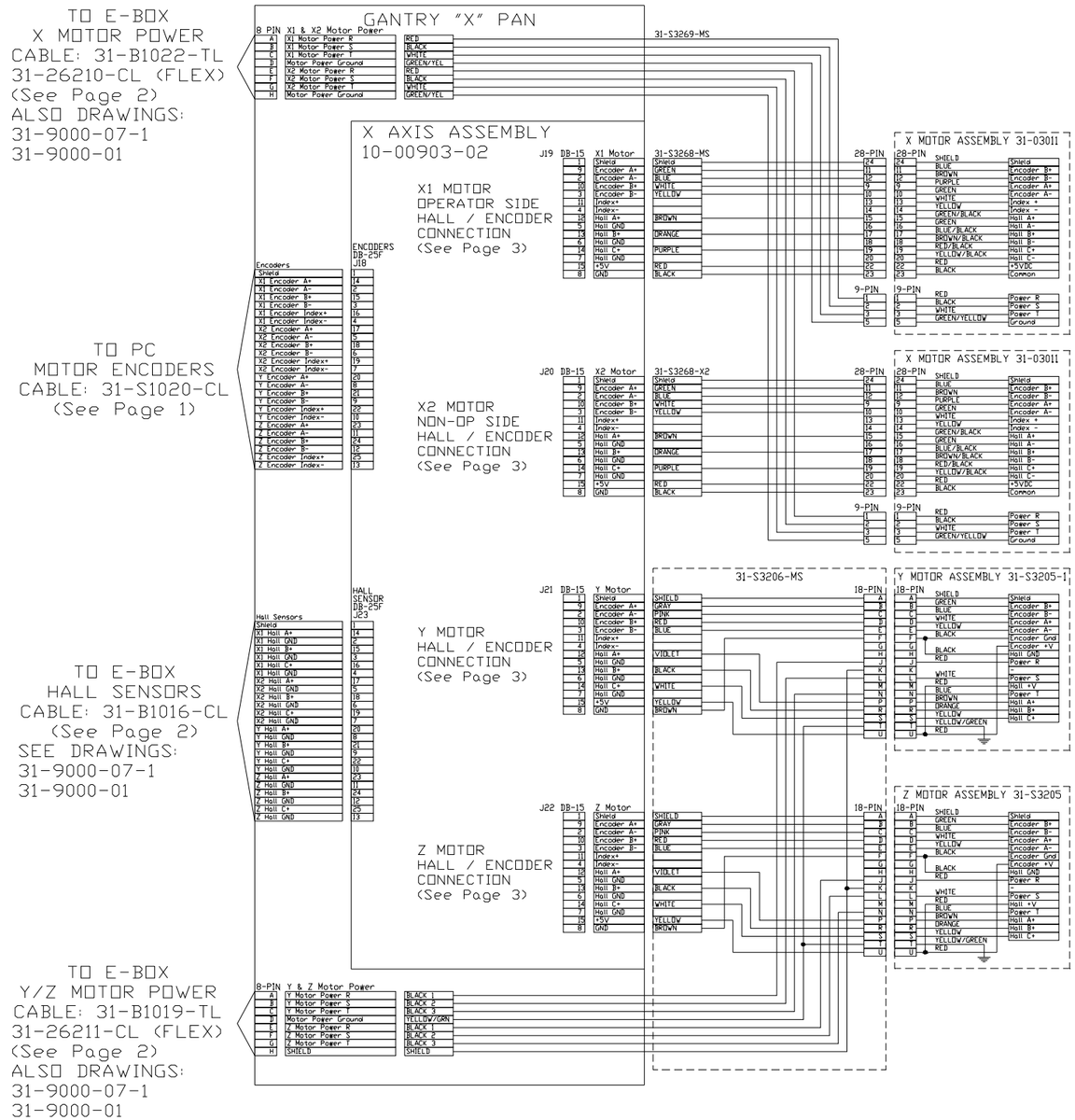


31-9000-13 REV-A
EC3 w/ Panasonic Labeler
Sheet 2 of 7

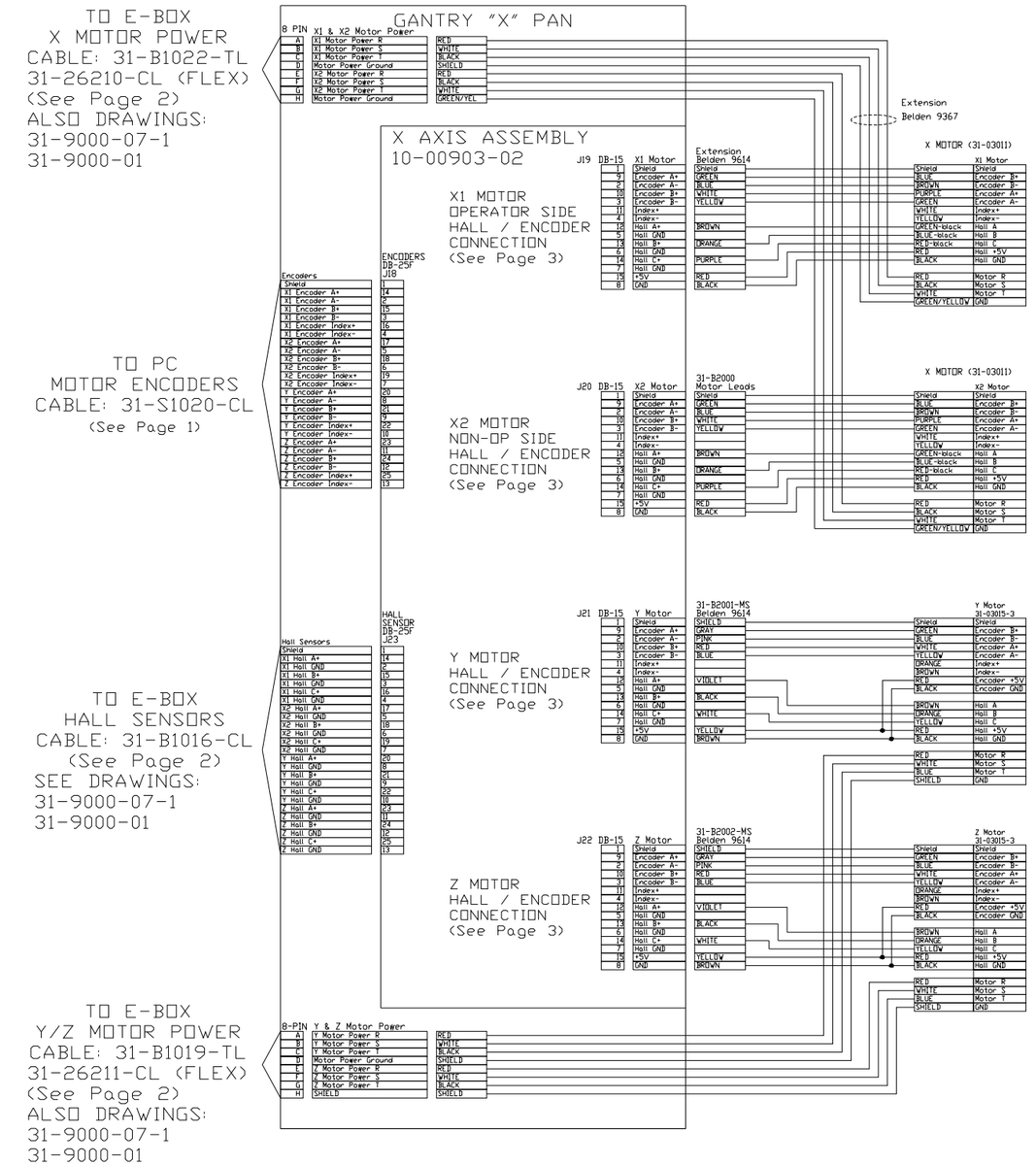


Eastman AUTOMATED SYSTEMS

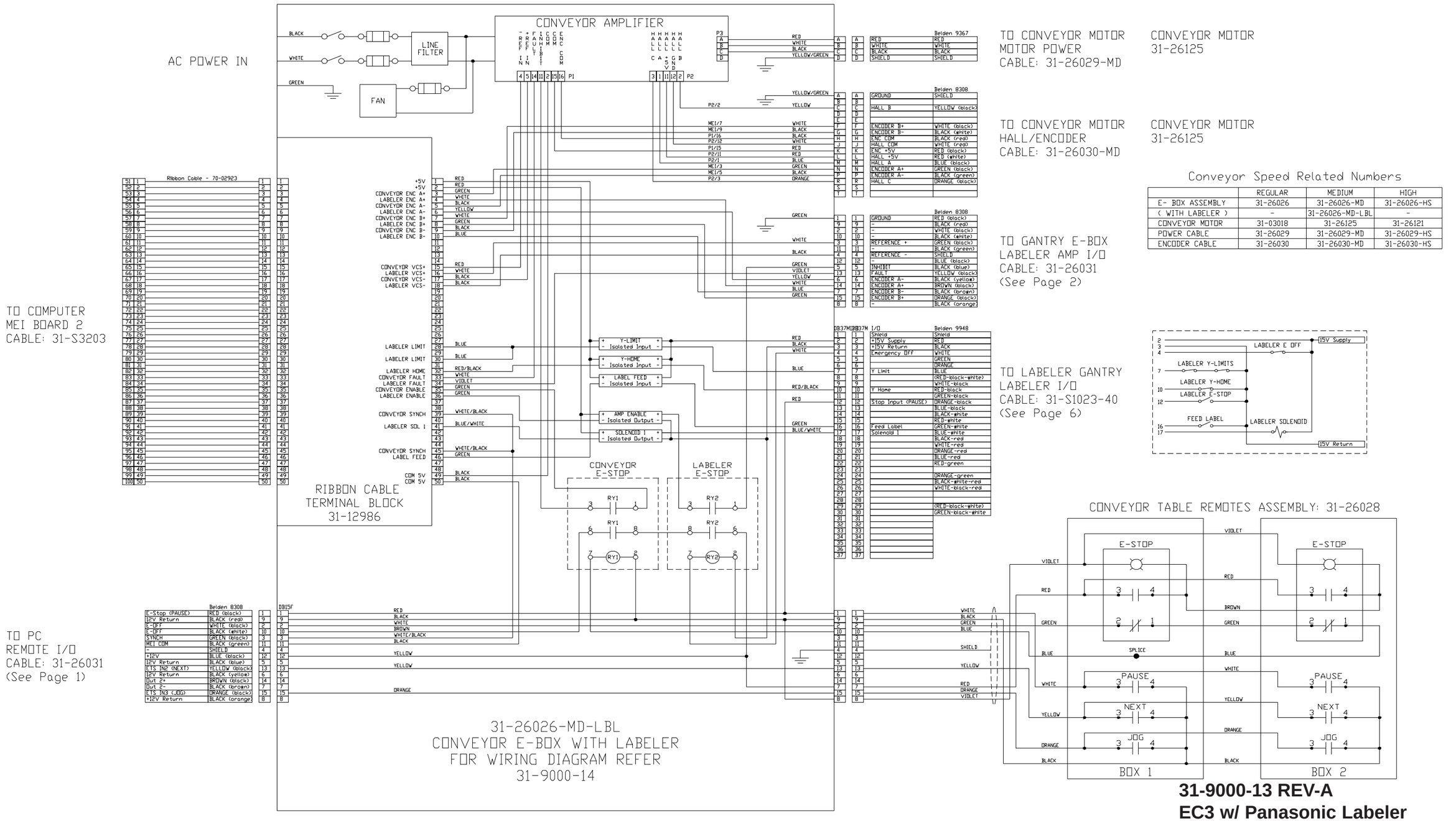
FLEX CABLE / CONNECTOR VERSIONS



HARD-WIRED VERSIONS



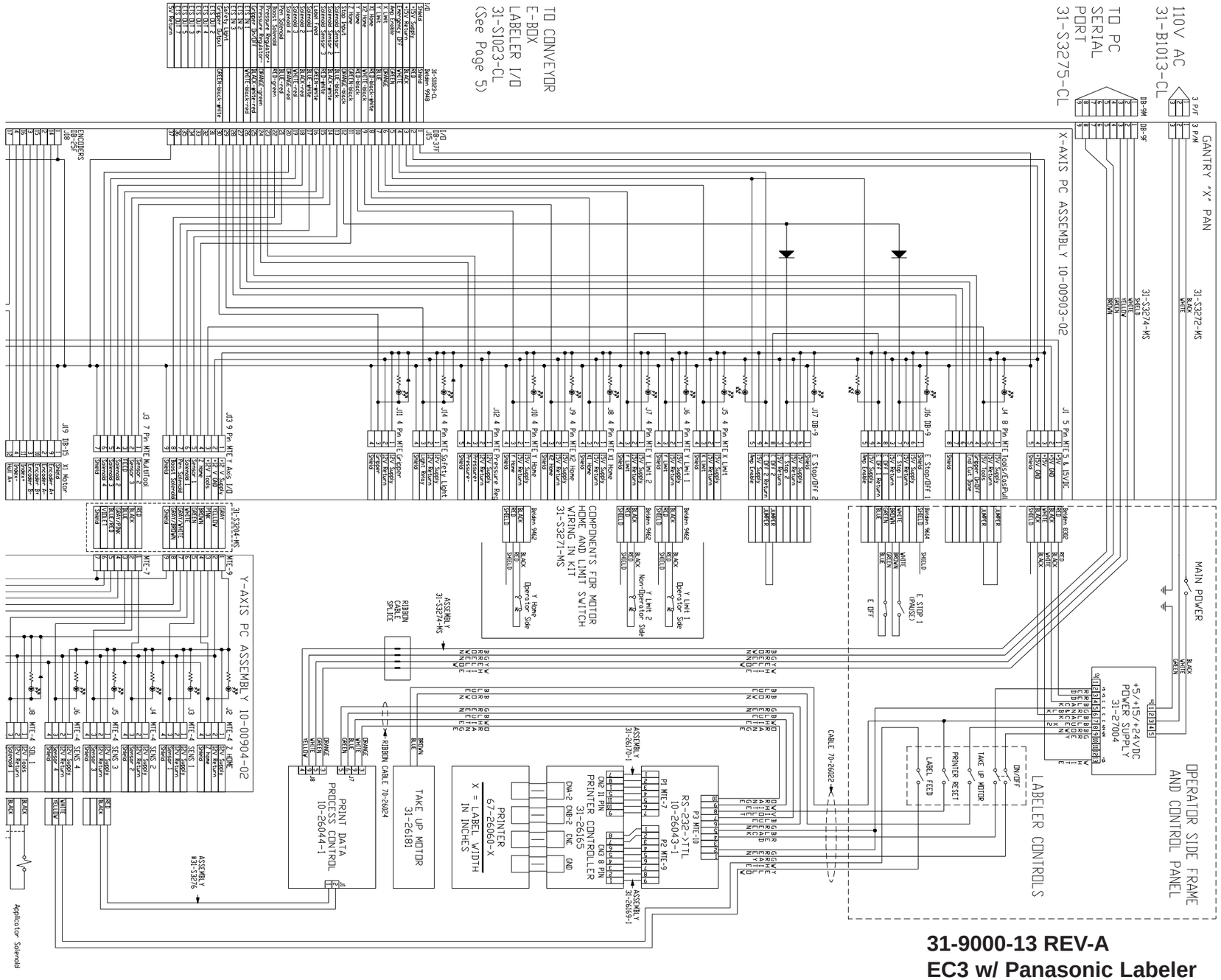
31-9000-13 REV-A
EC3 w/ Panasonic Labeler
Sheet 4 of 7



Conveyor Speed Related Numbers

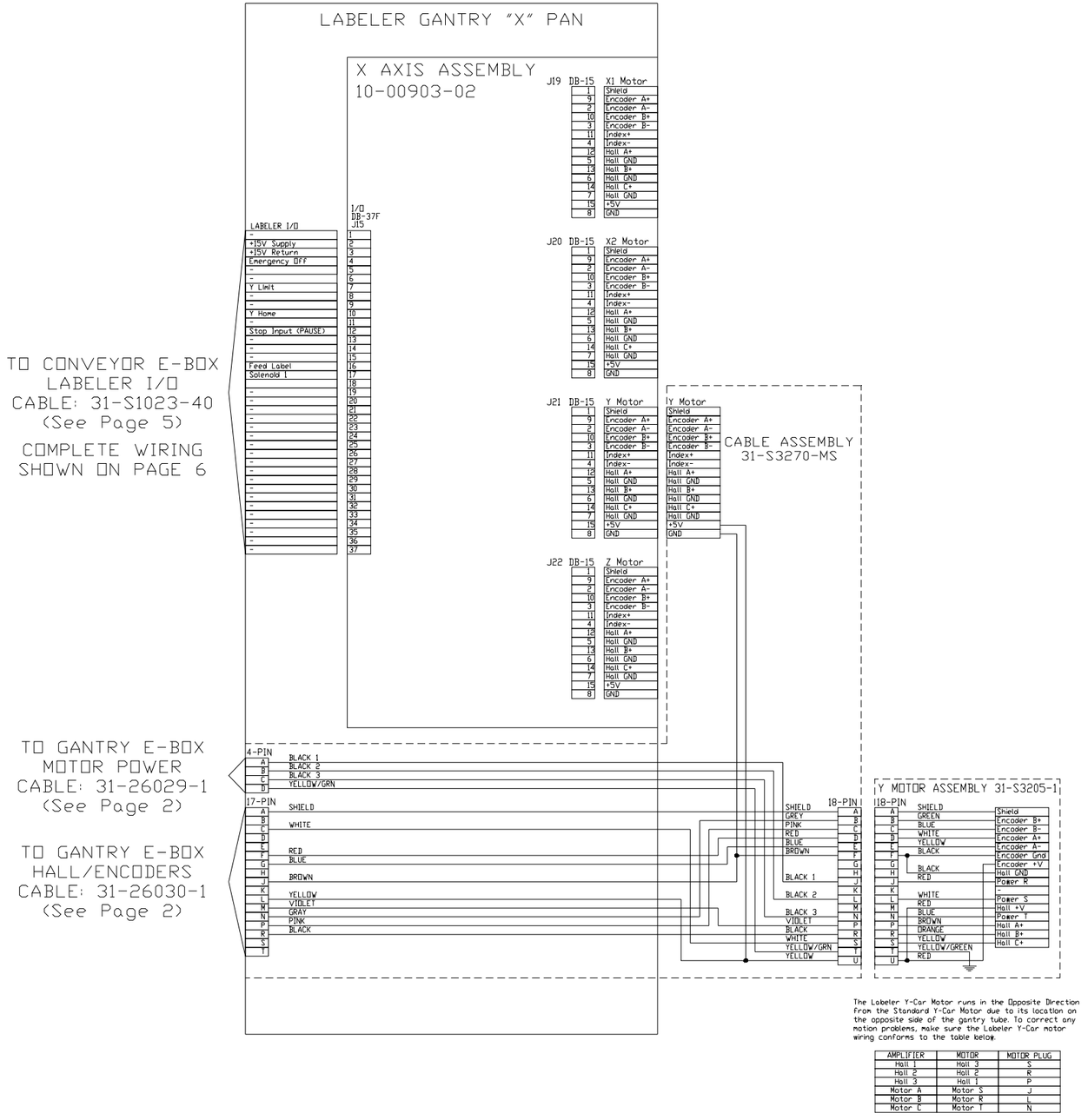
	REGULAR	MEDIUM	HIGH
E- BOX ASSEMBLY	31-26026	31-26026-MD	31-26026-HS
(WITH LABELER)	-	31-26026-MD-LBL	-
CONVEYOR MOTOR	31-03018	31-26125	31-26121
POWER CABLE	31-26029	31-26029-MD	31-26029-HS
ENCODER CABLE	31-26030	31-26030-MD	31-26030-HS

31-9000-13 REV-A
EC3 w/ Panasonic Labeler
Sheet 5 of 7



31-9000-13 REV-A
EC3 w/ Panasonic Labeler
Sheet 6 of 7

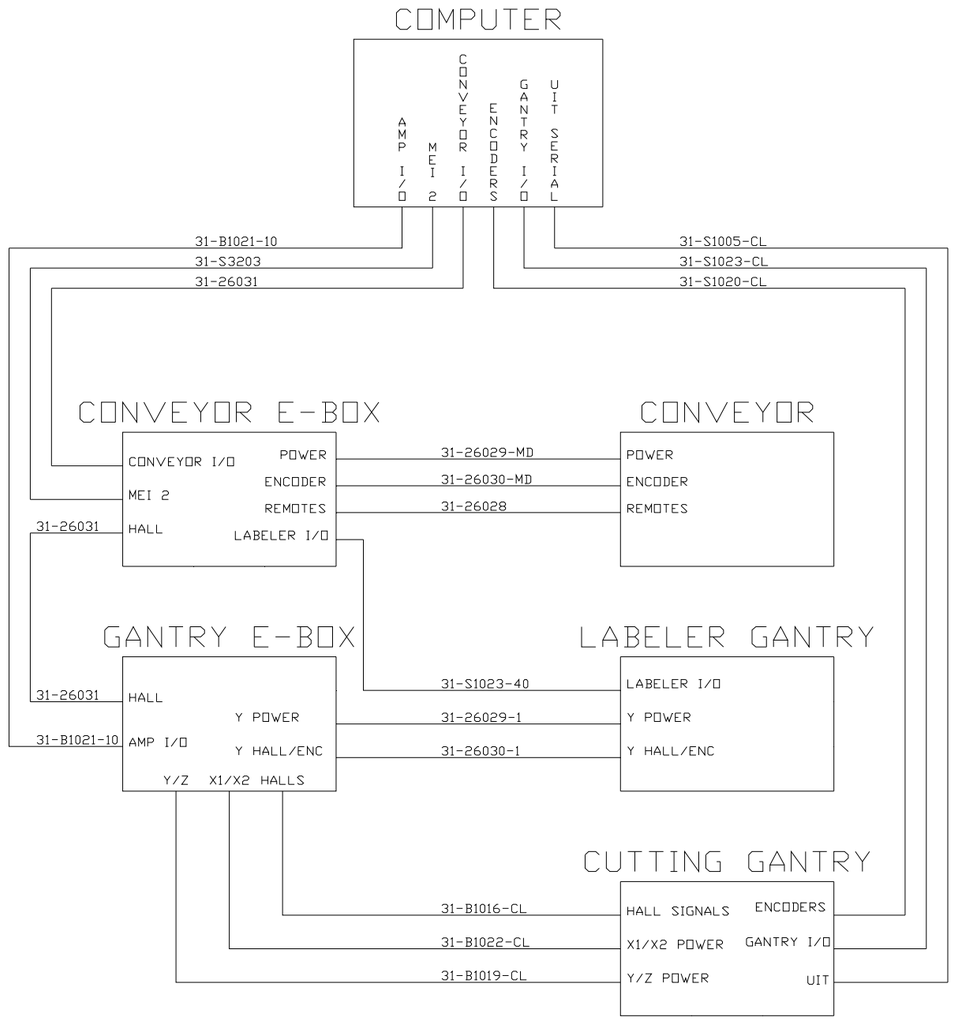
LABELER Y-CAR MOTOR WIRING



The Labeler Y-Car Motor runs in the Opposite Direction from the Standard Y-Car Motor due to its location on the opposite side of the gantry tube. To correct any motion problems, make sure the Labeler Y-Car motor wiring conforms to the table below.

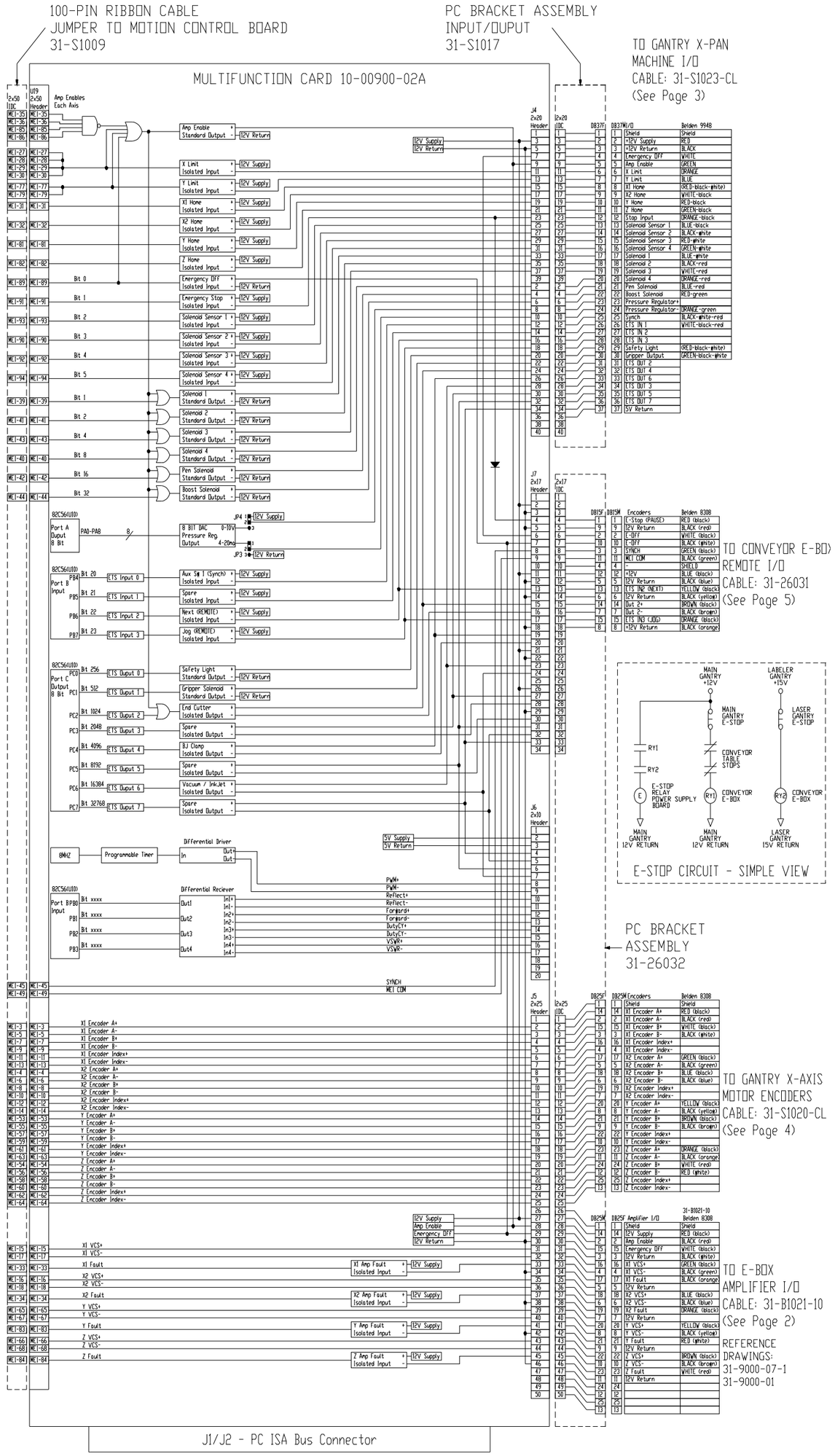
AMPLIFIER	MOTOR	MOTOR PLUG
Hall 1	Hall 3	S
Hall 2	Hall 2	R
Hall 3	Hall 1	P
Motor A	Motor S	J
Motor B	Motor R	L
Motor C	Motor T	N

SYSTEM CABLING BLOCK DIAGRAM



31-9000-13 REV-A
EC3 w/ Panasonic Labeler
Sheet 7 of 7

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

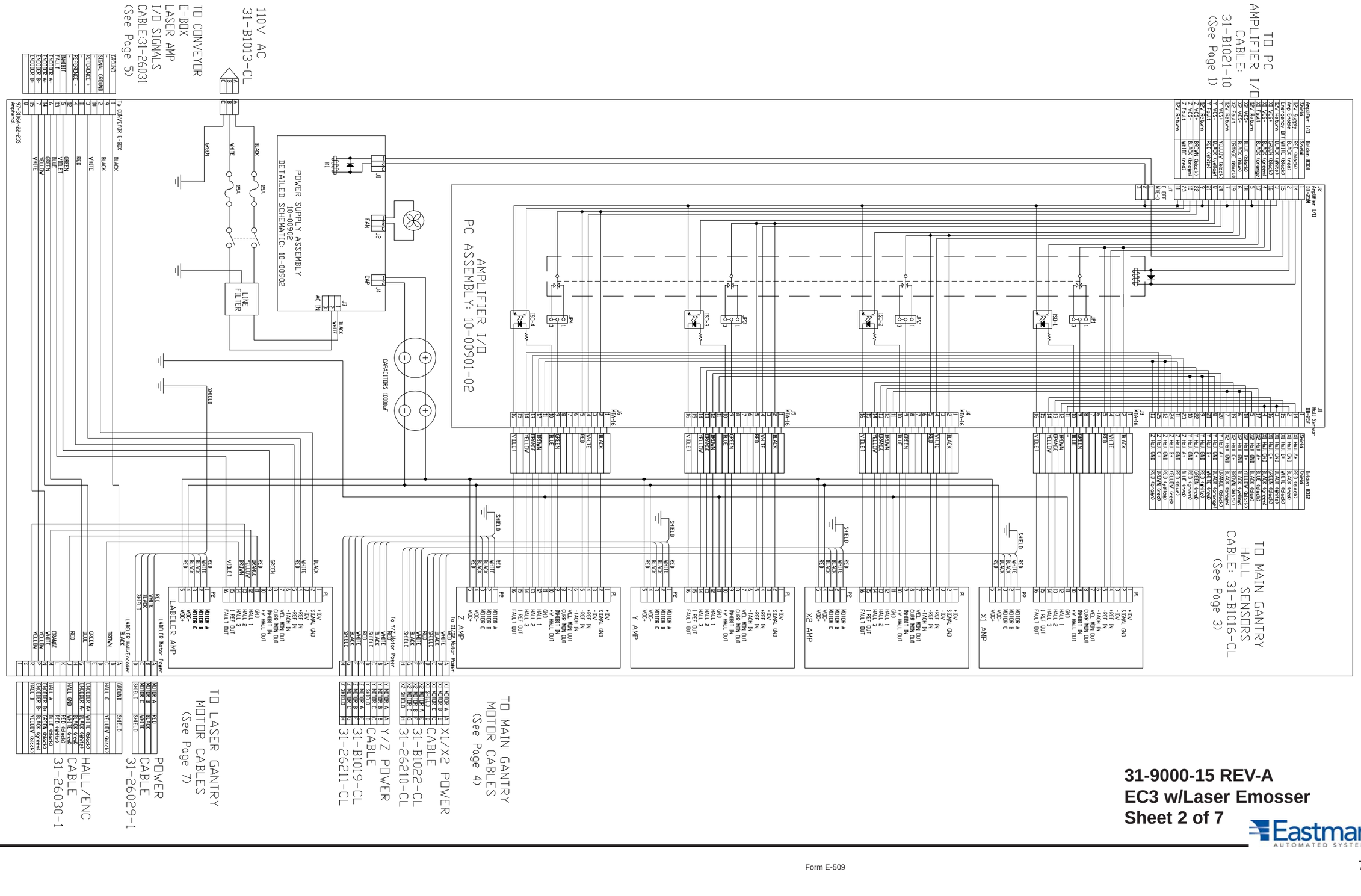


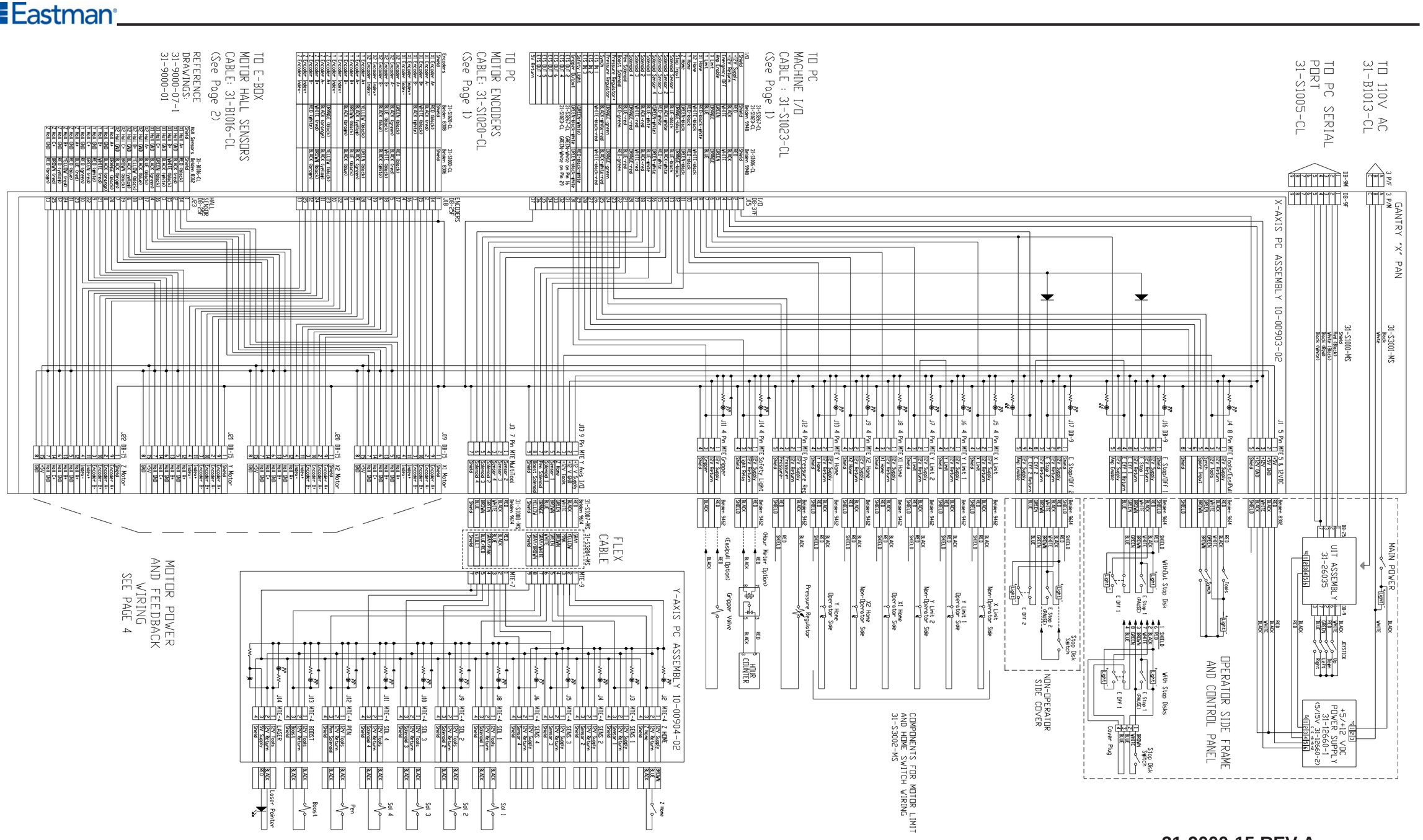
DB37F	DB37M I/O	Belden 9948
1	Shield	Shield
2	+12V Supply	RED
3	+12V Return	BLACK
4	Emergency Off	WHITE
5	Amp Enable	GREEN
6	X Limit	ORANGE
7	Y Limit	BLUE
8	X1 Home	(RED-black-white)
9	X2 Home	WHITE-black
10	Y Home	RED-black
11	Z Home	GREEN-black
12	Stop Input	ORANGE-black
13	Solenoid Sensor 1	BLUE-black
14	Solenoid Sensor 2	BLACK-white
15	Solenoid Sensor 3	RED-white
16	Solenoid Sensor 4	GREEN-white
17	Solenoid 1	BLUE-white
18	Solenoid 2	BLACK-red
19	Solenoid 3	WHITE-red
20	Solenoid 4	ORANGE-red
21	Pen Solenoid	BLUE-red
22	Boost Solenoid	RED-green
23	Pressure Regulator+	
24	Pressure Regulator-	ORANGE-green
25	Synch	BLACK-white-red
26	ETS IN 1	WHITE-black-red
27	ETS IN 2	
28	ETS IN 3	
29	Safety Light	(RED-black-white)
30	Gripper Output	GREEN-black-white
31	ETS OUT 2	
32	ETS OUT 4	
33	ETS OUT 6	
34	ETS OUT 3	
35	ETS OUT 5	
36	ETS OUT 7	
37	5V Return	

DB15F	DB15M	Encoders	Belden 8308
1	1	E-Stop (PAUSE)	RED (black)
9	9	12V Return	BLACK (red)
2	2	C-DIFF	WHITE (black)
10	10	C-DIFF	BLACK (white)
3	3	SYNCH	GREEN (black)
11	11	MCI COM	BLACK (green)
4	4	-	SHIELD
12	12	+12V	BLUE (black)
5	5	12V Return	BLACK (blue)
13	13	ETS IN2 (NEXT)	YELLOW (black)
6	6	12V Return	BLACK (yellow)
14	14	Out 2+	BROWN (black)
7	7	Out 2-	BLACK (brown)
15	15	ETS IN3 (JOG)	ORANGE (black)
8	8	+12V Return	BLACK (orange)

DB25F	DB25M Encoders	Belden 8308
1	Shield	Shield
14	X1 Encoder A+	RED (black)
2	X1 Encoder A-	BLACK (red)
15	X1 Encoder B+	WHITE (black)
3	X1 Encoder B-	BLACK (white)
16	X1 Encoder Index+	
4	X1 Encoder Index-	
17	X2 Encoder A+	GREEN (black)
5	X2 Encoder A-	BLACK (green)
18	X2 Encoder B+	BLUE (black)
6	X2 Encoder B-	BLACK (blue)
19	X2 Encoder Index+	
7	X2 Encoder Index-	
20	Y Encoder A+	YELLOW (black)
8	Y Encoder A-	BLACK (yellow)
21	Y Encoder B+	BROWN (black)
9	Y Encoder B-	BLACK (brown)
22	Y Encoder Index+	
10	Y Encoder Index-	
23	Z Encoder A+	ORANGE (black)
11	Z Encoder A-	BLACK (orange)
24	Z Encoder B+	WHITE (red)
12	Z Encoder B-	RED (white)
25	Z Encoder Index+	
13	Z Encoder Index-	

DB25M	DB25F Amplifier I/O	31-B1021-10 Belden 8308
1	Shield	Shield
14	12V Supply	RED (black)
2	Amp Enable	BLACK (red)
15	Emergency Off	WHITE (black)
3	12V Return	BLACK (white)
16	X1 VCS+	GREEN (black)
4	X1 VCS-	BLACK (green)
17	X1 Fault	BLACK (orange)
5	12V Return	
18	X2 VCS+	BLUE (black)
6	X2 VCS-	BLACK (blue)
19	X2 Fault	ORANGE (black)
7	12V Return	
20	Y VCS+	YELLOW (black)
8	Y VCS-	BLACK (yellow)
21	Y Fault	RED (white)
9	12V Return	
22	Z VCS+	BROWN (black)
10	Z VCS-	BLACK (brown)
23	Z Fault	WHITE (red)
11	12V Return	
24		
12		
25		
13		


TO PC
AMPLIFIER I/O
CABLE:
31-B1021-10
(See Page 1)
110V AC
31-B1013-CL
TO CONVEYOR
E-BOX
LASER AMP
I/O SIGNALS
CABLE:31-26031
(See Page 5)
POWER SUPPLY ASSEMBLY
10-00902
DETAILED SCHEMATIC: 10-00902
LINE FILTER
15A
AMPLIFIER I/O
PC ASSEMBLY: 10-00901-02
CAPACITORS 10000uF
TO MAIN GANTRY
HALL SENSORS
CABLE: 31-B1016-CL
(See Page 3)
X1 AMP
X2 AMP
Y AMP
Z AMP
TO MAIN GANTRY
MOTOR CABLES
(See Page 4)
X1/X2 POWER
CABLE
31-B1022-CL
31-26210-CL
Y/Z POWER
CABLE
31-B1019-CL
31-26211-CL
TO LASER GANTRY
MOTOR CABLES
(See Page 7)
POWER
CABLE
31-26029-1
HALL/ENC
CABLE
31-26030-1
LABELER AMP
LABELER Motor Power
LABELER Hall/Encoder
31-9000-15 REV-A
EC3 w/Laser Emosser
Sheet 2 of 7



31-9000-15 REV-A
EC3 w/Laser Emosser
Sheet 3 of 7

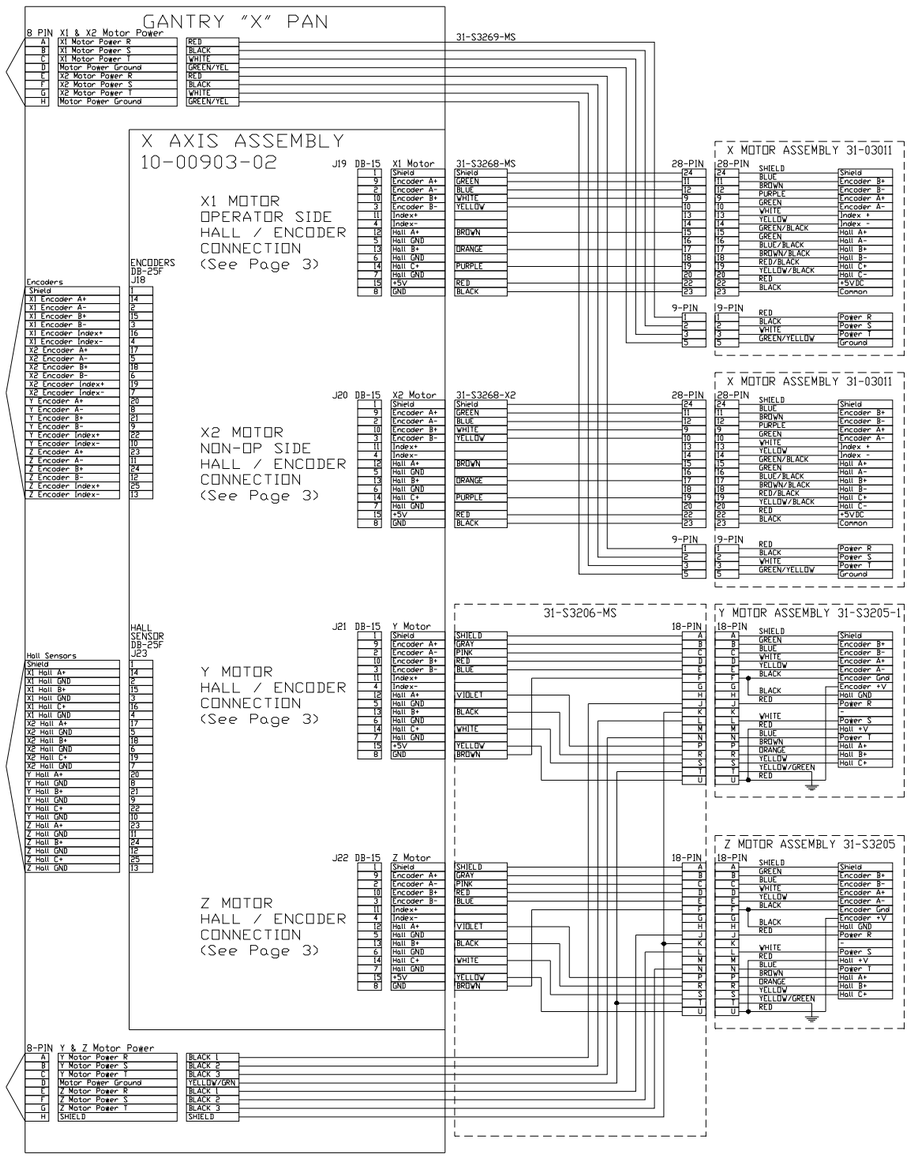
FLEX CABLE / CONNECTOR VERSIONS

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

TO PC
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



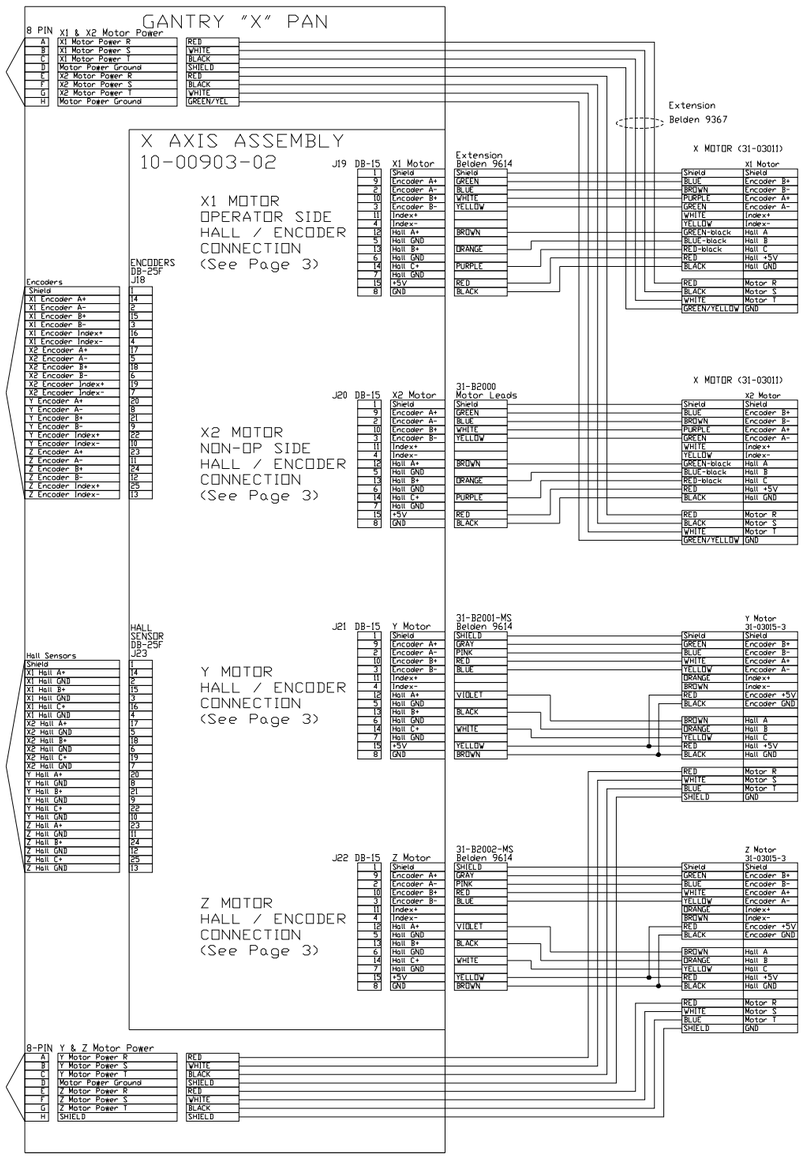
HARD-WIRED VERSIONS

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

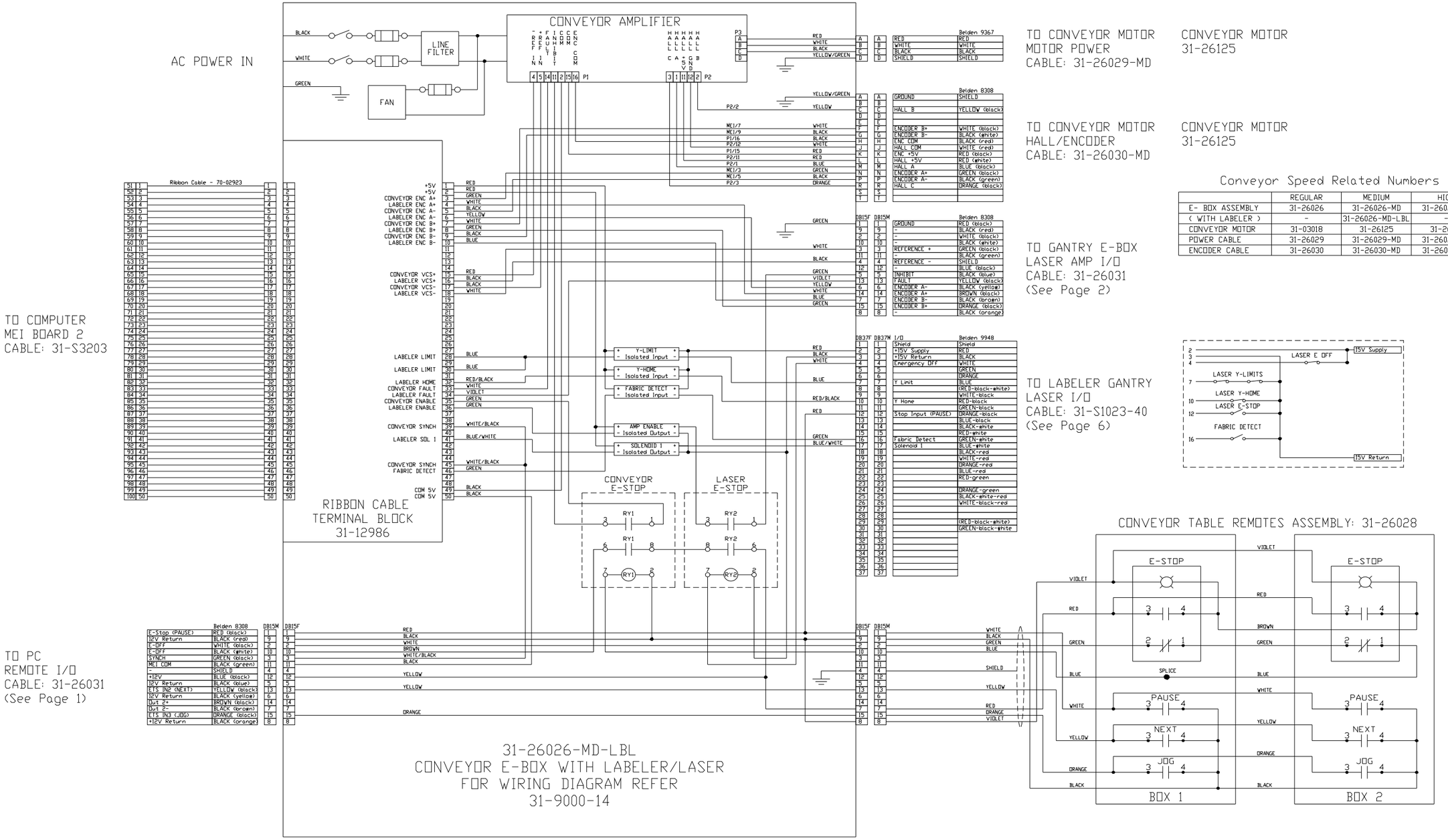
TO PC
MOTOR ENCODERS
CABLE: 31-S1020-CL
(See Page 1)

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



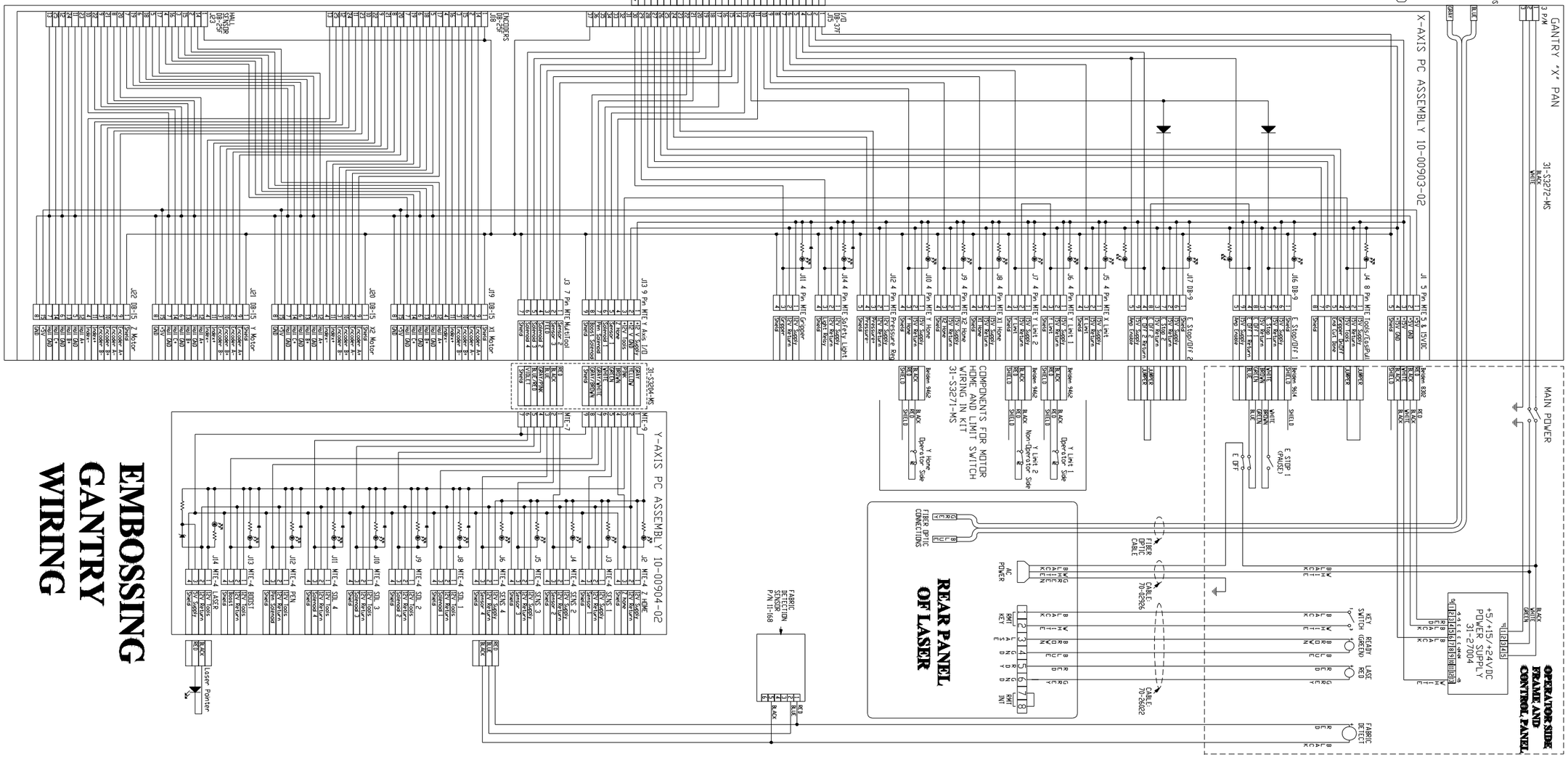
31-9000-15 REV-A
EC3 w/Laser Emosser
Sheet 4 of 7



Conveyor Speed Related Numbers

	REGULAR	MEDIUM	HIGH
E- BOX ASSEMBLY	31-26026	31-26026-MD	31-26026-HS
(WITH LABELER)	-	31-26026-MD-LBL	-
CONVEYOR MOTOR	31-03018	31-26125	31-26121
POWER CABLE	31-26029	31-26029-MD	31-26029-HS
ENCODER CABLE	31-26030	31-26030-MD	31-26030-HS

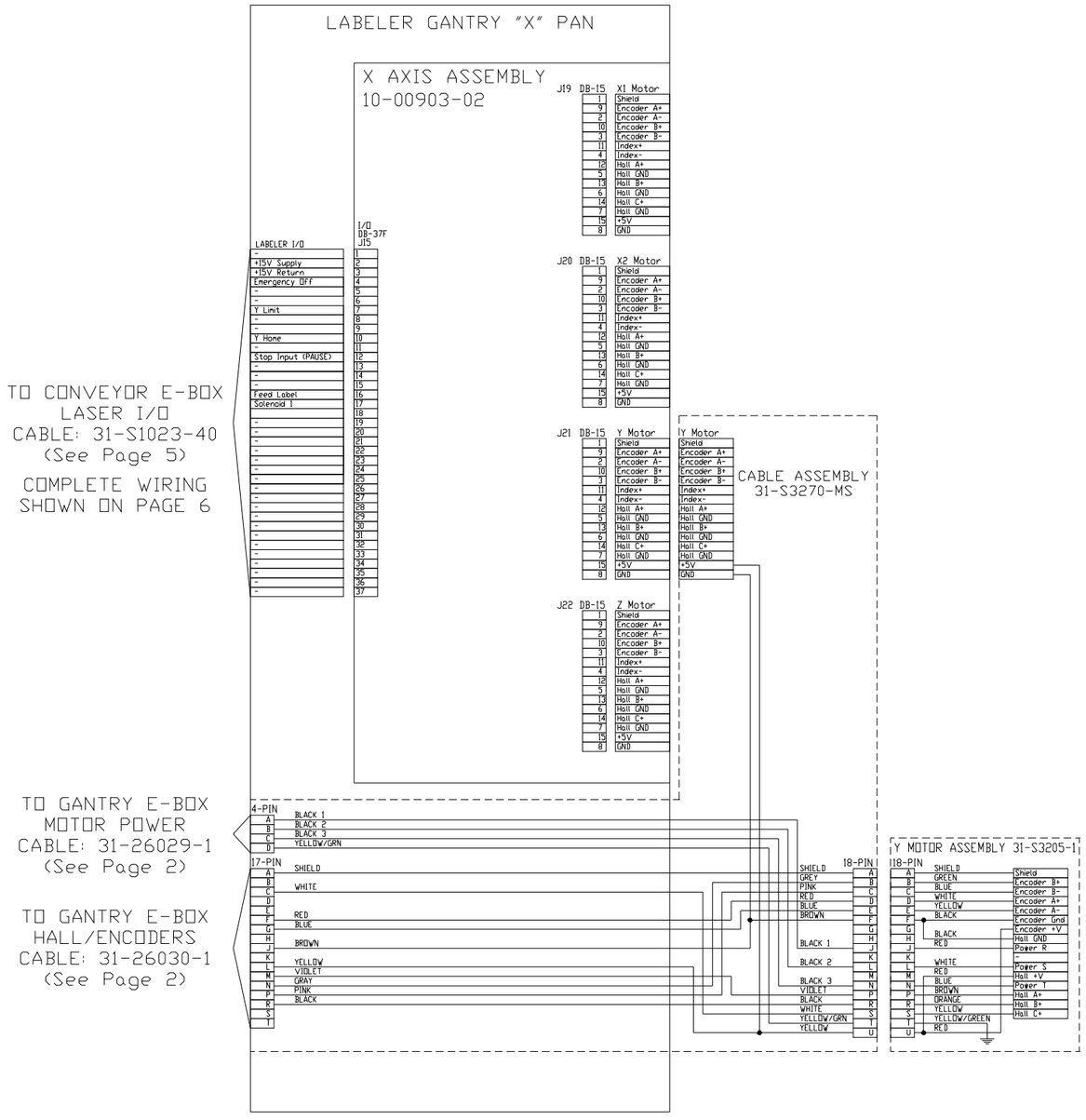
31-9000-15 REV-A
EC3 w/Laser Emosser
Sheet 5 of 7



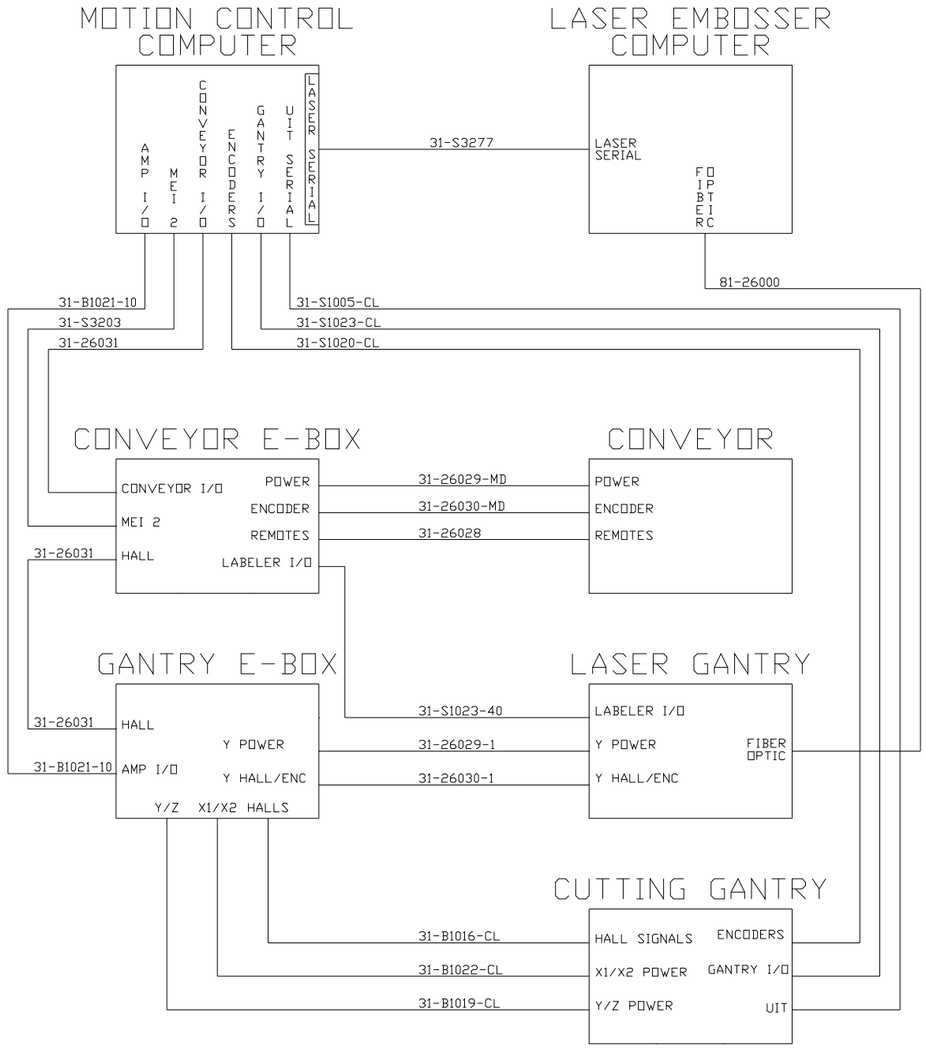
EMBOSSING GANTRY WIRING

31-9000-15 REV-A
EC3 w/Laser Emosser
Sheet 6 of 7

LASER GANTRY Y-CAR MOTOR WIRING



SYSTEM CABLING BLOCK DIAGRAM



31-9000-15 REV-A
EC3 w/Laser Emosser
Sheet 7 of 7

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

100-PIN RIBBON CABLE
JUMPER TO MOTION CONTROL BOARD
31-S1009

PC BRACKET ASSEMBLY
INPUT/OUPUT
31-S1017

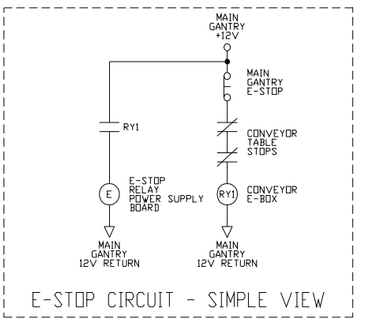
TO GANTRY X-PAN
MACHINE I/O
CABLE: 31-S1023-CL
(See Page 3)

MULTIFUNCTION CARD 10-00900-02A

DB37M I/O	Belden 9948
Shield	Shield
+12V Supply	RED
+12V Return	BLACK
Emergency OFF	WHITE
Amp Enable	GREEN
X1 Limit	ORANGE
Y1 Limit	BLUE
X1 Home	(RED-black-white)
X2 Home	WHITE-black
Y Home	RED-black
Z Home	GREEN-black
Stop Input	ORANGE-black
Solenoid Sensor 1	BLUE-black
Solenoid Sensor 2	BLACK-white
Solenoid Sensor 3	RED-white
Solenoid Sensor 4	GREEN-white
Solenoid 1	BLUE-white
Solenoid 2	BLACK-red
Solenoid 3	WHITE-red
Solenoid 4	ORANGE-red
Pen Solenoid	BLUE-red
Boost Solenoid	RED-green
Pressure Regulator+	
Pressure Regulator-	ORANGE-green
Sych Switch	BLACK-white-red
ETS IN 1	WHITE-black-red
ETS IN 2	
ETS IN 3	
Safety Light	(RED-black-white)
Gripper Output	GREEN-black-white
ETS OUT 2	
ETS OUT 4	
ETS OUT 6	
ETS OUT 3	
ETS OUT 5	
ETS OUT 7	
5V Return	

DB15M Encoders	Belden 8308
E-Stop (PAUSE)	RED (black)
12V Return	BLACK (red)
E- OFF	WHITE (black)
E- OFF	BLACK (white)
SYNCH	GREEN (black)
MEI COM	BLACK (green)
-	SHIELD
+12V	BLUE (black)
12V Return	BLACK (blue)
ETS IN2 (NEXT)	YELLOW (black)
12V Return	BLACK (yellow)
Out 2+	BROWN (black)
Out 2-	BLACK (brown)
ETS IN3 (JOG)	ORANGE (black)
+12V Return	BLACK (orange)

TO CONVEYOR E-BOX
REMOTE I/O
CABLE: 31-26031
(See Page 5)



E-STOP CIRCUIT - SIMPLE VIEW

PC BRACKET
ASSEMBLY
31-26032

DB25M Encoders	Belden 8308
Shield	Shield
X1 Encoder A+	RED (black)
X1 Encoder A-	BLACK (red)
X1 Encoder B+	WHITE (black)
X1 Encoder B-	BLACK (white)
X1 Encoder Index+	
X1 Encoder Index-	
X2 Encoder A+	GREEN (black)
X2 Encoder A-	BLACK (green)
X2 Encoder B+	BLUE (black)
X2 Encoder B-	BLACK (blue)
X2 Encoder Index+	
X2 Encoder Index-	
Y Encoder A+	YELLOW (black)
Y Encoder A-	BLACK (yellow)
Y Encoder B+	BROWN (black)
Y Encoder B-	BLACK (brown)
Y Encoder Index+	
Y Encoder Index-	
Z Encoder A+	ORANGE (black)
Z Encoder A-	BLACK (orange)
Z Encoder B+	WHITE (red)
Z Encoder B-	RED (white)
Z Encoder Index+	
Z Encoder Index-	

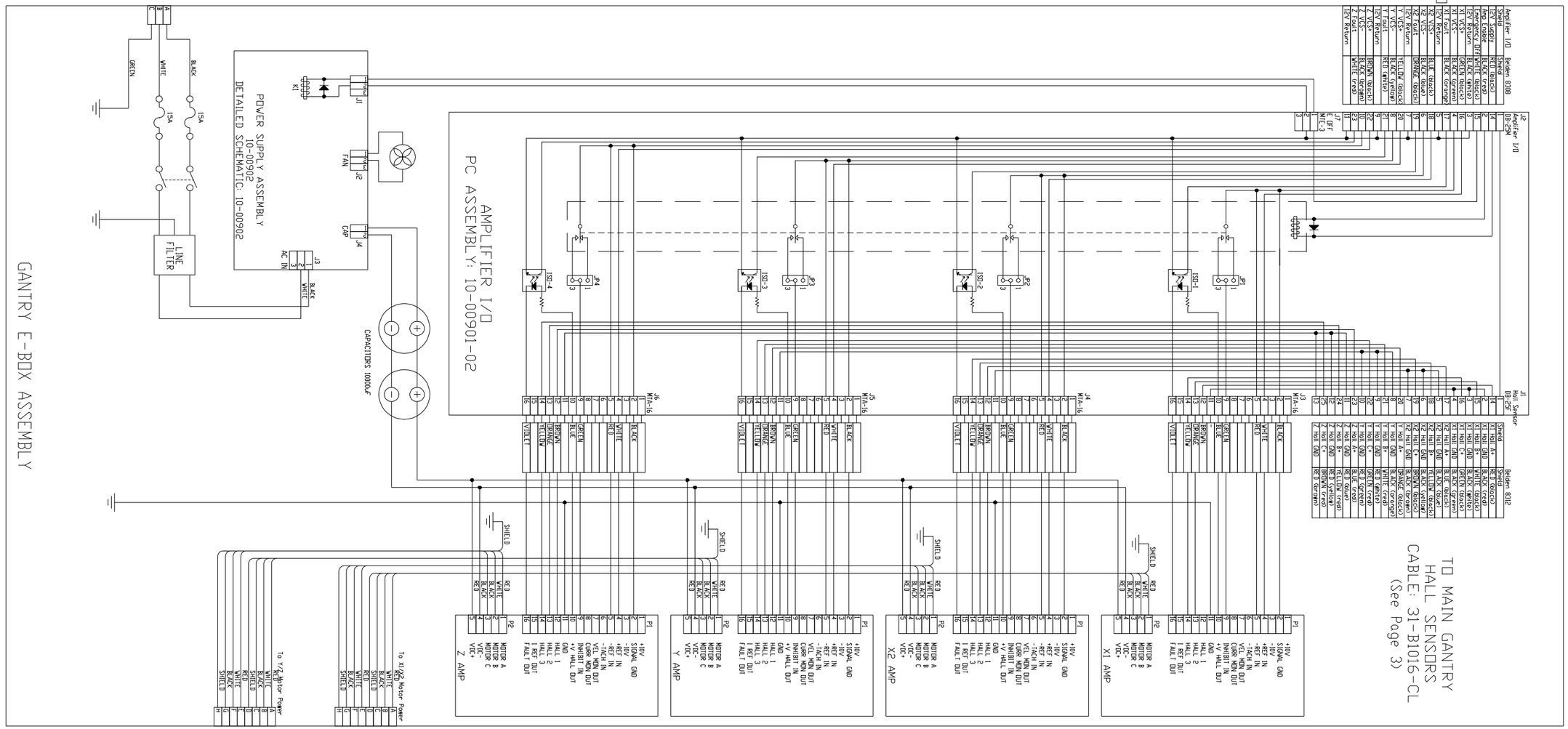
TO GANTRY X-AXIS
MOTOR ENCODERS
CABLE: 31-S1020-CL
(See Page 4)

DB25M/F Amplifier I/O	31-B1021-10 Belden 8308
Shield	Shield
12V Supply	RED (black)
Amp Enable	BLACK (red)
Emergency OFF	WHITE (black)
12V Return	BLACK (white)
X1 VCS+	GREEN (black)
X1 VCS-	BLACK (green)
X1 Fault	BLACK (orange)
12V Return	
X2 VCS+	BLUE (black)
X2 VCS-	BLACK (blue)
X2 Fault	ORANGE (black)
12V Return	
Y VCS+	YELLOW (black)
Y VCS-	BLACK (yellow)
Y Fault	RED (white)
12V Return	
Z VCS+	BROWN (black)
Z VCS-	BLACK (brown)
Z Fault	WHITE (red)
12V Return	

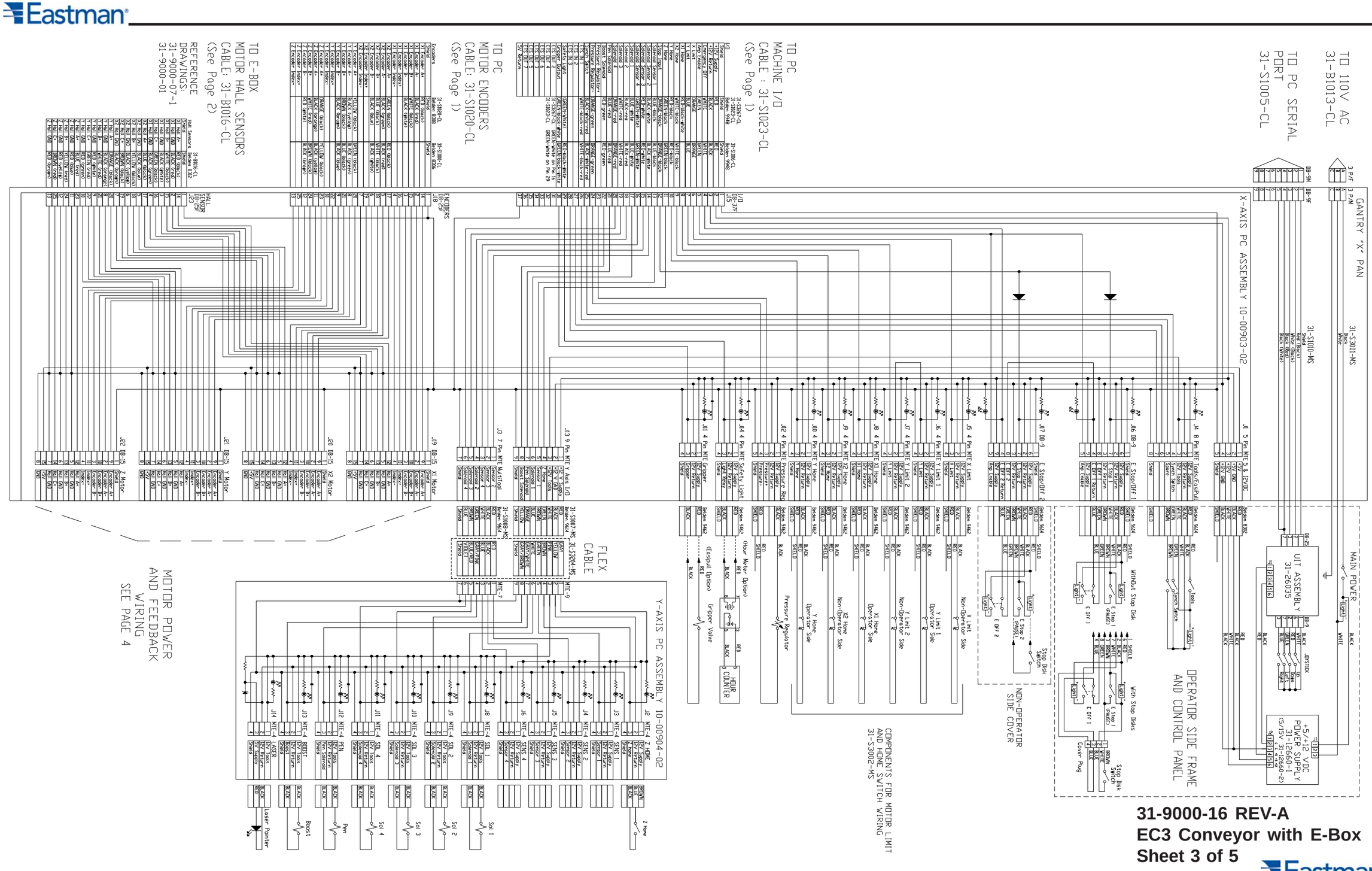
TO E-BOX
AMPLIFIER I/O
CABLE: 31-B1021-10
(See Page 2)

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

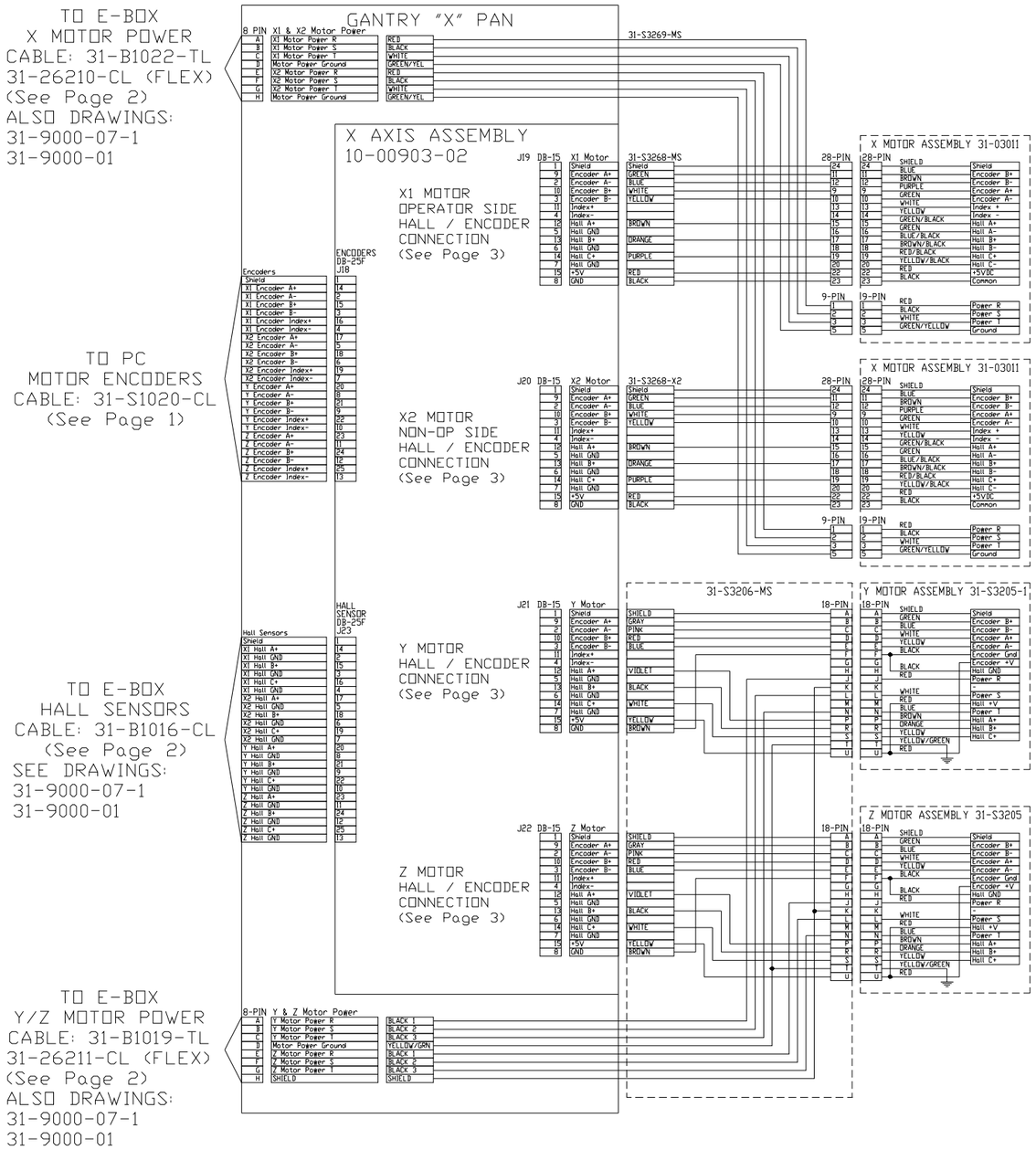
J1/J2 - PC ISA Bus Connector



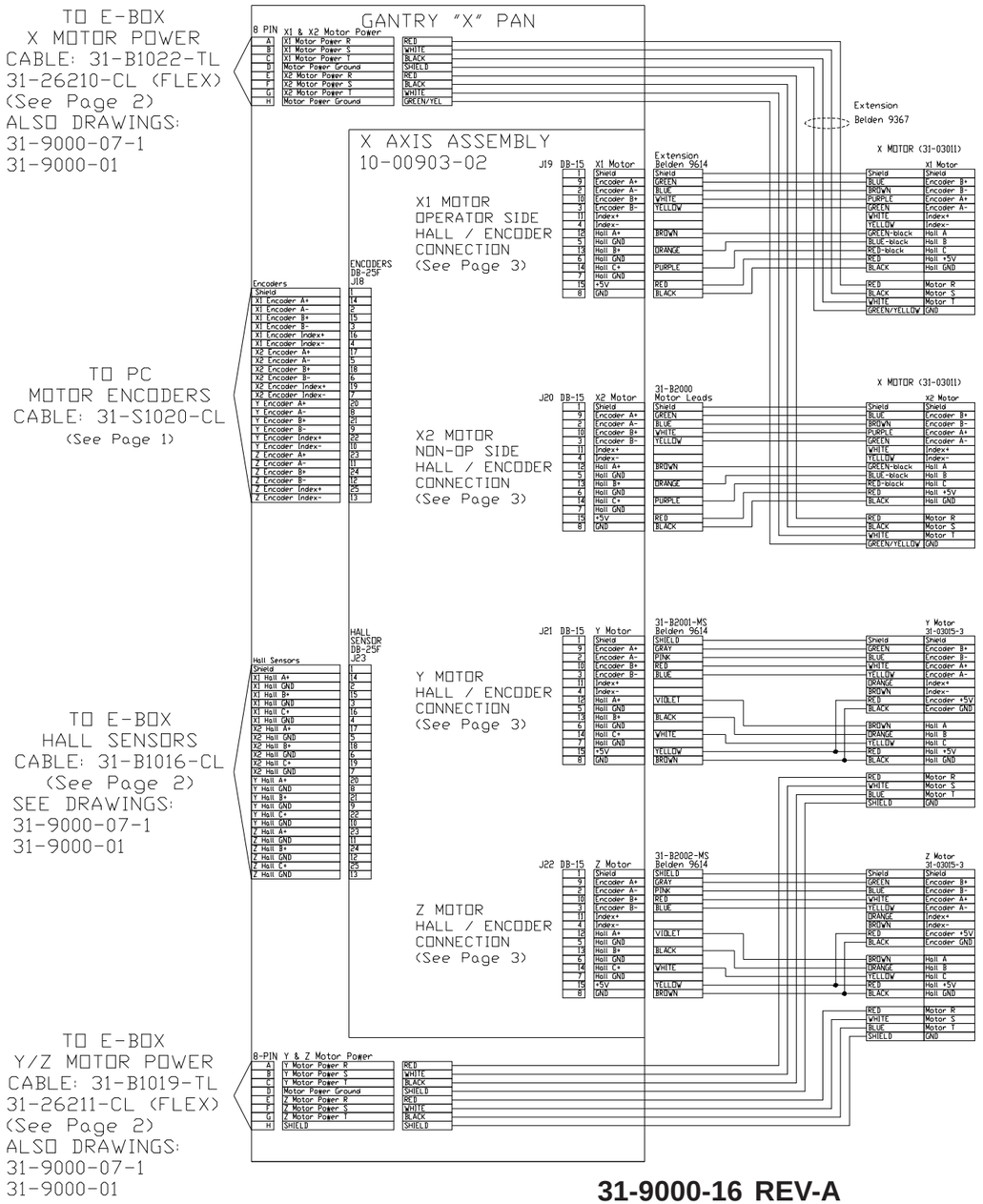
31-9000-16 REV-A
EC3 Conveyor with E-Box
Sheet 2 of 5


TO 110V AC
31-B1013-CL
TO PC SERIAL
PORT
31-S1005-CL
GANTRY "X" PAN
X-AXIS PC ASSEMBLY 10-00903-02
MAIN POWER
UIT ASSEMBLY
31-26035
+5/+12 VDC
POWER SUPPLY
31-12660-1
(5/15V 31-12660-2)
OPERATOR SIDE FRAME
AND CONTROL PANEL
NON-OPERATOR
SIDE COVER
TO PC
MACHINE I/O
CABLE : 31-S1023-CL
(See Page 1)
TO PC
MOTOR ENCODERS
CABLE: 31-S1020-CL
(See Page 1)
TO E-BOX
MOTOR HALL SENSORS
CABLE: 31-B1016-CL
(See Page 2)
REFERENCE
DRAWINGS:
31-9000-07-1
31-9000-01
COMPONENTS FOR MOTOR LIMIT
AND HOME SWITCH WIRING
31-S3002-MS
Y-AXIS PC ASSEMBLY 10-00904-02
FLEX
CABLE
MOTOR POWER
AND FEEDBACK
WIRING
SEE PAGE 4
31-9000-16 REV-A
EC3 Conveyor with E-Box
Sheet 3 of 5

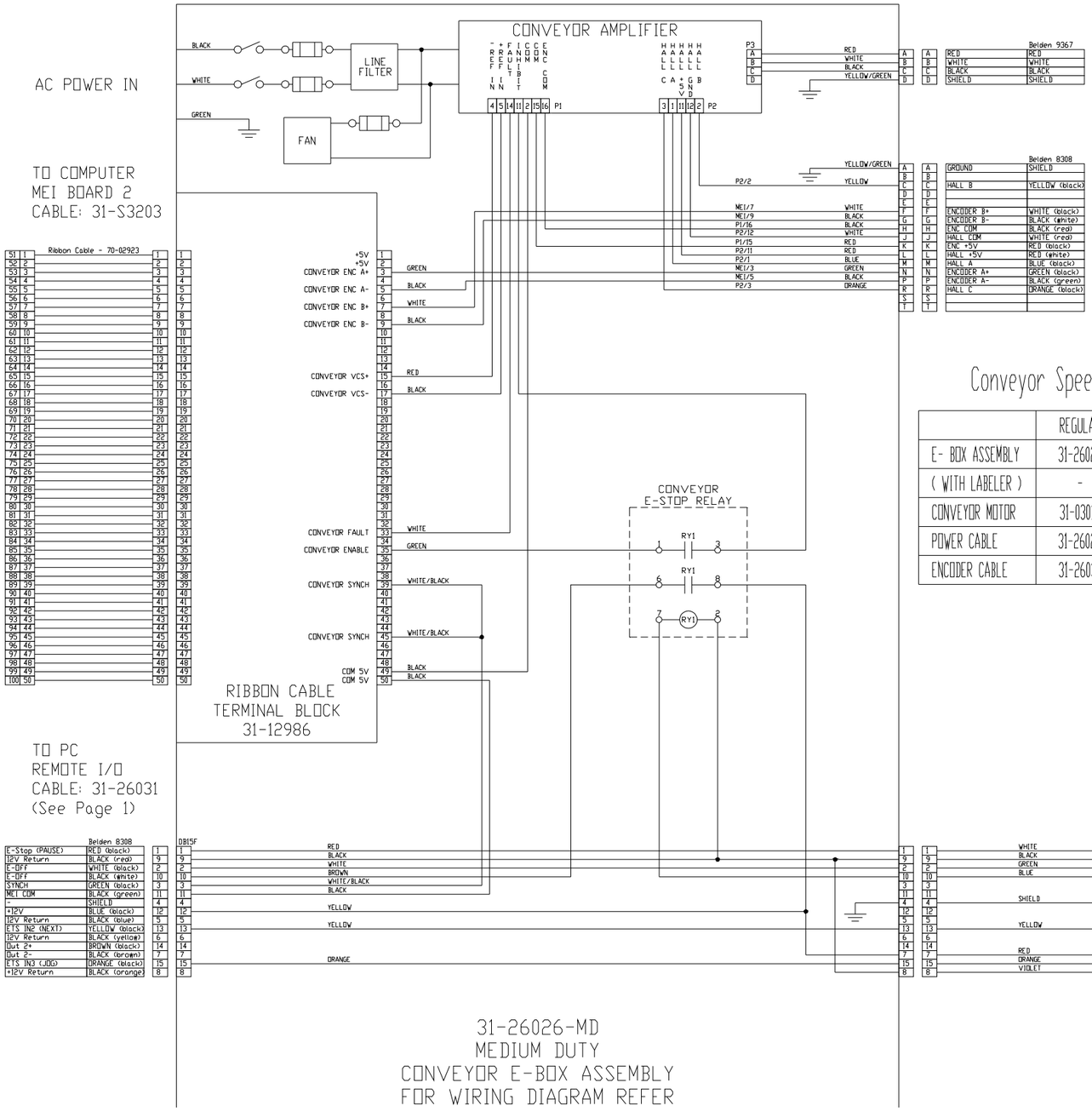
FLEX CABLE / CONNECTOR VERSIONS



HARD-WIRED VERSIONS



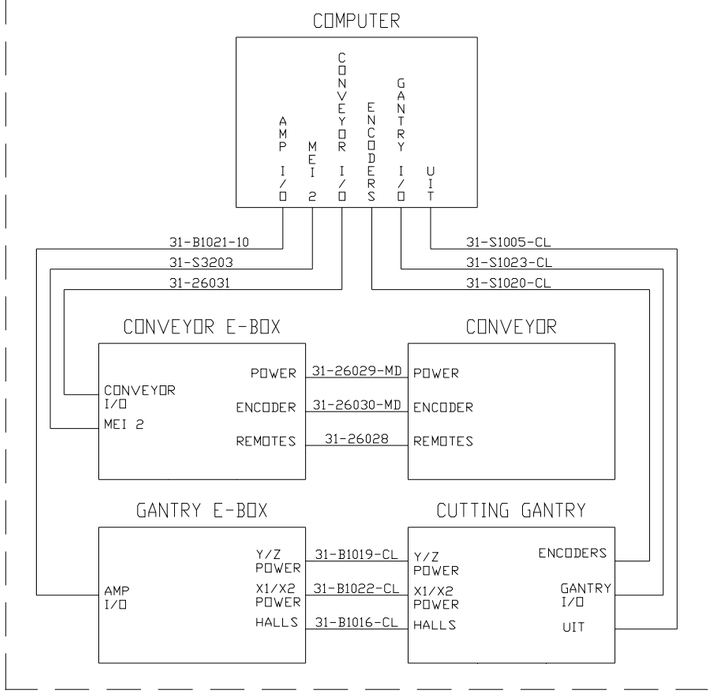
31-9000-16 REV-A
EC3 Conveyor with E-Box
Sheet 4 of 5



Conveyor Speed Related Numbers

	REGULAR	MEDIUM	HIGH
E- BOX ASSEMBLY	31-26026	31-26026-MD	31-26026-HS
(WITH LABELER)	-	31-26026-MD-LBL	-
CONVEYOR MOTOR	31-03018	31-26125	31-26121
POWER CABLE	31-26029	31-26029-MD	31-26029-HS
ENCODER CABLE	31-26030	31-26030-MD	31-26030-HS

SYSTEM CABLING BLOCK DIAGRAM



31-9000-16 REV-A
EC3 Conveyor with E-Box
Sheet 5 of 5

31-9000-18 REV-A
EC3 Conveyor with Diagnostic Cabinet
Sheet 1 of 8

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

100-PIN RIBBON CABLE
JUMPER TO MOTION CONTROL BOARD
31-S1009

PC BRACKET ASSEMBLY
INPUT/OUPUT
31-S1017

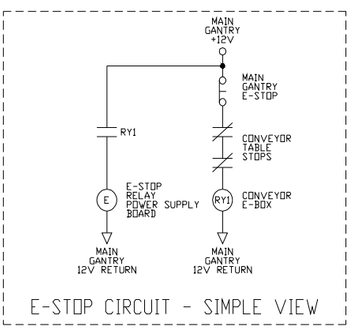
TO GANTRY X-PAN
MACHINE I/O
CABLE: 31-S1023-CL
(See Page 3)

MULTIFUNCTION CARD 10-00900-02A

J4 2x20 Header	2x20 IDC	DB37F	DB37M I/O	Belden 9948
	1	1	Shield	Shield
	3	2	+12V Supply	RED
	5	3	+12V Return	BLACK
	7	4	Emergency Off	WHITE
	9	5	Amp Enable	GREEN
	11	6	X Limit	ORANGE
	13	7	Y Limit	BLUE
	15	8	X1 Home	(RED-black-white)
	17	9	X2 Home	WHITE-black
	19	10	Y Home	RED-black
	21	11	Z Home	GREEN-black
	23	12	Stop Input	ORANGE-black
	25	13	Solenoid Sensor 1	BLUE-black
	27	14	Solenoid Sensor 2	BLACK-white
	29	15	Solenoid Sensor 3	RED-white
	31	16	Solenoid Sensor 4	GREEN-white
	33	17	Solenoid 1	BLUE-white
	35	18	Solenoid 2	BLACK-red
	37	19	Solenoid 3	WHITE-red
	39	20	Solenoid 4	ORANGE-red
	2	21	Pen Solenoid	BLUE-red
	4	22	Boost Solenoid	RED-green
	6	23	Pressure Regulator+	
	8	24	Pressure Regulator-	ORANGE-green
	10	25	Sych Switch	BLACK-white-red
	12	26	ETS IN 1	WHITE-black-red
	14	27	ETS IN 2	
	16	28	ETS IN 3	
	18	29	Safety Light	(RED-black-white)
	20	30	Gripper Output	GREEN-black-white
	22	31	ETS OUT 2	
	24	32	ETS OUT 4	
	26	33	ETS OUT 6	
	28	34	ETS OUT 3	
	30	35	ETS OUT 5	
	32	36	ETS OUT 7	
	34	37	5V Return	
	36			
	38			
	40			

J7 2x17 Header	2x17 IDC	DB15F	DB15M Encoders	Belden 8308
	1	1	E-Stop (PAUSE)	RED (black)
	2	9	12V Return	BLACK (red)
	3	2	E-OFF	WHITE (black)
	4	10	E- OFF	BLACK (white)
	5	3	SYNCH	GREEN (black)
	6	11	MEI COM	BLACK (green)
	7	4	+	SHIELD
	8	12	+12V	BLUE (black)
	9	5	12V Return	BLACK (blue)
	10	13	ETS IN2 (NEXT)	YELLOW (black)
	11	6	12V Return	BLACK (yellow)
	12	14	Out 2+	BROWN (black)
	13	7	Out 2-	BLACK (brown)
	14	15	ETS IN3 (JOG)	ORANGE (black)
	15	8	+12V Return	BLACK (orange)
	16			
	17			
	18			
	19			
	20			
	21			
	22			
	23			
	24			
	25			
	26			
	27			
	28			
	29			
	30			
	31			
	32			
	33			
	34			

TO CONVEYOR E-BOX
REMOTE I/O
CABLE: 31-26031
(See Page 5)



E-STOP CIRCUIT - SIMPLE VIEW

PC BRACKET
ASSEMBLY
31-26032

J5 2x25 Header	2x25 IDC	DB25F	DB25M Encoders	Belden 8308
	1	1	Shield	Shield
	2	14	X1 Encoder A+	RED (black)
	3	2	X1 Encoder A-	BLACK (red)
	4	15	X1 Encoder B+	WHITE (black)
	5	3	X1 Encoder B-	BLACK (white)
	6	16	X1 Encoder Index+	
	7	4	X1 Encoder Index-	
	8	17	X2 Encoder A+	GREEN (black)
	9	5	X2 Encoder A-	BLACK (green)
	10	18	X2 Encoder B+	BLUE (black)
	11	6	X2 Encoder B-	BLACK (blue)
	12	19	X2 Encoder Index+	
	13	7	X2 Encoder Index-	
	14	20	Y Encoder A+	YELLOW (black)
	15	8	Y Encoder A-	BLACK (yellow)
	16	21	Y Encoder B+	BROWN (black)
	17	9	Y Encoder B-	BLACK (brown)
	18	22	Y Encoder Index+	
	19	10	Y Encoder Index-	
	20	23	Z Encoder A+	ORANGE (black)
	21	11	Z Encoder A-	BLACK (orange)
	22	24	Z Encoder B+	WHITE (red)
	23	12	Z Encoder B-	RED (white)
	24	25	Z Encoder Index+	
	25	13	Z Encoder Index-	
	26			

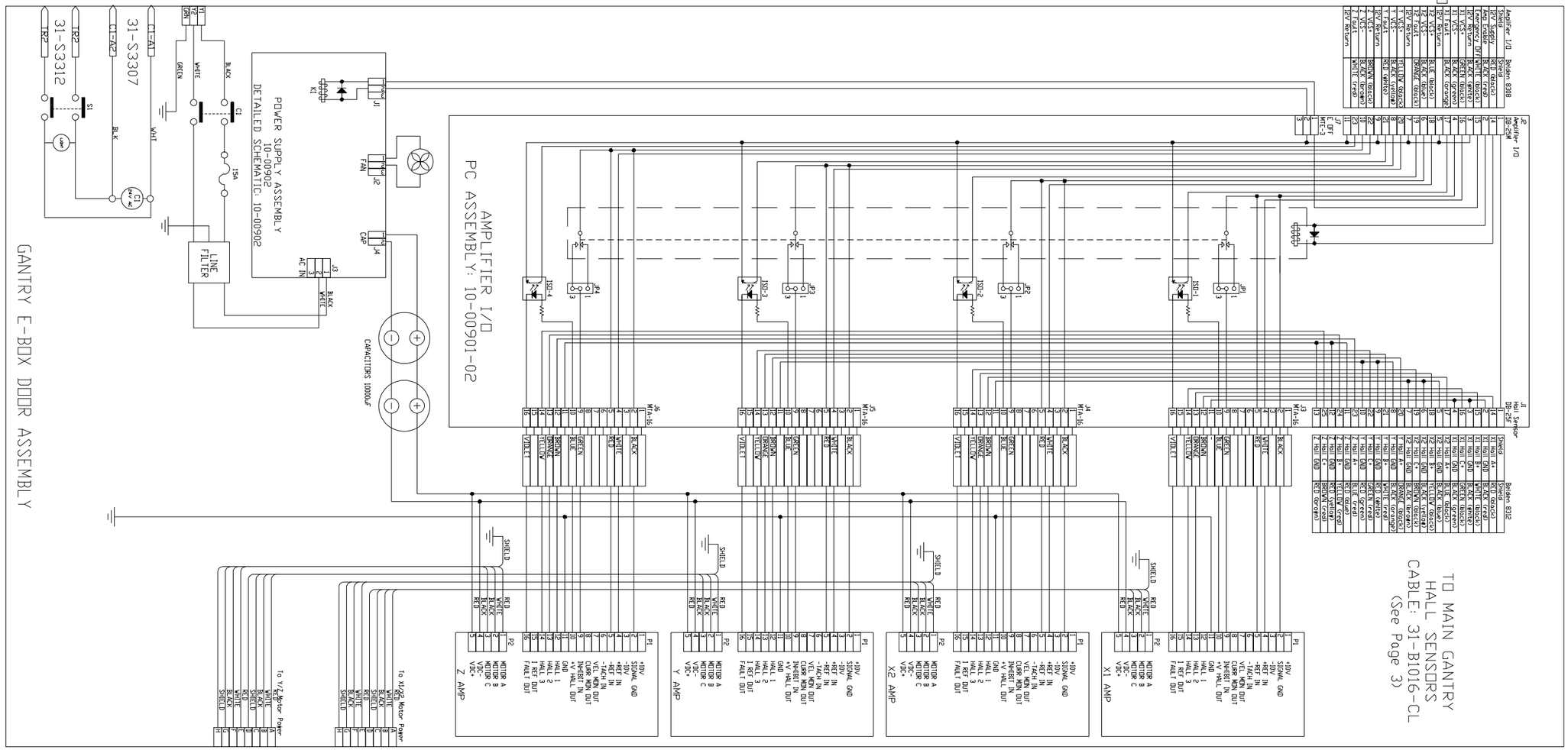
TO GANTRY X-AXIS
MOTOR ENCODERS
CABLE: 31-S1020-CL
(See Page 4)

	31-B1021-10	
DB25M	DB25F Amplifier I/O	Belden 8308
1	Shield	Shield
14	12V Supply	RED (black)
2	Amp Enable	BLACK (red)
15	Emergency OFF	WHITE (black)
3	12V Return	BLACK (white)
16	X1 VCS+	GREEN (black)
4	X1 VCS-	BLACK (green)
17	X1 Fault	BLACK (orange)
5	12V Return	
18	X2 VCS+	BLUE (black)
6	X2 VCS-	BLACK (blue)
19	X2 Fault	ORANGE (black)
7	12V Return	
20	Y VCS+	YELLOW (black)
8	Y VCS-	BLACK (yellow)
21	Y Fault	RED (white)
9	12V Return	
22	Z VCS+	BROWN (black)
10	Z VCS-	BLACK (brown)
23	Z Fault	WHITE (red)
11	12V Return	
24		
12		
25		
13		

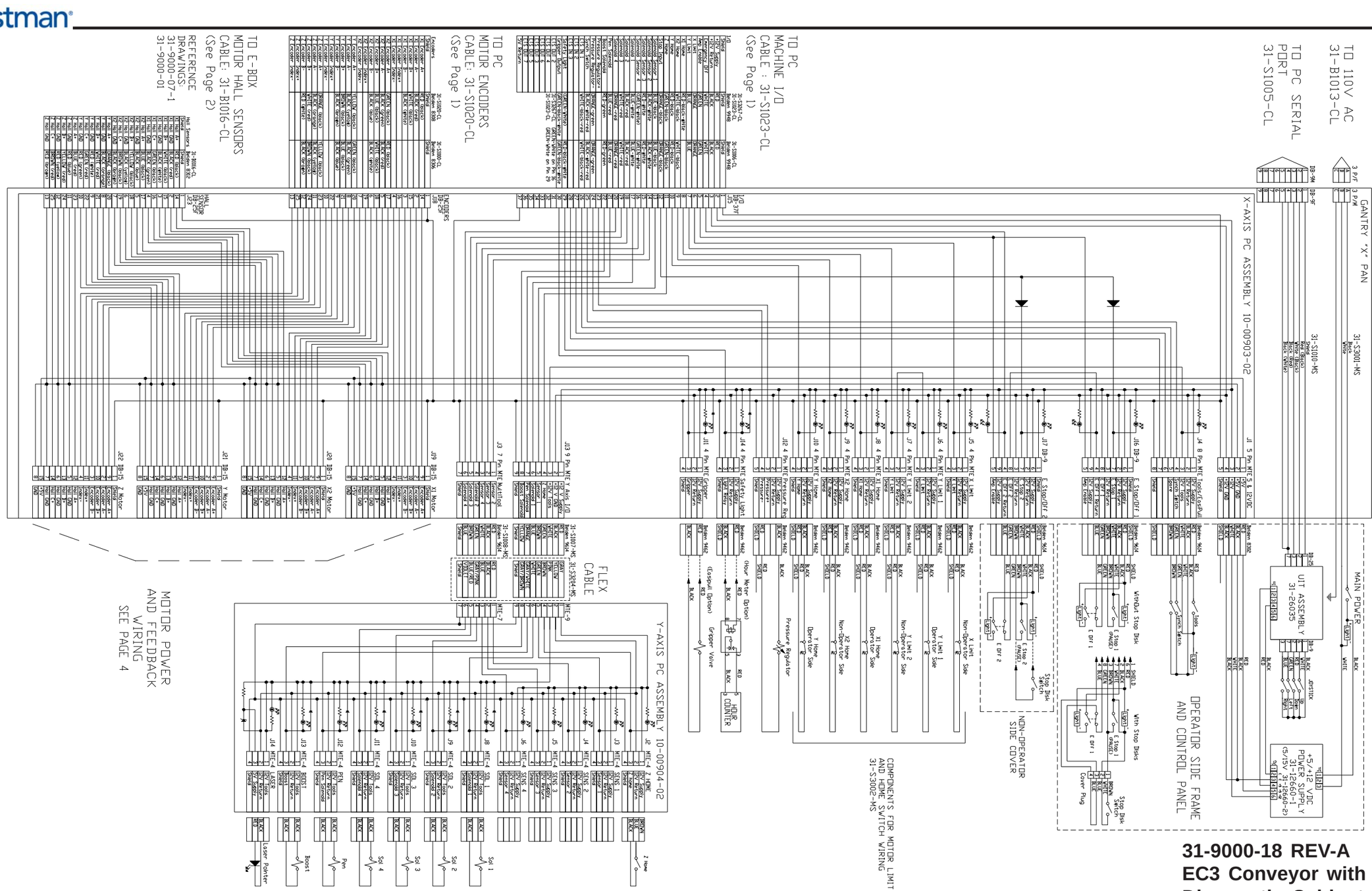
TO E-BOX
AMPLIFIER I/O
CABLE: 31-B1021-10
(See Page 2)

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

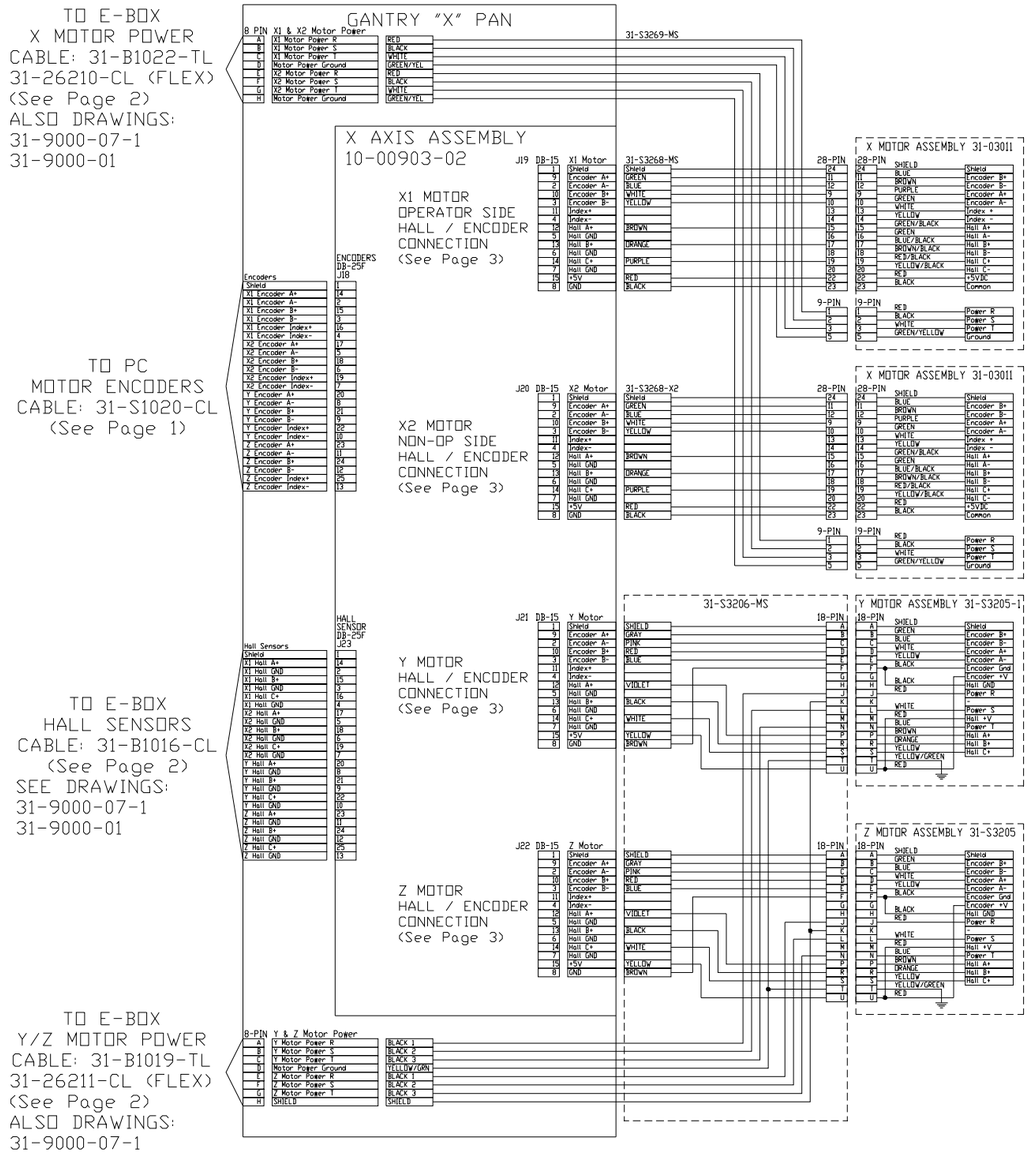
J1/J2 - PC ISA Bus Connector



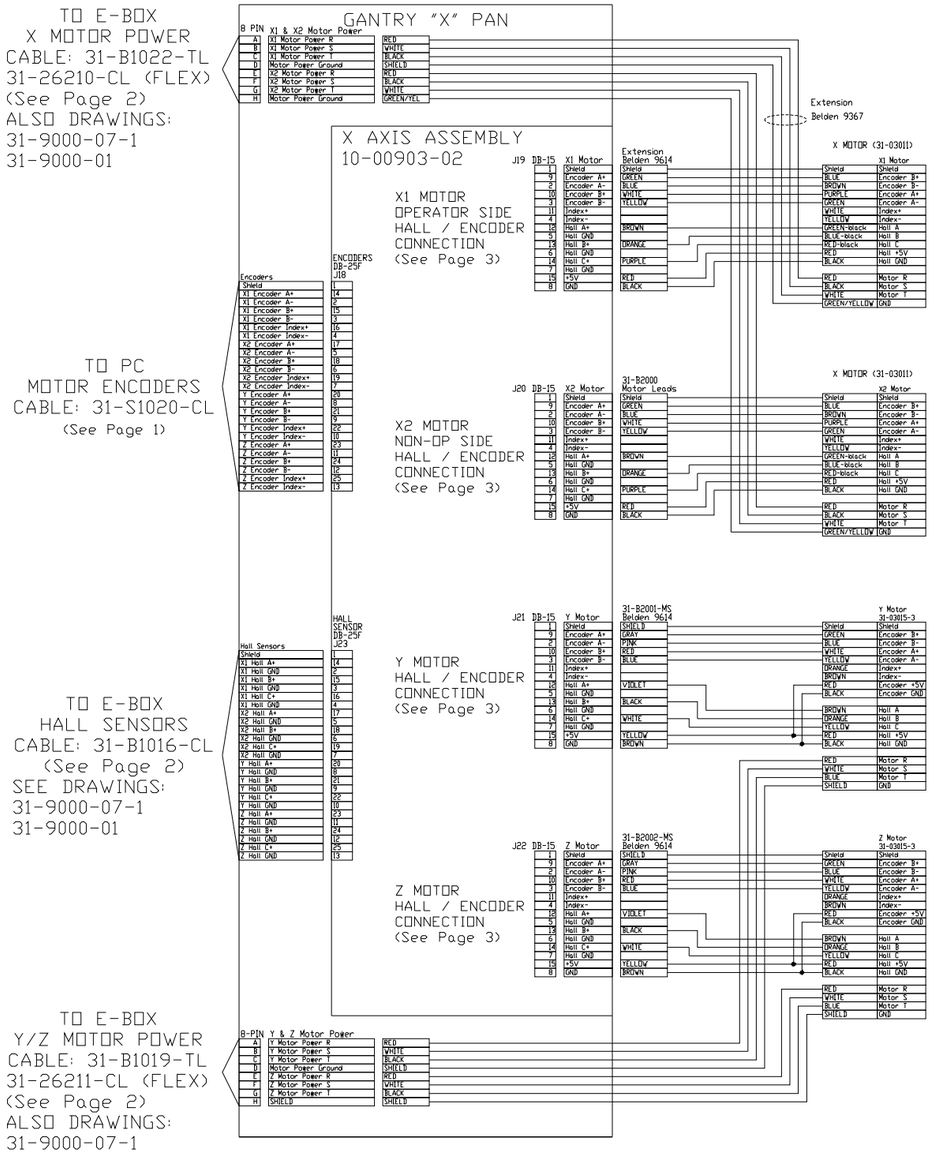
31-9000-18 REV-A
EC3 Conveyor with Diagnostic Cabinet
Sheet 2 of 8


TO 110V AC
31-B1013-CL
TO PC SERIAL
PORT
31-S1005-CL
GANTRY "X" PAN
X-AXIS PC ASSEMBLY 10-00903-02
TO PC
MACHINE I/O
CABLE : 31-S1023-CL
(See Page 1)
TO PC
MOTOR ENCODERS
CABLE: 31-S1020-CL
(See Page 1)
TO E-BOX
MOTOR HALL SENSORS
CABLE: 31-B1016-CL
(See Page 2)
REFERENCE
DRAWINGS:
31-9000-07-1
31-9000-01
MOTOR POWER
AND FEEDBACK
WIRING
SEE PAGE 4
FLEX
CABLE
Y-AXIS PC ASSEMBLY 10-00904-02
COMPONENTS FOR MOTOR LIMIT
AND HOME SWITCH WIRING
31-S3002-MS
UIT ASSEMBLY
31-26035
+5/+12 VDC
POWER SUPPLY
31-12660-1
(5/15V 31-12660-2)
MAIN POWER
OPERATOR SIDE FRAME
AND CONTROL PANEL
NON-OPERATOR
SIDE COVER
31-9000-18 REV-A
EC3 Conveyor with
Diagnostic Cabinet
Sheet 3 of 8

FLEX CABLE / CONNECTOR VERSIONS

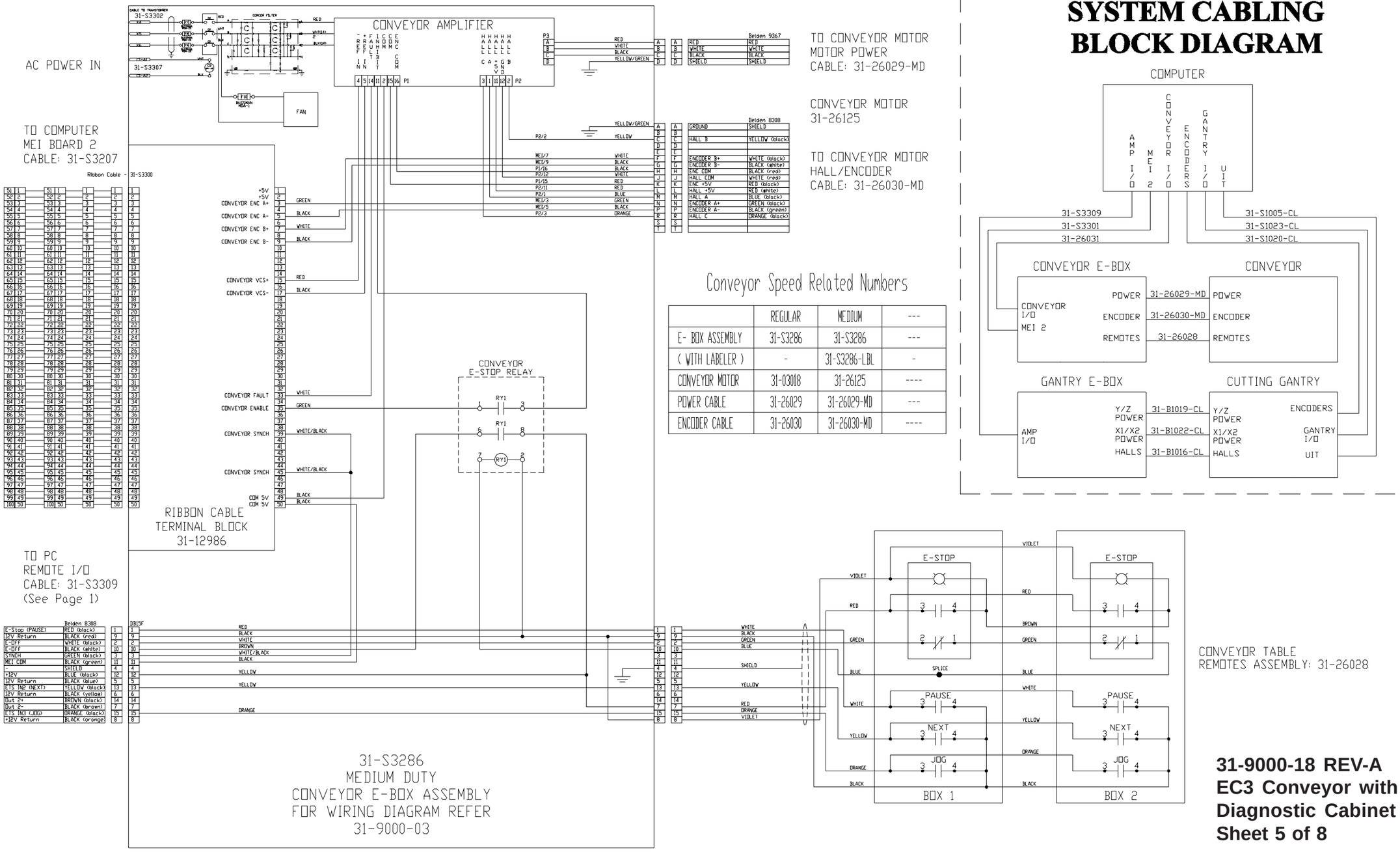


HARD-WIRED VERSIONS



31-9000-18 REV-A
EC3 Conveyor with Diagnostic Cabinet
Sheet 4 of 8

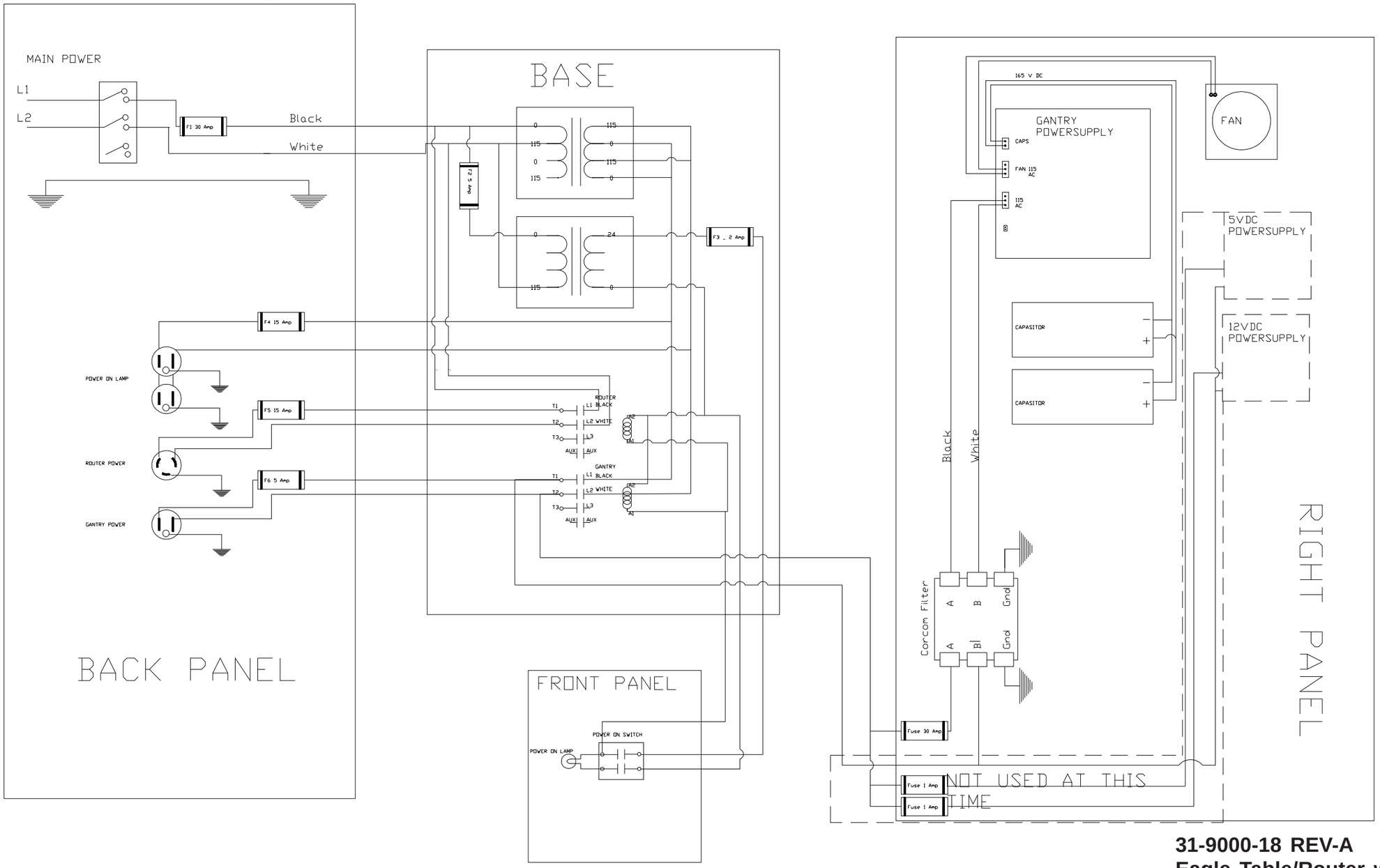
SYSTEM CABLING BLOCK DIAGRAM



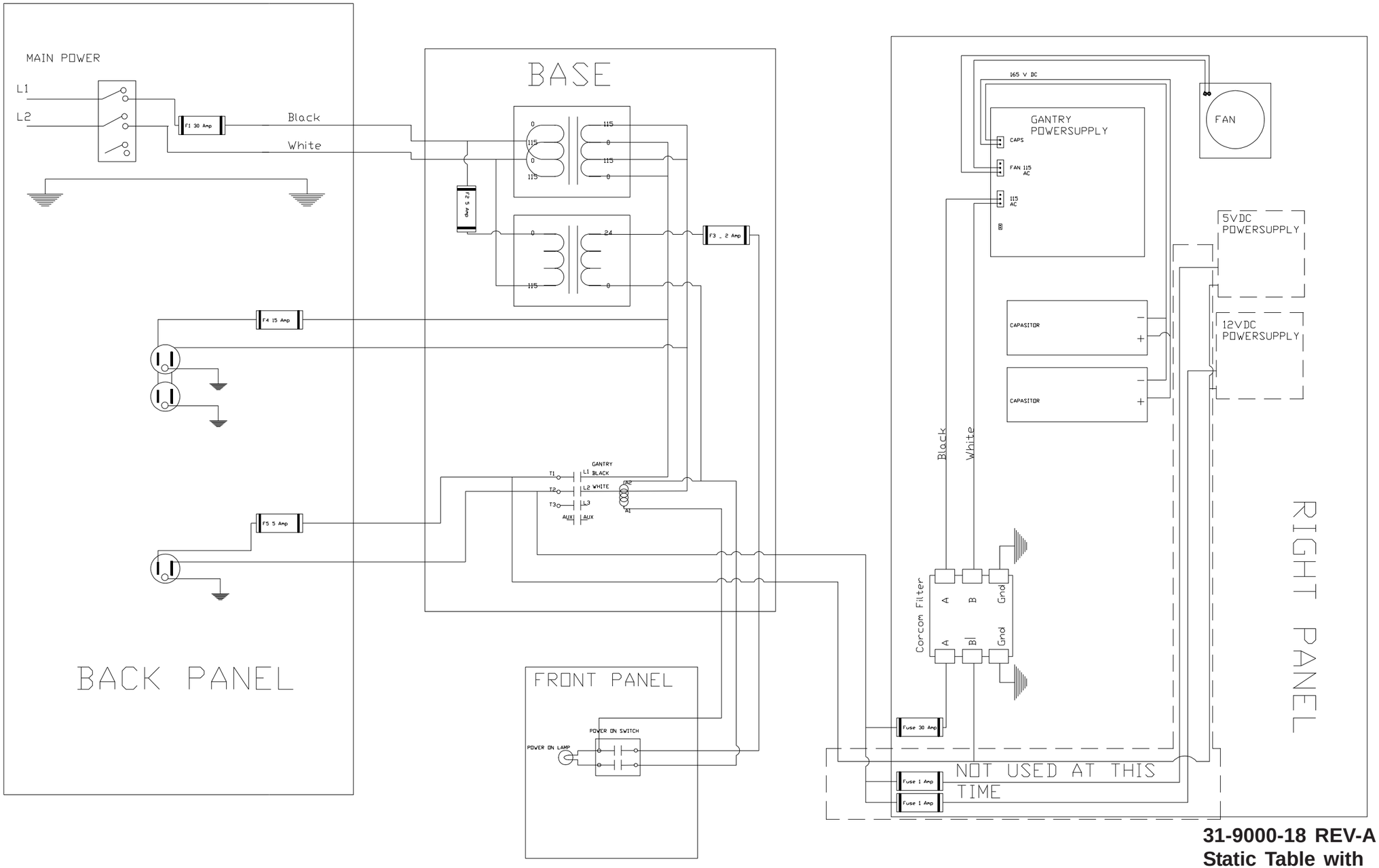
Conveyor Speed Related Numbers

	REGULAR	MEDIUM	---
E- BOX ASSEMBLY	31-S3286	31-S3286	---
(WITH LABELER)	-	31-S3286-LBL	-
CONVEYOR MOTOR	31-03018	31-26125	----
POWER CABLE	31-26029	31-26029-MD	---
ENCODER CABLE	31-26030	31-26030-MD	----

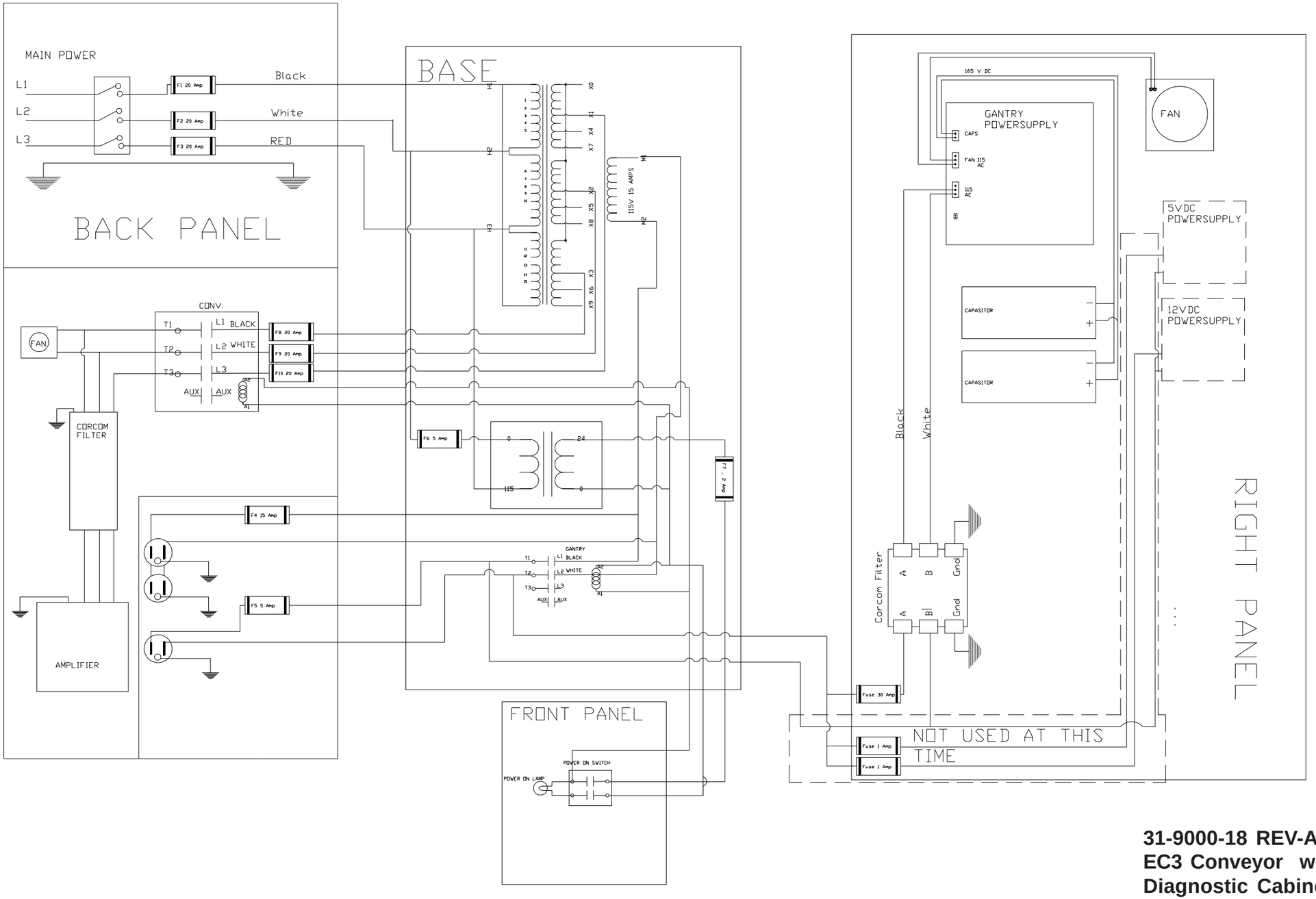
31-9000-18 REV-A
EC3 Conveyor with Diagnostic Cabinet
Sheet 5 of 8



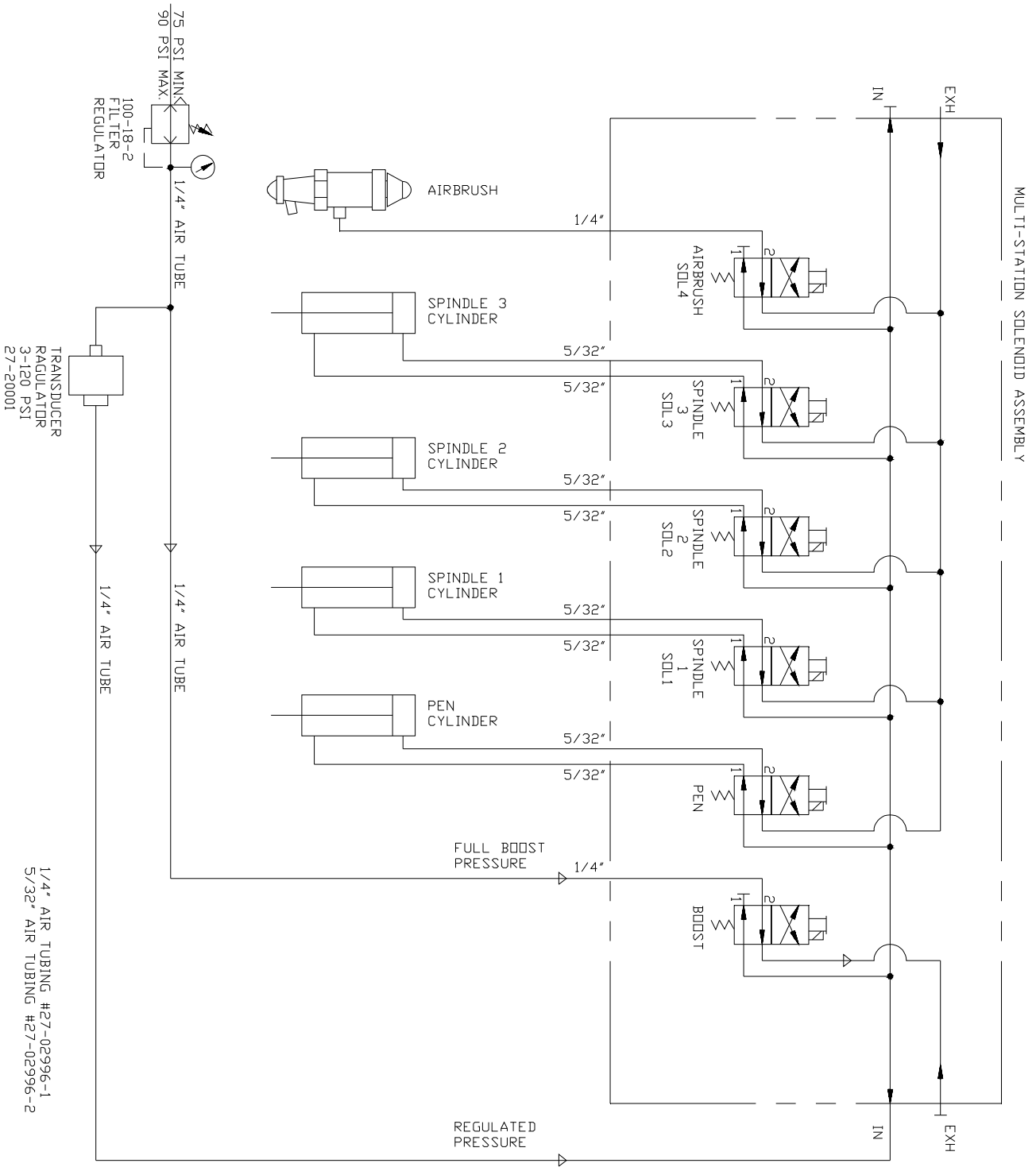
31-9000-18 REV-A
Eagle Table/Router with Diagnostic Cabinet
Sheet 6 of 8



31-9000-18 REV-A
Static Table with Diagnostic Cabinet
Sheet 7 of 8



31-9000-18 REV-A
EC3 Conveyor with Diagnostic Cabinet
Sheet 8 of 8



Pnuematic Diagram 31-9000-19

Technical Data
EASTMAN® ETS-EC3

ETS-EC3

Maximum Machine Speed*	60 in/sec. (150 cm/sec.)
Maximum Convey Speed*	12 in/sec. (30 cm/sec.)
Maximum Table Length	21 ft. (6.4 m)
Cut Accuracy*	+/- .015" (+/- .4 mm)
Gantry Weight	Approx. 200 lbs. (145 kg)
Gantry Operating Voltage	110V; 60hz
Conveyor Operating Voltage	220V; 60hz
25hp Blower Operating Voltage	220V; 60hz
Power Requirement (Gantry)	110V/20A
(Conveyor)	220V/30A
(25hp Blower)	220V/100A Service
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	Conveyor 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.

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Manufacturers of Eastman Cloth Cutting and Cloth Spreading Machines
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