User's Guide

BECK Automation, LLC
814 Fee Fee Road
St. Louis, MO 63043
Phone (314) 576-9736
Fax (314) 227-2104
www.beckautomation.com

CD 807M REV 5/12

Table of Contents

Overview

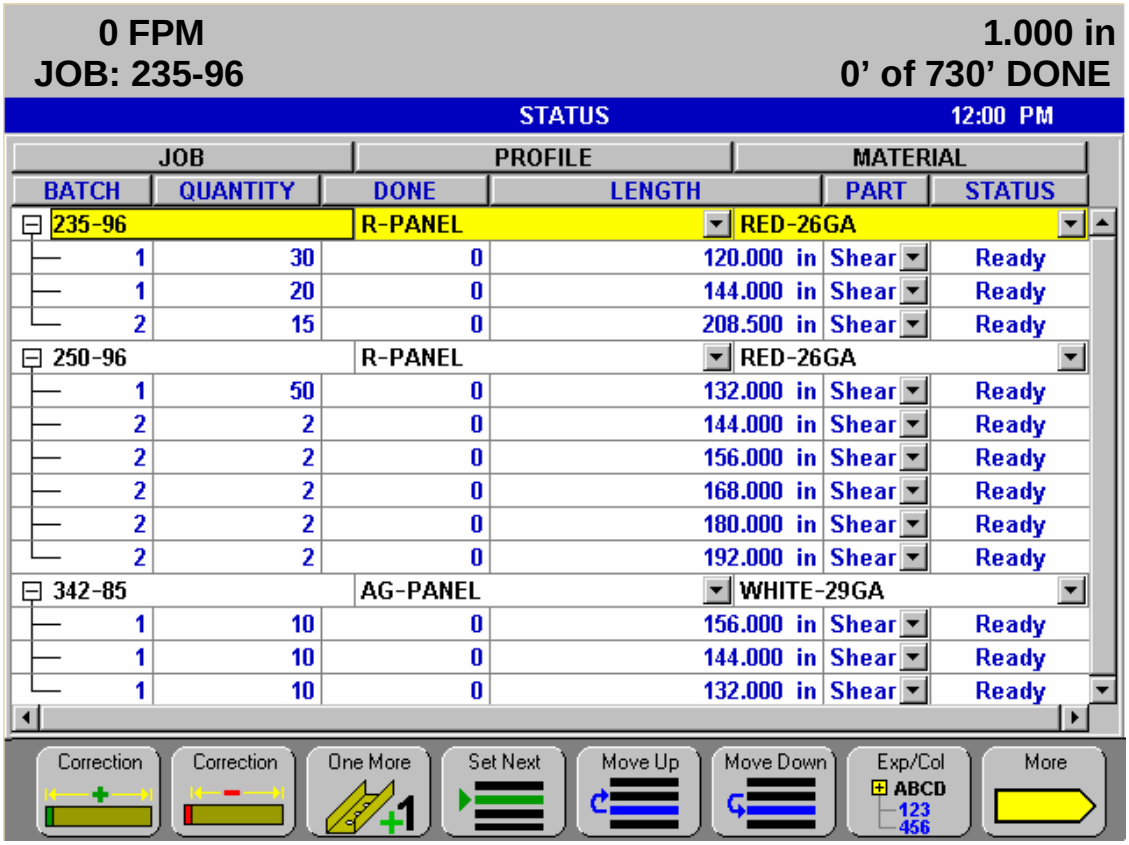
The SII controller is a high performance motion controller used on rollformers, cut-to-length lines, and tube mills. It is designed using a modern 32-bit embedded processor utilizing the latest in surface mount technology, including BGA technology. It has features that allow the operator to be more productive and efficient at his job. It also allows tracking of production through the use of SmartComm™ Office-to-Shop Program.

The SII controller is capable of controlling many types of closed loop lines depending on the setup. There will be sections of the manual that do not apply to your specific application and should be skipped over.

Interface

The SII controller has an easy to use interface. The controller has a built in 10.4" color display with a convenient touch-screen. It also has a membrane keypad and a PS2 keyboard connector.

Status Screen

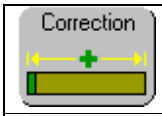
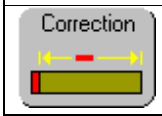
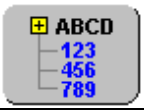


Headings:

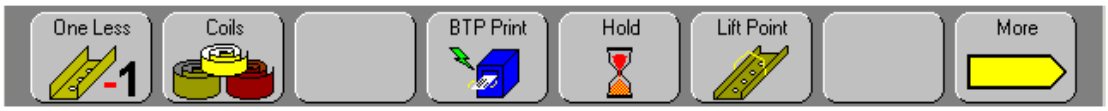
JOB: Job identification number. (16 character, alphanumeric field)
PROFILE: Tells operator what type of part is to be run. Definitions on profile screen. (23 character, alphanumeric field)
MATERIAL: Tells operator what type of coil to load. Definitions on material screen. (23 character, alphanumeric field)
BATCH: Arbitrary number. Can be used for sequencing or batch halting. Line halts when batch number changes, if setup is on batch halt. (5 character, alphanumeric field)
QUANTITY: Number of pieces desired. 9999 will make parts forever.
DONE: Number of pieces completed.
LENGTH: Length of the part. (units are selectable in UIF screen)
PART: If line is punching, this is the punch pattern. (10 character, alphanumeric field)
STATUS: Status of batch.

Status Options:

READY: Batch is ready to run.
FILL: Targets for batch are already queued. To set this to ready or next, a manual shear cycle is needed to dump the queue.
WORK: Batch is in work.
NEXT: Batch that will be queued next.
DONE: Batch is complete.
HOLD: Batch is on hold. Pressing the hold key will turn this on and off.

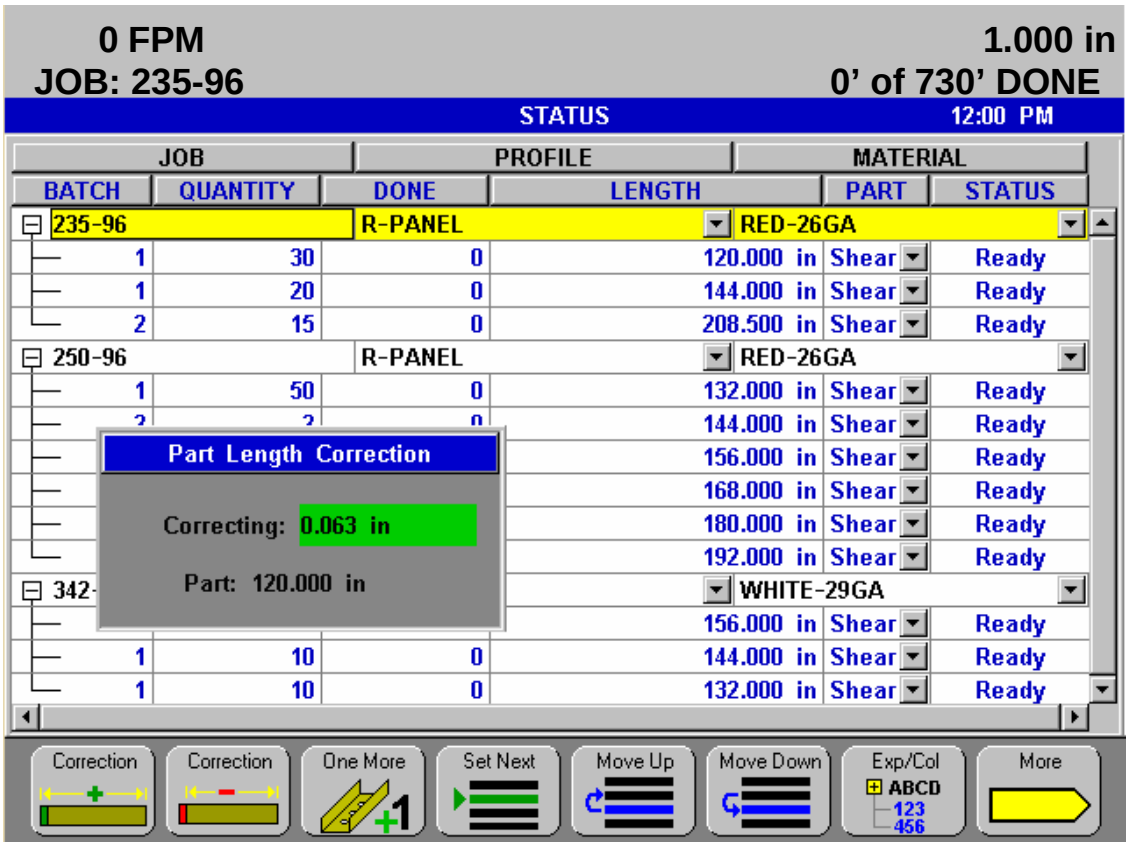
	Press once to bring up part length calibration dialog. Part will increase by the value shown in the dialog. The value incremented with each press is set in the configuration screen: setup length +/- correction adjust.
	Press once to bring up part length calibration dialog. Part will decrease by the value shown in the dialog. The value incremented with each press is set in the configuration screen: setup length +/- correction adjust.
	Make one extra piece of current highlighted batch. The Done Quantity will be decreased by one causing an extra part to be produced. This part length will be added to scrap production quantity.
	Set currently highlighted job/batch next to run.
	Move the highlighted job/batch up one line at a time.
	Move the highlighted job/batch down one line at a time.
	Expand or collapse the highlighted job. Pressing the red 2nd key before the expand/collapse key will expand or collapse all the jobs.
	Go to next set of function keys.

Status Screen Continued

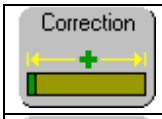
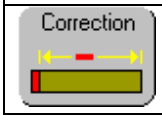


	Make one less piece of the current highlighted batch. The Done Quantity will be increased and cause one less part to be produced. This part length will be deducted from scrap production quantity.
	Transition to Coil inventory screen.
	Print Bundle Ticket.
	Put highlighted job/batch on hold, so it will not be produced. Pressing this key when job/batch is on hold will set the states to ready.
	Find center of mass for highlighted job/batch.
	Return to first set of function keys.

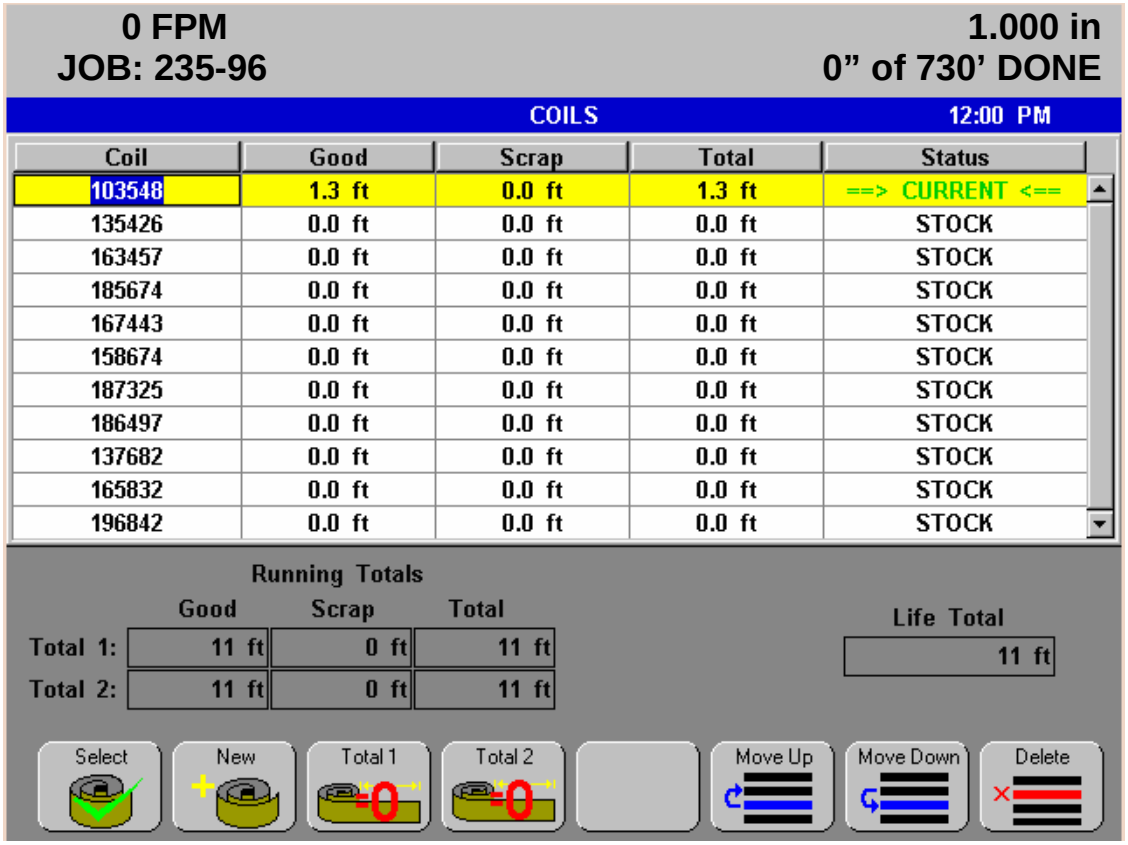
Part Length Correction from the Status Screen



This screen is used to make small, quick adjustments to part length. This can be done while the line is running.

	Press to increase length correction by default adjustment. Further presses will increase by multiples of this adjustment. This adjustment factor can be found in the machine settings. (Length +/- correction adjust).
	Press to decrease length correction by default adjustment. Further presses will decrease by multiples of this adjustment. This adjustment factor can be found in the machine settings. (Length +/- correction adjust).

Coil Screen

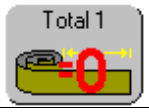


Headings

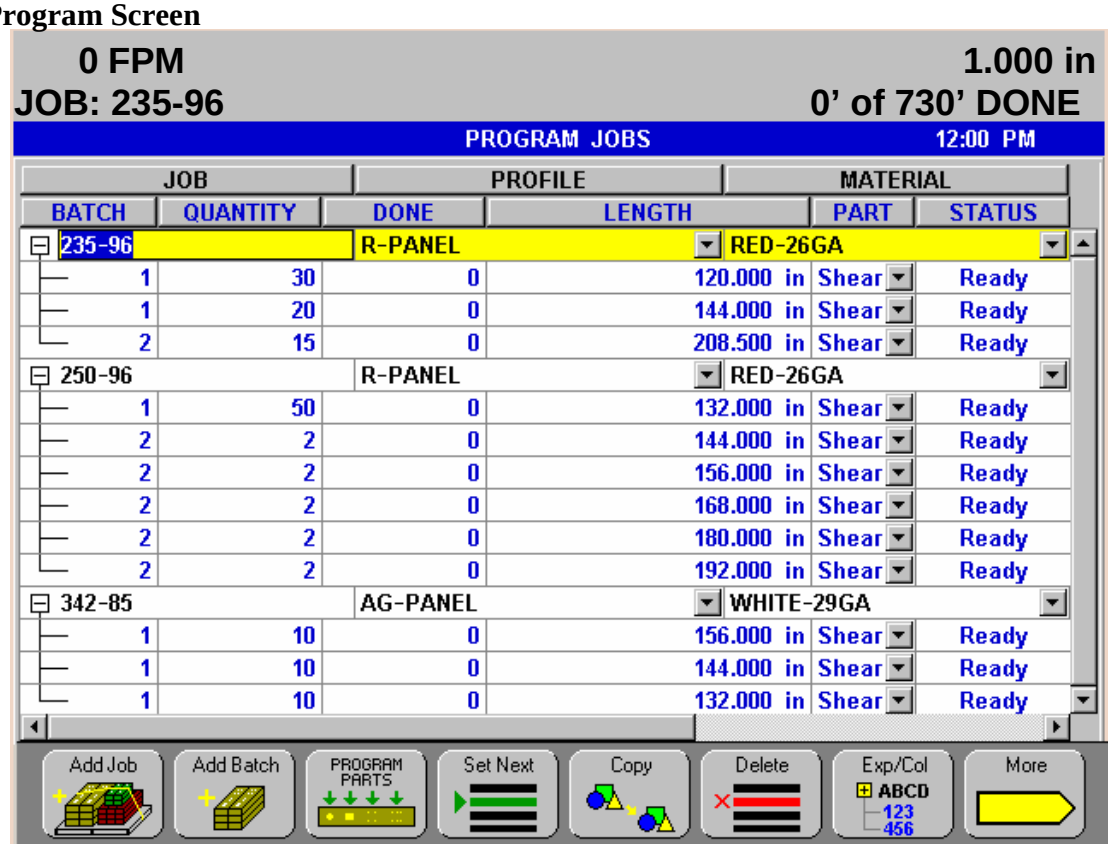
COIL: User coil number (24 character, alphanumeric field), double-touch to bring up qwerty keyboard.
GOOD: Amount of good material produced
SCRAP: Amount of scrap material produced
TOTAL: Total amount of good and scrap material produced
STATUS: Current - Coil currently running
Stock - Coil returned to stock
Depleted - Coil completely consumed

Running Totals:
Total 1: Typically used for tracking a shift or a day. Can be cleared at anytime.
Total 2: Typically used for tracking a shift or a day. Can be cleared at anytime.

Life Total: Non-resetable footage meter. Typically used for maintenance tracking.

	Select highlighted coil for use. Footage will be changed to this coil number.
	Add new coil to the bottom of the list.
	Clear footage for total #1.
	Clear footage for total #2.
	Move currently highlighted coil up.
	Move currently highlighted coil down.
	Delete currently highlighted coil. (<Shift> + F8: Deletes all coils)

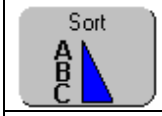
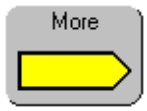
Program Screen



This screen is used to enter or edit batches.

	Add a job to the bottom of currently listed jobs.
	Add a batch to the bottom of the job selected.
	Go to Program Parts screen. ("Use Parts" needs to be configured in the User Interface Settings for this key to appear; pg. 22)
	Set currently highlighted job/batch next to run. By pressing SHIFT then F4 (must hit hard key) it will it will run that item without finishing the current batch.
	Copy the highlighted job/batch.
	Delete the highlighted job/batch.
	Expand/Collapse highlighted job. Pressing the red 2nd key before pressing this key will expand/collapse all jobs.
	Go to next set of function keys.

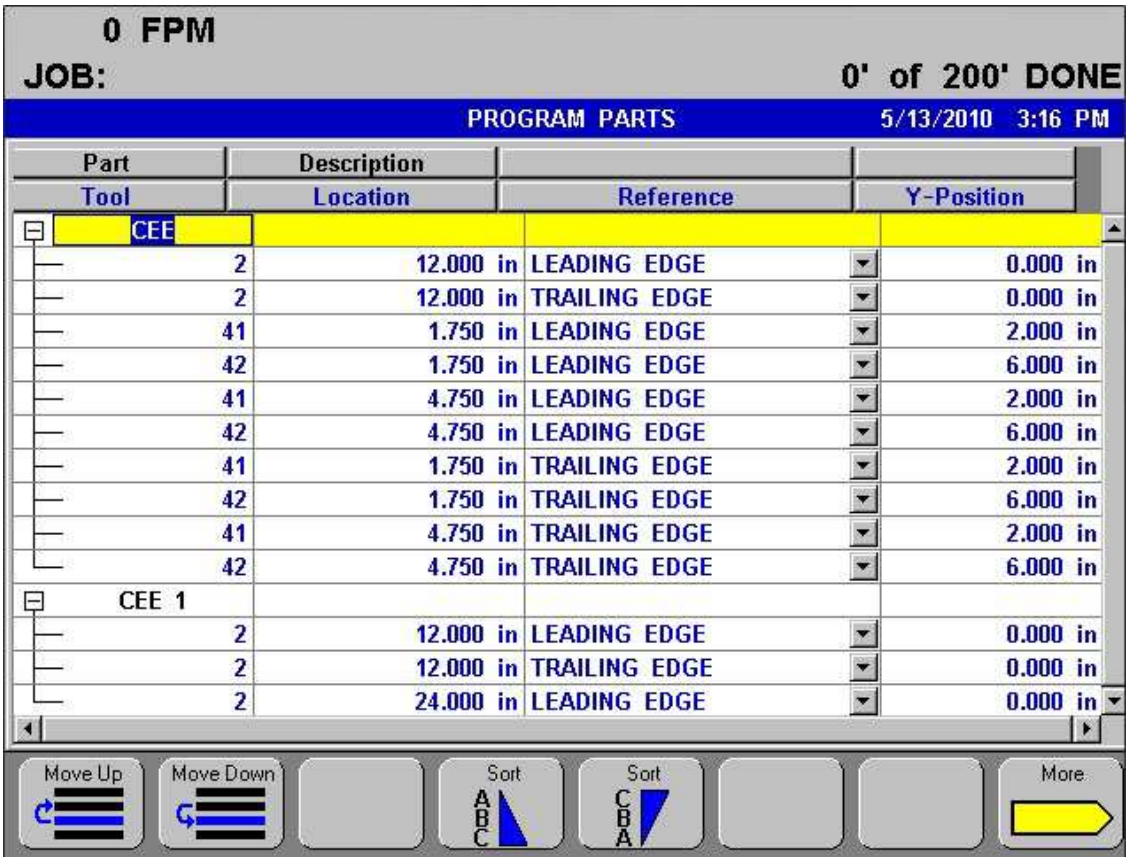
Program Screen Continued

	Move the highlighted job/batch up.
	Move the highlighted job/batch down.
	Renew job/batch. (Changes status from DONE to READY). Sets quantity DONE to 0.
	Sort highlighted column in ascending order.
	Sort highlighted column in descending order.
	Return to first set of options.

Program Parts

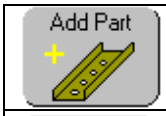
NOTE: A “Shear Only” controller will not have this screen.

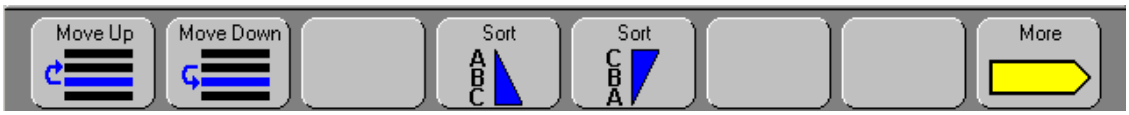
Punch Entry Display
This screen is used to enter operations for a part from the previous screen.

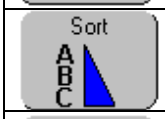


Headings

PART: User name of part (10 characters, Alphanumeric)
DESCRIPTION: Description of part if needed (120 characters, Alphanumeric)
TOOL: Tool number (10 characters, Alphanumeric)
LOCATION: Physical dimension that the hole will be punched on the part with reference to the material flow.
REFERENCE: Point to measure from including; leading and trailing edge, leading and trailing center, and even spacing options.
Y-POSITION: Distance from the edge of the material (this is perpendicular to material flow); the offset is based upon how the home or datum line for the Y-axis is setup.

	Add a part to the bottom of the currently listed parts.
	Add a punch to the bottom of the part selected.
	Copy currently highlighted part or operation.
	Delete currently highlighted part or operation.
	Expand/Collapse highlighted part. Press the 2nd key before pressing this key to expand or collapse all parts.
	Go to next set of option keys.



	Move selected part up.
	Move selected part down.
	Sort parts in ascending order.
	Sort parts in descending order.
	Return to first set of option keys.

Punch Reference Definitions

A punch definition can have one of several reference definitions.

Leading Edge

With this reference, the position of the current punch definition is measured from the leading edge of the part.

Trailing Edge

With this reference, the position of the current punch definition is measured from the trailing edge of the part.

Leading Center

With this reference, the position of the current punch definition is measured from the center of the part toward the leading edge. If a 120-inch part is programmed and the punch position is 10 inches from leading center, the part will be punched at 50 inches.

Trailing Center

With this reference, the position of the current punch definition is measured from the center of the part toward the trailing end of the part edge. If a 120-inch part is programmed and the punch position is 10 inches from trailing center, the part will be punched at 70 inches.

Spacing Start

This is used to specify the location of the first hole for Even Spacing punch references. This is optional for even spaced operations. If it is used, it must be specified above the even space reference. *See Even Spacing for more details.*

Spacing End

This is used to limit an even spacing punch reference from locating a punch too close to the end of a part. This specifies the minimum distance from the end of a part that an even spaced punch can occur. This parameter is optional for even spaced operations. If it is used, it must be specified above the even space reference. *See Even Spacing for more details.*

Even Spacing

This causes the specified tool to fire repeatably, spaced at the specified amount. To prevent punches form occurring too close to the ends of a part, the Spacing Start and Spacing End reference may be defined before this reference is entered.

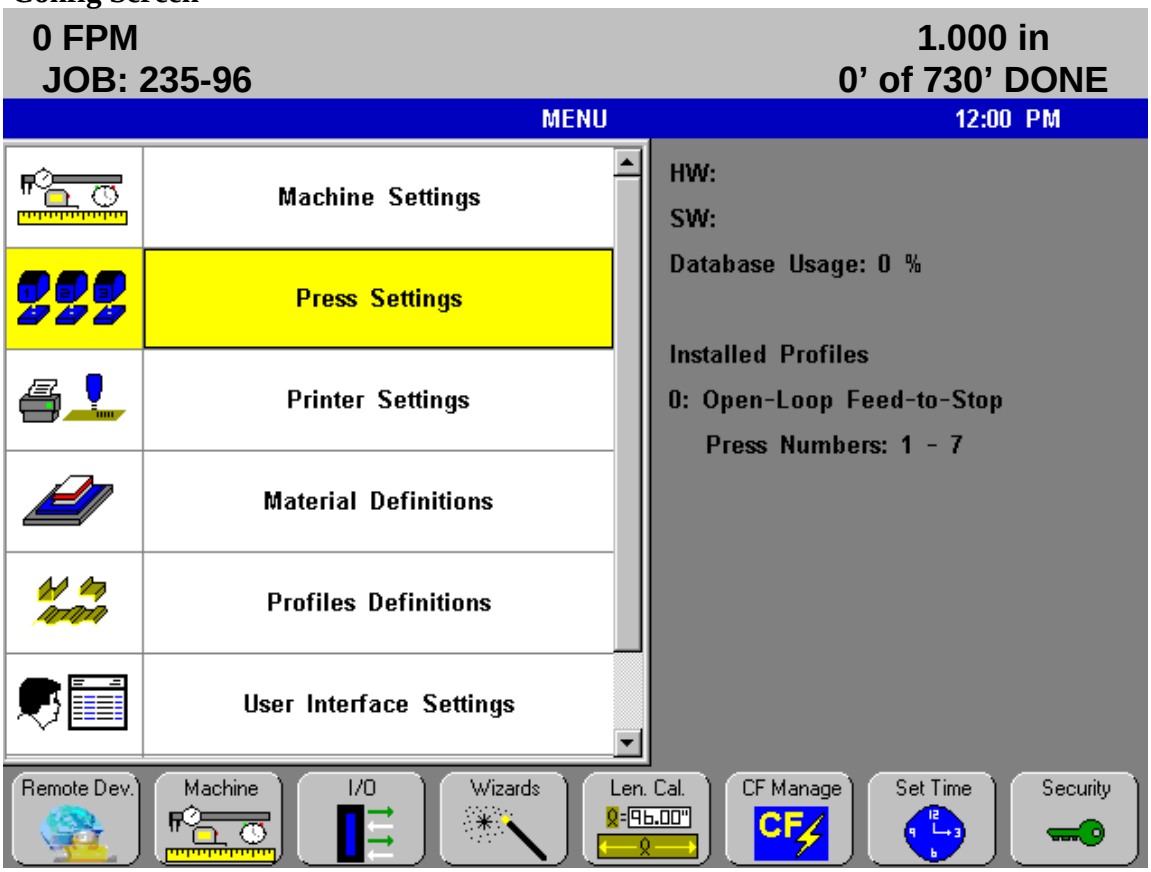
Example:

T: 2	Pos: 12.000”	Spacing Start
T: 2	Pos: 24.000”	Even Spacing
T: 2	Pos: 12.000”	Spacing End

This pattern would cause punches every 24 inches starting at 12 inches, with no punch closer than 12 inches from the end to the part. Without Spacing Stop specified, the last punch could occur at the end of the part. Without Spacing Start specified, the first hole would be at 24 inches, the even spacing distance.

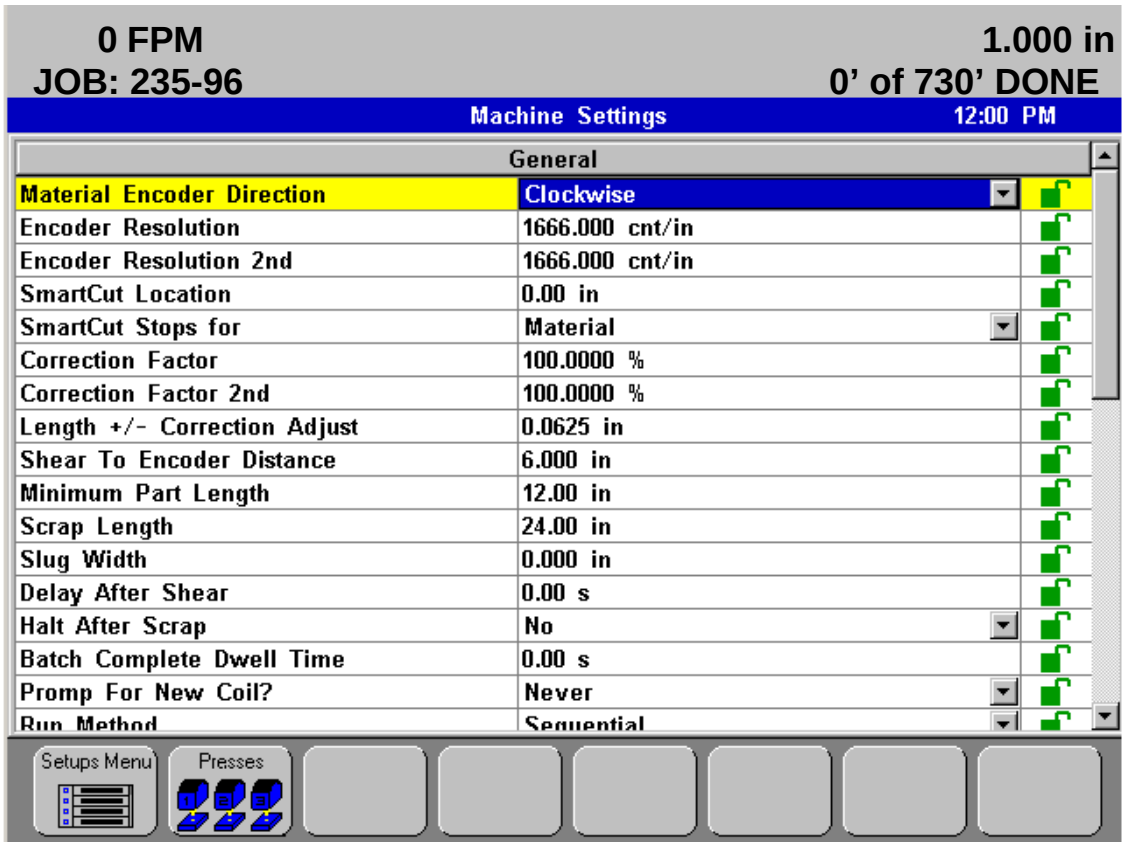
Multiple Even spacing operations may be set within a given part. For each one Spacing Start and Spacing End must be re-entered if they are desired.

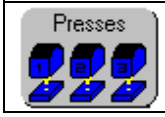
Config Screen



Remote Dev.	The first button in any configuration screen will take you to the previous screen, which in this case is the Remote Devices.
Machine	The second button in any configuration screen will take you to the next screen, which in this case is the Machine Settings.
I/O	Bring up Input/Output Status.
Wizards	Bring up Wizard Screen. The Wizard Screen allows you to set up your controller. Follow the on-screen prompts.
Len. Cal.	Bring up Calibration Length Box to enter the measured length for adjusting the correction factor.
CF	Bring up Compact Flash Screen to save and load setups, parts, jobs, etc.
	Set time and date in the SII Controller.
Security	Bring up Security Screen.

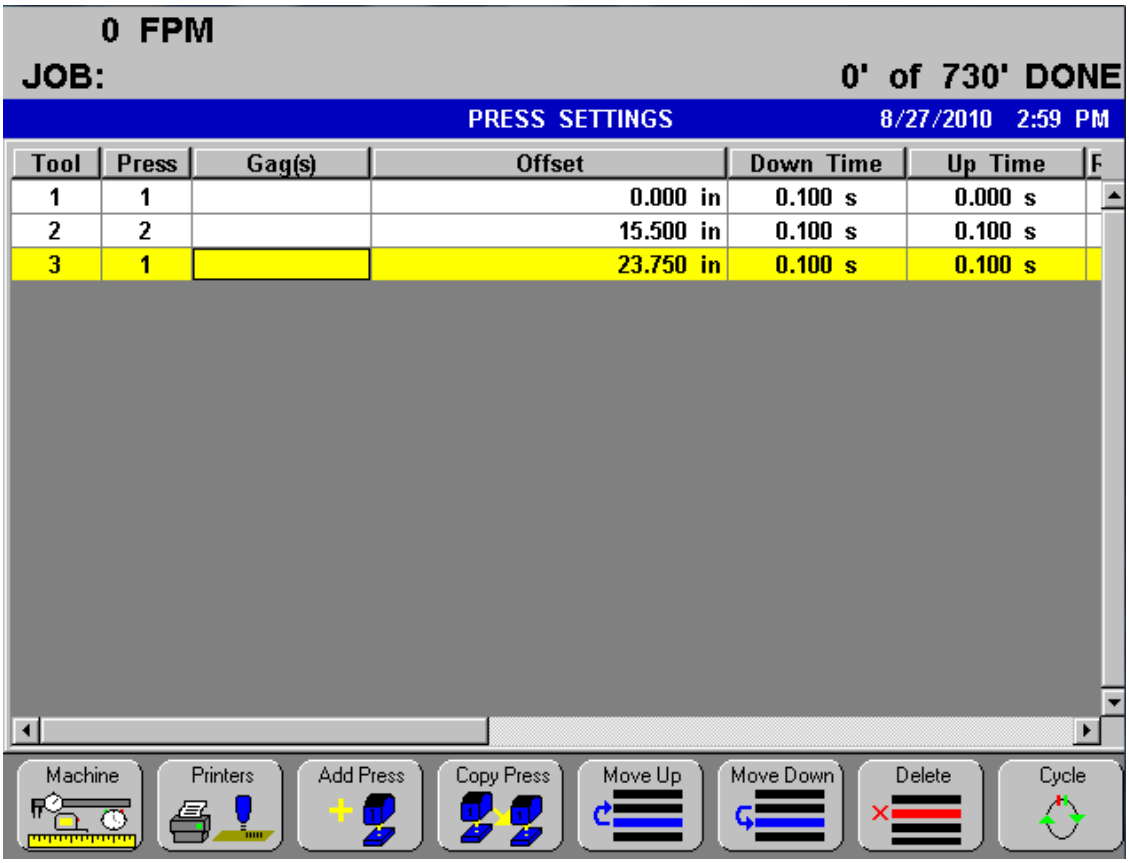
Machine Settings



	Previous screen (Setups Menu).
	Next screen (Press Settings).

Refer to Appendix A for available setups in your controller.

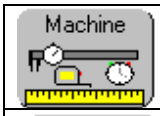
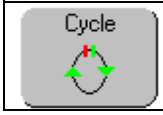
Press Settings



The number of presses available will depend on your controller's configuration.

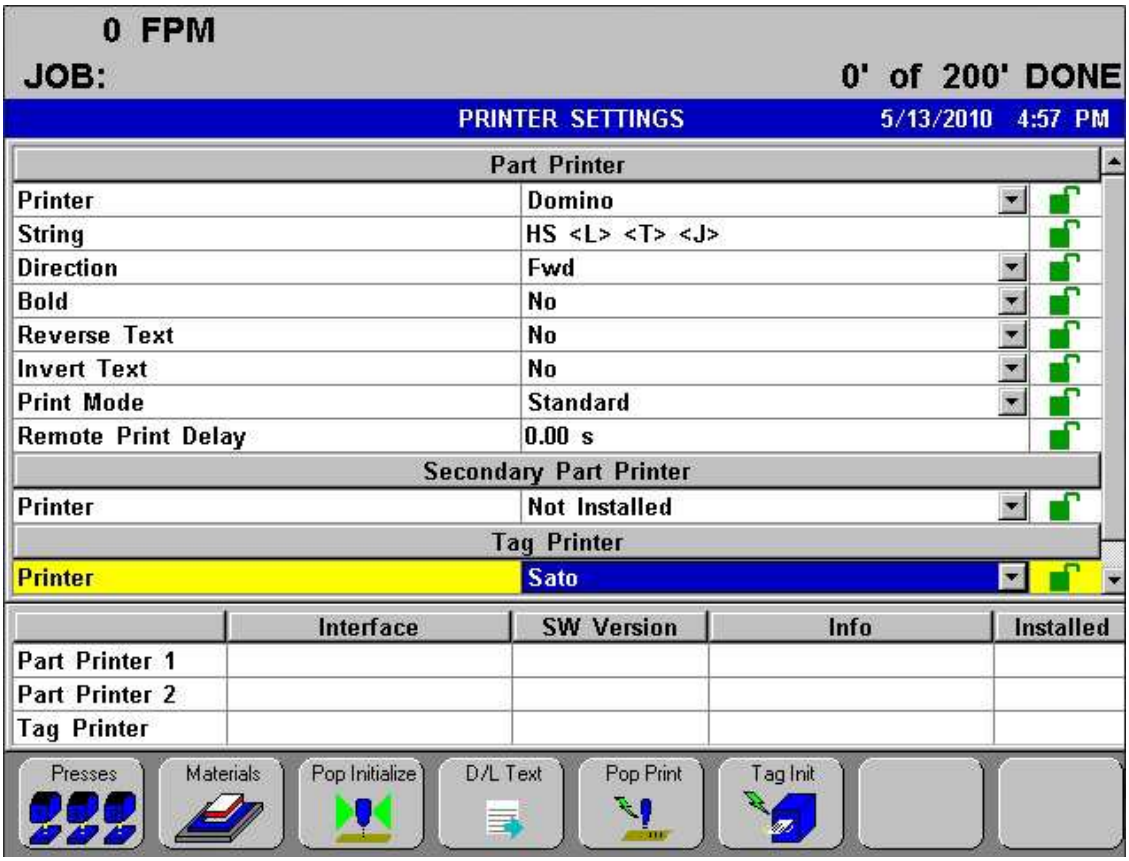
Headings

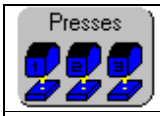
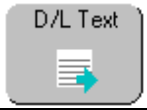
TOOL: An arbitrary Tool number designator to be used when programming parts. The shear tool must be Tool 1. Tools can be defined more than once if multiple presses are used for a grouping of holes. (Alphanumeric)
PRESS: Press number for the physical wiring of the press. Presses start at 1 and continue up depending on the model of the controller.
GAG(S): Gag number for the physical wiring of the gag.
OFFSET: Physical measured distance from die to shear.
DOWN TIME: Time for the press to complete it's down stroke.
UP TIME: Time for the press to complete it's up stroke. On a stopping line there will be no material movement during this time.
REACTION TIME: Time it takes for the press to react to the controller's command.
BOOST TIME: Amount of time needed to push the die away from home and keep it out until the press has completed it's cut cycle.
BOOST REACTION: How much early to turn the boost output on to get a smooth boosting of the press.
SKIP & AVOID SCRAP: Setting to Yes will allow the first part to be made even if a hole is to be punched closer to the leading edge than the press is located. In this case the part would be missing the first hole or two. The part is counted as a completed good part.
PUNCH TYPE: Description of the hole, optional
Y-DEVICE: The Y axis servo that this Tool is referenced to.
Z-DEVICE: The Z axis servo that this Tool is referenced to.

	Previous screen (Machine Settings).
	Next screen (Printer Settings).
	Add a press to bottom of list.
	Copy currently highlighted press.
	Move currently highlighted press up.
	Move currently highlighted press down.
	Delete currently highlighted press.
	Activate the highlighted press for the dwell time that is entered.

Refer to Appendix C for available setups in your controller.

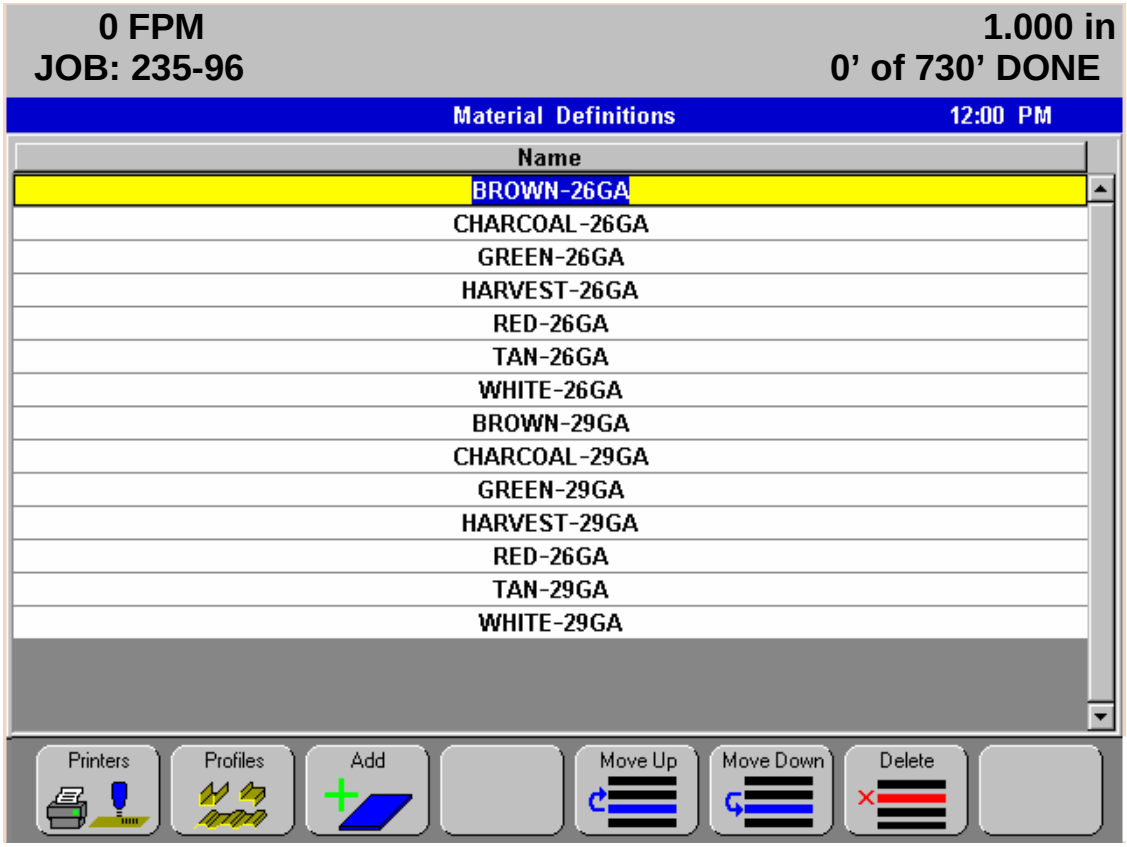
Printer Settings



	Previous screen (Press Settings).
	Next screen (Materials Definitions).
	Sends setup parameters to print-on-part printer. If the printer is not on line an error message will be displayed.
	Sends print message “PRINTER TEST STRING” to the print-on-part printer so it may be tested.
	Causes print-on-part printer to manually print.
	Initializes bundle tag printer so it can begin printing. If the printer is not on line an error message will be displayed.

Refer to Appendix A for available setups in your controller.

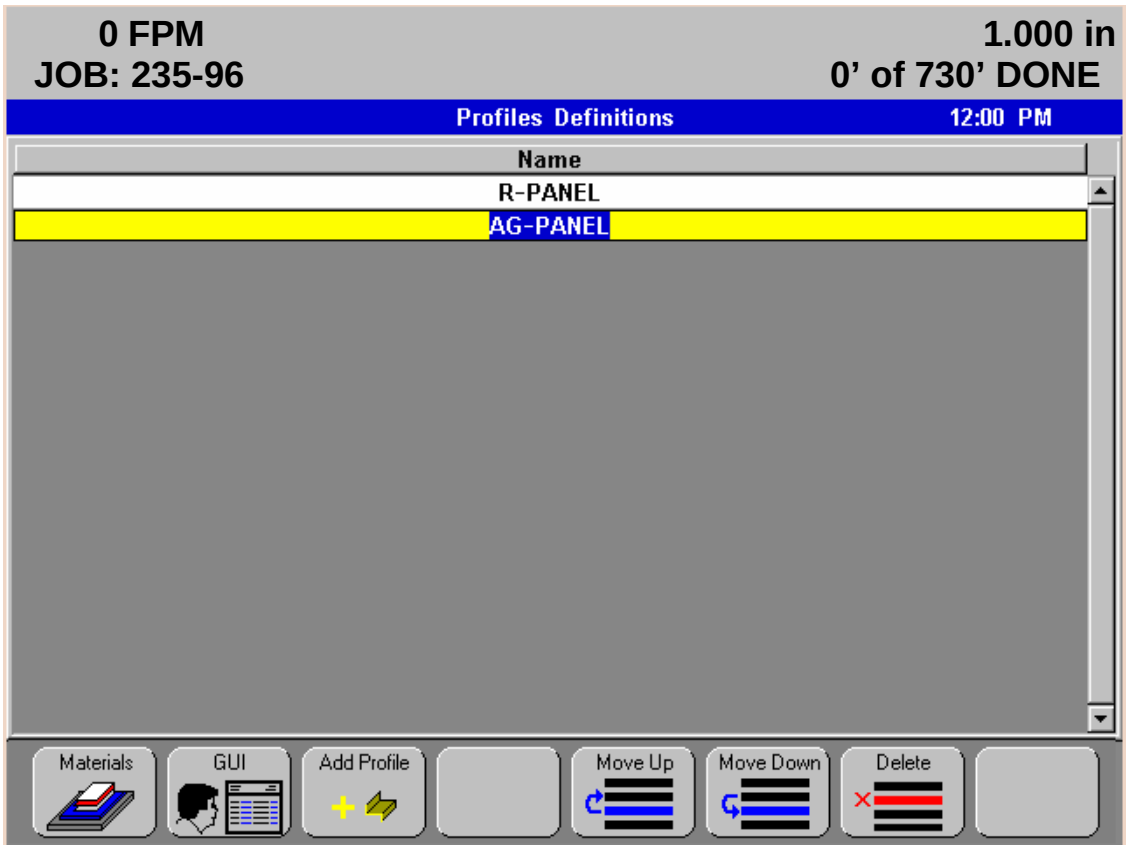
Material Definitions



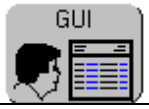
Refer to status material explanation.

	Bring up Printer Settings.
	Bring up Profile Definitions.
	Adds Material to bottom of list. The number keypad can be used or double touching the field will bring up a qwerty keyboard for editing.
	Move currently highlighted material up.
	Move currently highlighted material down.
	Delete currently highlighted material.

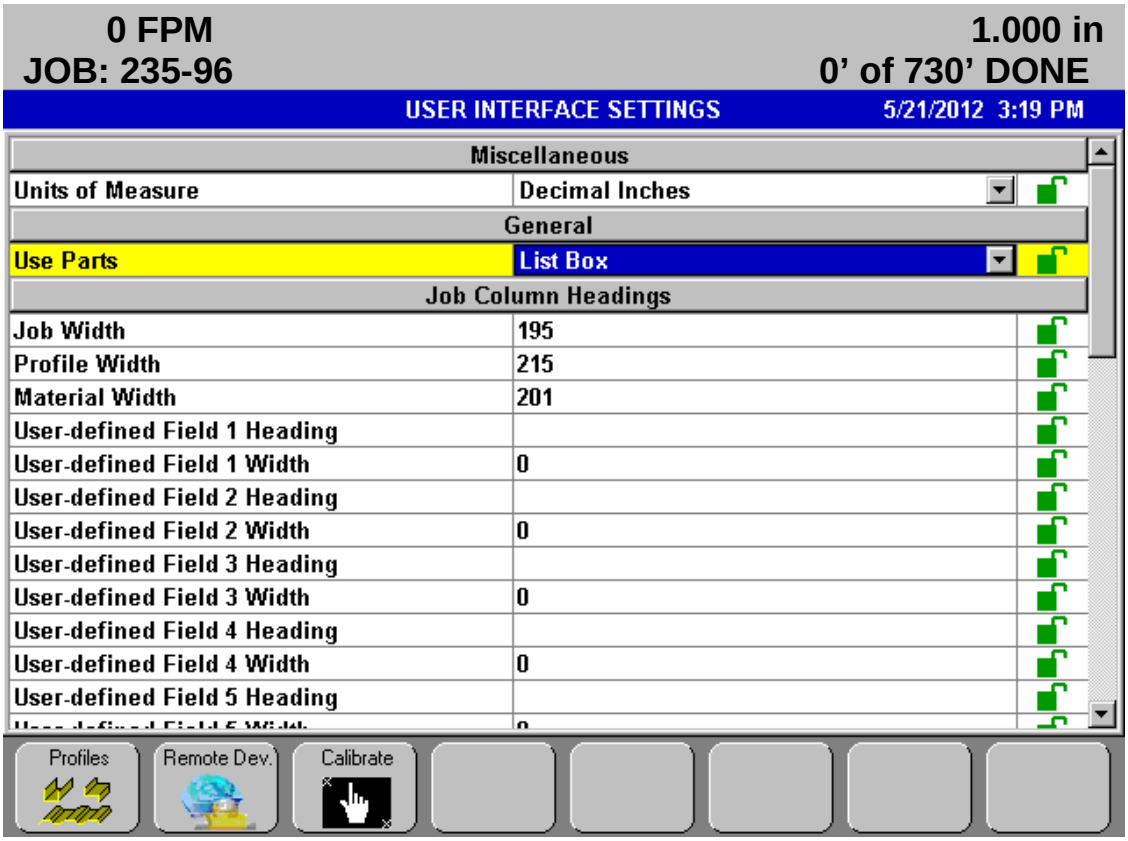
Profiles Definitions



Refer to status profile explanation.

	Previous screen (Materials Definitions).
	Next screen (User Interface Settings).
	Add a profile to bottom of list. The number keypad can be used or double touching the field will bring up a qwerty keyboard for editing.
	Move currently highlighted profile up.
	Move currently highlighted profile down.
	Delete currently highlighted profile.

User Interface Settings



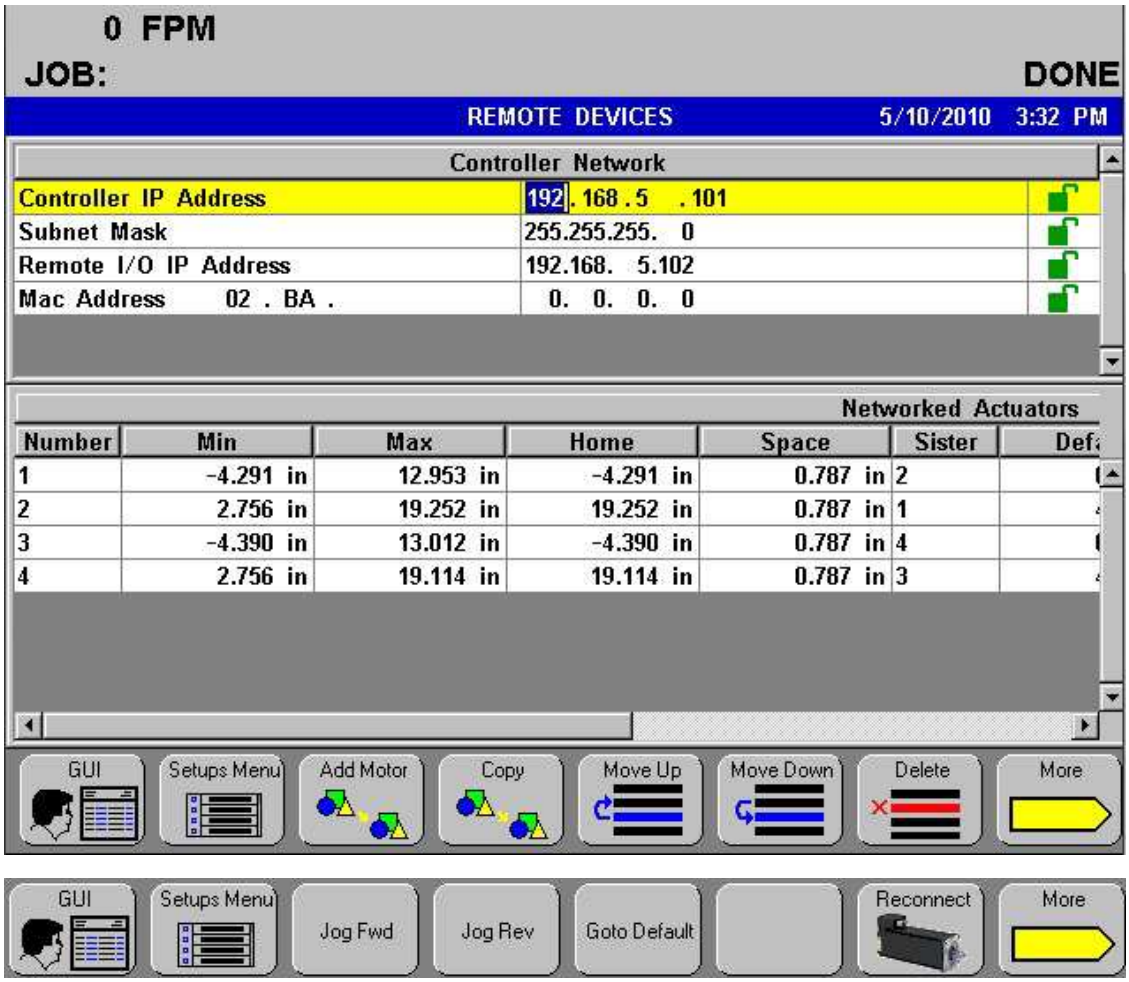
	Previous screen (Profiles Definitions).
	Next screen (Remote Devices).
	Bring up Touch Screen Calibration. You will be asked to touch the upper left corner and the lower right corner of the display and then to touch anywhere when finished. Pressing the 2nd key and then F3 brings up a test screen where everywhere you touch places a dot.

Refer to Appendix A for available setups in your controller.

NOTE:
Using Parts requires "Use Parts" parameter set to either List Box or Edit Box. You will also need to specify the width of the parts column in "Part Width" which is located under Batch Column Heading on this same screen.

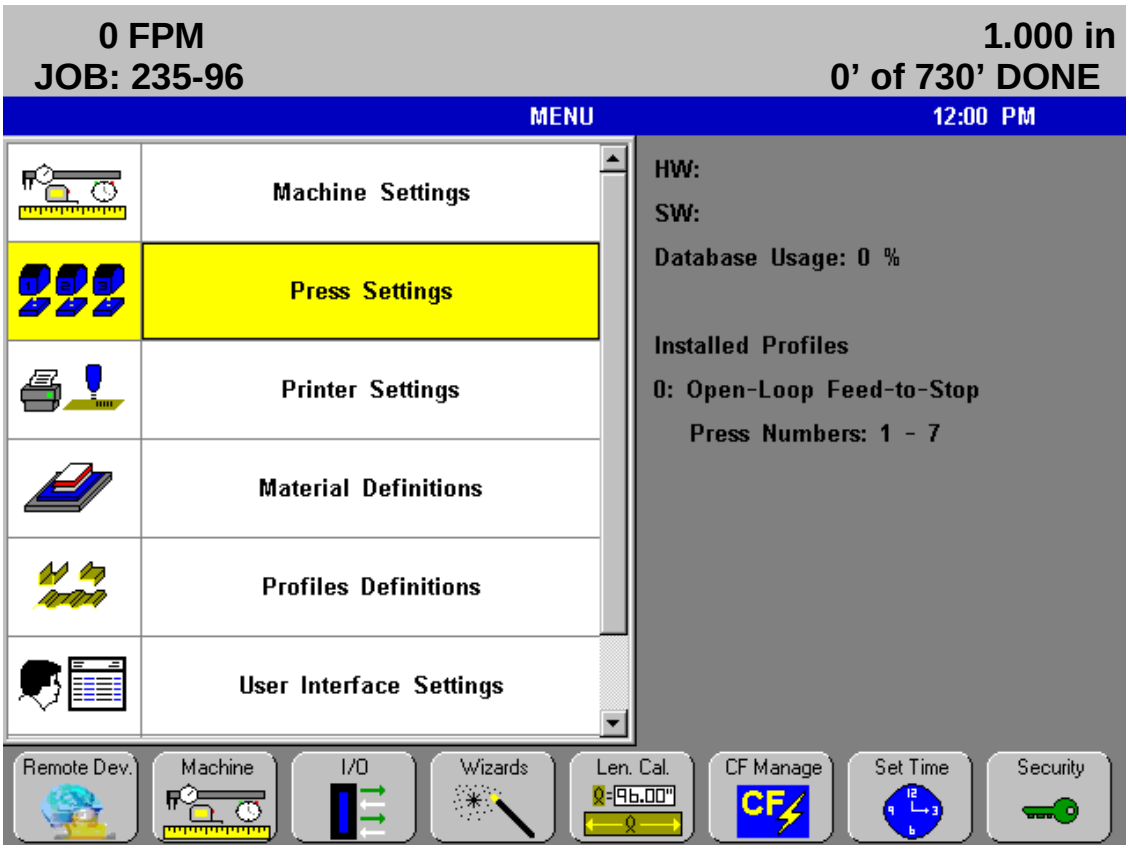
List box would be used if you have a minimal number of parts that you can scroll through, The Edit box will let you type in the name of the part to eliminate scrolling. The Edit box will also let you search with a Fast Find feature to select from available parts.

Remote Devices

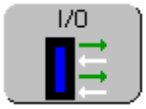


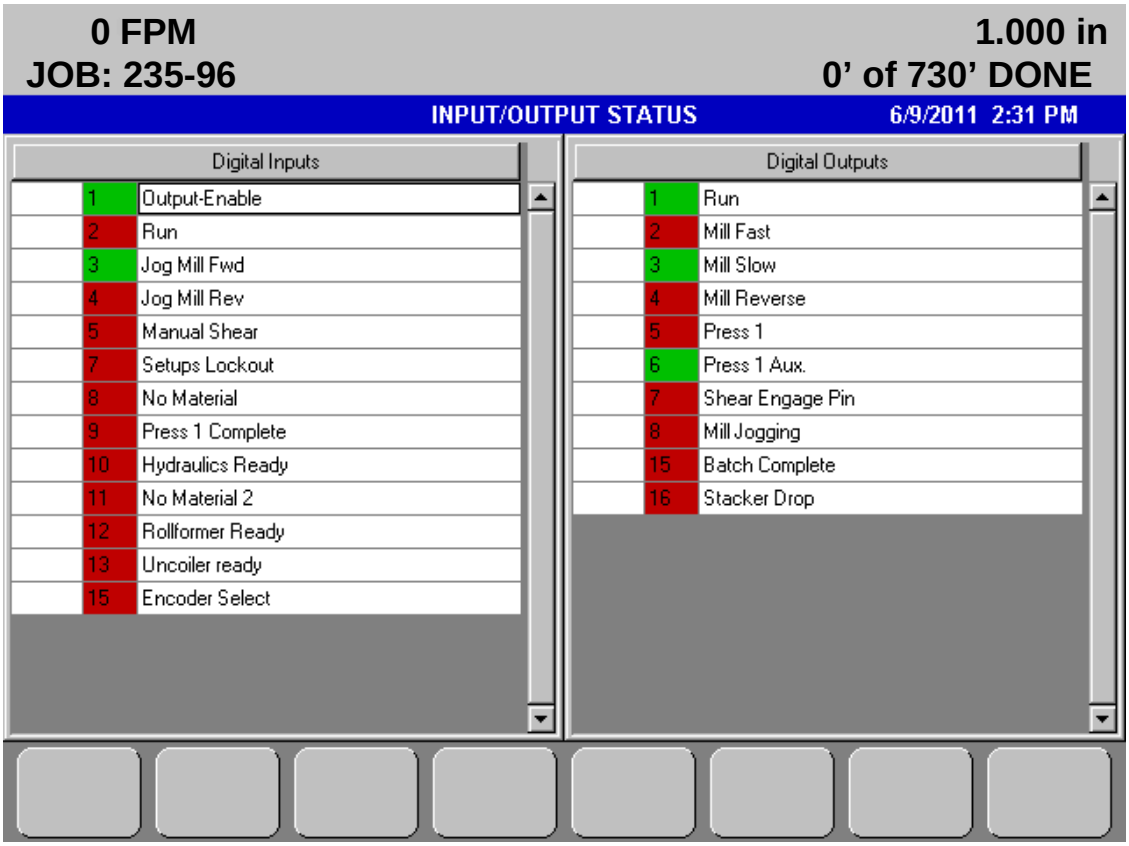
GUI	Previous screen (User Interface Settings).
Setups Menu	Next screen (Setups Menu).
Move Up	Move currently highlighted profile up.
Move Down	Move currently highlighted profile down.
Delete	Delete currently highlighted profile.
Reconnect	Re-Connects Y-Axis motors via Ethernet Communications if the connection was lost.

Config Screen



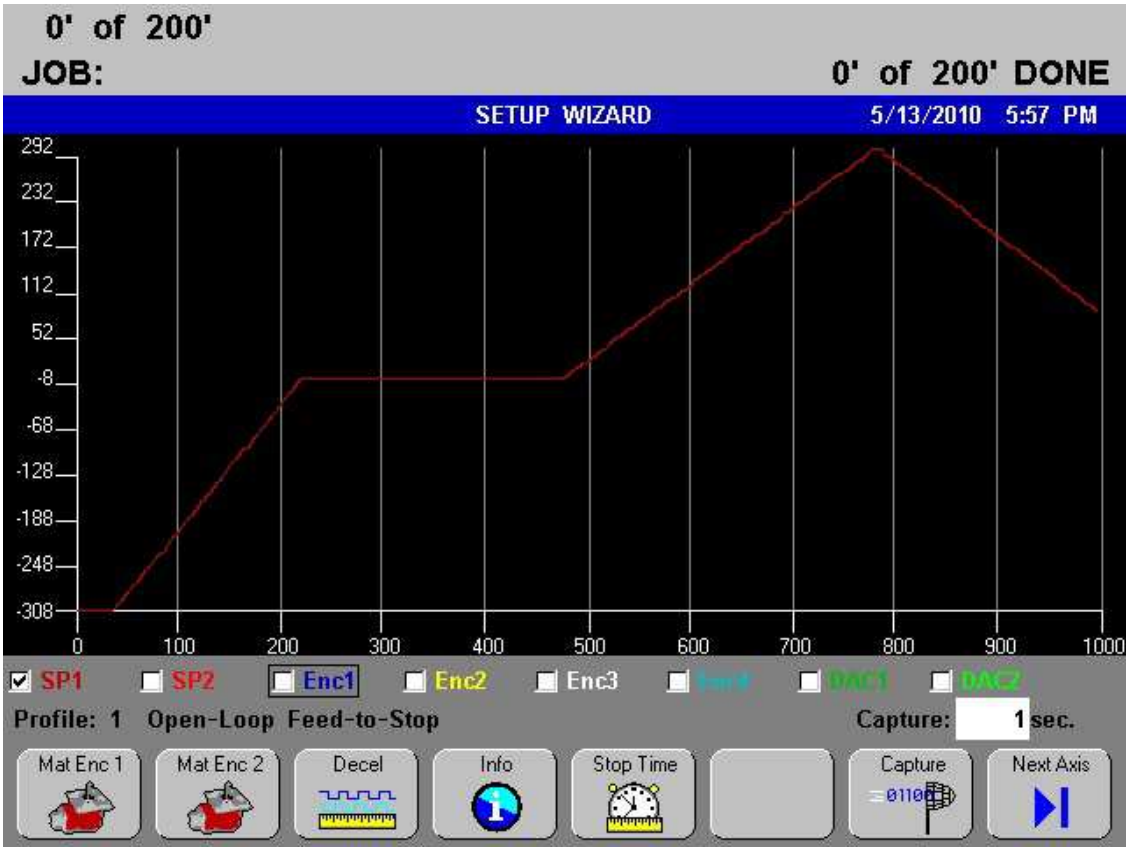
Function keys 3 - 8 on the Config screen follow.

I/O Screen 



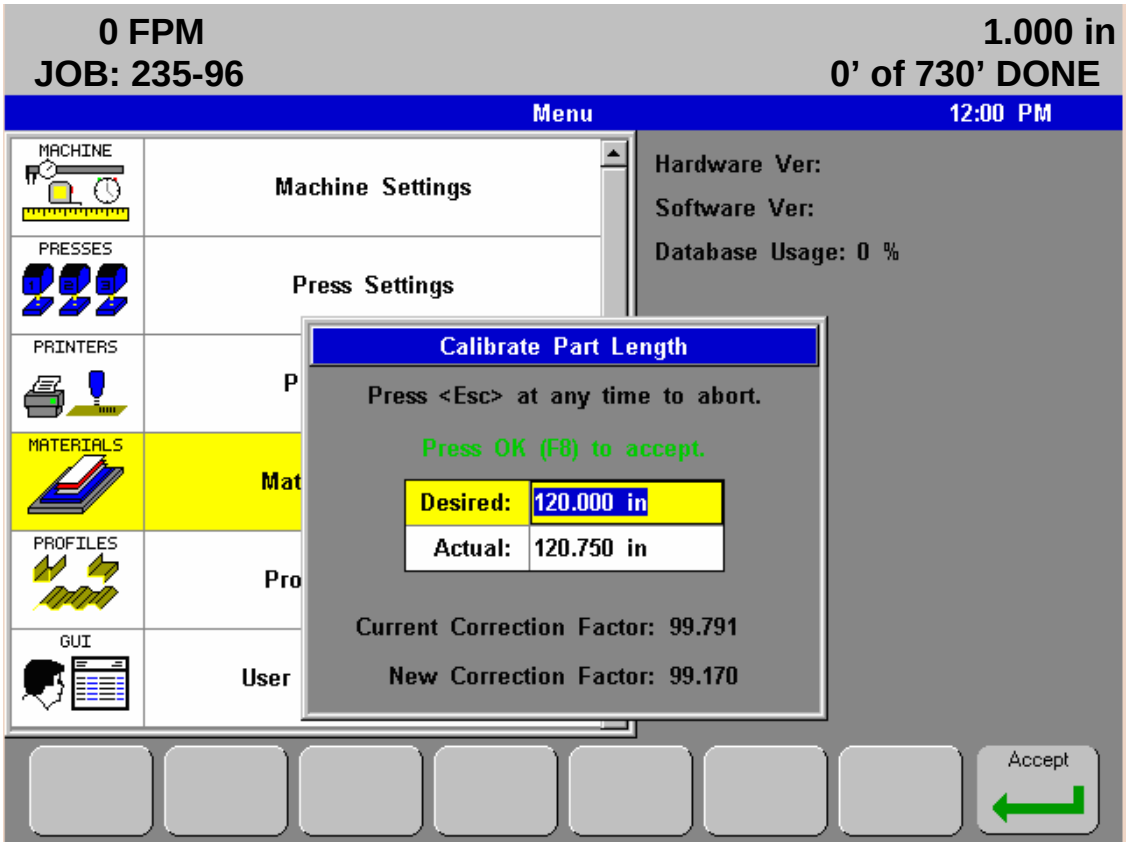
I/O Screen will vary depending on model code. Appendix B will give specific Inputs and Outputs assignments. When the input or output is on the square will be Green.

Setup Wizard 

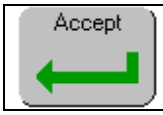


	The Wizard screen is specific to each model of controller. Depending on open loop, closed loop, feed-to-stop, flying cut, etc. there will be different Wizards for setting up and trouble-shooting the machine.
	Pressing capture will save the last five seconds of events from the SII controller. You can turn on or off any of the items for viewing of the graph as well as change the time scale of what is being viewed. Pressing 2nd and then Capture F7 will save the information to compact flash. You can then send the file to Beck Automation for help in setting up and debugging or look at the data using Excel or Access to determine details.
	Will transition to next axis if machine has more than one.

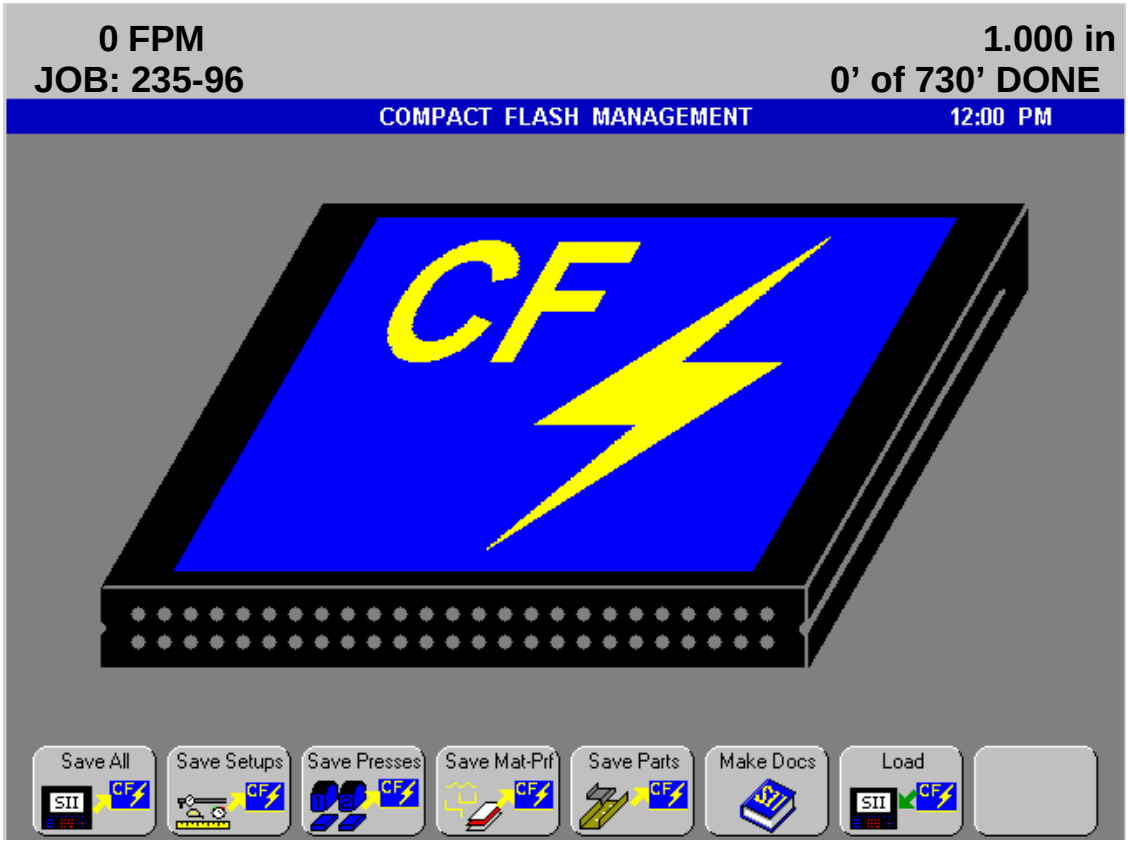
Calibrated Length 

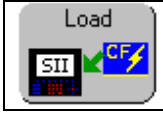


Prompts for actual and desired lengths, and adjusts correction factor accordingly.

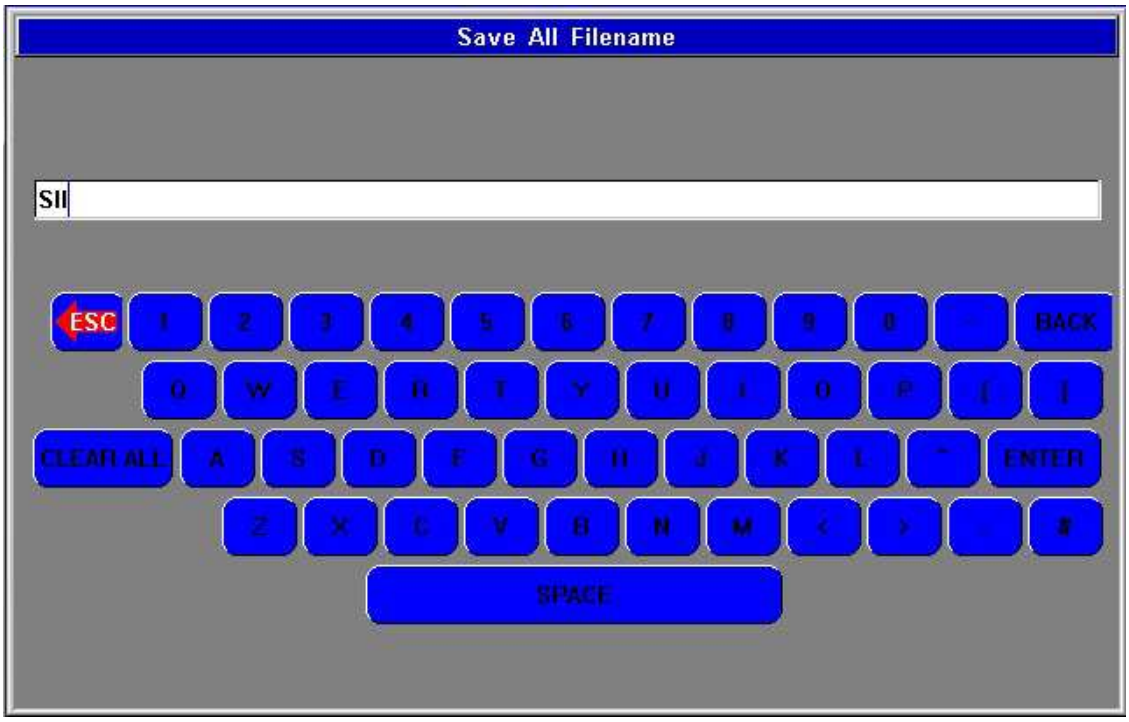
	Accept and return.

Compact Flash Screen 



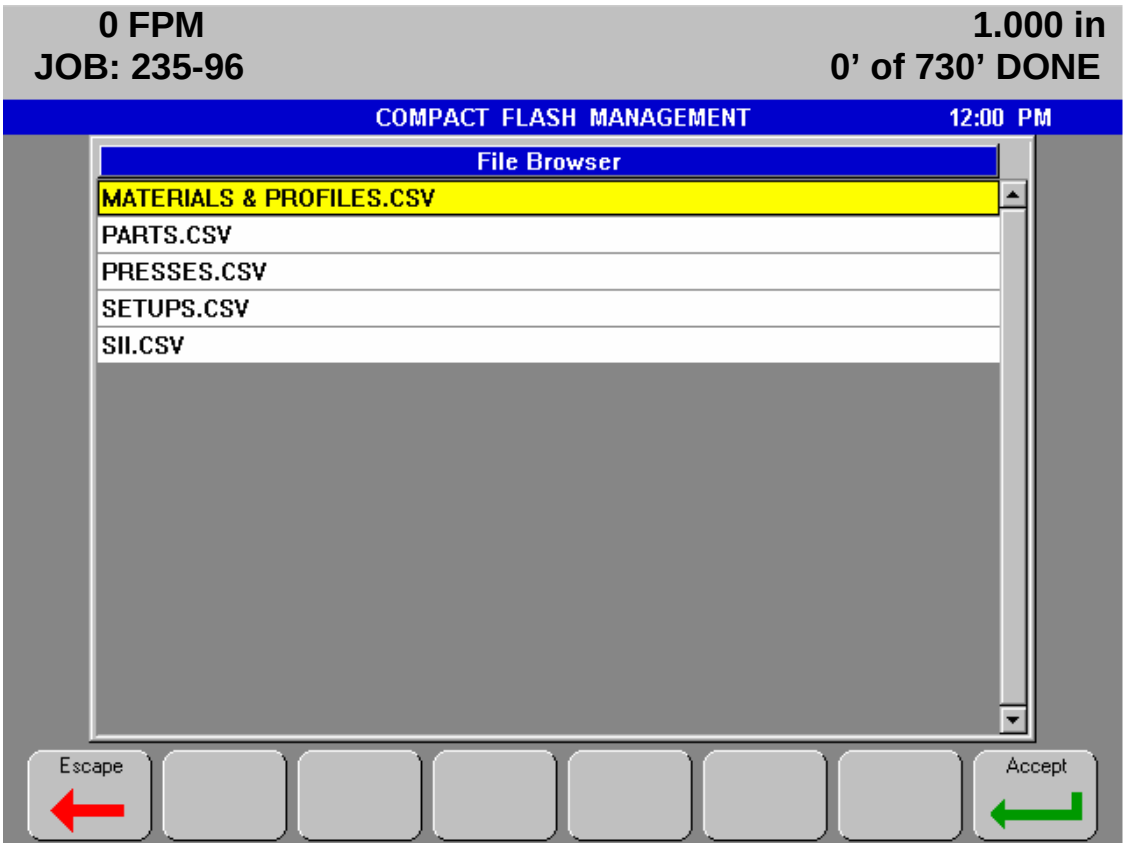
	Export everything to the CF card. This includes setups, parts, materials, jobs, and presses. A keyboard will pop up allowing the file name to be entered.
	Export setups to the CF card. A keyboard will pop up allowing the file name to be entered.
	Export presses to CF card. A keyboard will pop up allowing the file name to be entered.
	Export materials and profiles to CF card. A keyboard will pop up allowing the file name to be entered.
	Export parts to CF card. A keyboard will pop up allowing the file name to be entered.
	Save all machine settings and inputs and outputs to the CF card. These files are saved as .html. Print these files and insert into Appendix A of the manual.
	Import a file into the controller from the compact flash card. The file can consist of setups, parts, materials, jobs, or presses (or any combination of these). A menu will come up showing the available files on the CF.

Save Screen

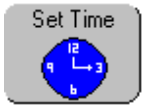


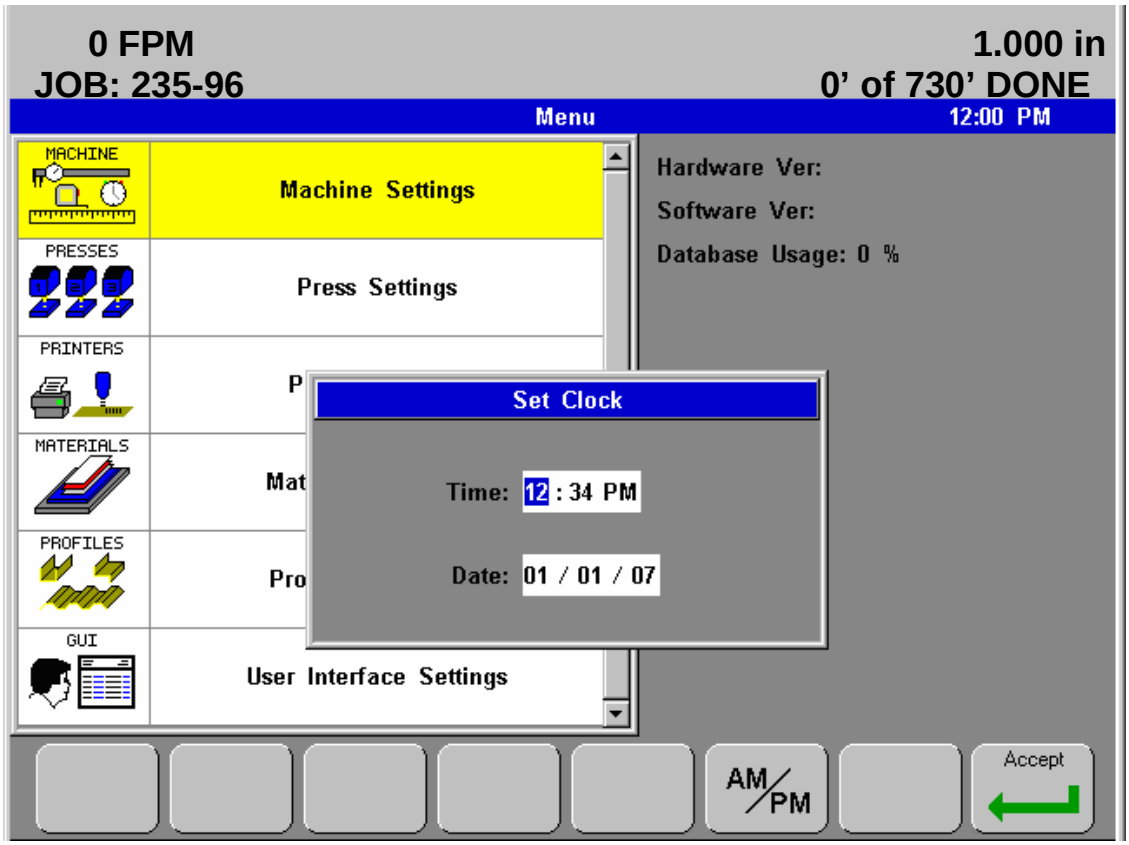
Type in the name of how you want to save this file. When viewing the files on your PC they will have a .CSV extension.

Load Screen



Escape	Back to Main Compact Flash Screen.
Accept	Highlight the file to be loaded into the SII Controller and press, Accept. Only .CSV files on the compact flash will be displayed.

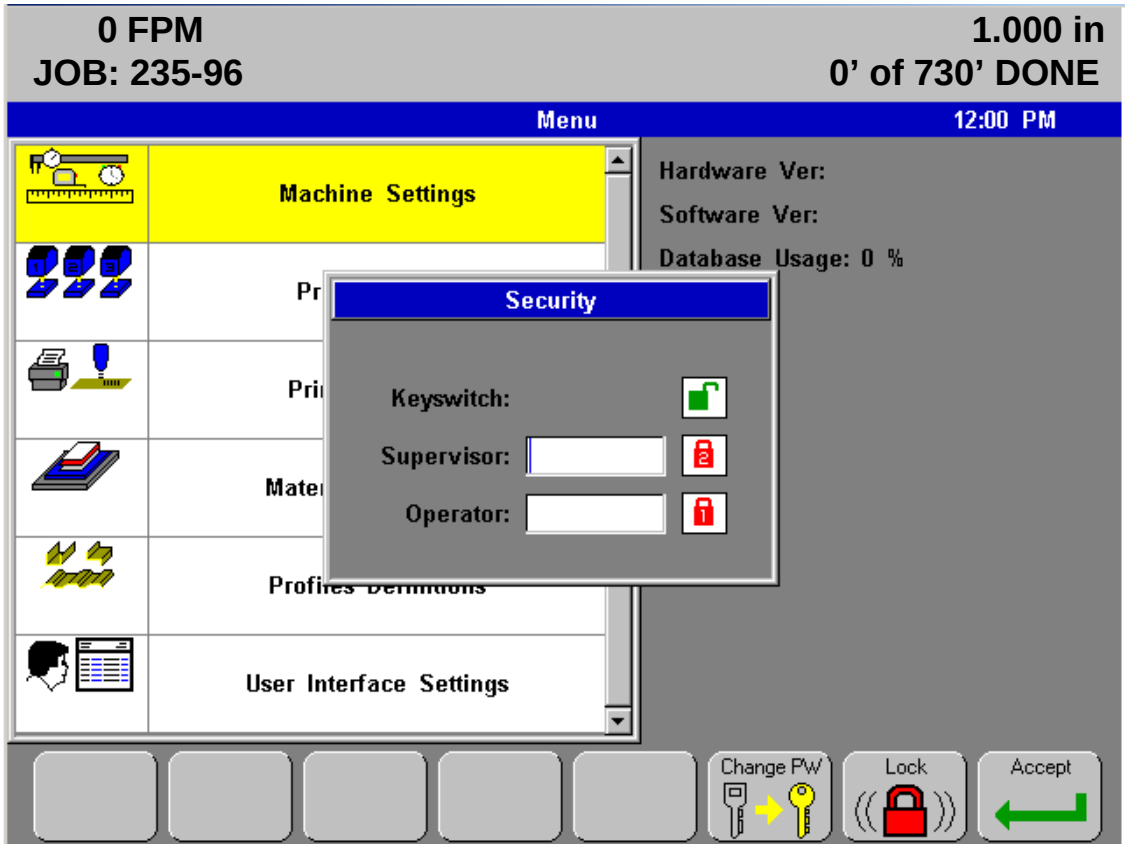
Clock Screen 

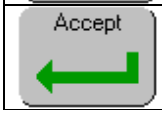


Key in new time and date. Then press Accept for the changes or escape to discard them.

	Changes Between AM and PM.
	Accept time and date.

Security Screen 



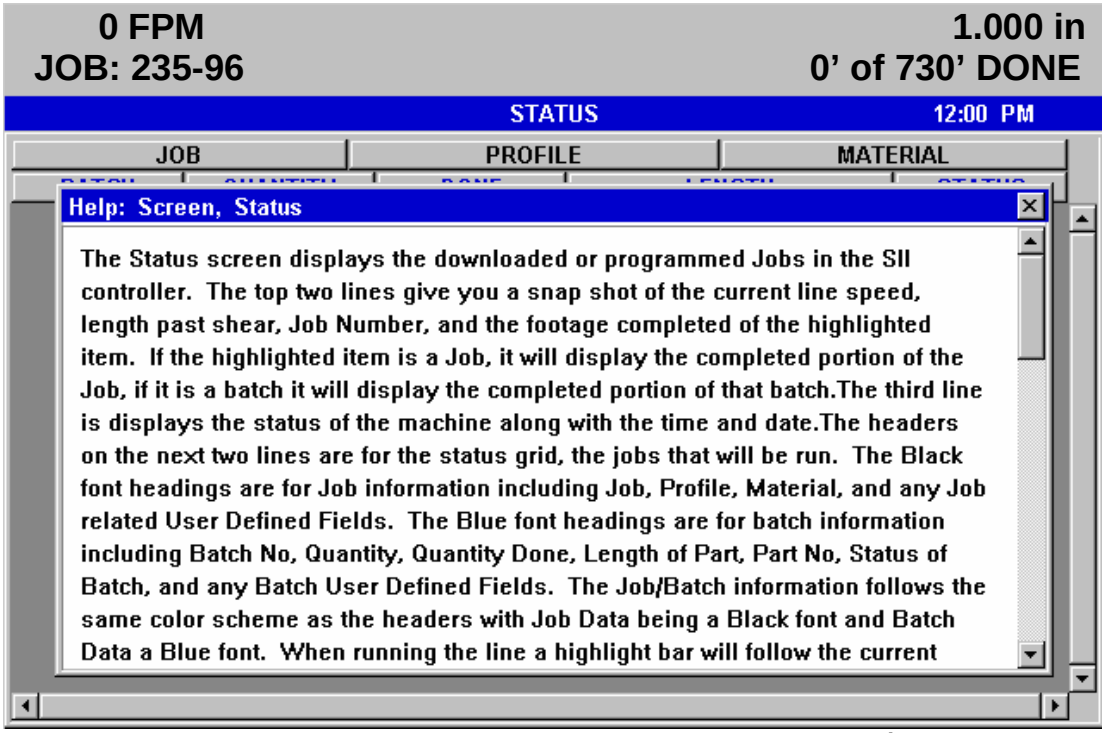
	Change Password. A valid password must be entered to change a password. If passwords are forgotten, the lock out input needs to be off to enter new ones.
	Will lock all setups. Both the supervisor and operator levels are independent.
	Accepts the keyed in value.

This symbol means the field is unlocked, and may be edited at any time.

This symbol means that the field is locked and requires the operator's password.

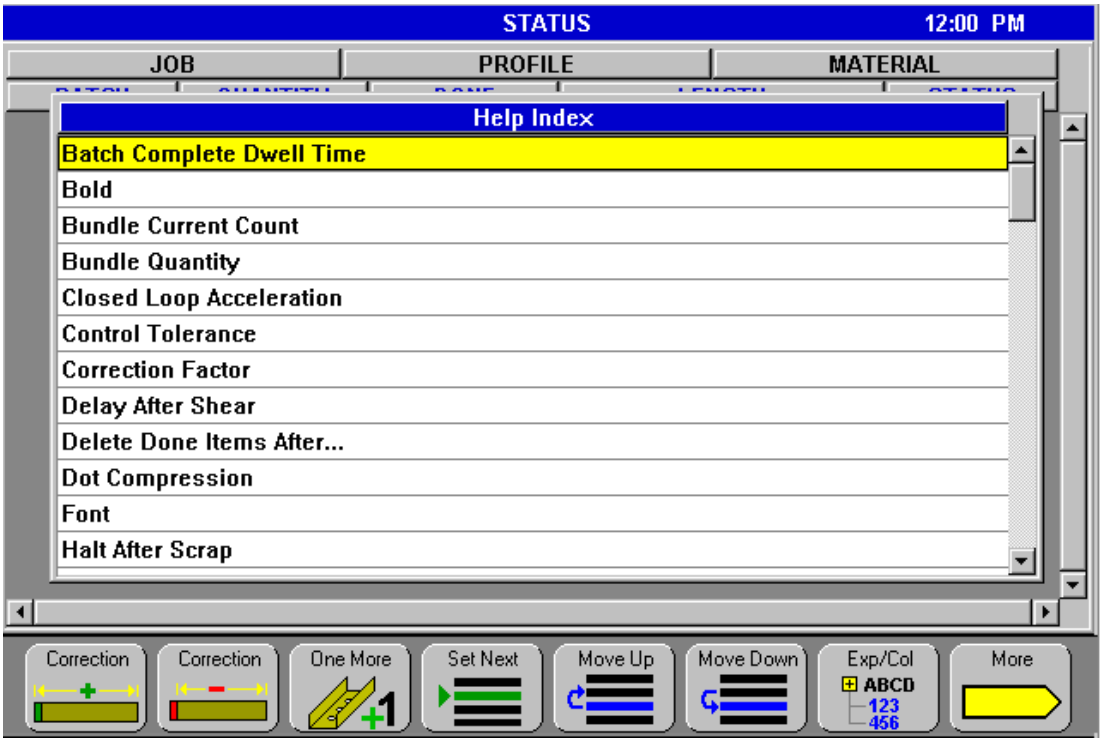
This symbol means that the field is locked and requires the supervisor's password. A red lock with a number three means that a key is required to gain access to modify these values. Input 7 will need to be turned off.

Help Screen



Press help for assistance with the currently selected object. Pressing 2nd and then help will give an index of all the explanations available.

Help Index

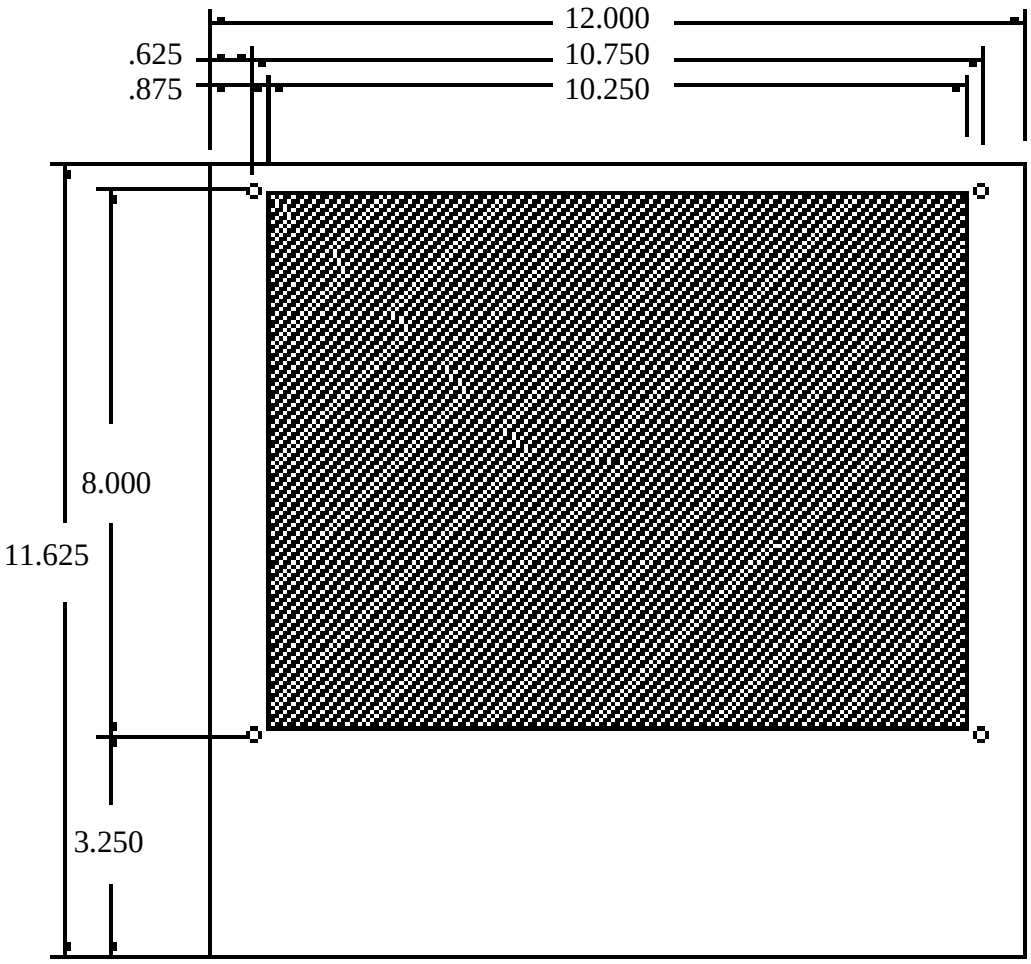


Installation

Panel Mounting

The SII controller is designed for mounting in a panel. The drawing below should be used to locate the required rectangular cut out and the four required mounting holes.

NOTE: The controller's threaded studs are used to ground the controller. Please make sure to remove any paint from the metal panel under the nuts in order to establish a good electrical connection. Also, be sure to use all four nuts and thread them down until they are snug.



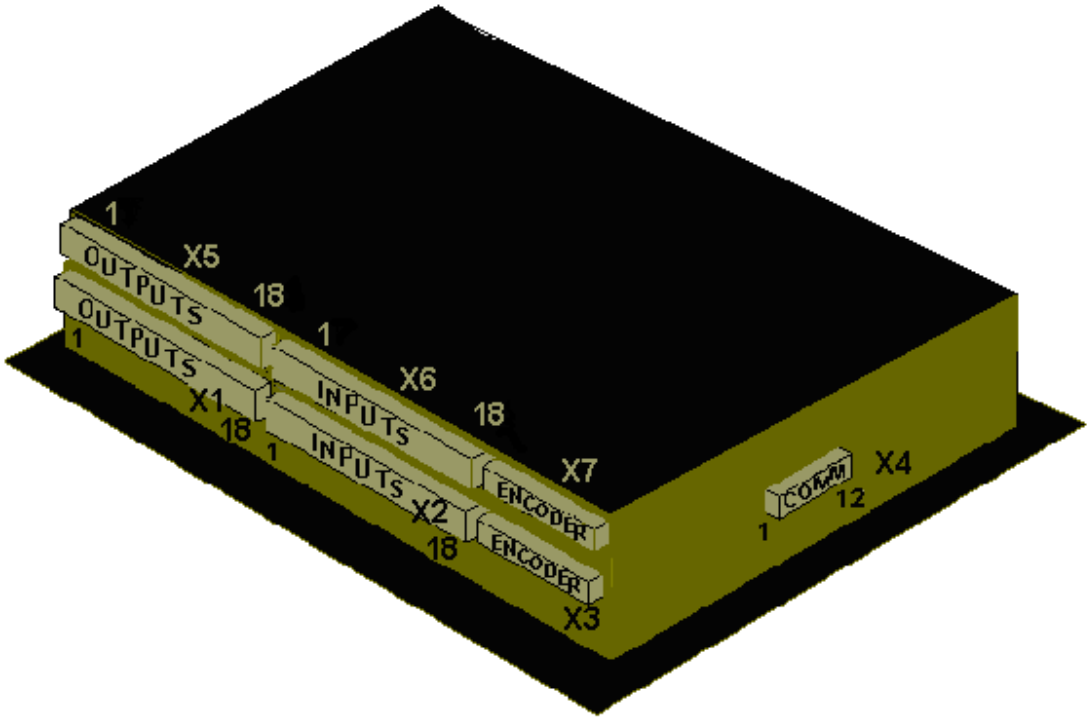
Electrical Connections

Electrical Connections are made on one of four connectors. The connector locations are shown on the drawing below. The first and last pin numbers are shown, as well.

NOTE: The single axis version only has connectors X1 to X4 and the enclosure is thinner.

*** Refer to Appendix B for specific inputs and outputs. ***

The specific operation of the inputs and outputs is determined by the model code of the SII Controller. This is obtained by going to the Config screen and then to the Compact Flash screen and pressing F7 for Make Docs. This will create an html file listing the inputs and outputs designations.



Output Connectors

The first two pins are used for the I/O power supply. It is recommended this be a different 24V DC supply than the supply used for the Digital supply.
The outputs are active low DC open drain outputs. They are able to sink 6-Amps of current continuously. The outputs are protected with TVS diodes and a low pass filter.

X1 Connector

Pin Number	Function
1	+24V I/O Supply
2	I/O GND
3	Output 1
4	Output 2
5	Output 3
6	Output 4
7	Output 5
8	Output 6
9	Output 7
10	Output 8
11	Output 9
12	Output 10
13	Output 11
14	Output 12
15	Output 13
16	Output 14
17	Output 15
18	Output 16

X5 Connector

Pin Number	Function
1	+24V I/O Supply
2	I/O GND
3	Output 17
4	Output 18
5	Output 19
6	Output 20
7	Output 21
8	Output 22
9	Output 23
10	Output 24
11	Output 25
12	Output 26
13	Output 27
14	Output 28
15	Output 29
16	Output 30
17	Output 31
18	Output 32

Input Connectors

The first sixteen pins on these connectors are used for the controller's inputs. All of the controller's inputs are active low DC inputs. They are protected with TVS diodes and a low pass filter network.

The last two pins on this connector are used for the digital power supply and its ground. A separate regulated 24VDC power supply should be used to power the controller and connect to these two pins. It is recommended that the supply is mounted in the same cabinet as the controller and the +24V and ground wires are twisted together and routed to the controller.

X2 Connector

Pin Number	Function
1	Input 1
2	Input 2
3	Input 3
4	Input 4
5	Input 5
6	Input 6
7	Input 7
8	Input 8
9	Input 9
10	Input 10
11	Input 11
12	Input 12
13	Input 13
14	Input 14
15	Input 15
16	Input 16
17	Digital Ground
18	+24VDC Digital Supply

X6 Connector

Pin Number	Function
1	Input 17
2	Input 18
3	Input 19
4	Input 20
5	Input 21
6	Input 22
7	Input 23
8	Input 24
9	Input 25
10	Input 26
11	Input 27
12	Input 28
13	Input 29
14	Input 30
15	Input 31
16	Input 32
17	Digital Ground
18	+24VDC Digital Supply

Encoder Connectors

The encoder connector is used to connect up to two encoders. It also contains the analog output signals for a servo drive.

X3 Connector

Pin Number	Function	Description
1	+5	5VDC supply to power an encoder
2	GND	Ground for encoder power supply.
3	(Shear Servo) 2B+	Encoder 2's channel B positive signal
4	2B-	Encoder 2's channel B negative signal
5	2A+	Encoder 2's channel A positive signal
6	2A-	Encoder 2's channel A negative signal
7	Shield	Connect the shield of a shielded

		encoder or analog cable to this pin.
8	(Line encoder) 1B+	Encoder 1's channel B positive signal
9	1B-	Encoder 1's channel B negative signal
10	1A+	Encoder 1's channel A positive signal
11	1A-	Encoder 1's channel A negative signal
12	Shield	Connect the shield of a shielded encoder or analog cable to this pin.
13	Pos. Analog Shear	Positive side of a +10/-10vdc differential command signal for a servo drives.
14	Neg. Analog Shear	Negative side of a +10/-10vdc differential command signal for a servo drive.

X7 Connector

Pin Number	Function	Description
1	+5	5VDC supply to power an encoder
2	GND	Ground for encoder power supply.
3	(Shear Servo) 4B+	Encoder 4's channel B positive signal
4	4B-	Encoder 4's channel B negative signal
5	4A+	Encoder 4's channel A positive signal
6	4A-	Encoder 4's channel A negative signal
7	Shield	Connect the shield of a shielded encoder or analog cable to this pin.
8	(Line encoder) 3B+	Encoder 3's channel B positive signal
9	3B-	Encoder 3's channel B negative signal
10	3A+	Encoder 3's channel A positive signal
11	3A-	Encoder 3's channel A negative signal
12	Shield	Connect the shield of a shielded encoder or analog cable to this pin.
13	Pos. Analog Shear	Positive side of a +10/-10vdc differential command signal for a

		servo drives.
14	Neg. Analog Shear	Negative side of a +10/-10vdc differential command signal for a servo drive.

Communication Connectors

The communication connector is used to access the RS232 port and two RS485 ports.

X4 Connector

Pin Number	Function	Description
1	1 – B	RS485 Port signal B
2	1 – A	RS485 Port signal A
3	Shield	Connect the shield of a communication cable to this pin.
4	2 – B	RS485 Port signal B
5	2 – A	RS485 Port signal A
6	GND	Use this Ground pin for the RS232 connection.
7	TX	RS232 Port Transmit connection
8	RX	RS232 Port Receive connection
9	Analog Out	Auxiliary Analog available on some models
10	+12V	Potentiometer Supply
11	Analog In	Auxiliary Analog available on some models
12	GNG	Potentiometer ground

Ethernet Connector

Ethernet communications connector is used to access the expansion I/O and Y-axis motor controls.

PS2 Connector

PS2 connector is used to plug in a keyboard for programming the SII.