XL200 Series Open Loop Controller

Version 3.18

Installation Guide & Technical Reference

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Chapter 1: Installation Overview

When installing an XL 200OL controller, you must have certain specific information available concerning the controller and your line. Once you have that information, you can install the controller following the procedures outlined in this guide.

The following steps offer a high-level "bird's-eye" view of the installation process. The location for further, detailed information is included for each step.

Warning: It is essential that the controller be configured and installed properly -- *Improper installation or configuration can result in damage to the system!*

1. Determine your **application type** (see "System Type Description" page 1).
2. Determine the appropriate **software model** for your application (see "Software Models" page 6.)
3. Configure the controller model to your **specific application** (see "Configuration Switch Settings" page 10).
4. Install the **hardware** and perform all **wiring** (see "Hardware & Installation" page 26).
5. Apply power, then set **system parameters** (see "Setup Parameters" page 43) and enter tool data (see "Tool Data", page 87).
6. **Calibrate** the system (see "Startup and Calibration" page 94).

Chapter 2: System Type Description

Overview

The AMS ControlsXL200 Series controller is a computerized device used to control roll forming machinery in production, including:

- Controlling the material movement through the machine.
- Measuring the amount of material moving past all the presses.
- Cycling the punch presses at programmed points.
- Cycling the cutoff press at the programmed length.
- Stopping the machine when the correct numbers of parts are produced.
- Alerting the operator of procedure errors and machine malfunctions.
- Providing built-in help messages and diagnostics.
- Changing part lengths on the fly.
- Programming in finished part dimensions.
- Tracking of completed productivity, downtime, scrap, coil consumption, operating efficiencies, and more.
- Providing production data reporting—coil inventory, and good/scrap footage.

Categories

There are two basic categories of roll forming machines:

- *Feed-to-stop machines*, where material stops for each press operation and the cutoff or punching die remains stationary relative to the material.
- Flying cutoff machines, where material does not stop for press operations and the cutoff or punching die moves with the material during the press cycle.

Combinations

The XL200 Series controller can be configured to operate machines of each type, as well as numerous variations and combinations. Typical applications include:

- Open Loop Flying Cutoff with Flying Punch Press
- Open Loop Feed-to-Stop, Shear-Only

Open Loop Flying Cutoff with Flying Punch Press

In a flying die application, the punch press and cutoff move with the material, and the material is not stopped for press operation. A block diagram of a typical roll forming operation with a pre-notch and a post-cut is shown in Figure 1.

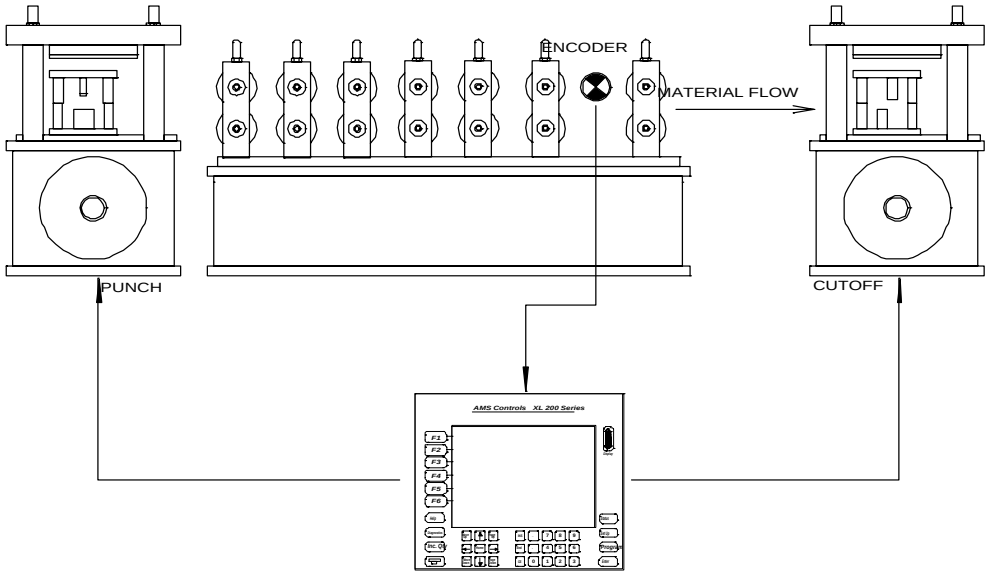


Figure 1: Roll-former with Flying Cutoff & Punch Press

Typical Operation

7. Material is loaded through the entire machine.
8. The cutoff press fires to reference the material's position.
9. The controller is put into RUN to set the machine into motion.
10. The encoder reports the material motion to the controller.
11. The controller fires the punch and cutoff presses at the programmed location.
12. The controller halts the machine motion at the end of the job, or as programmed by the relevant setup parameters.

Open Loop Feed-to-Stop, Shear-Only

Feed-to-stop machines stop the material for each press operation and the die remains at a fixed location. A simple feed-to-stop machine is shown in Figure 2.

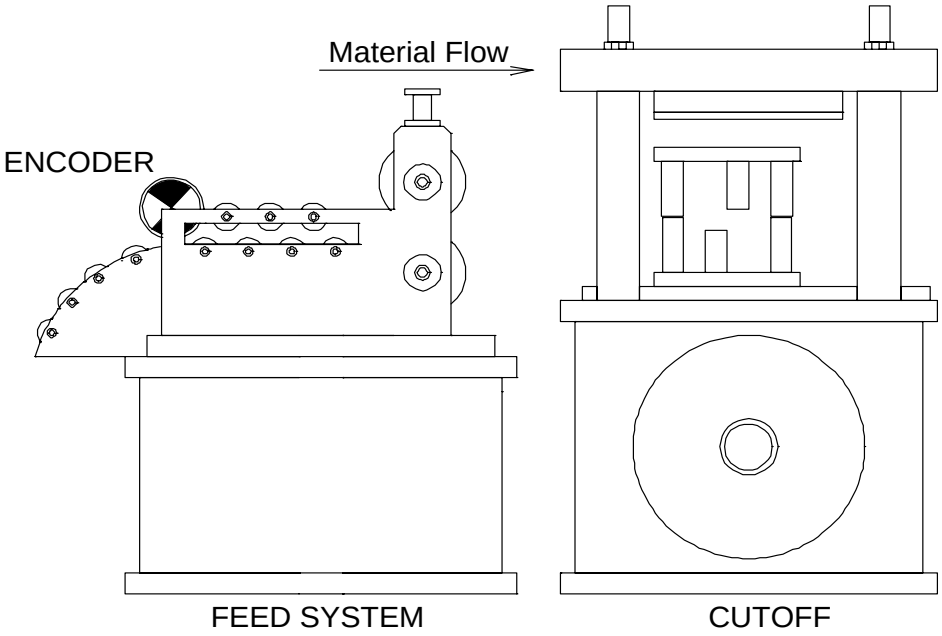


Figure 2: Feed-to-Stop Machine with Cutoff

Typical Operation

1. Material is fed to the cutoff press.
2. The cutoff press is fired to reference the material's position.
3. The controller is put into RUN to set the machine into motion.
4. The encoder reports the material motion to the controller.
5. The controller halts the material at the programmed locations.
6. The controller fires the cutoff press at the programmed locations.
7. Controller puts material back into motion to continue production.
8. The controller halts the machine motion at the end of the job, or as programmed by the relevant setup parameters.

Chapter 3: Model Customization

Software Models

The XL200 Series controller is factory-programmed with a specific software model. Hundreds of different software models are available to handle the large variety of machine types found throughout the roll forming industry. Additionally each individual software model may be configured to operate in one of several different modes, depending on the machine's requirements. Some model configurations may require unique input and output definitions to handle a particular machine type.

The factors that influence which software model should be selected and how it should be configured for a particular application include:

- The number of presses on the machine that the XL200 Series controller must control.
- Whether the machine operates in a flying-cut or feed-to-stop mode.
- The presence of selectable or gagged tooling on one or more presses.
- The presence of a sensor that detects pre-punched holes on the part.
- The presence of one or more peripheral devices that the XL200 Series controller interfaces with.

Model Types and Options

The following tables provide configuration instructions for each software model in each operating mode. Input and output definitions are provided for each model type are also listed.

Model Types

Model Type	Description	Switch Settings	I/O Definitions
XL200	Shear and 1 punch controller, single or two-speed operation, feed-to-stop or flying-cut (& punch), shear/punch boost outputs available.		
XL202	Shear and 1 punch (or gag), single or two-speed operation, feed-to-stop or flying-cut (& punch).		
XL206	Shear and up to 5 punches (or gags), single or two-speed operation, feed-to-stop or flying-cut (& all punches).		
XL212	Shear and up to 11 punches (or gags), single or two-speed operation, feed-to-stop or flying-cut (& all punches).		
XL200H	Hole-Detecting controller, shear only, flying-cut, single or two-speed operation.		
XL202H	Hole-Detecting controller, shear with one gagged punch tool, flying-cut, single or two-speed operation.		
XL206H	Hole-Detecting controller, shear with up to 5 gagged punch tools, flying-cut, single or two-speed operation.		
XL212H	Hole-Detecting controller, shear with up to 11 gagged punch tools, flying-cut, single or two-speed operation.		
XL266	Shear and up to 5 punch presses, two-speed operation, feed-to-stop only.		

Model Options

Model Option	Description
Expanded Gag Board (E)	Allows the XL200 Series controller to communicate with up to 4 additional output cards for controlling machines with a large number of gagged punch tools. This option is only available for model type XL212. See the XL200 Series Auxiliary Devices manual for more details.
Print on Part (P)	Allows the XL200 Series controller to communicate with an industrial printer used for part marking. This option is available for most model types. See the XL200 Series Auxiliary Devices manual for more details.
Bundle Print (B)	Allows the XL200 Series controller to communicate with an industrial printer used for bundle ticket printing. This option is available for most model types. See the XL200 Series Auxiliary Devices manual for more details.
Extended Macro (M)	Allows the user to create and store additional Macro Patterns, more than are available in the standard software model. This option is available for most model types. See the XL200 Series Operator's Guide for more details on programming punch patterns and macro patterns.
Auxiliary Controller (S)	Allows the XL200 Series controller to communicate with one or more auxiliary (slave) controllers. This option may be required for complex shear & punch machines requiring more than one AMS Controls controller. This option is available for most model types. See the XL200 Series Auxiliary Devices manual for more details.
Analog Speed Logic (AA)	Enables the XL200 Series controller's analog output port and provides additional setup parameters. An analog voltage is provided by the controller that can be used to control the roll forming machinery's fast and slow speeds proportional to the current part length. This option is available for most model types.

Model Option	Description
Alternating Press (L)	Allows the XL200 Series controller to control two punch presses in an alternating fashion. The controller is programmed as if there is only one punch press, but automatically alternates targets between two physical presses to provide increased production rates. This option is only available for Model Type XL200.
Multi-Axis (X)	Enables additional fields in the XL200 Series controller's user interface and allows the controller to communicate with other control devices. The intended application for this model option is a machine that includes the capability to re-position machine elements (punch tooling or roll form tooling) based on additional data entered into the XL200 Series controller. This option is available for most model types. See the XL200 Series Auxiliary Devices manual for more details.
PLC Interface (I)	Allows the XL200 Series controller to communicate with a PLC using the industry-standard MODBUS interface. Several additional features are available when this option is enabled including controlling PLC inputs and outputs, displaying PLC diagnostics messages on the XL200 Series controller screen, and publishing high-level run-time data from the controller to the PLC. This option is available for most model types. See the XL200 Series Auxiliary Devices manual for more details.

Combining Model Options

Several model options may be combined together as long as their functionality does not conflict with each other. Some examples of XL200 Series controller software model names are:

- XL200BP – XL200 model type with the Bundle Print and Print on Part model options enabled.
- XL206XI – XL206 model type with the Multi-Axis and PLC Interface options enabled.

- XL212AABEMS – XL212 model type with the Analog Speed Logic, Bundle Printer, Expanded Gag, Extended Macro, and Auxiliary Controller options enabled.

Configuration Switch Settings

Each model type must be configured for one of several different operating modes, depending on the machine's requirements. This is done by setting the controller's configuration dip-switches located on the top panel of the enclosure. There are 10 switches provided, each one can be set to On or Off. The operating functionality determined by these switches varies depending on the controller's model type. The following tables define how the configuration dip-switches are used for each model type.

Model Types: XL200 & XL200H

Switch #	Off	On
1	Material stops for each Shear (cut) operation	Material does NOT stop for each shear (cut) operation
2	Output provided for Shear Die Boost functionality	Output provided for Shear Up functionality
3	Machine does NOT shift into a slow speed prior to each shear (cut) operation	Machine DOES shift into a slow speed prior to each shear (cut) operation
4	Auto-Crop functionality is DISABLED	Auto-Crop functionality is ENABLED (for machines that are incapable of performing a stationary cut)
5	Material stops for each punch operation	Material does NOT stop for each punch operation
6	Output provided for Punch Die Boost functionality	Output provided for Punch Up functionality
7	Machine does NOT shift into a slow speed prior to each punch operation	Machine DOES shift into a slow speed prior to each punch operation
8	Reserved –Set to Off	Reserved –Set to Off
9	SVGA Monitor DISABLED	SVGA Monitor ENABLED
10	Reserved –Set to Off	Reserved –Set to Off

Notes:

- The Shear Boost functionality can not be enabled for a feed-to-stop shear. The Punch Boost functionality can not be enabled for feed-to-stop punch press.
- The Auto-Crop functionality is only available for model type XL200 and can not be enabled when the controller is configured for a punch press.
- Turning off switches 5, 6, and 7 completely disables the punch press functionality.
- Model Type XL200H can not be configured with a punch press and can not be configured to operate in a feed-to-stop mode.
- If no external SVGA monitor is connected, switch 9 should be turned off to improve the appearance of the liquid crystal display.

Model Types: XL202, XL206, XL212, XL202H, XL206H, & XL212H

Switch #	Off	On
1	Material stops for each Shear (& punch) operation	Material does NOT stop for each shear (& punch) operation
2	Reserved –Set to Off	Reserved –Set to Off
3	Machine does NOT shift into a slow speed prior to each shear (& punch) operation	Machine DOES shift into a slow speed prior to each shear (& punch) operation
8	Reserved –Set to Off	Reserved –Set to Off
9	SVGA Monitor DISABLED	SVGA Monitor ENABLED
10	Reserved –Set to Off	Reserved –Set to Off

Switch #4	Switch #5	Switch #6	Switch #7	Total Number of Presses (including the shear)
Off	Off	Off	Off	1
On	Off	Off	Off	2
Off	On	Off	Off	3
On	On	Off	Off	4
Off	Off	On	Off	5
On	Off	On	Off	6
Off	On	On	Off	7
On	On	On	Off	8
Off	Off	Off	On	9
On	Off	Off	On	10
Off	On	Off	On	11
On	On	Off	On	12

Notes:

- Model Types XL202H, XL206H, and XL212H can not be configured with any punch presses and can not be configured to operate in a feed-to-stop mode.
- The maximum number of press and/or gag outputs available for each model type is specified by the last two digits of the model type number (XL202 – 2 outputs, XL206 – 6 outputs, XL212 – 12 outputs). For example: If model type XL206 is configured for a machine with 2 presses (switch #4 On), The XL200 Series controller provides outputs for the shear press, one punch press, and four gagged tools.
- The Shear Boost functionality can not be enabled for a feed-to-stop shear. The Punch Boost functionality can not be enabled for feed-to-stop punch presses.
- Turning off switches 5, 6, and 7 completely disables the functionality or all seven punch presses.
- If no external SVGA monitor is connected, switch 9 should be turned off to improve the appearance of the liquid crystal display.

Model Type: XL266

Switch #	Off	On
4	Reserved –Set to Off	Reserved –Set to Off
5	Reserved –Set to Off	Reserved –Set to Off
6	Reserved –Set to Off	Reserved –Set to Off
7	Reserved –Set to Off	Reserved –Set to Off
8	Reserved –Set to Off	Reserved –Set to Off
9	SVGA Monitor DISABLED	SVGA Monitor ENABLED
10	Reserved –Set to Off	Reserved –Set to Off

Switch #1	Switch #2	Switch #3	Total Number of Presses (including the shear)
Off	Off	Off	1
On	Off	Off	2
Off	On	Off	3
On	On	Off	4
Off	Off	On	5
On	Off	On	6

Notes:

- The total number or presses on the machine includes the exit shear.
- Turning switches 1, 2, and 3 off slows for shear-only operation.
- To enable the entry shear option, the controller must be configured for two or more presses.
- The XL266 model type does not support gagged presses or die boosts.
- If no external SVGA monitor is connected, switch 9 should be turned off to improve the appearance of the liquid crystal display.

Input/Output Definitions

Only after the XL200 Series controller's software model is identified and the configuration dip-switches have been set, the definitions for all inputs and outputs are known. The following tables define how the configuration dip-switches are used for each model type. A description for how each input and output functions is provided in a later chapter.

Model Types: XL200 & XL200H

I/O #	Inputs	Outputs
1	Jog Forward	Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Reserved	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Forward
7	Manual Punch	Reserved
8	Tail Out / Sheet Detect	Part Print Trigger
9	Press 0 (Shear) Complete	Press 0 (Shear) Down
10	Press 1 (Punch) Complete	Press 1 (Punch) Down
11	Reserved	Press 0 (Shear) Up/ Boost
12	Reserved	Press 1 (Punch) Up/ Boost
13	Reserved	Reserved
14	Reserved	Reserved
15	Reserved	Reserved
16	Reserved	Reserved
17	Reserved	Reserved
18	Reserved	Reserved
19	Reserved	Reserved
20	Reserved	Reserved
21	Asynchronous Print Detect	Not Used
22	Manual Stacker	Stacker
23	Reserved	Reserved

24	Hole Detect	Reserved

Notes:

- Input 21 (Asynchronous Print Detect) and Output 8 (Part Print Trigger) are only available when the Print on Part model option is enabled.
- Input 24 (Hole Detect) is only available for model type XL200H.
- All inputs and outputs that pertain to the punch press (press 1) are not active when the controller's configuration dip-switches are set to disable the punch press functionality.

Model Type: XL200L (Alternating Punch Option Enabled)

I/O #	Inputs	Outputs
1	Jog Forward	Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Reserved	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Forward
7	Manual Punch	Reserved
8	Tail Out / Sheet Detect	Part Print Trigger
9	Press 0 (Shear) Complete	Press 0 (Shear) Down
10	Press 1 (Punch) Complete	Press 1 (Punch) Down
11	Press 2 (Punch) Complete	Press 2 (2^{nd} Punch) Down
12	Reserved	Press 0 (Shear) Up/ Boost
13	Reserved	Press 1 (Punch) Up/ Boost
14	Reserved	Press 2 (2^{nd} Punch) Up/ Boost
15	Reserved	Reserved
16	Reserved	Reserved
17	Reserved	Reserved
18	Reserved	Reserved
19	Reserved	Reserved
20	Reserved	Reserved
21	Asynchronous Print Detect	Not Used
22	Manual Stacker	Stacker
23	Reserved	Reserved
24	Reserved	Reserved

Notes:

- Input 21 (Asynchronous Print Detect) and Output 8 (Part Print Trigger) are only available when the Print on Part model option is enabled.
- Input 24 (Hole Detect) is only available for model type XL200H.

- All inputs and outputs that pertain to the punch press (press 1) are not active when the controller's configuration dip-switches are set to disable the punch press functionality.

Model Types: XL202 & XL202H

I/O #	Inputs	Outputs
1	Jog Forward	Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Reserved	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Forward
7	Manual Punch	Reserved
8	Tail Out / Sheet Detect	Part Print Trigger
9	Press 0 (Shear) Complete	Press 0 (Shear) Down
10	Press 1 Complete	Press 1 Down | Gag 1
11	Reserved	Reserved
12	Reserved	Reserved
13	Reserved	Reserved
14	Reserved	Reserved
15	Reserved	Reserved
16	Reserved	Reserved
17	Reserved	Reserved
18	Reserved	Reserved
19	Reserved	Reserved
20	Reserved	Reserved
21	Asynchronous Print Detect	Not Used
22	Manual Stacker	Stacker
23	Reserved	Reserved
24	Hole Detect	Reserved

Notes:

- Input 21 (Asynchronous Print Detect) and Output 8 (Part Print Trigger) are only available when the Print on Part model option is enabled.
- Input 24 (Hole Detect) is only available for model type XL202H.
- Output 10 (Press 1 Down | Gag 1) functions as the Press 1 Down output when the controller is configured for two presses, otherwise it functions as a gag output.
- Input 10 (Press 1 Complete) is only active when the controller is configured for two presses.

Model Types: XL206 & XL206H

I/O #	Inputs	Outputs
1	Jog Forward	Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Reserved	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Forward
7	Manual Punch	Reserved
8	Tail Out / Sheet Detect	Part Print Trigger
9	Press 0 (Shear) Complete	Press 0 (Shear) Down
10	Press 1 Complete	Press 1 Down| Gag 1
11	Press 2 Complete	Press 2 Down| Gag 2
12	Press 3 Complete	Press 3 Down| Gag 3
13	Press 4 Complete	Press 4 Down| Gag 4
14	Press 5 Complete	Press 5 Down| Gag 5
15	Reserved	Reserved
16	Reserved	Reserved
17	Reserved	Reserved
18	Reserved	Reserved
19	Reserved	Reserved
20	Reserved	Reserved
21	Asynchronous Print Detect	Not Used
22	Manual Stacker	Stacker
23	Reserved	Reserved
24	Hole Detect	Reserved

Notes:

- Input 21 (Asynchronous Print Detect) and Output 8 (Part Print Trigger) are only available when the Print on Part model option is enabled.
- Input 24 (Hole Detect) is only available for model type XL206H.

- The controller will provide as many Press Down outputs as required based on the number of presses defined by the configuration dip-switch setting. The remaining outputs will be defined as gags.
- The controller will provide as many Press Complete inputs as required based on the number of presses defined by the configuration dip-switch setting. The remaining inputs will be unused.

Model Types: XL212 & XL212H

I/O #	Inputs	Outputs
1	Jog Forward	Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Reserved	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Forward
7	Manual Punch	Reserved
8	Tail Out / Sheet Detect	Part Print Trigger
9	Press 0 (Shear) Complete	Press 0 (Shear) Down
10	Press 1 Complete	Press 1 Down| Gag 1
11	Press 2 Complete	Press 2 Down| Gag 2
12	Press 3 Complete	Press 3 Down| Gag 3
13	Press 4 Complete	Press 4 Down| Gag 4
14	Press 5 Complete	Press 5 Down| Gag 5
15	Press 6 Complete	Press 6 Down| Gag 6
16	Press 7 Complete	Press 7 Down| Gag 7
17	Press 8 Complete	Press 8 Down| Gag 8
18	Press 9 Complete	Press 9 Down| Gag 9
19	Press 10 Complete	Press 10 Down| Gag 10
20	Press 11 Complete	Press 11 Down| Gag 11
21	Asynchronous Print Detect	Not Used
22	Manual Stacker	Stacker
23	Reserved	Reserved
24	Hole Detect	Reserved

Notes:

- Input 21 (Asynchronous Print Detect) and Output 8 (Part Print Trigger) are only available when the Print on Part model option is enabled.
- Input 24 (Hole Detect) is only available for model type XL212H.

- The controller will provide as many Press Down outputs as required based on the number of presses defined by the configuration dip-switch setting. The remaining outputs will be defined as gags.
- The controller will provide as many Press Complete inputs as required based on the number of presses defined by the configuration dip-switch setting. The remaining inputs will be unused.

Model Type: XL200DLP (with the Alternating Punch & Print on Part Options Enabled)

I/O #	Inputs	Outputs
1	Jog Forward	Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Reserved	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Forward
7	Manual Punch	Reserved
8	Tail Out / Sheet Detect	Part Print Trigger
9	Press 0 (Shear) Complete	Press 0 (Shear) Down
10	Press 1 (Punch) Complete	Press 1 (Punch) Down
11	Press 2 (Punch) Complete	Press 2 (2nd Punch) Down
12	Reserved	Press 0 (Shear) Up/ Boost
13	Reserved	Press 1 (Punch) Up/ Boost
14	Reserved	Press 2 (2nd Punch) Up/ Boost
15	Reserved	Reserved
16	Reserved	Reserved
17	Reserved	Reserved
18	Reserved	Reserved
19	Reserved	Reserved
20	Reserved	Reserved
21	Manual Press 2	Not Used
22	Manual Stacker	Stacker
23	Asynchronous Print Detect	Scanner Verify
24	Reserved	Horn

Notes:

- All inputs and outputs that pertain to the punch presses are not active when the controller's configuration dip-switches are set to disable the punch press functionality.

- Input 24 (Asynchronous Print Detect) and Output 6 (Part Print Trigger) are only available when the Print on Part model option is enabled.

Model Type: XL266

I/O #	Inputs	Outputs
1	Jog Forward	Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Manual Press 2	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Forward
7	Manual Punch 1	Reserved
8	Tail Out / Sheet Detect	Part Print Trigger
9	Press 0 (Shear) Complete	Press 0 (Shear) Down
10	Press 1 Complete	Press 1 Down
11	Press 2 Complete	Press 2 Down
12	Press 3 Complete	Press 3 Down
13	Press 4 Complete	Press 4 Down
14	Press 5 Complete	Press 5 Down
15	Press 0 (Shear) Up Complete	Press 0 (Shear) Up
16	Press 1 Up Complete	Press 1 Up
17	Press 2 Up Complete	Press 2 Up
18	Press 3 Up Complete	Press 3 Up
19	Press 4 Up Complete	Press 4 Up
20	Press 5 Up Complete	Press 5 Up
21	Asynchronous Print Detect	Reserved
22	Manual Stacker	Stacker
23	Stacker Complete	Reserved
24	Hole Detect	Reserved

Notes:

- Input 21 (Asynchronous Print Detect) and Output 8 (Part Print Trigger) are only available when the Print on Part model option is enabled.
- The controller will provide as many Press Down outputs as required based on the number of presses defined by the configuration dip-switch setting. The remaining outputs will be unused.
- The controller will provide as many Press Complete and Press Up Complete inputs as required based on the number of presses defined by the configuration dip-switch setting. The remaining inputs will be unused.

Chapter 4: Hardware & Installation

General Information

WARNING! This document is intended for users familiar with electrical control system wiring, cabinet layout, and component sizing, as well as local and national electrical codes. The procedures described in this handbook must be performed only by trained, certified industrial electricians in accordance with local, state, federal, and NEC codes and regulations. While AMS Controls has taken all reasonable care to develop safe procedures, it accepts no responsibility for injuries, damages, death, or destruction to persons or equipment caused as a result of not closely following these instructions. For specific controller questions, contact AMS Controls Inc.

Hardware Configuration & Connections

The XL200 Series controller is available in two hardware configurations:

- Sinking Outputs with Sourcing Inputs (standard) – identified with green connectors.
- Sourcing Outputs with Sinking Inputs (optional) – identified with black connectors.

The XL200 Series controller has six 16-pin terminal-style connectors on its back surface and several additional interface ports on its top surface. Figure 5 through Figure 6 show the controller's keypad and display, and the locations of all of the various connections.

Figure 3: XL200 Series Controller - Front View

Back Panel Connections

Figure 4: XL200 Series Controller - Back View

The six connectors on the back surface provide the following connection points:

- Connector A - 24VDC CPU Power Supply input, Encoder 1 input, Encoder 2 input.
- Connector B – 24VDC I/O Power Supply input, Analog 1 output, Analog 2 output, Comm. Port-A (RS485), Comm. Port-B (RS485).

- Connector C – General Purpose Inputs 1-15.
- Connector D – General Purpose Inputs 16-24, I/O Common, Comm. Port-C (RS422).
- Connector E – General Purpose Outputs 1-15, I/O Common.
- Connector F – General Purpose Outputs 16-24, I/O Common, Comm. Port-D (RS422).
- Six user-accessible fuses are provided to protect the controller CPU power supply and input/output circuits.

Additional Connections

Figure 5: XL200 Series Controller - Top View

The interface ports on top provide the following connection points:

- SVGA Port (15-pin) - for connection to an industry-standard SVGA monitor.
- Scanner/Debugger Port (RS232, 9-pin) - for connection to an AMS-approved barcode scanner. This port is also used for updating the controller's firmware (a laptop computer with the appropriate software application required).
- Mouse – for connection of any industry-standard PS/2 mouse.
- Keyboard – for connection of any industry-standard PS/2 keyboard.
- SERCOS Transmitter/Receive/Power Indicator – for connection to servo drives and other devices on an industry-standard SERCOS fiber-optic communications network.

Power Requirements

CPU Power Supply

A high-quality, regulated supply is recommended for use with the XL200 Series controller.

- 24 Volts DC (+/- 10%)
- 2.5 Amps, minimum

I/O Power Supply

A separate, non-regulated power supply is sufficient for the Input/Output supply voltage.

Note: Power supplies must not be shared—otherwise, there can be no optical isolation.

This power supply should be properly sized based on the load requirements for all output devices connected to the XL200 Series controller. Typical output devices include, motor contactors, relays, and valve solenoids. Each device has its own power requirements that will determine the size requirements for the I/O power supply.

Refer to *Appendix A. Specifications* for all other power requirements.

Electrical Interface

Refer to *Figure 28: XL200 Cutout Dimensions* (page 122) for the pane cutout drawing and *Appendix A:*

Diagrams (page 125) for examples of typical XL200 Series controller wiring diagrams.

Encoder Installation

Mounting the encoder properly is the most important aspect of the XL200 Series controller installation because accurate material tracking is required for the controller to produce consistently accurate parts. Here are few guidelines to consider when installing the material-tracking encoder with an XL200 Series controller:

Encoder Placement

AMS Controls recommends that the encoder be located in a position where the material is stable, free from excessive vibration, and not exposed to a large amount of liquid coolant. The distance from the encoder to the cut-off press must not fluctuate, and kept as short as possible. Locate the encoder on a flat section of material where the entire surface of the wheel makes contact with the material; avoid tracking on curved or arced surfaces.

Whenever possible, the encoder wheel should ride directly on the material. In some applications where space is limited, extra couplers, belts, or shaft extenders are required for the encoder wheel to reach the material. Extra care should then be taken to ensure that no slippage or backlash can occur in the coupling mechanism.

Encoder Mounting and Alignment

The encoder wheel should turn perfectly parallel to the direction of material flow. The face of the wheel should be mounted at a 90 degree angle from the surface of the material it is tracking. Figure 6 illustrates several examples of improper encoder mounting.

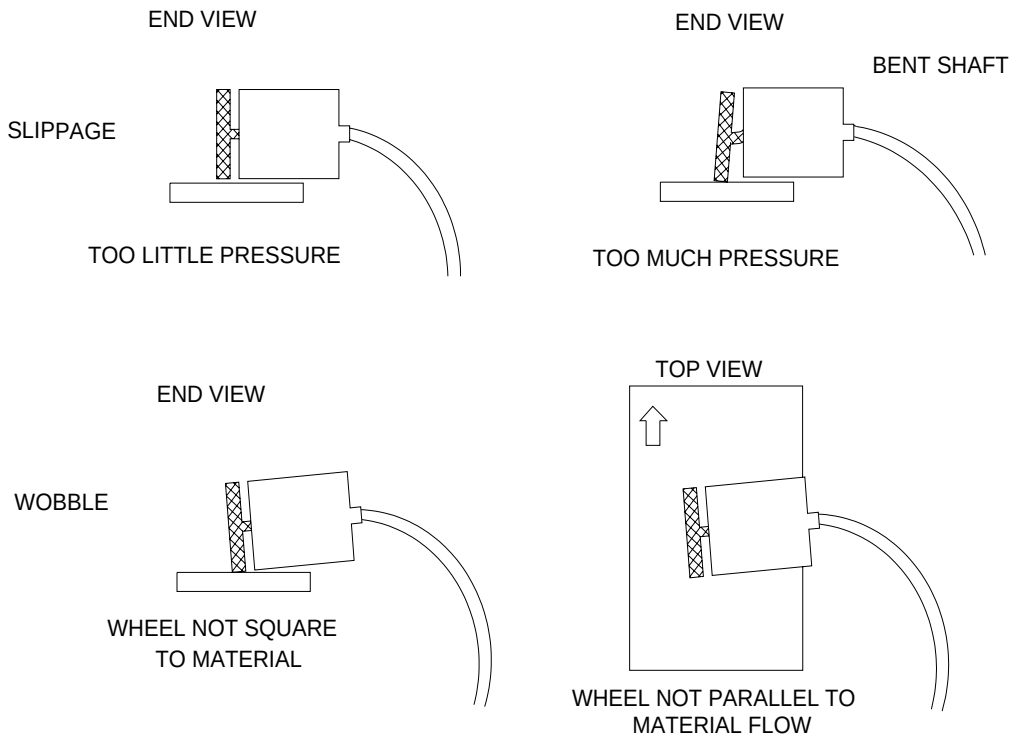


Figure 6: Improper Encoder Mounting

For best results, the encoder wheel to should be able to float up and down with the material,

Mount the encoder wheel using a tensioning system (spring tension, pneumatic pressure, or a weighting device) to apply adjustable and controlled pressure between the encoder wheel and the material, This way, the encoder wheel can move with the material's fluctuations, yet continue to track the surface without slippage.

Note: 7-10 pounds per square inch of pressure is recommended for proper material tracking--excessive pressure causes binding in the encoder bearing, or causes the shaft to bend over time.

Some applications may require special mounting hardware and special types of tracking wheels. The encoder wheel may need to be mounted onto the surface of a feed roll or straightener roll, or the encoder itself may need to be mounted onto the end of a roll. Tracking in this method may provide the desired results, but also creates potential for slippage between the rolls and the material, costing accuracy—appropriate precautions must be taken.

AMS Controls Encoders, Wheels, & Brackets

AMS Controls provides specially designed encoders, wheels, and mounting brackets for use with all XL200 Series controllers.

Chapter 5: Input & Output Descriptions

Although the XL200 Series controller's Input & Output definitions vary based on the software model and configuration dip-switch settings, their functionality generally remains consistent.

This chapter lists and describes the valid inputs and outputs.

Inputs

Jog Forward

Jog Forward jogs the material forward through the machine. The XL200 Series controller ignores this input if it goes active while the controller is in the run mode. The controller will turn on its Slow and Forward outputs for as long as the Jog Forward input is activated. This Jog Forward input is typically activated by a momentary push-button.

Jog Reverse

Jog Reverse jogs the material backward through the machine. The XL200 Series controller ignores this input if it goes active while the controller is in the run mode. The controller will turn on its Slow and Reverse outputs for as long as the Jog Reverse input is activated. The Jog Reverse input is typically activated by a momentary push-button.

Run

Run causes the XL200 Series controller to enter and exit the run mode. When activated, the controller enters the run mode as long as valid order data is programmed and no error conditions are detected (See the XL200 Series Operator's guide for more details about entering the Run Mode). The controller exits the run mode any time this input goes in-active. The Run input is typically initiated by a momentary push-button, but is latched-in (maintained) by a control relay tied to the controller's Run Output.

Shear Complete

The *Shear Complete* is an input that should go momentarily active when the shear is at the bottom of its stroke. Typically this input is wired to a limit switch, cam switch, proximity switch, or similar device. The use of the input is optional. Its function is to force the controller's Shear Down output to turn off before the programmed Shear Dwell Down time elapses. This can be used to prevent a hydraulic shear press from over-driving (bottoming-out) or to help a mechanical press to stop at top-dead-center following each cycle. If the Shear Complete input is not used, the controller leaves the Shear Down output active for the entire Shear Dwell Down time during each shear cycle.

Shear Up Complete

The *Shear Up Complete* input is only available for Model Type XL266. The Shear Up Complete is an input that should go active when the shear is at the top of its stroke. Typically this input is wired to a limit switch, cam switch, proximity switch, or similar device. The use of the input is optional. Its function is to force the controller's Shear Up output to turn off before the programmed Shear Dwell Up time elapses. This can be used to prevent the material from feeding if the shear press fails to return to its top-of-stroke position. If the Shear Up Complete input is not used, the controller leaves the Shear Up output active for the entire Shear Dwell Up time during each shear cycle.

Setup Lockout

The *Setup Lockout* input is used to prevent personnel from accessing critical data in the XL200 Series controller. When active, machine operator is not allowed to change most setup parameter and is restricted from performing certain functions. The Setup Lockout is typically wired to a key-switch and it is recommended that the key be held by a maintenance supervisor.

Manual Shear

The *Manual Shear* input causes the XL200 Series controller to cycle the shear press and manually crop off any material that is under the shear blade. This process also references the controller to the material encoder and sets the controller's encoder position to a known value. On some systems, the manual shear cycle must be executed twice to reference the encoder's position. See the XL200 Series Operator's Guide for more details. The Manual Shear input is not allowed while the controller is in the run mode (unless the controller is configured

for a shear-only machine) but is always allowed while the controller is halted. The Manual Shear input is typically wired to a momentary push-button.

Manual Punch

Only available on XL200 Series controllers that are configured for one or more punch presses and/or one or more gagged presses, the *Manual Punch* input causes the controller activate one its press outputs and execute a press cycle. Which press output turns on may depend on the value of a setup parameter Tool Selected for Manual Press. A manual press cycle is not allowed while the controller is in the run mode. This input is typically wired to a momentary push-button.

Coil Tail-out (Sheet Detect)

The *Coil Tail-out* input detects the presence of material in the machine and "qualifies" the encoder signal. Its functionality can be though of as an inverted sheet detect. It should be wired such that the input goes in-active when the leading edge of the material (coil) is loaded into the machine. The input should go active when the trailing edge of the material exits the machine (when the coil tails out). The use of this input is optional and it left unconnected the controller will think that there is always material present. Using this input along with the accompanying setup parameter Shear-to-Encoder Distance allows the controller to keep track of good and scrap material during the coil loading and tail-out processes. This input is typically wired to a photo-cell, and the sensor should be locates just after the encoder

Press (n) Complete

The XL200 Series controller provides a *Press Complete* input for each press on the machine based on the software model type and configuration dip-switch settings. Each Press Complete input functions similar to how the Shear Complete input works. The Press Complete input should go active momentarily when the corresponding press is at the bottom of its stroke. When the input goes active, it causes the controller to turn off the corresponding Press Down output before the programmed Press Dwell Down time has elapsed. Use of this input is optional, but it may be required on mechanical presses to cause the press to stop at top-dead-center after each cycle. See the description for the Shear Complete input for more details.

Press (n) Up Complete

Only available for Model Type XL266, the XL200 Series controller provides a *Press Up Complete* input for each press on the machine based on the software model type and configuration dip-switch settings. Each Press Up Complete input functions similar to how the Shear Up Complete input works. The input should go active when the press is at the top of its stroke. Typically this input is wired to a limit switch, cam switch, proximity switch, or similar device. The use of the input is optional. Its function is to force the controller's Press Up output to turn off before the programmed Press Dwell Up time elapses. This can be used to prevent the material from feeding if any punch press fails to return to its top-of-stroke position. If the Press Up Complete input is not used, the controller leaves the Pres Up output active for the entire Press Dwell Up time during each press cycle.

Manual Stacker

The *Manual Stacker* input causes the XL200 Series controller to initiate the stacker function. The controller's Stacker output turns on for the specified time and the stacker part counter is reset. This input is typically wired to a momentary push-button.

Asynchronous Print Detect

Only available when the Print-on-Part model option is enabled and when a print driver that supports asynchronous printing is selected, the *Asynchronous Print Detect* input is used to detect the pre-cut sheet whenever a part printer is located down-stream from the shear press. When it goes active, the XL200 Series controller activates its Part Print Trigger output causing the part printer to print its current message, then sends a new message to the printer to be applied to the next part. A photo-cell is typically used for this function.

Hole Detect

Only available for model types XL200H, XL202H, XL206H, and XL212H, the *Hole Detect* input is used to sense a pre-punched hole or notch in the material to be used as a reference point for the next cut-off target. This input is typically wired to a high-speed photo-cell with a fast response time.

Outputs

Fast, Slow, Reverse, and Forward

These four outputs are referred to as the motion outputs of the XL200 Series controller. They are intended to control the motion of the machine. The table below describes the state of each of these outputs while the controller is in various operating modes:

Operating Mode	Fast Output	Slow Output	Reverse Output	Forward Output	Run Output
Halted	Off	Off/On*	Off	Off	Off
Jog Forward	Off	On	Off	On	Off
Jog Reverse	Off	On	On	Off	Off
Run (Fast Speed)	On	Off	Off	On	On
Run (Slow Speed)	Off	On	Off	On	On

Note: The Slow output may remain On based on the value of a setup parameter Slow Output While Halted.

Run

The *Run* output should be used only to latch in the controller's run input circuit and to activate safety devices such as horns or indicator lights to indicate when the controller is in the Run Mode. The output turns on after the controller's Run input has been activated only if there is valid job data entered and there are not error conditions that prevent the controller from entering the run mode. This output should NOT to be used to control actual material motion.

Shear/Press Down

The *Shear/Press* outputs are connected directly or indirectly to solenoids that force a shear or punch press to move in the downward direction. This output is a timed output that remains active for the length of time specified by the

controller's setup parameter Shear Dwell Down or Press Dwell Down unless over-ridden by the corresponding Shear/Press Complete input.

Shear/Press Up

The *Shear/Press Up* outputs may be available depending on the XL200 Series controller's software model and configuration dip-switch setting. The output should be directly connected to a solenoid that drives the shear/punch press upward during the return stroke of its cycle. This is a timed output that remains on for the programmed Shear/Press Dwell Up time in the controller's setup parameter list.

Shear/Press Die Boost

The *Shear/Press Die Boost* outputs may be available depending on the XL200 Series controller's software model and configuration dip-switch setting. It is applicable for shear/punch presses that activate on-the-fly (without the material stopping for the operation) and that require a device that boosts (or pushes) the die forward in the direction the material is moving. The output should be directly or indirectly connected to a solenoid that activates the boosting device. This is a timed output that remains on for the programmed Shear/Press Boost Dwell time in the controller's setup parameter list.

Item Complete

The XL200 Series controller activates the *Item Complete* output during the run mode each time a programmed line item has been completed. This is a timed output that remains active for the length of time specified by the setup parameter Item Complete Dwell. The output can be used for a variety of functions, but is typically connected to the input of a PLC that may be controlling some downstream packaging equipment or other processing.

Stacker

The *Stacker* output is activated as part of the controller's Indexer/Stacker function whenever the stacker part count is reached or the counter is reset. The output is intended to be connected to some type of automated part stacking equipment. It is a timed output that remains active for the length of time specified by the setup parameter Stacker Dwell.

Signal Ports

Analog Output #1 (Proportional to Line Velocity)

A 0-10 Volt analog output signal is generated that is directly proportional to the current line speed as measured by the material encoder. The setup parameter Velocity at Max Analog Voltage determines the scaling factor for this proportional output voltage with respect to the current line velocity.

Analog Output #2 (Analog Speed Logic)

This function is only active when the Analog Speed Logic model option is enabled. A 0-10 Volt analog output signal is generated that is intended to control the speed of the roll former. Several additional setup parameters are provided when this model option is enabled that are used to set this analog output to specific voltage levels for fast, slow, and jog speeds. The voltage may also be set up so that it is proportional to the current part length being produced (for applications where it is desirable to run the machine at a faster speed while making longer parts).

Comm. Port "A" (RS485 Eclipse Port)

This RS485, serial communication port is solely intended to be connected to an office computer running the AMS Controls Eclipse software application. See the Eclipse User's/Installation guides for more details.

Comm. Port "B" (RS485 Auxiliary Port)

This RS485 serial communication port can be connected to a variety of auxiliary devices including Bundle Tag and Part Printer interface cards, AMS Controls Auxiliary Controllers, and Expansion Gag Boards. See the XL200 Series Auxiliary Devices manual for more details.

Comm. Port "C" (RS422 High Speed Port)

This is RS422, High-Speed communication port can be connected to time-critical devices that comply with the AMS Controls High-Speed Bus specification. Such devices include the AMS Controls SERCOS-PC for use on multi-axis machine applications.

Comm. Port "D" (RS422 High Speed Port)

This RS422 High-Speed communication port can be connected to a PLC that complies with the industry-standard MODBUS serial communication specification. See the XL200 Series Auxiliary Devices manual for more details.

Chapter 6: Setup Parameters

Once the XL200 Series controller has been customized with a specific software model and a unique configuration dip-switch setting, it still must be tailored to the machine's operation using setup parameters.

Most setup parameters are determined and entered during the controller installation process and are not usually changed during normal operation. This chapter provides a complete listing of all possible setup parameters in the XL200 Series controller; however, not all parameters apply to each software model and dip-switch configuration.

Setup Screen

The XL200 Series controller's setup parameters are accessed from the *Setup screen* (for details on how to navigate the controller's screens and menus, and on how to enter numeric and non-numeric data, see the XL200 Series Operator's Guide).

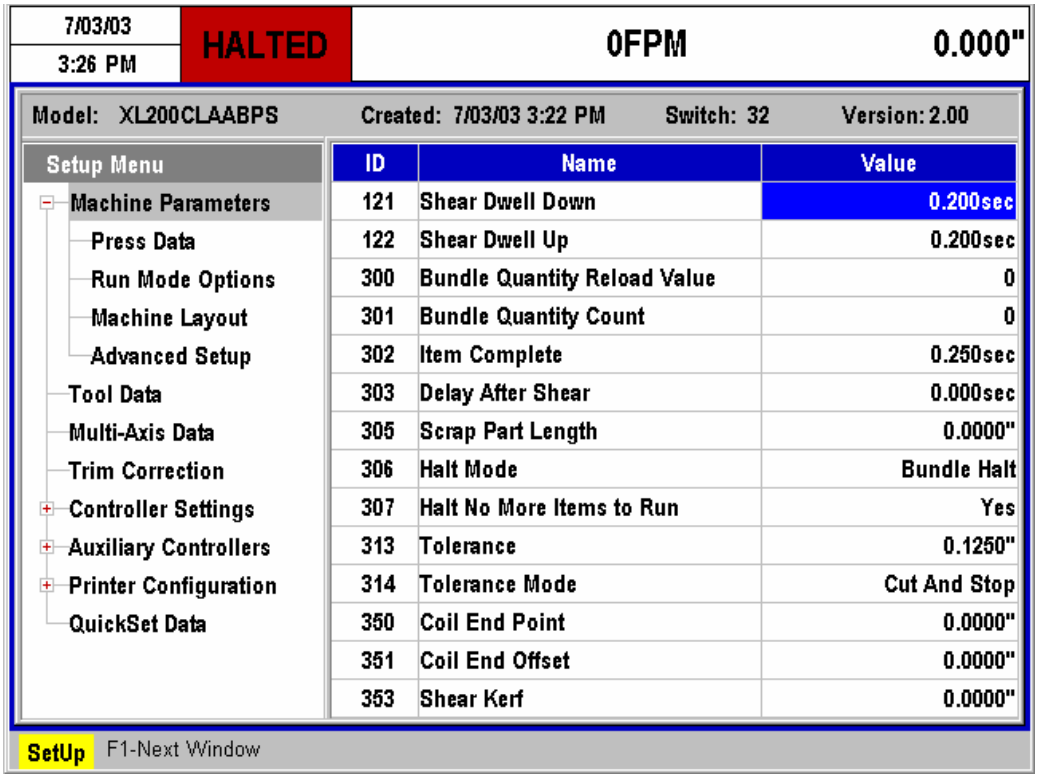


Figure 7: Setup screen

The Setup screen is divided into two sections. Menus are listed in the right-hand section, while the parameters for the selected menu display in the right-hand section.

This section lists and describes the most commonly used menus and their parameters.

Machine Parameters Menu

Select the **Machine Parameters** menu to display the parameters that affect the operation of the machine, including press timing, machine layout dimensions, and run mode options.

Press Data

Includes setup parameters that are related to the operation and timing of the shear and punch press or presses.

Shear Dwell Down

ID: 121
Range: 0.001 to 30.000 Seconds
Applies to: All configurations

The Shear Dwell Down parameter defines the length of time that the controller turns on the Shear Down output during a manual or automatic shear cycle. This may be set to the exact time necessary to move the shear die from the top of its stroke to the bottom, or it could be set to a value longer than necessary if the Shear Complete input is used to override the timer.

See Also: Shear Dwell Up, Shear Reaction, Expect Shear Complete, Shear Complete Input.

Shear Dwell Up

ID: 122
Range: 0.000 to 30.000 Seconds
Applies to: Configurations with the Shear Boost output disabled

The *Shear Dwell Up* parameter defines the length of time the controller turns on the Shear Up output during a manual or automatic shear cycle. This is typically the time necessary for the shear die to return from the bottom to the top of its stroke. For models where the Shear Up output is unavailable the controller pauses for this length of time during an automatic shear cycle to allow the die to return to the top of stroke.

See Also: Shear Dwell Up, Shear Reaction, Expect Shear Complete, Shear/Press Cycle Timing.

Shear Boost Dwell

ID: 123
Range: 0.000 to 9.999 Seconds
Applies to: Flying-Cutoff configurations with Shear Boost enabled

The *Shear Boost Dwell* parameter defines the length of time the controller turns on the Shear Boost output during an automatic shear cycle.

See Also: Shear Dwell Down, Shear/Press Cycle Timing.

Shear Reaction

ID: 124
Range: 0.000 to 1.000 Seconds
Applies to: Flying-Cutoff Configurations

The *Shear Reaction* parameter is used to compensate for the time delay between the instant that the controller's Shear Down output turns on and when the shear die makes contact with the material. The effect is that the Shear Down output turns on early by this amount of time during an automatic shear cycle before the programmed cutoff target is reached. Properly setting the Shear Reaction parameter helps to avoid the common problem of the first piece is too long following a standing (manual) cut.

See Also: Shear Dwell Down, Shear/Press Cycle Timing.

Shear Boost Reaction

ID: 125
Range: 0.000 to 1.000Seconds
Applies to: Flying-Cutoff configurations with Shear Boost enabled

The *Shear Boost Reaction* parameter defines the amount of time by which the Shear Boost output turns on early with respect to the programmed cutoff target during an automatic shear cycle. It is often used to activate the boosting device BEFORE the Shear Down output is turned on in order to get the shear die moving before the cut cycle is initiated.

See Also: Shear Boost Dwell, Shear Reaction, Shear/Press Cycle Timing.

Shear Boost Enable Velocity

ID: 126
Range: 0 to 1000 Feet/Min
Applies to: Flying-Cutoff configurations with Shear Boost enabled

The *Shear Boost Enable Velocity* parameter defines the lowest line velocity at which the Shear Boost output becomes functional. This parameter typically prevents the Shear Boost output from turning on during an automatic shear cycle if the line is running too slow. If the line speed is less than this value, the Shear Boost output will not turn on during the shear cycle. A value of 0 enables the Shear Boost functionality at any line speed.

See Also: Shear Boost Dwell, Shear Boost Output, Shear/Press Cycle Timing.

Expect Shear Complete

ID: 127
Selections: Yes/No
Applies to: All configurations

Setting this parameter to Yes causes the controller to display an error message (and drop out of the run mode) if the Shear Dwell Down timer expires before the Shear Complete input goes active during a manual or automatic shear cycle. Using this functionality with a properly mounted Shear Complete switch provides a method to guarantee that the shear die completely cuts through the material during each cycle.

Note: This functionality was provided in previous controller software versions by setting the Shear Dwell Down parameter to 0.000 seconds.

See Also: Shear Dwell Down, Shear Complete Input, Shear/Press Cycle Timing.

Expect Shear Up Complete

ID: 128
Selections: Yes/No
Applies to: Model Type XL266 Only

Setting this parameter to Yes causes the controller to display an error message (and drop out of the run mode) if the Shear Dwell Up timer expires before the Shear Up Complete input goes active during a manual or automatic shear cycle. Using this functionality with a properly mounted Shear Up Complete switch provides a method to guarantee that the shear die has returned to its top of stroke position before the material is fed for the next programmed target.

See Also: Shear Dwell Up, Shear Up Complete Input, Shear/Press Cycle Timing.

Press (n) Dwell Down

ID: 131,141,151,161,171,181,191,201,211,221,231
Range: 0.001 to 30.000 Seconds
Applies to: Configurations including one or more punch presses

The XL200 Series controller provides one Press (n) Dwell Down setup parameter for each punch press on the machine based on the model type and configuration switch setting. The functionality is very similar to that of the Shear Dwell Down parameter, only with respect to a punch press.

See Also: Shear Dwell Down.

Press (n) Dwell Up

ID: 132,142,152,162,172,182,192,202,212,222,232
Range: 0.001 to 30.000 Seconds
Applies to: Configurations including one or more punch presses when Press Boost outputs are disabled

The XL200 Series controller provides one *Press (n) Dwell Up* setup parameter for each punch press on the machine based on the model type and configuration switch setting. The functionality is very similar to that of the Shear Dwell Up parameter, only with respect to a punch press.

See Also: Shear Dwell Up.

Press (n) Boost Dwell

ID: 133,143,153,163,173,183,193,203,213,223,233
Range: 0.000 to 9.999 Seconds
Applies to: All configurations including one or more punch presses in non-stopping mode with Press Boost output(s) enabled

The XL200 Series controller provides one *Press (n) Boost Dwell* setup parameter for each punch press on the machine based on the model type and configuration switch setting. The functionality is very similar to that of the Shear Boost Dwell parameter, only with respect to a punch press.

See Also: Shear Boost Dwell.

Press (n) Reaction

ID: 134,144,154,164,174,184,194,204,214,224,234
Range: 0.000 to 1.000 Seconds
Applies to: All configurations including one or more punch presses in non-stopping mode

The XL200 Series controller provides one *Press (n) Reaction* setup parameter for each punch press on the machine based on the model type and configuration switch setting. The functionality is very similar to that of the Shear Reaction parameter, only with respect to a punch press.

See Also: Shear Reaction.

Press (n) Boost Reaction

ID: 135,145,155,165,175,185,195,205,215,225,235
Range: 0.000 to 1.000 Seconds
Applies to: All configurations including one or more punch presses in non-stopping mode

The XL200 Series controller provides one *Press (n) Boost Reaction* setup parameter for each punch press on the machine based on the model type and configuration switch setting. The functionality is very similar to that of the Shear Boost Reaction parameter, only with respect to a punch press.

See Also: Shear Boost Reaction.

Press (n) Boost Enable Velocity

ID: 136,146,156,166,176,186,196,206,216,226,236
Range: 0 to 1000 Feet/Min
Applies to: All configurations including one or more punch presses in non-stopping mode

The XL200 Series controller provides one *Press (n) Boost Enable Velocity* setup parameter for each punch press on the machine based on the model type and configuration switch setting. The functionality is very similar to that of the Shear Boost Enable Velocity parameter, only with respect to a punch press.

See Also: Shear Boost Enable Velocity.

Expect Press Complete (n)

ID: 137,147,157,167,177,187,197,207,217,227,237
Selections: Yes/No
Applies to: All configurations including one or more punch presses

The XL200 Series controller provides one *Expect Press Complete (n)* setup parameter for each punch press on the machine based on the model type and configuration switch setting. The functionality is very similar to that of the Expect Shear Complete parameter, only with respect to a punch press.

See Also: Expect Shear Complete.

Expect Press Up Complete (n)

ID: 138,148,158,168,178
Selections: Yes/No
Applies to: Model Type XL266 Only when configured for one or more punch presses

The XL200 Series controller provides one *Expect Press Up Complete (n)* setup parameter for each punch press on the machine based on the model type and configuration switch setting. The functionality is very similar to that of the Expect Shear Up Complete parameter, only with respect to a punch press.

See Also: Expect Shear Up Complete.

Tool Selected for Manual Punch

ID: 260
Range: 0 to 999 (Tool ID)
Applies to: All configurations for model types XL202, XL202H, XL206, XL206H, XL212, XL212H, and XL266. Also, any configuration where the Alternating Press (L) model option is enabled.

The *Tool Selected for Manual Punch* parameter determines which tool is activated (and thus which press and gag outputs turn on) whenever the Manual Press input is activated. This parameter allows the controller to activate any of the tools that are defined in the Tool Data screen without requiring an individual Manual Press input for each tool or press. This functionality can be especially useful while troubleshooting individual tools on presses containing multiple gagged tools.

See Also: Manual Press (Punch) input, Tool Data.

Run Mode Options

Bundle Quantity Reload Value

ID: 300
Range: 0 to 9999 (Quantity of Parts)
Applies to: All configurations

The *Bundle Quantity Reload Value* parameter forces the controller to exit the run mode each time a pre-determined number of pieces are cut off, to allow the machine operator time to package a bundle.

For example, if a production run requires a large number of parts to be run, and the operator wants the machine to stop after every 50 pieces, set this parameter to 50. After the controller cuts 50 pieces, the machine will stop and the Bundle Quantity Counter gets reloaded to 50. Entering a value of 0 (zero) disables the Bundle Quantity Counter feature.

Note: The controller still exits the run mode at other appropriate times, depending on the Halt Mode setup parameter.

See Also: Bundle Quantity Count, Halt Mode

Bundle Quantity Count

ID: 301
Range: 0 to 9999 (Quantity of Parts)
Applies to: All configurations

Used in conjunction with the *Bundle Quantity Reload* parameter, the *Bundle Quantity Count* parameter creates additional bundle stops. The Bundle Quantity Count displays the running total (a decrementing counter) of parts remaining before the next bundle stop. As soon as this value decrements to zero, the machine halts and this counter is re-loaded with the Bundle Quantity Reload Value.

See Also: Bundle Quantity Reload Value, Halt Mode

Item Complete

ID: 302
Range: 0.000 to 64.000 Seconds
Applies to: All configurations except model type XL255

The *Item Complete* parameter defines the length of time that the Item complete output turns on at the completion of each Item while the controller is in the run mode. This output is often used to machinery running (an exit conveyor, for example) for a given length of time after the last part of an item has been produced the controller has exited the run mode.

See Also: Item Complete output.

Delay After Shear

ID: 303
Range: 0.000 to 64.000 Seconds
Applies to: All configurations

The *Delay After Shear* parameter defines the length of time that the controller waits after each automatic shear cycle before turning on the motion outputs to start feeding the next part. This is typically used to create separation between parts and allows time for an exit conveyor to move the last cut part out of the way before a new part begins to feed.

Note: The controller remains in the run mode during this delay period and the Run output remains active.

Minimum Slow Distance

ID: 304
Range: 0.000 to 100.000 Inches
Applies to: Any configuration configured for two-speed operation

The *Minimum Slow Distance* parameter defines the minimum distance prior to each punch and cutoff target that the controller commands the machine to shift from fast to slow speed. The speed shift point may occur even earlier than this distance depending on the Deceleration Mode setup parameter.

For best accuracy, the Minimum Slow Distance should be set large enough so that the machine is able to de-accelerate to a consistent, stable slow speed before the current punch or cutoff target is reached.

See Also: Deceleration Mode, Deceleration Factor

Scrap Part Length

ID: 305
Range: 0.000 to 1000.000 Inches
Applies to: Any configuration that supports punching

The *Scrap Part Length* parameter defines the length of shear-only scrap parts that will be made any time the controller enters the run mode and is unable to produce the currently programmed part. This scenario can occur after a new coil is loaded onto the machine, or after any time the controller's target queue is cleared. If the currently programmed part requires a punch operation at a location which has already passed the punch press, the controller will automatically insert scrap parts of this length until the first good part can be made.

Entering a Scrap Part Length of zero instructs the controller to produce parts at the current programmed length, upon entering the run mode, even if some or all of the punch operations can not be included in the part(s).

See Also: Clear Queue After, Tool Data, Part Programming

Halt Mode

ID: 306
Selections: Item Halt / Bundle Halt / Order Halt / Never Halt
Applies to: All configurations

The *Halt Mode* parameter determines when the controller will execute an automatic line halt (exits the run mode) during production. The Halt Mode has four available options:

- Item Halt

  The controller exits the run mode after the completion of every line Item.

- Bundle Halt

  The controller exits the run mode after the completion of a line Item only it the next item's Bundle Number is different from the previous line item or if it is the last Item of the current Order.

- Order Halt

  The controller exits the run mode after the completion of a line Item only when it is the last Item of the current Order.

- Never Halt

  The controller exits the run mode after the completion of a line Item only when it is the last Item of the current Order, and the next Order's Material or Product Code definition is different from the current Order.

See Also: Bundle Quantity Reload Value, Bundle Quantity Count, Order/Item Programming.

Halt No More Items to Run

ID: 307
Selections: Yes / No
Applies to: Any configuration that supports punching

- *When set to Yes,* this parameter causes controller to exit the run mode whenever it detects that there are no more punch or shear targets in its queue for the current Material or Product Code. A message is displayed to the machine operator, giving him the opportunity to program more parts at this time and possibly avoid producing extra scrap.
- *When set to No,* the controller runs until the punch/shear target queue is empty without displaying the operator message.

Stopping Reaction Mode

ID: 309
Selections: Automatic / Manual / Off
Applies to: Any configuration configured for feed-to-stop operation

This parameter determines how the controller uses the Stopping Reaction Time to control the machine each time it stops for a shear or punch operation. The following Stopping Reaction Modes are available:

- Automatic

  The controller turns off its motion outputs prior to the actual shear or punch target, assuming the machine's inertia will allow the target to coast into the correct position. If the material stops such that the target is within the programmed Tolerance range, the shear or punch press is activated and a new Stopping Reaction Time is iteratively calculated to be used for the next target. The iteration is based on how close the machine was able to stop in reference to the programmed target location.

- Manual

  The controller turns off its motion outputs prior to the actual shear or punch target the same as in the Automatic mode; however, it does NOT calculate a new Stopping Reaction Time. The value entered for the Stopping Reaction Time remains constant while in Manual mode.

- Off

  This mode is provided so that the Stopping Reaction Time calculation and compensation can be disabled altogether. The controller will turn off the motion outputs as soon as the programmed shear or punch target is reached. Typically the machine's inertia causes the material to coast beyond the programmed target location while in this mode. If the amount of this coast distance is consistent, the machine can still produce relatively accurate parts, however this often leads to a first part is long scenario following a standing cut.

Note: The controller's tolerance test is not performed while the Stopping Reaction Mode is set to Off.'

See Also: Stopping Reaction Time, Tolerance

Stopping Reaction Time

ID: 310
Range: 0.000 to 8.000 Seconds
Applies to: Any configuration configured for feed-to-stop operation

This parameter represents the amount of time in advance of the each shear or punch target that the controller commands the machine to stop (unless the Stopping Reaction Mode is set to Off'). It is a rough indication of how long it takes the machine to stop once the controller's motions outputs have been turned off.

See Also: Stopping Reaction Mode, Tolerance

Deceleration Mode

ID: 311
Selections: Automatic / Manual / Off
Applies to: Any configuration configured for two-speed operation

This parameter determines how the controller uses the Deceleration Factor to control the machine each time it shifts from fast speed to slow speed. The following Deceleration Modes are available:

- Automatic

  The controller commands the machine to shift from fast to slow speed prior to the programmed Minimum Slow Distance before each shear or punch target. The controller detects whether or not a stable slow speed was reached prior to the Minimum Slow Distance target and iteratively calculates a new Deceleration Factor to be used for the operation.

  If properly calibrated on a machine that demonstrates consistent behavior, the Automatic Deceleration Mode allows the controller to choose the optimum point at which to initiate the speed shift, allowing the machine to reach a consistently stable slow speed prior to each target, and maximizing the amount of time the machine is able to run in fast speed.

- Manual

  The controller commands the machine to shift from fast to slow speed prior to the programmed Minimum Slow Distance the same as in the Automatic mode; however, it does NOT calculate a new Deceleration Factor. The value entered for the Deceleration Factor remains constant while in Manual mode.

- Off

  This mode is provided so that the Deceleration Factor calculation and compensation can be disabled altogether. The controller will command the

machine to shift from fast to slow speed at the programmed Minimum Slow Distance before the programmed shear or punch target.

See Also: Deceleration Factor

Deceleration Factor

ID: 312
Range: 4.0 to 1000.0 Inches/Sec/Sec
Applies to: Any configuration configured for two-speed operation

This parameter represents the estimated deceleration rate of the machine calculated (depending on the Deceleration Mode) each time the controller commands the machine to shift from fast to slow speed. This value is used to adjust the point at which the controller commands the machine to shift from fast to slow speeds prior to each shear or punch target (unless the Deceleration Mode is set to Off').

See Also: Deceleration Mode

Tolerance

ID: 313
Range: 0.0005 to 10.0000 Inches
Applies to: Any configuration configured for feed-to-stop operation

This parameter defines the maximum amount of position error the controller allows before activating a shear or punch press for a given target while in the run mode. Each time the machine stops for a programmed target location (and the Stopping Reaction Mode is not set to Off') the XL200 Series controller performs a tolerance test by comparing the current encoder position to the programmed target location.

If the Current Encoder Position is:

- Greater than (Programmed Target + Tolerance)
- or
- Less than (Programmed Target – Tolerance)

then the shear or punch press is not activated, and the controller displays an appropriate error message and exits the run mode.

See Also: Stopping Reaction Mode

Alternating Press Mode

ID: 315
Selections: Alternating / Single
Applies to: Only when the Alternating Press (L) model option is enabled

This parameter can be used to enable or disable the Alternating Press functionality. The following Alternating Press Modes are available:

- Alternating

  The Alternating Press functionality is enabled. This feature allows the user to program Punch Patterns with operations for only one of the two available punch presses. When an item with a punch pattern is run, the controller automatically alternates between activating the two punch presses. This feature can be used to provide increased production rates on machines that are limited by the cycle time of a single punch press, if duplicate punch tooling is available.

- Single

  The Alternating Press functionality is disabled, causing the controller to activate the punch presses exactly as they programmed in the Punch Pattern.

See Also: Programming Patterns

Stitch Gag

ID: 316
Range: 0 to nn (where nn is the maximum number of gag outputs available for the current model type and configuration switch setting.
Applies to: All configurations that support gagged punch tooling, model types XL202, XL202H, XL206, XL206H, XL212, and XL212H

This parameter determines which gag output the controller turns on whenever it executes a stitch cut operation. This functionality is intended for machines that are capable of performing a stitch cut where the shear press contains special tooling that prevents it from cutting completely through the material. Typically a gagged tool is engaged during this operation that allows the shear to perform the stitch cut.

Note: Stitch Cut capability is typically found on pre-cut machines and is used to prevent the control system from shearing a part that is too short to pass through the roll former tooling.

See Also: Max Auto Stitch Length

Max Auto Stitch Length

ID: 317
Range: 0.000 to 1000.000 Inches
Applies to: All configurations that support gagged punch tooling, model types XL202, XL202H, XL206, XL206H, XL212, and XL212H

This parameter defines the shortest length of material the controller will cut off without engaging the Stitch Gag output. Any time a length of material is cut off (during an automatic shear cycle) that is shorter than this parameter, the controller will automatically activate the Stitch Gag output during the shear cycle.

Note: The Max Auto Stitch Length parameter doesn't appear in the list unless a non-zero value is entered for the Stitch Gag parameter.

See Also: Stitch Gag

Slow Output While Halted

ID: 318
Selections: Off / On
Applies to: All configurations

This parameter determines whether the Slow output is turned On or Off while the controller is halted (i.e. not in the run, jog forward, or jog reverse modes).

Note: Some hydraulic-driven machines may require the controller's Slow output to be left on while halted depending on the configuration of the hydraulic valves.

Stacker Dwell

ID: 319
Range: 0.000 to 9.999 Seconds
Applies to: All configurations, machines with automatic part stacking equipment

This parameter determines the length of time the XL200 Series controller turns on its Stacker output during an automatic or manual stacker operation.

Entering a Stacker Dwell of zero disables the stacker functionality.

See Also: Stacker Delay, Parts Per Stack, Expect Stacker Compete

Stacker Delay

ID: 319
Range: 0.000 to 9.999 Seconds
Applies to: All configurations, machines with automatic part stacking equipment

This parameter defines the length of time the XL200 Series controller waits before activating the Stacker output whenever it is time to perform an automatic stacker operation.

See Also: Stacker Dwell, Parts Per Stack, Expect Stacker Compete

Parts Per Stack

ID: 319
Range: 0 to 999
Applies to: All configurations, machines with automatic part stacking equipment

This parameter defines the number of parts the controller must produce during the run mode before performing an automatic stacker operation. The XL200 Series controller keeps a running count of the number of parts it makes during the run mode. As soon as this count is equal to the Parts Per Stack parameter, it initiates an automatic stacker operation (turns on the Stacker output for the programmed Stacker Dwell time after waiting for the programmed Stacker Delay time).

- Any time a stacker operation occurs, the internal part counter gets reset to zero. Several other events cause a stacker operation to occur, including:
- The Manual Stacker input is activated.
- Any time the controller transitions from one Item to another Item during the run mode.
- Any time the machine operator sets a new Item to Next status.
- Any time the controller's queue is cleared following a manual shear operation.

See Also: Stacker Dwell, Stacker Delay, Expect Stacker Compete

Expect Stacker Complete

ID: 319
Selections: Yes / No
Applies to: Model type XL266 only

Setting this parameter to Yes causes the controller to display an error message (and drop out of the run mode) if the Stacker Complete input does not go active

after an appropriate amount of time elapses once the stacker operation has been initiated. It also prevents the controller from feeding the next part until the Stacker Complete input is detected. The controller will not be allowed to enter the run mode if the Stacker Complete input is not active.

Setting this parameter to No disables the functionality of the Stacker Complete input and removes the restrictions mentioned above.

See Also: Stacker Dwell, Stacker Delay, Parts Per Stack

Crash Detect Velocity Change

ID: 321
Range: 0 to 1000 Feet/Minute
Applies to: All flying-cutoff configurations

Used in conjunction with the Crash Detect Time parameter, these values determine the maximum rate of deceleration the controller will allow before dropping out of the run mode and displaying an error message. This feature intended to help identify material jam-up conditions that occur on the machine prior to the location of the material encoder. A sudden drop in line velocity detected by the XL200 Series controller will be regarded as a crash condition and all motion outputs will be turned off to help prevent equipment damage and injury to personnel.

Note: Entering a value of zero disables the Crash Detect feature.

See Also: Crash Detect Time

Crash Detect Time

ID: 321
Range: 0.000 to 9.999 Seconds
Applies to: All flying-cutoff configurations

Used in conjunction with the Crash Detect Velocity Change parameter, these values determine the maximum rate of deceleration the controller will allow before dropping out of the run mode and displaying an error message.

Note: Entering a value of zero disables the Crash Detect feature.

See Also: Crash Detect Velocity Change

Test Part Length

ID: 330
Range: 0.000 to 1000.000 Inches
Applies to: All configurations

This parameter defines the length of the test part the XL200 Series controller produces any time the Test Part function key is pressed while the controller is in the run mode.

Use Coil Inventory

ID: 333
Selections: Yes / No
Applies to: All configurations

Setting this parameter to No removes all references to the XL200 Series controller's Coil Inventory management and tracking features. The controller will not prompt the operator to enter any coil inventory numbers, and the Coil Inventory menu will no longer appear on the Production Data screen.

See Also: Allow Coil Override

Allow Coil Override

ID: 334
Selections: Always / Only With Key
Applies to: All configurations, only when Use Coil Inventory is set to Yes'

This parameter whether the controller will allow the machine operator run an Order whose material definition doesn't match the material defined for the currently loaded coil. When set to Always the operator always has the authority to override this condition. When set to Only with Key, the operator does not have the authority to override this condition unless the Setup Lockout input is unlocked.

See Also: Use Coil Inventory

Bump Tolerance

ID: 338
Range: 0.000 to 10.000 Inches
Applies to: Model Type XL266 (stopping operations) only

If the XL200 Series controller stops for a shear or punch target and is not within the programmed Tolerance, but is within the programmed Bump Tolerance, the controller will attempt to bump the material either forward or backward to try and achieve tolerance. A bump move is attempted by turning on the appropriate motion output(s) for the programmed Bump Time.

Enter a value of zero for this parameter disables the Bump into Tolerance feature.

See Also: Bump Time, Tolerance

Bump Time

ID: 339
Range: 0.000 to 1.000 Seconds
Applies to: Model Type XL266 only

This parameter defines the length of time the controller turns on its motion outputs while attempting to bump the material within the programmed tolerance.

Enter a value of zero for this parameter disables the Bump into Tolerance feature.

See Also: Bump Tolerance, Tolerance

Machine Layout

Coil End Point

ID: 350
Range: 0.000 to 65535.000 Inches
Applies to: All configurations

This parameter defines the distance from the back edge of the shear to a point on the machine where the material is typically cut free when there are no more orders to run for the current coil. When this parameter is set correctly, the XL200 Series controller will exit the run mode when there is just enough material remaining in the machine to complete the current order any time it detects an upcoming material or product code change. A message is displayed to the operator informing him that it is time to cut the remainder of the coil free.

This feature is intended to minimize unnecessary scrap on post-cut machines by preventing extra material from passing through the roll former. Entering a value of zero disables the Coil End Point feature.

See Also: Coil End Offset

Coil End Offset

ID: 351
Range: 0.000 to 65535.000 Inches
Applies to: All configurations

This parameter provides a means to delay the Coil End Point feature from occurring if it is too close to a current shear target. The Coil End Point feature will be delayed if it occurs when the next shear target is within the Coil End Offset distance from reaching the shear press.

For example, suppose the Coil End Point is set to 120 inches, and the Coil End Offset is set to 12.000 inches. If the controller encounters the Coil End Point condition, but the next shear target is within 12 inches from reaching the cutoff press, the line will continue running so that the shear operation can take place before the Coil End Point halt occurs.

See Also: Coil End Point

Encoder Direction

ID: 352
Selections: CW / CCW
Applies to: All configurations

This parameter determines the counting direction for the material encoder. Set to CW if the material causes the encoder wheel to turn clockwise when moving in the forward direction. Set to CCW if the material causes the encoder wheel to turn counter-clockwise when moving in the forward direction.

Shear Kerf

ID: 353
Range: 0.0000 to 10.0000 Inches
Applies to: All configurations

This parameter should be set to a value that equals the amount of material that gets removed by the shear die when it cuts through the material. The XL200 Series controller will automatically compensate for this material by producing each programmed part length extra long by the Shear Kerf distance.

For shear dies that have a cutting action similar to a pair of scissors (no material is removed) enter a value of zero for the Shear Kerf.

Minimum Part Length

ID: 354
Range: 0.000 to 1000.000 Inches
Applies to: All configurations

This parameter defines the shortest part length that the XL200 Series controller allows the machine operator to enter while in the Program screen. It should be set to the shortest part length that the machine is able to run.

Shear to Encoder Distance

ID: 355
Range: 0.0000 to 10000.0000 Inches
Applies to: All configurations

This parameter detects leading edge of a coil, and accurately records scap material when the coil tails out.

Note: Always set this value to the measured distance between the tail-out sensor and the back edge of the shear die, depending on the orientation of the encoder and the sensor. For the best accuracy, the material encoder and the coil tail-out sensor should be positioned so that they are equidistant from the shear die.

See Also: Coil Tail-out Input, Enable Shear Encoder Distance 2, Shear to Encoder Distance 2, Production Tracking - Scrap Material

Machine Material Y Reference

ID: 370
Selections: Center / +Edge / -Edge
Applies to: Only when the Multi-Axis (X) model option is enabled

This parameter specifies whether the material is center-guided or edge-guided. It edge-guided, it specifies whether it is guided on the positive edge or the negative edge of the machine.

See Also: Multi-Axis applications

Enable Multi-Angle Shear

ID: 371
Selections: Center / +Edge / -Edge

Applies to: Only when the Multi-Axis (X) model option is enabled AND the Machine Material Y Reference parameter is not set to Center'

Setting this parameter to Yes allows the multi-axis controller to perform leading-edge and trailing-edge shear operations using varying angles. Very specialized machinery is required to correctly utilize this feature.

See Also: Multi-Axis applications

Clear Queue After

ID: 372
Selections: Double Shear / Single Shear
Applies to: Any configuration that supports punching or gagged tooling

This parameter determines whether the XL200 Series controller clears all of the punch and shear targets from its queue following one manual shear (Single Shear) operation of two manual shear (Double Shear) operations.

Enable Shear Encoder Distance 2

ID: 373
Selections: Yes / No
Applies to: All configurations

Setting this parameter to Yes allows additional setup parameters to appear in the list, related to the use of a second material encoder and tail-out sensor.

See Also: Shear to Encoder Distance 2, Coil Trim Cut Distance

Shear to Encoder Distance 2

ID: 374
Range: 0.0000 to 10000.0000 Inches
Applies to: All configurations, whenever the setup parameter Enable Shear Encoder Distance 2 is set to Yes'

This parameter should be set to the measured distance between the second material encoder and the back edge of the shear die. The XL200 Series controller uses this parameter when a new coil is loaded, and uses the other Shear to Encoder Distance value whenever the coil tails out.

Using this parameter requires that a second tail-out sensor (and a second material encoder) be located on the machine upstream from the first sensor and encoder.

The two sensors must be wired such that when either sensor detects the presence of material, the controller's tail-out input goes inactive.

See Also: Shear to Encoder Distance, Coil Tail-out Input, Enable Shear Encoder Distance 2, Coil Trim Cut Distance, Production Tracking - Scrap Material

Coil Trim Cut Distance

ID: 375
Range: 0.0000 to 100.0000 Inches
Applies to: All configurations, whenever the setup parameter Enable Shear Encoder Distance 2 is set to Yes'

This parameter defines the length of the leading edge trim cut that the XL200 Series controller when it enters the run mode for the first time after a new coil is loaded. The automatic trim cut references the leading edge of the material and allows the controller to produce an accurate first part without requiring the machine operator to thread the coil all the way through the machine and perform a manual standing crop.

See Also: Shear to Encoder Distance, Coil Tail-out Input, Enable Shear Encoder Distance 2

Front Shear Tool

ID: 376
Range: 0 to 999 (Tool ID)
Applies to: Model type XL200 when configured when with a feed-to-stop punch. Model type XL266 when configured for at least one punch press.

This parameter determines which tool is designated as the Front (Entry) Shear. Machines equipped with an entry shear are capable of accurately cutting off the coil before it enters the roll former in order to prevent scrap material near the end of an order. Correctly entering the Front Shear Tool ID along with the correct Tool Data offset for this shear allows the controller to automatically stop the machine when the exactly enough material remaining to complete the current order (Similar to how the Coil End Point feature works, only more accurate). The controller automatically activates the Front Shear to cut off the remainder of the coil whenever this condition occurs, so the trailing edge of the last part before a material change is cut accurately

See Also: Coil End Point, Front Shear Advance, Tool Data.

Front Shear Advance

ID: 377
Selections: Yes / No
Applies to: Model type XL266 when configured for at least one punch press.

Setting this parameter to Yes causes the controller to turn on its motions outputs and begin feeding the material between the out stroke and the return stroke of the Front Shear cycle.

See Also: Front Shear Tool

Hole Detect Options

Hole Mode Select

ID: 400
Selections: Yes / No
Applies to: Model types XL200H, XL202H, XL206H, & XL212H

This parameter can be used to enable or disable all the hole-detect features of the XL200 Series controller.

When set to Count Hole mode the controller determines the programmed part length by defining a number of holes to be counted by the hole detector.

When set to Standard mode, the controller operates as if the Hole Detect model were not specified. The part lengths produced are determined by the length programmed in each Item.

The Hole Mode Select parameter may not be changed while the controller is in the run mode.

See Also: Hole-Detect Operating Mode, Programming Items (Hole-Detect Mode)

No Hole Stop Distance

ID: 401
Range: 0.0000 to 3499.9999 Inches
Applies to: Model types XL200H, XL202H, XL206H, & XL212H

This parameter can be used to enable a safety feature in the XL200 Series controller while operating in Hole Detect mode. If a length of material greater than this distance passes by the material encoder without the controller sensing

any transitions of its Hole Detect input, the controller will exit the run mode and display an error message to the operator indicating the hole detector has failed.

A value should be entered that is greater than the largest expected distance between consecutive holes on the part. Entering a value of zero disables this feature.

See Also: Hole-Detect Operating Mode

Hole Detect Logic

ID: 402
Selections: Normal / Inverted
Applies to: Model types XL200H, XL202H, XL206H, XL212H, & XL266

This parameter determines the logic (active-high or active-low) required on the controller's Hole Detect input in order to register a hole. Use this in cooperation with the sensor's light-on / dark-on setting to provide the desired operation.

See Also: Hole-Detect Input

Minimum Hole Spacing

ID: 404
Range: 1.0000 to 3499.9999 Inches
Applies to: Model types XL200H, XL202H, XL206H, XL212H, & XL266

This parameter must be used to prevent the XL200 Series controller from detecting the same hole twice. It should be set to a value that is slightly larger than the expected hole diameter, but smaller than the minimum expected distance between consecutive holes. Once the controller senses a hole, the material encoder must move at least this distance before the controller will register another hole.

See Also: Hole-Detect Operating Mode

Shear to Detector Distance

ID: 404
Range: 1.0000 to 3499.9999 Inches
Applies to: Model types XL200H, XL202H, XL206H, XL212H, & XL266

This parameter should be set to the measured distance from the hole-detect sensor to the back edge of the shear blade while the shear die is at its home position. This parameter must be set large enough to allow the controller enough time to queue

up a target whenever the hole is detected; however, keeping this distance as short as possible typically provides the best cutting position accuracy.

See Also: Hole-Detect Operating Mode

Advanced Setup

Line Resolution

ID: 450
Range: 0.0400000 to 0.0000400 Inches per Count
Applies to: All configurations

This parameter specifies the resolution for the XL200 Series controller's material encoder (a.k.a. Line Encoder). The encoder's resolution is defined as the distance of material movement for every encoder count registered by the controller.

On a typical configuration where a measuring wheel is directly coupled to the shaft of the material encoder, and the wheel rides directly on the material surface, the resolution can be calculated using the following formula:

$$\text{Resolution} = \frac{\text{Wheel Circumference}}{\text{\# of Encoder Counts in one Revolution}}$$

Most commercially available encoders, including those supplied by AMS ControlsControls, provide two channels of square wave pulses and are specified in pulses-per-revolution (PPR). The XL200 Series controller registers an encoder count on the rising and falling edge of each pulse on each channel. Thus the number of encoder counts per revolution is equal to the number of pulses-per-revolution times four (PPR x 4).

The following table lists the correct Line Resolution when using an AMS Controls encoder with a 12-inch circumference measuring wheel in the typical configuration described above:

AMS Controls Encoder Model Number	Typical Line Resolution
256	.001171875
500	.00600000
1000	.00300000
2000	.00150000

It is not necessary to precisely measure the wheel circumference. Nominal values can be used with accurate results achieved during the Trim Correction process.

See Also: Correction Factor, Trim Correction

Velocity at Max Analog Voltage

ID: 500
Range: 0 to 1000 Feet/Min
Applies to: All configurations except model type XL266

This parameter can be used to enable the Analog Voltage Proportional to Line Velocity feature of the XL200 Series controller. Whenever a non-zero value is entered for this parameter, the controller provides an analog output voltage (on Analog Port #1) that is proportional to the current line velocity as measured by the material encoder.

This parameter specifies the minimum line velocity for which a 10 Volt output signal will be provided. The voltage output will be 0 Volts whenever the measured line velocity is 0 Feet/Minute and it will be linearly proportional for any velocity within this range.

Note: This feature is active for any and all movement reported by the material encoder whether the controller is in the run mode or not. Entering a value of zero disables this feature.

Auxiliary Shear Compensation

ID: 501
Range: 0.0000 to 1000.0000 Inches
Applies to: Any configuration where the Auxiliary Controller (S) model option is enabled

This parameter is used to compensate for a long first part produced following a manual shear operation when the shear press is being controller by an auxiliary controller. The XL200 Series controller will adjust the length of the first part is produces (after any time its queue has been cleared) by this amount.

This parameter will be required on any machine configuration if the Shear output of the XL200 Series controller is wired directly into the Hole Detect input of the auxiliary controller. The value that should be used for this parameter can be calculated by taking the sum of two of the setup parameters found in the auxiliary controller: Shear-to-Detector distance plus Manual Shear Die Distance.

See Also: Auxiliary Controller Operation

Die Boost Compensation

ID: 502
Range: 0.0000 to 10.0000 Inches
Applies to: Any flying-cut configuration where the Shear Die Boost functionality is enabled

This parameter is used to compensate for the condition where the first part produced following a manual shear is the wrong length due to the fact that the Die Boost output doesn't activate during a manual shear cycle. Enter a value equal to the average distance that the Die Boost output causes the die to travel before it makes contact with the material during an automatic shear cycle.

See Also: Shear Die Boost Output

Filter Constant

ID: 503
Range: 1.0 to 200.0 Hertz
Applies to: All configurations

This parameter is used by the XL200 Series controller's velocity calculation. It can be adjusted to help improve the controller's responsiveness to changes in line velocity. Lower values should be used on machines with relatively stable velocities while higher values can be used on machines with fluctuating velocities.

Note: The default value of 32.0 Hz has been experimentally determined as the optimum Filter Constant for most applications. Very rarely should it be necessary to change this value.

Minimum Speed Voltage

ID: 504
Range: 0.0 to 10.0 Volts
Applies to: Only when the Analog Speed Logic (AA) model option is enabled

Maximum Speed Voltage

ID: 505
Range: 0.0 to 10.0 Volts
Applies to: Only when the Analog Speed Logic (AA) model option is enabled

Length at Maximum Speed

ID: 506
Range: 0.0000 to 3499.9999 Inches
Applies to: Only when the Analog Speed Logic (AA) model option is enabled

Jog Speed Voltage

ID: 507
Range: 0.0 to 10.0 Volts
Applies to: Only when the Analog Speed Logic (AA) model option is enabled

These four parameters are used to control the XL200 Series controller's Analog Speed Logic feature. They represent the analog voltage output produced (on Analog Port # 2) by the controller during the run mode (Fast and Slow speeds) and during the jog mode.

Jog Speed Voltage defines the voltage produces while the controller is in the jog mode (forward or reverse).

Minimum Speed Voltage defines the voltage produced while the controller is in the run mode, running at slow speed.

Maximum Speed Voltage defines the maximum voltage produced while the controller is in the run mode, running at fast speed. The voltage produced during this mode may be scaled to value between Max and Min depending on the Length at Maximum Speed parameter.

Length at Maximum Speed is used to scale the analog voltage produced during the run mode (at fast speed) in proportion to the current part length being run. This provides the functionality of automatically being able to run the machine faster for long parts and slower for short parts. This parameter defines the shortest part length at which the maximum voltage (10 Volts) will be applied during the

run mode, at fast speed. The voltage applied during this mode for parts shorter than this length will be linearly scaled between Min and Max.

Trim Correction

Last Programmed Length

ID: 775
Range: 0.000 to 3500.000 Inches
Applies to: All configurations

This parameter is used in the automatic Correction Factor calculation described below.

See Also: Last Measured Length, Correction Factor

Last Measured Length

ID: 776
Range: 0.000 to 3500.000 Inches
Applies to: All configurations

This parameter is used in the automatic Correction Factor calculation described below.

See Also: Last Programmed Length, Correction Factor

Correction Factor

ID: 777
Range: 95.000 to 105.000 %
Applies to: All configurations

This parameter is used by the XL200 Series controller to automatically scale all programmed part lengths (and punch locations) to be made longer or shorter. This is typically used to compensate for inaccuracies in determining the precise circumference of the material encoder's measuring wheel. The formula for calculating a new Correction Factor is described below:

$$\text{New CF} = \left(\frac{\text{Programmed Length}}{\text{Actual Measured Length}} \right) \times \text{Old CF}$$

where CF = Correction Factor

For best results, AMS Controls recommends you take a sample of several measured parts and use the average length as the actual measured length.

The XL200 Series controller will automatically perform this calculation whenever values are entered for the Last Programmed Length and Last Measured Length parameters.

The Correction Factor parameter and Trim Correction feature should only be used when measured parts are coming out **consistently** long or **consistently** short. Varying part lengths typically indicates some other machine problem (See the XL200 Series Troubleshooting Guide for more information).

See Also: Last Programmed Length, Last Measured Length

Controller Settings

Select the **Controller Settings** menu populates the parameter list with parameters that affect the general operation and appearance of the XL200 Series controller such as time and date formatting, number formatting preferences, and language settings. This list is subdivided into the following categories.

Clock / Calendar

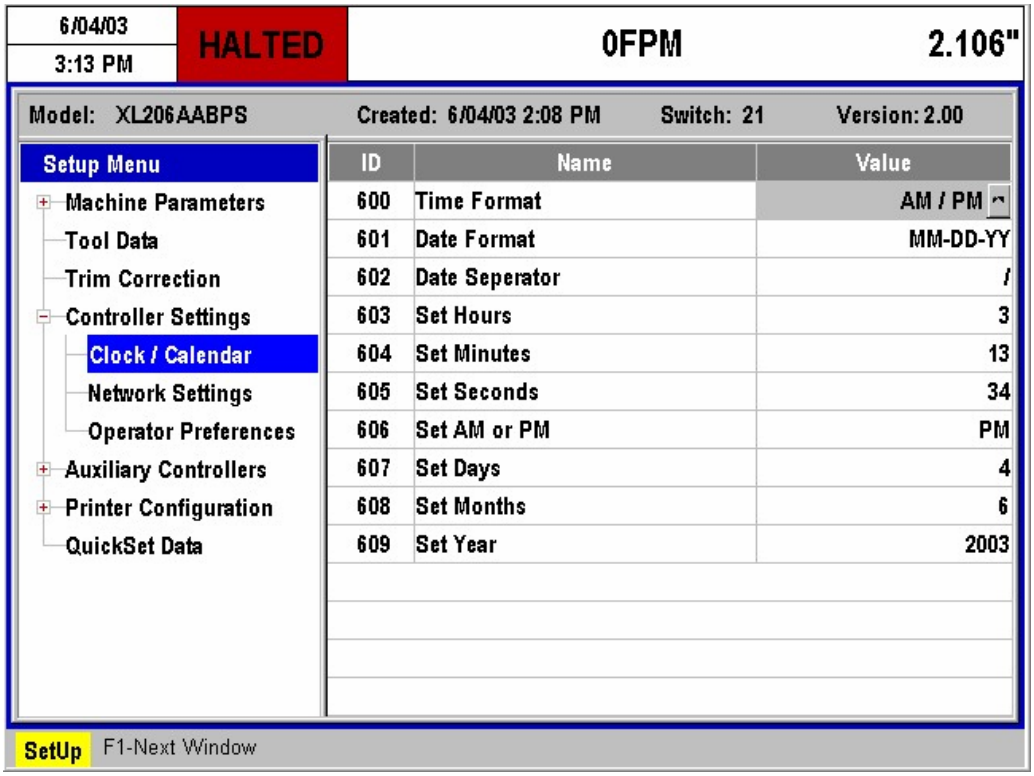


Figure 8: Clock/Calendar Setup Screen

Time Format

ID: 600
Selections: AM-PM / 24-Hour
Applies to: All Configurations

This parameter determines the format for the XL200 Controller's built-in real-time clock. AM-PM allows for a 12-hour style, while 24-Hour allows for military-style 24-hour readout. This format will be used when displaying the real-time clock (in the top right corner of the screen) and for any printed data that includes a time/date stamp.

Date Format

ID: 601
Selections: MM-DD-YY / DD-MM-YY / YY-MM-DD
Applies to: All Configurations

This parameter determines the format for the XL200 Controller's built-in real-time calendar. It allows the date to be displayed in the format that the machine operator is most familiar with.

MM = Month, DD = Day, YY = Year.

This format will be used when displaying the real-time calendar (in the top-right corner of the screen) and for any printed data that includes a time/date stamp.

Date Separator

ID: 602
Selections: / - or .
Applies to: All Configurations

This parameter determines the character used to separate the months, days, and years when the XL200 Series controller displays its real-time calendar.

See Also: Date Format

Set Hours, Set Minutes, Set Seconds, Set AM or PM, Set Days, Set Months, Set Year

IDs: 603-609
Range: Typical Clock/Calendar
Applies to: All Configurations

These parameters allow the user to configure the XL200 Series controller's built-in real-time clock and calendar if necessary.

Note: When the controller is networked to a PC running the AMS Controls Eclipse Production Management software, the real-time clock/calendar is automatically set to match the one on the Eclipse PC.

Network Settings

The Network Settings menu contains parameters that pertain to the AMS Controls Eclipse Production Management software. Up to 30 XL200 Series controllers can be connected on a single network for communicating with a computer running the Eclipse software. See the Eclipse Technical Reference and User's Guides for more information.

Note: Most of the parameters described below do not appear in the list until a valid Network Unit ID has been entered.

Network Unit ID

ID: 650
Range: 0 to 30
Applies to: All Configurations

This parameter specifies a unique identifier on the Eclipse network. Each XL200 Series controller on the network must have a unique Network Unit ID, and must have a matching Machine ID assigned for it at the Eclipse PC.

Entering a Network Unit ID of zero disables all Eclipse-related features.

Network Baud Rate

ID: 651
Selections: 460800, 230400, 115200, 76800, 57600, 38400, 28800, 19200, 9600, 4800 Bits/Second
Applies to: All Configurations

This parameter sets the data communications rate for the Eclipse network. The Network Baud Rate for each XL200 Series controller on the network must match the corresponding baud rate set on the Eclipse PC.

Note: The network baud rate may be limited by the maximum rate supported by the PC and/or by any communication interface adapters installed on the network. Consult the Eclipse Technical Reference Guide for more information.

Halt Delay Minimum

ID: 652
Range: 0 to 99 minutes
Applies to: All Configurations

This parameter is used in cooperation with the Eclipse functionality of tracking machine down-time. This value specifies the minimum amount of time after which the XL200 Series controller has been halted (i.e. not in the run mode) that it will prompt the machine operator to enter a delay reason the next time he enters the run mode. In other words, once the controller exits the run mode, if it is halted for a time longer than is specified by this parameter, the machine operator must provide a reason why the machine was stopped for so long.

Entering a value of 99 minutes disables this feature.

See Also: Delay Reasons, Eclipse Downtime Tracking

Auto-Request Order Footage

ID: 653
Range: 0 to 9999 feet
Applies to: All Configurations

This parameter is used in cooperation with the Eclipse functionality of automatic order scheduling. This value provides a threshold such that whenever the total remaining footage of all orders currently programmed in the XL200 Series controller drops below this number, the controller sends a request to the Eclipse PC or more orders to be sent down.

See Also: Eclipse Automatic Order Scheduling

Use Scrap Codes

ID: 654
Selections: Yes / No
Applies to: All Configurations

This parameter is used in cooperation with the Eclipse functionality of scrap material reporting. Setting this parameter to Yes causes the XL200 Series controller to prompt the machine operator to enter a scrap code for any event that the controller determines to be creating scrap material. Such events include: Performing the Increment Quantity function and using the Remake function.

See Also: Eclipse Material Usage Reporting

Manual Shear Scrap Length

ID: 655
Range: 0 to 1000 inches
Applies to: All Configurations

This parameter is used in cooperation with the Eclipse functionality of scrap material reporting and the XL200 Series controller setup parameter Use Scrap Codes. This value specifies the minimum amount of material that must be cut off by a manual shear operation which causes the controller to prompt the machine operator to enter a scrap code. All material removed by a manual shear operation is recorded by the controller as scrap, but by setting this parameter correctly the machine operator will not be prompted to enter scrap reasons for insignificant lengths of material.

Any material removed by manual shear operation which is less than this length, will be automatically assigned the scrap code of zero if Use Scrap Codes is enabled.

See Also: Eclipse Material Usage Reporting

Enforce Eclipse Coil Validation

ID: 656
Selections: Yes / No
Applies to: All Configurations

This parameter is used in cooperation with the Eclipse coil inventory management feature. Setting this parameter to Yes prevents the XL200 Series controller from entering the run mode, after a new coil is loaded, until the coil inventory number has been validated by the Eclipse PC. During the coil loading process, the controller sends the coil number to the Eclipse PC where it is verified to exist in the Coil Inventory database. If the coil number was invalid, the controller will not be allowed to enter the run mode until the correct inventory number is entered.

Note: For cases where the Eclipse network communications is temporarily unavailable, the coil validation process can be overridden by unlocking the controller's Setup Lockout input.

See Also: Eclipse Coil Inventory Database

PLC Communication

The PLC Communication menu appears only when the PLC Integration (I) model option is enabled. This menu contains parameters that pertain to the data transfer between the XL200 Series controller and a PLC that conforms to the MODBUS communications specification.

Note: Most of the parameters described below do not appear in the list until a valid PLC Unit ID has been entered.

PLC Unit ID

ID: 675
Range: 0 to 247
Applies to: Only when the PLC Integration (I) model option is enabled

This parameter specifies a unique identifier for the MODBUS capable PLC that the XL200 Series controller communicates with.

Entering a PLC Unit ID of zero disables all communication between the controller and the PLC.

PLC Baud Rate

ID: 676
Selections: 460800, 230400, 115200, 76800, 57600, 38400, 28800, 19200, 9600, 4800 Bits/Second
Applies to: Only when the PLC Integration (I) model option is enabled

This parameter sets the data communications rate for communicating with the MODBUS-capable PLC. The PLC Baud Rate must match the corresponding baud rate set on the PLC.

Note: The network baud rate may be limited by the maximum rate supported by the PLC and/or by any communication interface adapters installed on the network.

PLC Parity

ID: 677
Selections: None / Even / Odd
Applies to: Only when the PLC Integration (I) model option is enabled

This parameter sets the data communications parity setting for communicating with the MODBUS-capable PLC. The PLC Parity must match the corresponding parity setting on the PLC.

PLC Stop Bits

ID: 679
Selections: 1 or 2
Applies to: Only when the PLC Integration (I) model option is enabled

This parameter sets the number of stop bits used while communicating with the MODBUS -capable PLC. The PLC Stop Bits must match the corresponding stop bits setting on the PLC.

Configuration Register Address

ID: 678
Range: 0 to 999999999
Applies to: Only when the PLC Integration (I) model option is enabled

This parameter specifies the starting address for the PLC holding register where the configuration data is stored. The XL200 Series controller must be able to read valid configuration data at this address before any other communication can occur.

See Also: Using the PLC Integration (MODBUS) Option

Operator Preferences

Language Select

ID: 700
Selections: English / Spanish / French / Italian / Russian
Applies to: All Configurations

This parameter determines the language for all text displayed by the XL200 Series controller's user interface.

Numeric Display Format

ID: 701
Selections: Decimal Inch / Feet-Fractional Inch / Feet-Decimal Inch / Decimal Feet / Metric mm / Metric cm / Metric M
Applies to: All Configurations

This parameter determines the format for displaying and entering all data values with units of length. Examples of each format are shown below:

- Decimal Inch 126.500”
- Fractional Inch 10' 6-1/2”
- Feet-Decimal Inch 10' 6.500"
- Decimal Feet 10.542'
- Metric mm 3213.10mm
- Metric cm 321.310cm
- Metric M 3.213M

Auto-Delete Done Orders After

ID: 702
Range: 0 to 28 days
Applies to: All Configurations

This parameter determines how long complete orders remain in the controller's memory before they are automatically deleted. Orders & Items that have been run to completion assume a status of Done. These records are automatically deleted from the controller's memory at either noon or midnight after the specified number of days has elapsed. Of course the machine operator may delete these records manually at any time.

Set Done Items to Ready

ID: 703
Selections: Yes / No
Applies to: All Configurations

This parameter, when set to Yes', causes the XL200 Series controller to automatically re-program each line item as soon as it is run to completion. This is useful for applications where the machine operator is not concerned with counting the number of parts produced, but may simply be running the same part length over and over again until his bin is full.

It is not recommended to enable this parameter whenever the controller is networked with an Eclipse PC.

Enable Virtual Keyboard

ID: 704
Selections: Yes / No
Applies to: All Configurations

This parameter, when set to Yes', causes the XL200 Series controller to display an on-screen virtual keyboard any time non-numeric data entry is required. The virtual keyboard must be used to enter non-numeric (or alpha-numeric) data for fields such as Order Numbers, Material Codes, Product Codes, and Coil Numbers. If no non-numeric data is required or if an external PS/2 keyboard is attached to the controller, the virtual keyboard may become an annoyance and can be disabled.

Figure 9: Virtual Keyboard

Velocity Display Unit ID

ID: 706
Range: 0 to 99
Applies to: Only when the Auxiliary Controller "S" model option is enabled

This parameter specifies Unit ID for a connected auxiliary controller if the machine operator desires to view the velocity reported by the auxiliary controller instead of the velocity calculated by the XL200 Series controller on the top line of the display.

This is typically used on a specific machine configuration (roll-feed die-accelerator combo) where the XL200 Series controller is controlling the roll-feed portion of the machine, and the auxiliary controller is controlling the roll-former and flying-cutoff portion. Often the machine operator is more concerned with the roll-former velocity than with the roll-feed velocity.

See Also: Auxiliary Controller Operation

Show User Data – Program Screen

ID: 707
Selection: Disabled / One Line / Two Lines / Three Lines / Four Lines
Applies to: All configurations

This parameter allows the XL200 Series controller to display the user data fields (optionally provided by the Eclipse PC) while in the Program screen. The machine operator can choose to view none of this data, or up to 4 lines of data (2 fields per line).

See Also: Eclipse User Fields

Show User Data – Status Screen

ID: 708
Selection: Disabled / One Line / Two Lines / Three Lines / Four Lines
Applies to: All configurations

This parameter allows the XL200 Series controller to display the user data fields (optionally provided by the Eclipse PC) while in the Status screen. The machine operator can choose to view none of this data, or up to 4 lines of data (2 fields per line).

See Also: Eclipse User Fields

Show Help Preview – Setup Screen

ID: 709
Selection: Disabled / Enabled
Applies to: All configurations

This parameter allows the XL200 Series controller to display a help message preview at the bottom of the screen while in the Setup Screen. The preview contains the first sentence of two of the help message provided for each setup parameter. The full help message text can be viewed at any time by pressing the Help key.

Quickset Data

This menu provides a sub-set of other machine parameters that can be modified by the machine operator at any time, regardless of the state of the Setup Lockout input. The parameters have all been previously described in this chapter. The Quickset Data menu is simply a convenient location to access some of the parameters that are changed relatively often by many machine operators.

The parameters that appear in the Quickset Data list are shown below:

ID	Name	Value
260	Tool Selected for Manual Punch	1
300	Bundle Quantity Reload Value	0
301	Bundle Quantity Count	0
303	Delay After Shear	0.000sec
306	Halt Mode	Bundle Halt
353	Shear Kerf	0.0000"

Figure 10: Quickset Data Parameter List

Chapter 7: Tool Data

Tooling Terms

The following definitions apply throughout this chapter:

Press

A press is a device that closes a die set that is to punch, notch or shear a given material. Air, hydraulics, or a mechanical flywheel may power the press. The Cutoff Press (Shear) is always considered press 0.

Tool

A tool is any section or combination of sections of a die set that can be engaged with one cycle of a single press. The tool may produce a single hole, single notch, group of holes, or notches, or cut the part completely.

Die Set

A die set is a mechanical assembly containing any number of tools that punch, notch, or shear.

Gag

A gag is a device that can select or deselect specific tools in a die set. This is most often a sliding block that is moved by an air cylinder prior to activation of the press.

Pattern

A pattern is a set of tool operations that define most of the details of a finished part. Each entry has a tool number, a reference designation, and a dimension. For Y-axis machines, a Y-reference and Y-offset may also be necessary.

What is Tool Data

The Tool Data configuration lets the XL200 series controller know where all of its tools are in reference to all of the others along with what output or outputs to

turn on for a given tool. The controller uses this information to calculate when/where to turn on these outputs in order to make the desired part.

Note: For a machine that only cuts parts to length, the tool configuration is very simple. Only one tool needs to be defined, for the shear. Every field in the tool should be set equal to zero. See *Defining a Tool.*

Determining the Machine Zero Reference Point

For each application, a Machine Zero Reference Point is required. It is usually most convenient to use the shear blade as the zero reference point but it can be any point that allows all measured offsets to be greater than or equal to zero. See Figure 11.

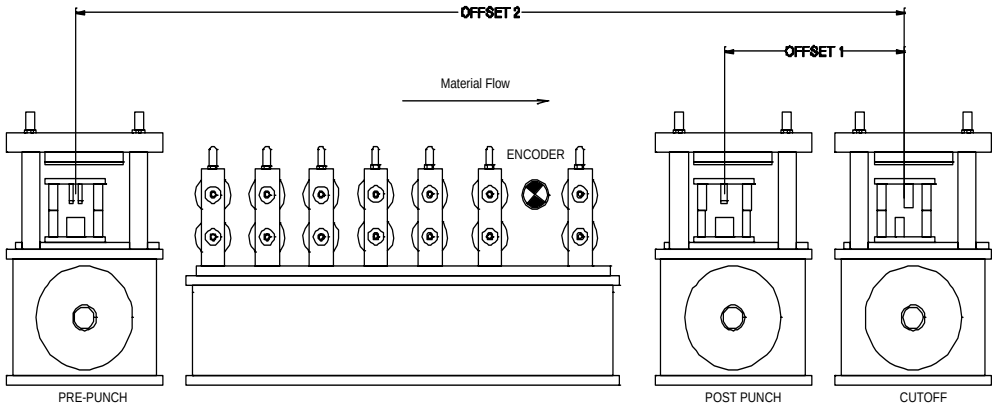


Figure 11: Press Reference Distance

This example uses the shear blade as the machine zero reference point. Tool offsets can be measured by activating all dies, including the shear, with material loaded and clamped in a stationary position. The strip is then fed forward past the shear. The distance from the leading edge to the reference point on each die tool can now be measured. These dimensions should be used as the X-offset value of each tool.

Some machines may have tools that are downstream of the shear. In these cases, the shear cannot be used as the reference point. Any convenient reference point can be chosen that is even with or further down stream from the last tool. In this case, the tool for the shear will have a positive offset from the arbitrary reference point.

1. Press **[Setup]** to display the setup menu selection list.
2. Highlight **Tool Data**, displaying the tool definitions in the right-hand window.
3. Press **[F1]** to tab over to the settings.
4. Press **[F2]**. A new tool entry displays below the currently selected tool entry.

The tool data display is shown in Figure 6-2. Each entry contains an ID, Press, Gag, X-Offset, Y-Offset, Axis, and Name.

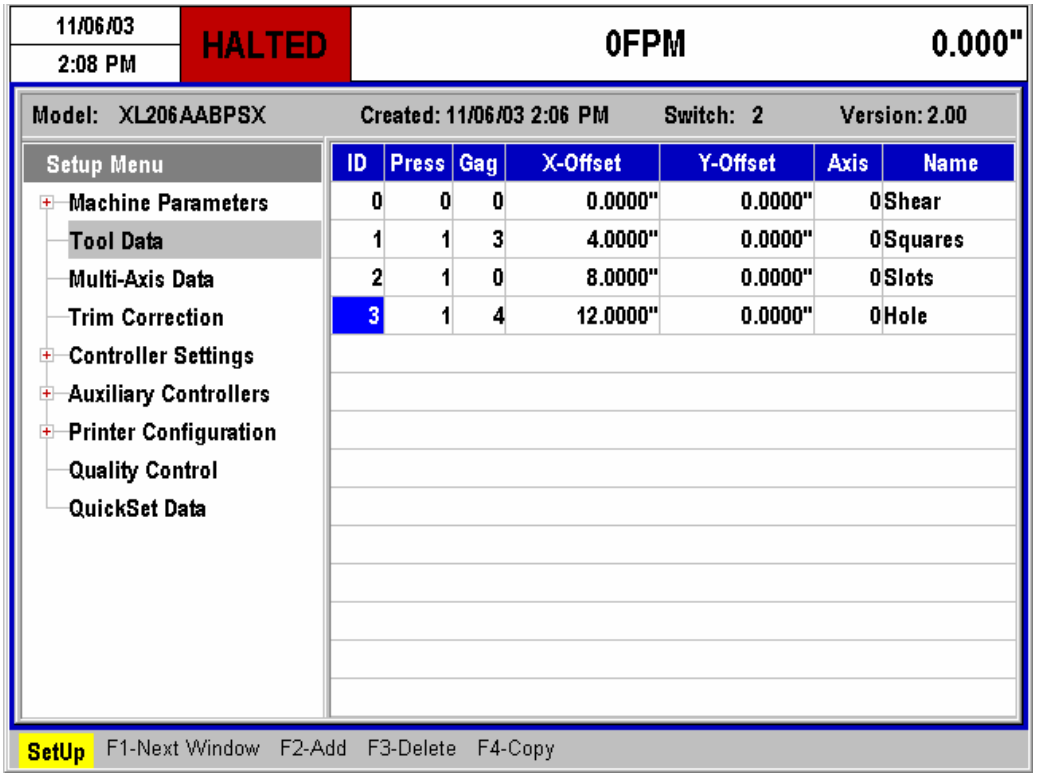


Figure 12: Typical Edit Tool Data Screen

Defining a Tool

Note: There must always be a tool to be defined for the shear. It must have ID = 0 and Press = 0.

ID (Tool Number)

The Tool ID field allows any numeric value from 0 to 974 or 0 to 649 depending on your particular software model. Tools can be entered in any order and numbers can be skipped.

Press

The PRESS number refers to the Press Output that should be activated by that tool. The PRESS number must be from zero to the number of presses allowed by the software model and configuration switches. Press 0 is defined to be the shear press.

Gag

The GAG number corresponds to the Gag Output that is energized when this tool is to be activated. If no gag is to be energized for a specific tool, the gag field should be set to 0 (see Figure 12).

X-Offset

The X-Offset is a distance measured from the designated machine zero point to the reference point of the tool. The X means that this measurement is in the same plane as material movement, the X axis.

The reference point of the tool can be chosen as any part of the resulting feature it places on the part.

Y-Offset

The Y-Offset is only used on tools that can be positioned automatically while the line is running. The Y-Offset is measured in the Y axis plane (across the material motion, X axis, plane). In most cases this value will be zero unless multiple tools are all controlled in the Y axis by the same auxiliary device.

Axis

The AXIS field is only used on tools that can be positioned automatically while the line is running. The AXIS is the ID of the Axis that a particular tool is positioned in the Y axis by.

Name

The *Name* is any 8-character name that may help the operator identify a particular tool. Programming the NAME is optional.

Nested Tooling

If a single press has multiple dies that can be independently engaged using gag valves, the user has the option of assigning different tool ID numbers to each individual die tool. Each gag can then be independently engaged or disengaged using a different tool number. However the operator is not limited to just one gag per tool. Multiple gags may be used with the same tool. As an example, assume that you have a press with three sets of tools on one Press (Figure 13).

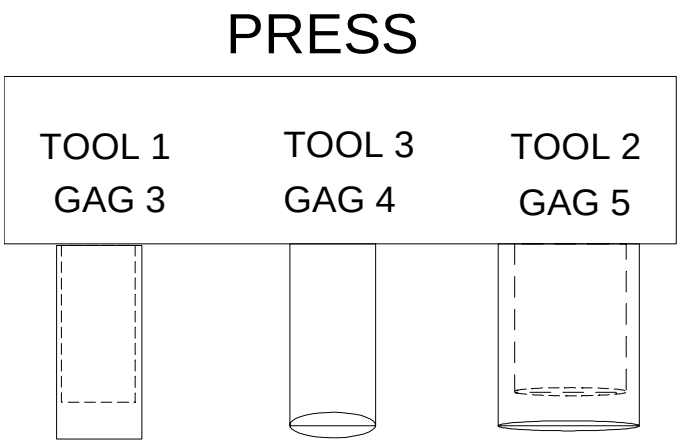
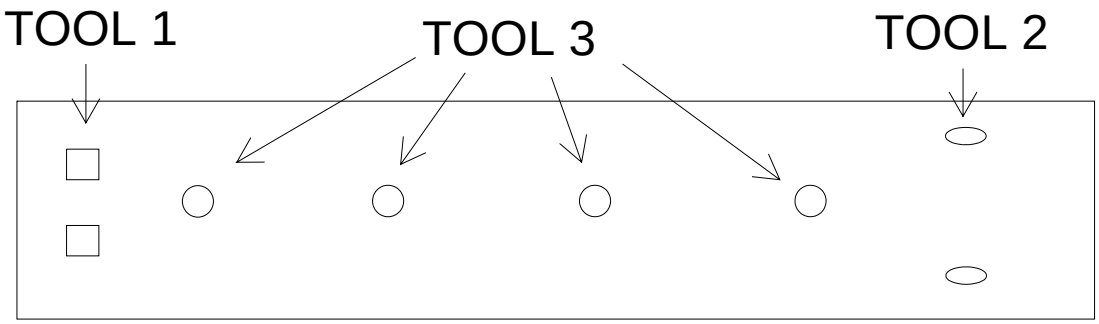


Figure 13: Example Punch Press

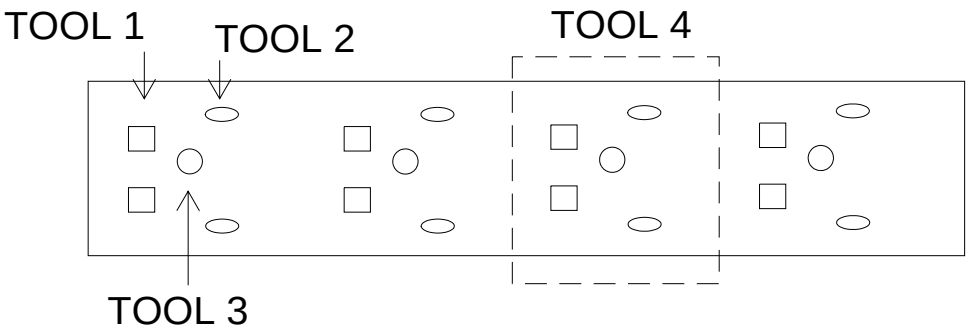
With this tool arrangement, the following part can be made using the individual tools in six punch press operations (see Example Part 1).



Example Part 1

Many complex dies are designed to allow the tools spacing to coincide with often-used patterns. This allows the press to create a usable pattern from different tools in a single operation. If there are parts that can be made with some or all of the tools during a single press operation (see Example Part 2), the pattern can be programmed one of two ways.

1. First, the individual tools could be entered separately. In the example, this would require three pattern entries for each press operation.
2. Second, all necessary tools that coincide on a press operation can instead be assigned a separate tool number altogether. This would produce the same operation but would reduce the programming step for this example to one per press operation. If this is an often-used pattern, this could add up to a lot of savings in programming time.



Example Part 2

Example Part 1 can be made with Tools 1, 2, and 3. Part 2 could also be made with Tools 1, 2, and 3, but the more efficient method would be to use Tool 4, which includes all three tools.

An example of the Edit Tool Data screen is shown in Figure 14.

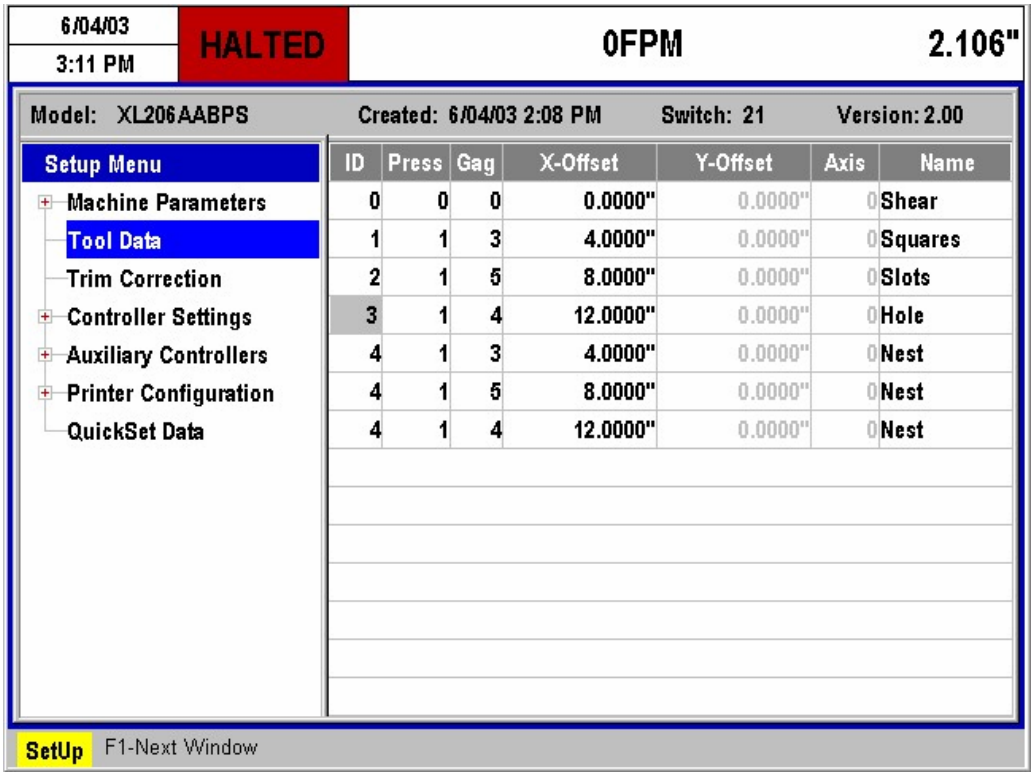


Figure 14: Different Gags on the Same Tool and Press

Chapter 8: Startup and Calibration

Initial Tests and Settings

Wiring Verification

The wiring of the machine should be thoroughly checked for shorts and miss-wires. Applying voltage to the controller's inputs or AC voltage to the controller's outputs will result in a damaged controller and an unsuccessful installation.

Powering the Unit for the First Time

It is recommended that a gradual power-up test be performed before beginning the setup routine:

1. Disconnect the controller connectors (Connectors A – F) from the XL200CL series controller and any other sensitive devices from their power sources.
2. Isolate the 110VAC supply from all input and output devices, power supplies, and incoming 3-phase supply voltage. This may be as simple as setting the power off/on switch to the Off position and removing the 110VAC transformer input fuses.
3. Before applying and verifying the 3-phase power, check the Incoming 3-phase power supply at its factory source to verify the correct voltage level.
4. Turn on the factory source (usually a disconnect or breaker) of power to the console. Verify that the proper 3-phase power is present at the control console.
5. Turn off the 3-phase input and reconnect the 110 VAC transformer to the incoming 3-phase supply lines. Re-apply 3-phase power and verify that the 110VAC is at proper levels at the transformer output. Transformer taps that are incorrectly connected could place low or high voltage across the system it supplies, resulting in possible damage.
6. Turn the Power switch to On to connect the 110VAC supply to the input/output devices. E-stop circuits may be able to be tested at this point also.

7. The 24VDC supplies should now be functioning. Measure the output voltage of each supply and verify that they are at the right levels and polarity. Once the installer is satisfied that all supplies are of the correct value and polarity, the 110VAC should be turned Off.
8. Reconnect the controller connectors (connectors A – F) and all other sensitive devices that were disconnected the first step.
9. Reapply power. The XL200CL series controller will power up. All systems should now be functional.

Model Customization

The XL200 series controller can be set up to run in a variety of configurations including punching or non-punching, flying cut or stopping cut, single speed or dual speed, and with die boosts or without die boosts. For Models with multiple punches, the number of punches and gags can be selected.

Refer to **Error! Reference source not found. Error! Reference source not found.** (page **Error! Bookmark not defined.**), to locate the correct switch configuration that best fits the specific application that the controller will be used for.

Initial Setup Parameters

A thorough understanding of the parameters should be gained by reading *Chapter 6:.Setup Parameters* (page 43). Certain parameters will be reviewed in detail in this chapter for the purpose of installing the controller and producing good parts.

After the controller has been properly installed and all wiring has been double-checked, the basic controller parameters can be programmed.

1. Program the Shear Parameters:
   A. Shear Dwell Down and Shear Dwell Up parameters.

      AMS Controls controllers have a timed shear output with a switch input override feature. The duration of the Shear Down output is programmable from 0.001 to 30 seconds. Your Controller may have a Shear Boost output or a Shear Up output. The Shear Boost output will be covered later in the Flying Cutoff Calibration Section. The Shear Up output is programmable with a range of 0 to 30 seconds. Refer to the timing diagram on Figure 15; each parameter has a dwell time of .125 seconds.

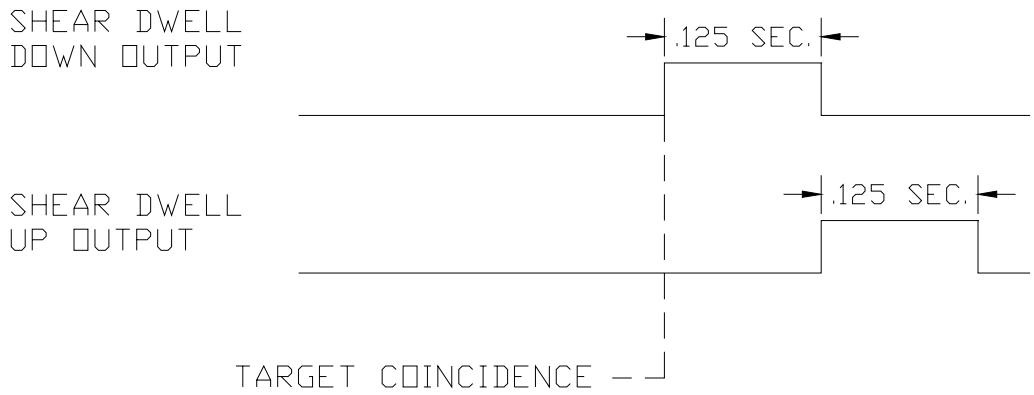


Figure 15: Timing Sequence of Shear Dwell Times

The controller has a Shear Complete input. If the controller detects a switch closure on this input during the shear dwell down time, the dwell time is overridden and the output will turn off immediately Figure 16.

This feature is especially useful on mechanical presses that require shear-complete switch return the press to top-dead-center after every cycle**.** This is simply done by adjusting the complete switch to the proper location on the press. The Shear Dwell Up time is not affected by the Shear Complete input.

Note: On mechanical presses that do not have an electronic length controller, a Shear unlatch switch is typically mounted as a rotating cam switch or a dog-ear detector on the cam shaft. When retrofitting such a press with an AMS Controls controller, these switches can usually be used as the Shear Complete input. Care must be taken to isolate all power from the contact points and the installer will have to change the contact closure

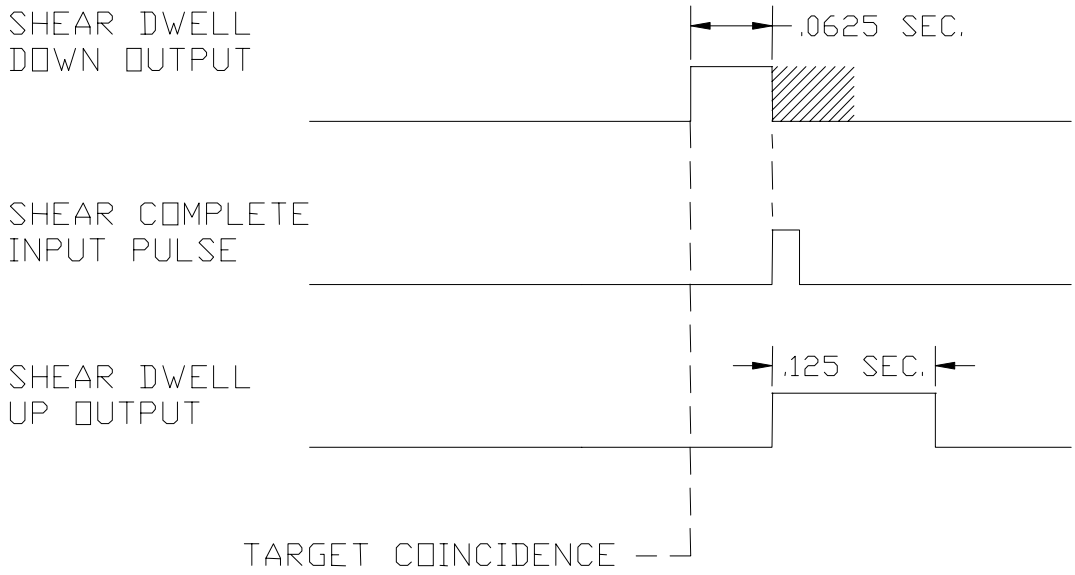


Figure 16: Shear Output/Dwell Time Relationship

Note: If a shear-complete switch is used on a mechanical press, it may need to be moved in order for the press to stop at the right location. If the press stops short of top-dead-center, then move the switch so that it is triggered later in the rotation. If the press stops late (beyond top-dead-center), move the switch so that it is triggered earlier in the rotation.

Set the shear dwell times to an approximate value. Large mechanical presses may require .5 seconds or more. Air presses may only require .020 to .040 seconds to complete a cut. Fire the press by using the manual cycle input and adjust the shear dwell times until the press operates properly. If the press does not fire completely, make the dwell time longer. If the press hits too hard or stays on too long, make the dwell time shorter.

B. Program the Expect Shear Complete parameter.

   The *Expect Shear Complete* setup parameter can be set to Yes or No. Setting the parameter to Yes enables a test feature that will inform the user if the Shear Complete input or switch has failed. The controller will expect to see the Shear Complete input to turn on at some point during the Shear Dwell Down time or it will exit the run mode, terminate the press cycle, and inform the user that the controller did not see a press complete input.

C. Program the Expect Shear Up Complete parameter.

The XL266 controller has a setup parameter performs the same function as the Expect Shear Complete except that it has and tests for a Shear Up Complete input during the Shear Dwell Up time. The Shear Up Complete input overrides the Shear Up Dwell just like the Shear Complete input does to the Shear Dwell Down time. Setting Expect Shear Up Complete to Yes enables a test feature that will inform the user if the Shear Up Complete input or switch has failed. The controller will expect to see the Shear Up Complete input to turn on at some point during the Shear Dwell Up time or it will exit the run mode, terminate the press cycle, and inform the user that the controller did not see a press up complete input. An additional function of turning on the feature enables a test that prevents the controller from entering the run mode if the Shear Up Complete input is not on. This will minimize material jam ups and damage to the machine or personnel.

2. Program the Press Dwell parameters (each Press will have similar, corresponding, setup parameters, inputs and outputs, to the Shear):

   D. Press Dwell Down and Press Dwell Up parameters:

      AMS Controls controllers have a timed press output with a switch input override feature. The duration of the Press Down output is programmable from 0.001 to 30 seconds. Your Controller may have a Press Boost output or a Press Up output. The Press Boost output will be covered later in the Flying Cutoff Calibration Section. The Press Up output is programmable with a range of 0 to 30 seconds. Refer to the timing diagram on Figure 15; each parameter has a dwell time of .125 seconds.

   E. Expect Press Complete

      The *Expect Press Complete* setup parameter can be set to Yes or No. Setting the parameter to Yes enables a test feature that will inform the user if the Press Complete input or switch has failed. The controller will expect to see the Press Complete input to turn on at some point during the Press Dwell Down time or it will exit the run mode, terminate the press cycle, and inform the user that the controller did not see a press complete input.

   F. Expect Press Up Complete

      The XL266 controller has a setup parameter performs the same function as the Expect Press Complete except that it has and tests for a Press Up Complete input during the Press Dwell Up time. The Press Up Complete input overrides the Press Up Dwell just like the Press Complete input does to the Press Dwell Down time. Setting Expect Press Up Complete to Yes enables a test feature that will inform the user if the Press Up Complete input or switch has failed. The controller will expect to see the Press Up

Complete input to turn on at some point during the Press Dwell Up time or it will exit the run mode, terminate the press cycle, and inform the user that the controller did not see a press up complete input. An additional function of turning on the feature enables a test that prevents the controller from entering the run mode if the Press Up Complete input is not on. This will minimize material jam ups and damage to the machine or personnel.

3. Program the Resolution parameter.

The Resolution parameter informs the controller what each pulse from the material tracking encoder represents in length. If this value is off by even a slight degree, all subsequent measurements will be proportionally off during operation of the controller.

Note: This parameter must be input before any kind of testing is performed.

To calculate Line Resolution, divide the circumference of the encoder wheel by the number of PPR (Pulses per Revolution) of the encoder.

- The circumference of the wheel is determined by measuring the diameter of the wheel and multiplying that number by pi (3.1416).
- The PPR (pulses per revolution) is determined by multiplying the rated number of encoder counts by 4. The model number of an AMS Controls encoder represents the number of counts from one channel of that encoder.

For example, a 256-count encoder will provide 1024 PPR. Similarly, a 500-count encoder will provide 2000 PPR. Refer to the following formula.

$$\text{Resolution} = \frac{\text{Circumference}}{4 \text{ x Encoder Counts}}$$

For example, suppose a wheel 5.0 inches wide is mounted onto a model 1000 encoder. The formula shows how the resolution is calculated.

$$\text{Resolution} = \frac{5.00\,\text{in.} \times 3.1416}{4 \text{ x } 1000 \text{ count}} = \frac{15.708}{4000} = .00393$$

Test the E-stop Circuit

Before testing any functionality of the controller or machine, the Emergency Stop and Safety Circuits should be tested for proper operation. Not only may this save injury to personnel, but it may save equipment and material from getting damaged.

If the Emergency stop circuit is a latched circuit, make sure that it latches properly and that the latch is dropped by the loss of any E-stop button or other emergency stop switch, safety curtain, or other device.

> ***DANGER! Although AMS Controls provides wiring templates and wiring methods for customers use, each customer is responsible for designing, installing, and applying an adequate emergency stop circuit as well as necessary safety guards and enclosures for the protection of personnel and equipment!!***

When an emergency stop condition occurs, all output devices should be isolated from their power source. However, the AMS Controls CPU power (Terminals A1 & A2) should only lose power when the controller is turned off via a power switch. The controller's encoder input and DC inputs can still be active during an e-stop condition, and the display diagnostic information may assist the operator in the case of a problem.

> ***DANGER! Special care should be taken to ensure that an E-Stop condition unlatches all input circuits to prevent any automatic movement or functionality of the machine or controller from occurring after the E-Stop circuit is reset.***

Test Inputs and Outputs

Test Jog outputs

The jog inputs and motion outputs should be tested for proper operation and direction. If the outputs do not energize properly, the XL200 series controller has an input/output screen with which to view the states of the inputs and outputs.

This window is available through the Diagnostic screen of the controller and provides a handy means for troubleshooting.

Jogging forward should result in the material feeding device moving in the forward direction. Two speed machines should provide outputs for the slow velocity. Jogging reverse should provide the opposite feed at slow speed.

Test Encoder Direction

Initiating the jog forward input should cause the material feeding device to go in the forward direction. If material is in the machine, the material position on the controller should grow more positive. Keep in mind that the number may be growing but in the negative direction. If the controller counts more negative while jogging forward, the parameter for Encoder Direction will need to be reversed. The choices are CW and CCW (Clockwise and Counter-Clockwise)

Test Shear Outputs

The press dwell time is simply set by manually cycling the press and adjusting the Shear Dwell Down and Up times until the press makes a full and complete cut. Large mechanical presses may require between .2 to .5 seconds typically. Air presses may only require 40 to 80 milliseconds (.040 to .080) to complete a cut.

Initiate the manual shear input to fire the press and adjust the shear dwell times until the press operates properly. If the press does not fire completely, make the dwell time longer. If the press hits too hard or stays on too long, make the dwell time shorter.

If a shear-complete switch is used on a press (usually mechanical presses) it may need to be moved in order for the press to stop at the right location. If the press makes less than a full rotation (short of top-dead-center), move the Shear Complete switch so that it is triggered later in the cycle. If the press over-rotates (beyond top-dead-center), move the switch so that it is triggered earlier in the cycle.

Initial Run & Calibration

Once the basic parameters are set and the emergency circuits are tested, the controller can be tested to see if the run input and run output are properly connected. The basic purpose of the test is to verify that the run circuit will latch-in with a Line Run command and un-latch when Line Halt is signaled. This is best done without material present in the machine.

Program a basic order of a given length. Use no patterns, materials, or other options, just a length such as 5 pieces at 72 inches. If possible, turn the line speed down to a slow feed. Initiate the run input. The run latch should turn on and hold the unit in a run state. The motion outputs should energize and begin feeding in the forward direction (with or without material). Press the halt button to verify that a manual halt will stop the line.

Initiate the run input again. If no material is loaded and it is safe to do so, turn the encoder wheel by hand in the forward direction to simulate material motion. If setting up a feed to stop line, the Tolerance parameter may need to be increased to a large value such as 10.000 inches to allow a non-steady hand to avoid tolerance errors when stopping at the programmed target distance. After the last part is made, the run latch should open, causing the run input to drop and the motion outputs to disengage.

The controller should now be ready for the initial run. The system can then be calibrated using the specific parameters for a flying-cutoff or a feed-to-stop. Each type of controller is setup in the next two sections.

Flying Cutoff Calibration

What is Shear Reaction?

Shear Reaction Time is the amount of time that it takes a press die to move from its rest position (once fired) to the point at which it impacts the material. This time lapse is a result of an accumulation of delays due to energizing relays & solenoids, filling cylinders with air or hydraulics, and the overcoming die inertia. Without compensating for these time lapses the actual shearing operation would be displaced from the desired cut point (Figure 17). By using the proper shear reaction time, the controller can more accurately cut on-target, most noticeably on the first piece made after a standing crop.

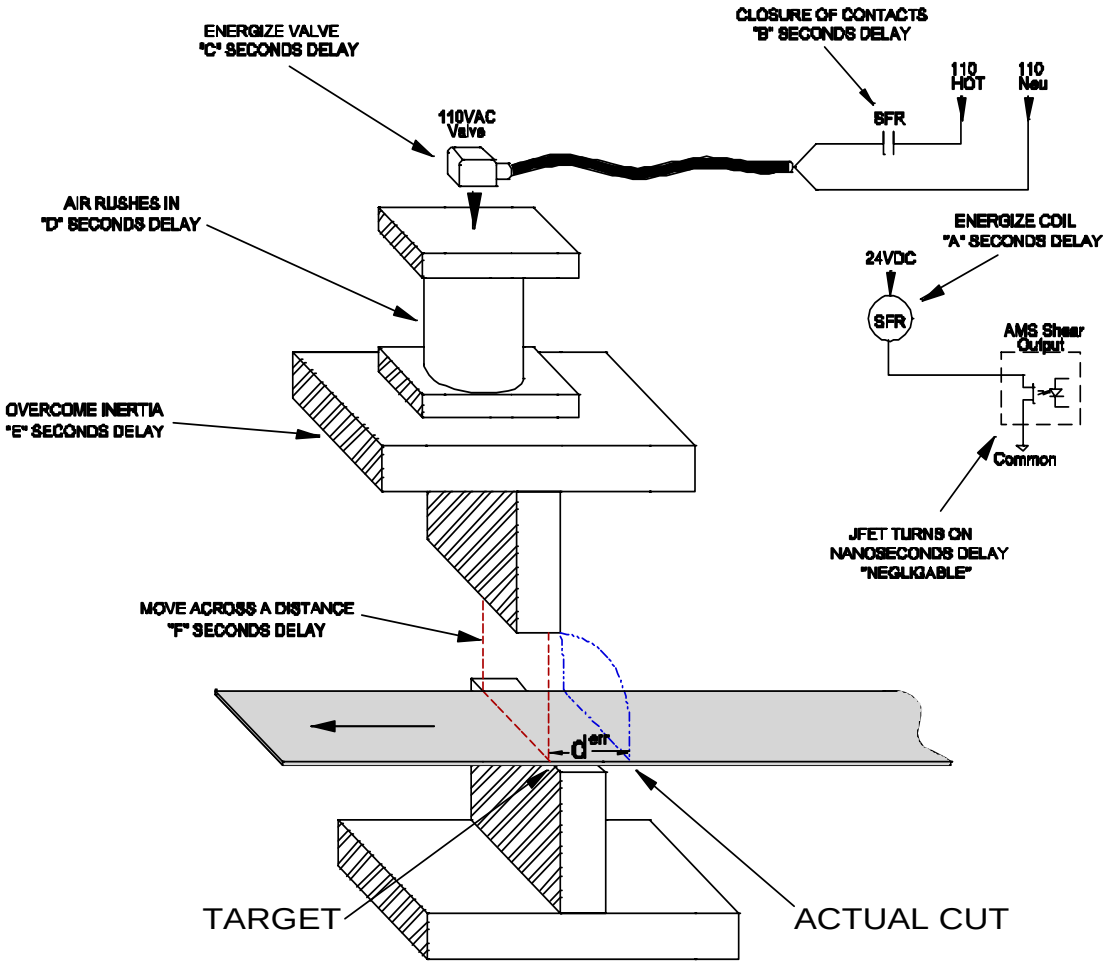


Figure 17: Delay Reactions that add up to the Shear Reaction

As Figure 17 shows, the delay reaction is actually caused by several factors. In this case the Shear Reaction is the accumulation of delays A, B, C, D, E, and F. This causes the press to lag behind the target. If not compensated for, every piece made will include a similar amount of error.

Each piece has an equal amount of error if the line velocity and reaction delays remain constant; therefore parts appear to be good as long as conditions stay identical. If any of the reactions vary or if the speed of the material fluctuates even slightly from one cut to the next the resulting lengths will vary. For most pneumatic and hydraulic presses, the delay time is usually constant. Sometimes these constants drift over time due to heat, humidity, moisture, and friction variations. The result is loss of tolerance. Velocity variations on the material feed are common and are also a source of inaccuracy on flying die machines. The reason the first piece after a standing crop is the most noticeably affected by Reaction Time is because the change in velocity between the standing leading edge crop and the moving trailing edge crop is the greatest.

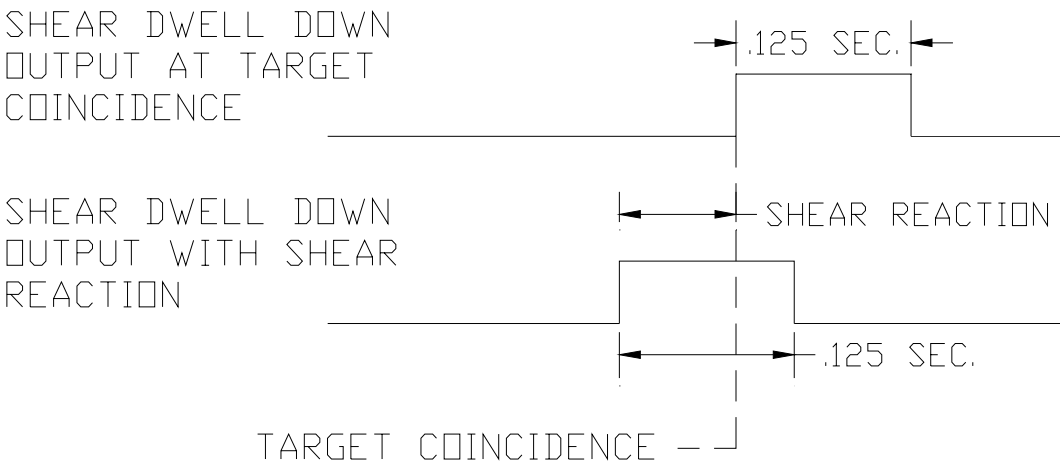


Figure 18: Timing Graph of Shear Reaction Time

△ **Caution: A Shear Reaction time that is larger than the Shear Dwell time is unrealistic, as it would cause the shear completion time to occur prior to the target coincidence.**

Note: A Shear Reaction time turns on the shear output prior to the target coincidence point. It does not affect Shear Dwell.

Setting Shear and Boost Reaction Times

Note: Before attempting to perform the procedures detailed in this section, the Trim Correction procedure at the end of this chapter should be performed. This will ensure that all of the calculations involved in this section will be as accurate as possible.

Note: The procedures in this section should be performed from beginning to end in order to finish with a predicable result.

Shear Reaction is necessary on flying cut lines because of delays that occur during the shear cycle. These delays occur due to the time it takes for valves to energize, cylinders to fill, and for dies to move. Since the Shearing function is not instantaneous, the shear must be activated prior to the actual cut point, see Figure 19.

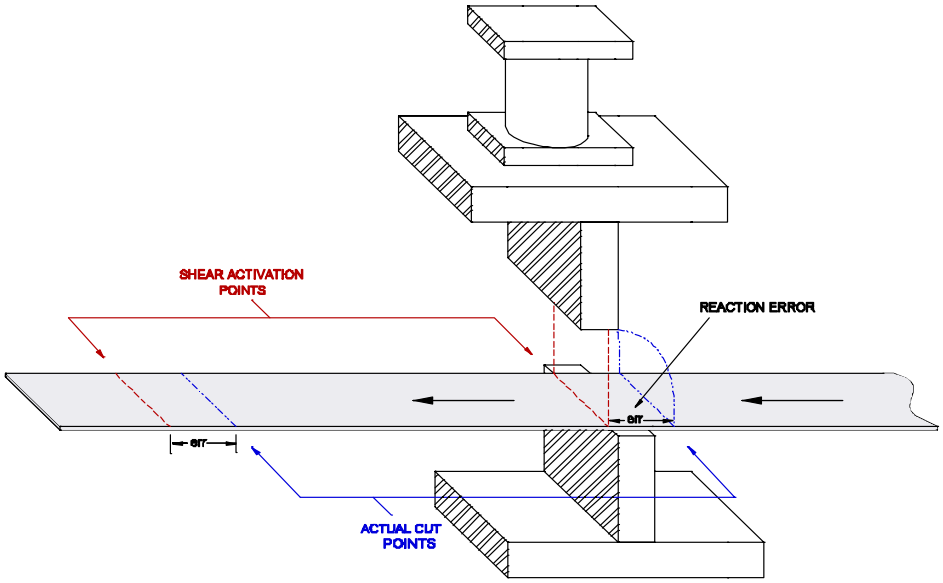


Figure 19: Shear Reaction vs. Actual Cut Point

To calculate the Shear Reaction time,

1. Set the **Shear Reaction** time to zero
2. Cycle the shear
3. Run two parts that are long enough for the line to reach full velocity before firing the press.
4. Note the line speed on the controller display (Top, Center)
5. Mark the parts 1st Part and 2nd Part.
6. Use the following formula for the new Shear Reaction time:

$$\text{Shear Reaction Time} = \left[\frac{(\text{1st Part - 2nd Part})}{\text{Line Speed in FPM}}\right] \times 5$$

Setting Shear Reaction with a Boost attached

Boost cylinders and boost reaction can cause problems when trying to calculate shear reaction time. See the following example

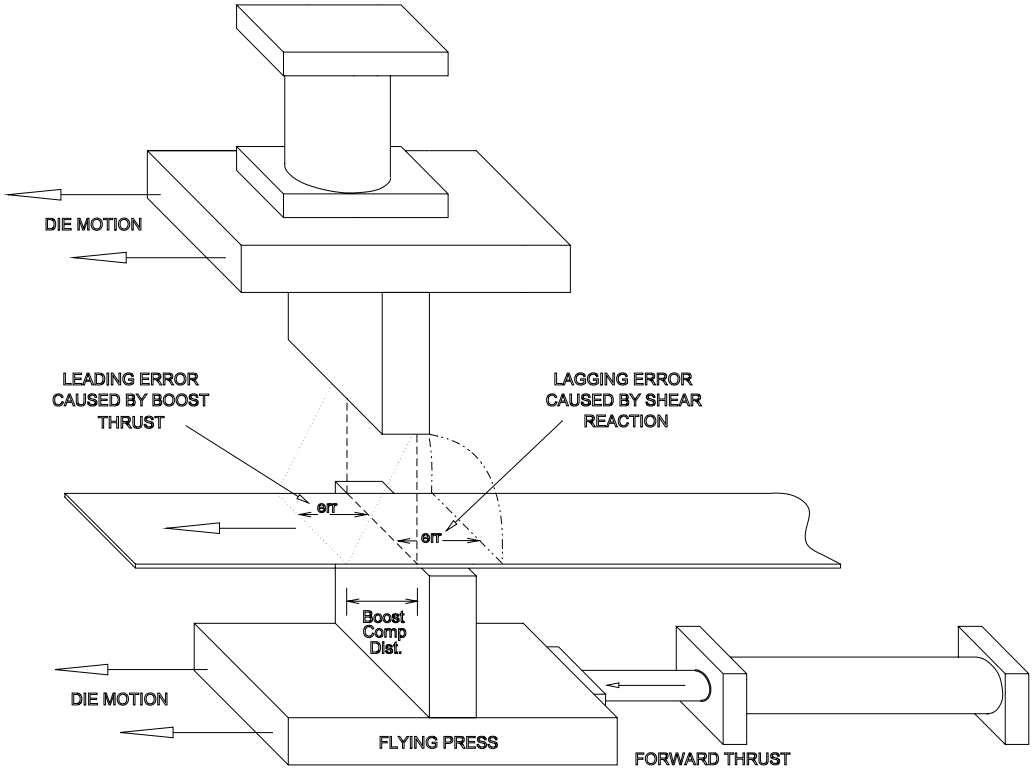


Figure 20: (Example) Boost displacement of die vs. target coincident point

Notice that the die boost does not change the shear reaction itself, but it can cause the die to fire in a different location since the entire die is moved forward during the cut.

If possible, disconnect the die boost when setting shear reaction. This will allow you to use the above method for calculating the Shear Reaction time. Although you may have to run the line at a slower speed, this is the quickest and most accurate way of setting the shear reaction.

Another way to figure shear reaction with a boost is to test at two different speed ranges. For example, perform the standard reaction test at 100 FPM and then again at 200 fpm, and then calculate the difference in the two speeds and the two errors to set your reaction times (the theory is that the boost compensation distance of the die is a constant value, but the shear reaction error will grow lineally as the line material moves faster).

For example, with First Speed At 100 FPM (20 In/Sec)

- Crop the leading edge of the material and run part #1.
- Part is 120.90 inches long

Then with the Second Speed At 200 FPM (40 In/Sec)

- Crop the leading edge of the material and run part #2.
- Part is 121.80 inches long

The difference in speed is 100 FPM (20 In/Sec)

Now apply the shear reaction formula

$$\frac{Part2 \quad - \quad Part1}{SecondSpeed \quad - \quad FirstSpeed} \times (5) = \frac{121.80" \quad - \quad 120.90"}{200FPM \quad - \quad 100FPM}(5) = .045 \quad \text{Re}action \quad Time$$

Boost Reaction Time

Many dies have a boost cylinder attached to them to push the die forward with the material. This causes less stress on the material as the die tool engages it. Optimally, the die would be moving at the same speed as the material for best cutting results.

Note: Always keep in mind that the Boost Reaction is only for enhancing the quality of the cut, not for correcting the length of the part.

There are no formulas for calculating boost reaction times. It basically comes down to two rules:

- If you are buckling or damaging the leading edge of cut or punch during the press operation, increase the boost reaction in order to cause the die to push forward earlier in time allowing the die to be moving faster at the cut point.
- If you are pulling or tearing the material during a punch or cutting operation the die is going faster than the material. Decrease the boost reaction time to cause the die to be moving slower at the cut point.

The Shear Boost Dwell sets the length of time that the Die Boost Output stays on.

The Die Boost output is activated at the target coincidence point and left on for the value of time programmed into the Shear Boost Dwell time (Figure 21). This is done to push the die forward in order to allow the shear press to cycle through the material without damaging the part.

The Die Boost Reaction time turns the Die Boost on earlier in time. This allows the die to begin accelerating prior to the target coincidence point; allowing for the press to more closely match the line speed before the die tool hits the material.

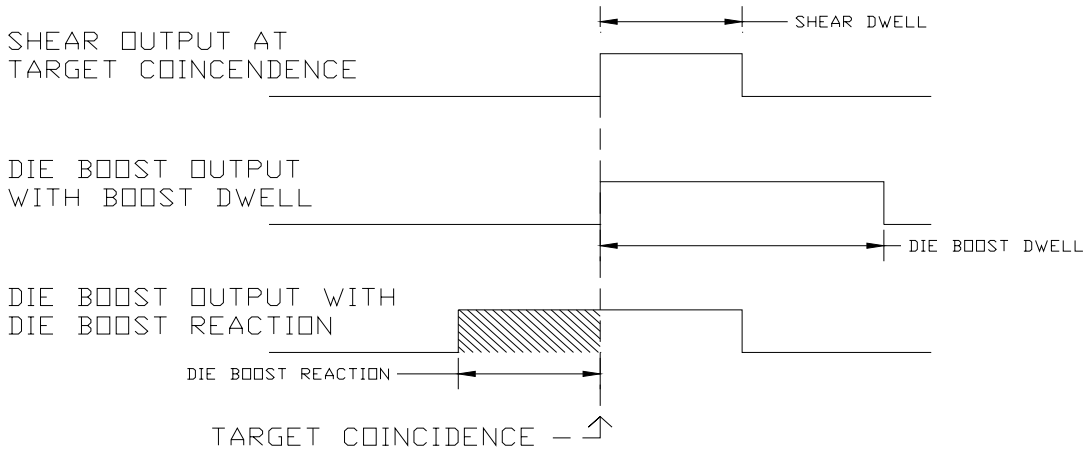


Figure 21: Die Boost Timing

When the Die Boost Reaction is added, the Die Boost output is advanced earlier in time as referenced to the Target Coincidence (See Figure 22). The reaction time shifts the entire pulse forward in time.

Note: The Die Boost Reaction Time is entirely independent of Shear Reaction Time. Die Boost Reaction is typically greater than or equal to the Shear Reaction.

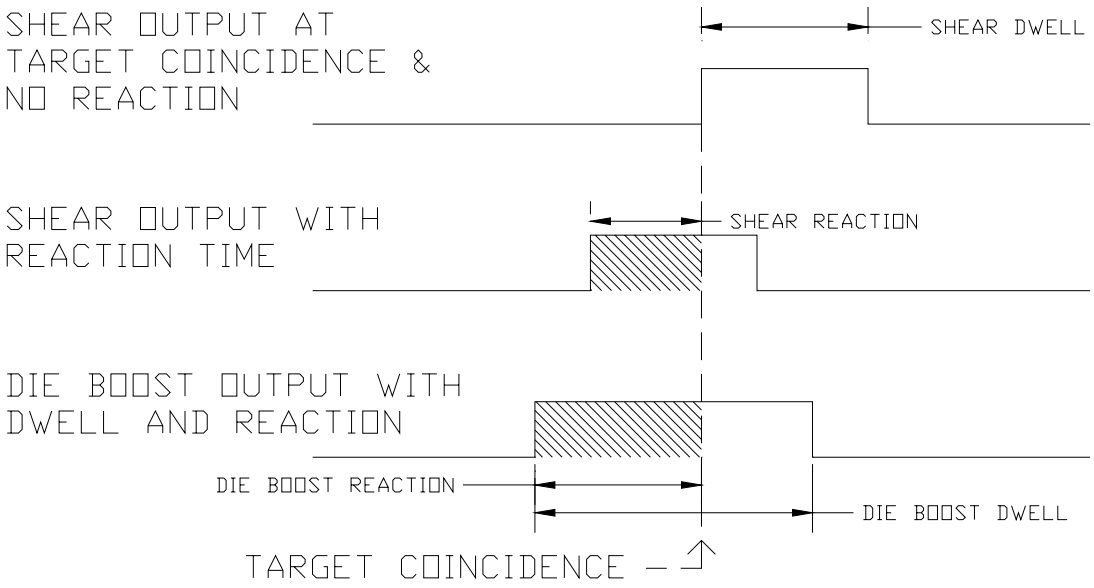


Figure 22: Die Boost Timing with Shear Reaction

If the leading edge of the part gets caught on the die (pushes the die), the Shear Boost Dwell time should be increased. If the die moves too far out causing the material to pull or tear, the Shear Boost Dwell time should be decreased.

Boost Compensation

The final step of calibrating the Shear should be setting the Boost Compensation parameter. After the Shear Reaction time has been calculated by one of the two methods above, the first piece after a manual shear may still be short due to the Boost Comp. Dist. (see Figure 20). Setting the Boost Compensation parameter equal to the difference between the first part and second parts after a standing crop cut should resolve this issue by adding this distance to the first part.

Note: Any changes to the Boost or Shear Reaction times may require changes to this parameter as well.

Press Reaction Time (Short Distances)

Note: Prior to using the procedure to calculate the Press Reaction, the Correction Factor and Shear Reaction should first be calculated.

The Press Reaction time is the time delay that takes place between the time that the punch signal occurs and the time that the die contacts the material. This factor is used on flying die machines only. The maximum value is 1.000 seconds. There is a Press Reaction time for each Press.

Calculate the Press Reaction time using the following steps:

1. Set the Press Reaction time to zero
2. Program a 130" part with holes at 60" and 120". This may need modification to assure that the line is up to full speed before the first punch occurs.
3. Cycle the shear
4. Run the line
5. After the first part is cut, jog the material out and measure the leading edge to the first hole and the first hole to the second hole
6. Use the following formula for the new Press Reaction time:

Press Reaction Time (Long Distances)

If there is a long distance between the shear and the press and a large amount of scrap would be produced, the following procedure could be used:

Calculate the Press Reaction time using the following steps:

1. Set the Shear-Punch Distance and the Press Reaction time to zero
2. Program a 130" part with holes at 60" and 120"
3. Cycle the Shear *and* the Press being tested.
4. Run a single part.
5. After the first part is complete, measure from the manually produced hole to the first hole and the first hole to the second hole
6. Use the following formula for the new Press Reaction time:

$$\text{Press Reaction} = \left[\frac{(\text{MH to 1st Hole}) - (\text{1st to 2nd Hole})}{\text{Line Speed}} \right] \times 5$$

MH =Manually Produced Hole

Both methods will calculate a good press reaction time. This same test must be repeated for all individual presses.

Feed-to-Stop Setup

Minimum Slow Distance (2-speed lines only)

The *Minimum Slow Distance* is the value used by the controller to determine how close to the end of the part that the controller shifts its outputs from fast speed logic to slow speed logic. The larger this value is, the sooner the line will shift into a slow velocity (creep speed) prior to press operation. This parameter needs to be set large enough so that the line is in the stabilized slow velocity before the controller tells it to stop for the operation. If this parameter is too small, the material may still be decelerating from the fast speed when it is told to stop, thereby producing poor tolerances.

This parameter is used in conjunction with the Deceleration Factor parameter. When the Deceleration Mode parameter is set to automatic or manual, an additional slow down length will occur depending on line speed and machine operation.

Deceleration Mode (2-speed lines only)

On two-speed machines, the XL200 Series uses a Deceleration (Decel) Factor when changing from fast to slow speed. The Decel Factor is used in conjunction with the Minimum Slow Distance to determine the ideal time to shift from fast speed to the slow speed. The user has the options:

Auto

The XL200 Series controller automatically maintains and updates the Deceleration Factor parameter. It is expressed in inches-per-second-per-second (In/Sec^2) and is used in the Adaptive Slowdown calculation. The parameter can be overridden but is automatically updated during the next speed shift or stop.

Manual

This allows the Deceleration Factor to be manually entered into the controller rather than being automatically updated. Some trial and error may be necessary when in the Manual mode to find a Decel Factor that works properly. Ideally, the machine should shift from fast to slow at some distance prior to the target (shear or punch point) and long enough so that it reaches a constant slow velocity before the motion outputs are turned off.

If the machine tends to shift into slow too soon, increase the Decel Factor. If the machine tends too shift into slow too late, decrease the Decel Factor.

While in the Manual mode, the XL200 Series controller will not calculate a new value for the Decel Factor after each speed shift or stop.

Off

The Deceleration Factor is not used and the controller will not make an Adaptive Slowdown calculation. The machine will shift from fast to slow when the material has reached the Minimum Slow Distance before the target. For example, if the Minimum Slow Distance has been set to four inches, the machine will shift from fast to slow four inches before each press operation. This may or may not be enough distance for the machine to decelerate properly.

The Deceleration Mode defaults to Off. Setting this parameter to Manual or Auto may increase productivity by running the line in slow for the minimal amount of time necessary.

Deceleration Factor (2-speed lines only)

A Decel Factor can be set to keep production optimized by minimizing the amount of time that the material is running in slow speed. Like the Stopping Reaction, the Decel Factor can be set manually, automatically or turned off in the Decel Mode parameter. When set to Automatic, the controller will continually calculate and adjust the optimum point at which to shift the line into slow speed so that material is moving at a steady, slow velocity just as it reaches the Minimum Slow Distance before the target.

If the Deceleration Factor is set to Off the controller will use only the Minimum Slow Distance when determining the location to change the feed rate to a slow speed. The Decel Mode may also be set to manual. This will allow the operator to program the Deceleration Factor by hand. In this case the parameter will not be automatically updated and the controller will not make any adjustments for changes in line performance.

The controller with Adaptive Slowdown uses the measured line speed and deceleration characteristics of the machine to calculate the optimum point to shift into slow speed. The result (Figure 23) is less time spent in slow speed on short parts, which leads to increased productivity. The XL200 Series controller continuously monitors machine parameters and automatically adjusts for machine changes.

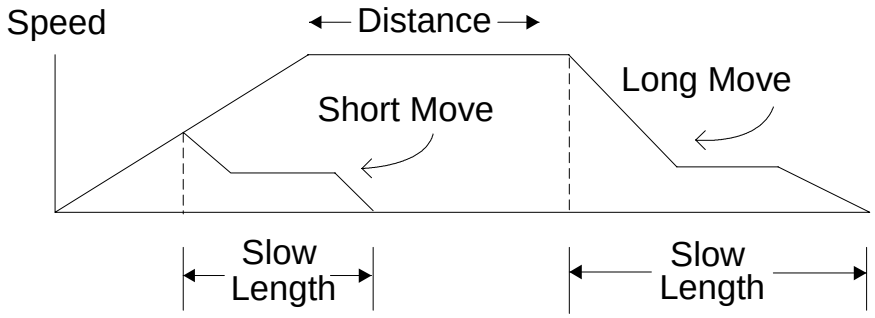


Figure 23: Speed Profile with Adaptive Slowdown

To increase productivity, on stopping lines, the controller will fire a shear or punch upon reaching a halted velocity. This halted velocity will allow a specific

number of encoder counts to occur and still be considered halted. This allows the press tool to meet the metal just as it stops moving. The controller waits until tolerance is reached, then checks for the material to fall below halted velocity at which time it can fire the shear. This speed is calculated based on tolerance and shear dwell time. To calculate the halted velocity, use the following equation:

"T"/"D"= 5("S1")= "S2 FPM"

Where:

S2 = Line Speed in Feet Per Minute
S1 = Line Speed in Inches Per Second
T = Tolerance in Inches that is Programmed into the Tolerance Parameter
D = Dwell Time of the Press in Seconds that is Programmed into the Shear Dwell or Press Dwell Parameter

To force the controller to use a smaller halted velocity, make the tolerance smaller.

Tolerance

The Tolerance parameter sets the acceptable measurement range the controller will be allowed to stop within in order to perform an operation.

If the controller stops for a press operation but detects that the target is further away from the target point than what the parameter is set to, the controller will not cycle the press.

If the target is missed by more than the Tolerance value, it will halt the line and post a warning to the operator that the part is Out of Tolerance.

This parameter should be set low enough that parts are within a window of acceptance, but large enough not to get repeated errors.

For example, suppose a 120-inch part is produced with a programmed Tolerance of .125 inches. If the controller stops for the operation and the target is between 119.875 and 120.125 inches, the controller will cycle the press and continue running. Anything thing outside this quarter-inch window (+/- .125) will cause the controller to halt and post the error.

Note: The Tolerance parameter may need to be set to a larger value (3 or 4 inches) initially while calibrating the machine for the first time. Once calibration is complete, set the parameter for the required production value.

Stopping Mode

On feed-to-stop machines, a Stopping Reaction time parameter is used. This represents the time delay from the time that the controller turns off the movement outputs until the material actually stops. The longer a machine takes to stop, the larger the reaction time will need to be. Knowing that the machine will require time to stop, the value from this parameter is used to stop the material before reaching the press target. The user has a choice of three Stopping Modes :

Auto

The XL200 Series controller turns off the movement outputs prior to the actual shear or punch point, allowing for the momentum and inertia of the machine and material to carry it to the correct stop point. The stopping reaction is monitored continually with a new STOPPING REACTION time being calculated after each operational stop. This parameter may be overridden in the Manual Calibration mode but the value will be again be updated after the next operational stop. A tolerance check will be performed before firing the shear. The maximum value is 5.000 seconds.

The default mode for Stopping Reaction time is Auto. This is the recommended mode of operation.

Manual

This mode functions identically to Auto except that a new Stopping Reaction is not calculated after each stop. The controller will use the manually entered value.

Off

The value in the Stopping Reaction parameter is not calculated and is not used at all by the XL200 Series controller. The movement outputs are turned off when the material past the shear point is equal to the programmed length of the part. This is the least accurate mode and may cause all parts to come out long due to the momentum of the machine and material during stopping. When the Stopping Mode is set to Off a tolerance test is *not* performed.

Stopping Reaction

What is Stopping Reaction?

Feed-to-stop machines are used instead of flying die machines because the dies are simpler and the machines are normally more accurate. Higher accuracy is

normally achieved by slowing the line speed down to a creep speed just before the target. This is done to minimize the effect of a delay in stopping that occurs and to increase consistency when the stop signal is given by the controller.

Similar to the flying die situation, it takes a finite amount of time for valves to close, brakes to engage, and motors to stop turning. With simple counters, an overshoot past the target always occurs. Shifting into slow speed minimizes the amount of overshoot.

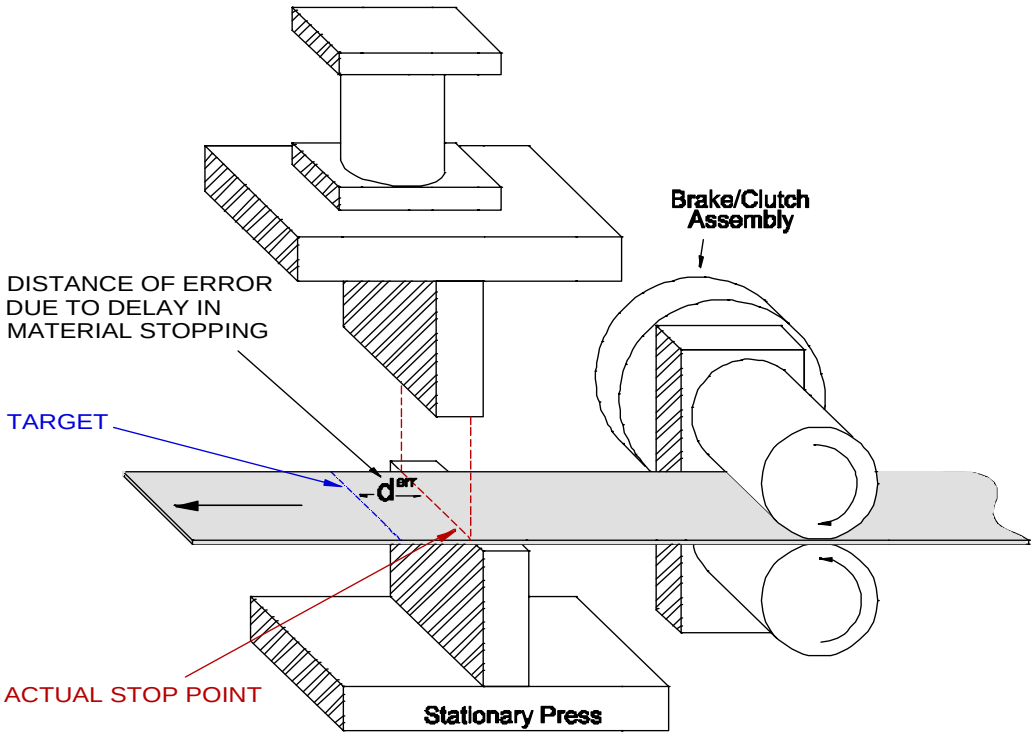


Figure 24: Feed-To-Stop System Showing a Delay In Stopping

If the delay time and slow speed are constant, the lengths are often consistent, but lack true accuracy.

The XL200 Series controller improves the performance of feed-to-stop machines by compensating for the stopping delay time and automatically setting the slowdown distance.

The controller uses its automatic parameters to calculate an advanced target to stop the machine so that it coasts into the exact shear point.

The controller measures the amount of overshoot or undershoot on each move and adjusts the Stopping Reaction Time to match the characteristics of the machine. The user can specify a tolerance so that accuracy is assured.

For example, suppose you have a motor driven Feed Roll with a clutch/brake assembly running a line. The motor runs continuously and the clutch is engaged to put the material into motion. When the line is halted, the clutch is released and the brake is engaged to stop the line.

Several causes can delay the line from halting immediately.

- The momentum of the Rolls and of the material can continue feeding forward for a short duration after being disengaged.
- The time it takes to energize the solenoid valves that control both the brake and the clutch.
- The brake overcoming its inertia and a distance before engaging the rolls to stop them.
- Slippage between the roll pad and the brake pad after the brake engages.

The XL200 Series controllers are programmed to handle this problem of overshoot automatically. The Stopping Reaction Mode and Stopping Reaction Time are in the Machine Parameters of the XL200 series controllers.

The controller knows where the target is located via the line encoder. At the precise moment that the target is below the shear blade, the controller attempts to halt the line. Due to the reasons mentioned above, the target will coast a little further before it stops.

The controller senses (through encoder measurement) that the target is past the blade by given measurement. It knows that it was X inches away from where it should have been. It then uses a proprietary algorithm to calculate a reaction time to correct for the overshoot. In order to minimize issues with machines that have inconsistent stopping reaction times the controller does not correct for the full X error amount every time but finds an average value that it adjusts over several parts.

Note: During a new installation or a recalibration, it is recommended to run at least 7-10 short parts to allow for the automatic calculation of the Stopping Reaction time. This will allow it to reach its stable range. It is advisable to set the Tolerance parameter to a larger value until the stopping reaction parameter is stabilized.

The Stopping Reaction can be set manually, automatically or completely turned off through the Stopping Mode parameter. When set to automatic, the controller will compare the intended target position to the where the target actually stopped.

The two positions should vary initially due to coasting of the material after the controller turned off its feed outputs. The error between the two positions will be integrated out over the next few parts. Since the first few parts may be substantially off-target until the reaction time is worked out, it may be best to set the Tolerance parameter to a larger number.

If the target stops outside the range programmed into the Tolerance parameter, the controller will automatically turn off the run output without firing the shear and post an error message on the display.

Once the **Stopping Reaction Time** is calculated, the **Tolerance** parameter can be set back to the required level. As long as the **Stopping Mode** is set to automatic, the controller will continually update any for any variations in how long the drive system takes to stop the line.

The Stopping Reaction Time can be manually set if manual is selected in the Stopping Mode. Manually entered settings in this parameter will not be automatically adjusted for if changes in the operation of the line occur. These parameters will be found on both single-speed and two-speed applications.

Inducing Automatic Values

Once the basic Configuration parameters and Manual Calibration parameters are set, you can begin to run the line and calibrate the lengths.

Initial Run

Widen the Tolerance parameter to allow for calibration of the Stopping Reaction time. This may need to be several inches.

Set Minimum Slow Distance to a value conservatively larger than the distance it will take the material to shift from fast speed to a stable slow speed.

Program some short parts from 36 to 60 inches. Put the controller into run and watch the display. As each part is cut, the amount displayed as being cut should get closer to the actual programmed length. This is due to the automatic features of Stopping Reaction and Decel Factor. If these are not set to automatic they must be set by hand using trial and error.

If the Stopping Reaction Mode is set to Automatic, Watch the Stopping Reaction until it becomes a relatively stable value.

If the Deceleration Mode is set to Automatic, the line may shift into slow mode very early in the part during the first few pieces made. This will gradually become closer and closer to the Minimum Slow Distance parameter. Watch the Decel

Factor until it becomes a relatively stable value. Once it has become stable you can shorten the Minimum Slow Distance to a smaller value. The Minimum Slow Distance must be larger than the distance it takes the material to stop from slow speed. If set to too small a value it can confuse the Stopping Reaction calculation and cause tolerance problems.

Now measure the sample that you just produced. You should notice that the first parts (probably long) eventually were corrected for and that the last parts are a relatively consistent length.

Once the parts appear to be consistent (even though they may appear to be slightly shorter or longer than the target), you can move onto setting the Correction Factor.

Trim Correction

The Correction Factor adjusts for errors in the size and tracking of the measuring wheel and is expressed as a percentage, with 100% being no correction. Increasing the Correction Factor causes the parts to become longer and decreasing the value shrinks the parts.

The XL200 Series controller's Trim Correction feature automatically computes a new Correction Factor. The Correction Factor is used in the controller's length calculations. Trim Correction should be used any time part lengths are incorrect in a consistent manner (e.g., all parts 3/16 long, etc.).

The XL200 controller provides an easy method for making such corrections. Press the Setup button on the controller and highlight Trim Correction. The window to the right will display the Last Programmed Length, Last Measured Length, and the Correction Factor.

Note: When calculating the Correction Factor, make several parts (6 to 10) and use the average of these parts for the part length. The first part produced should not be used in this calculation since it may be inaccurate due to shear reaction, boosts motion, or other variances.

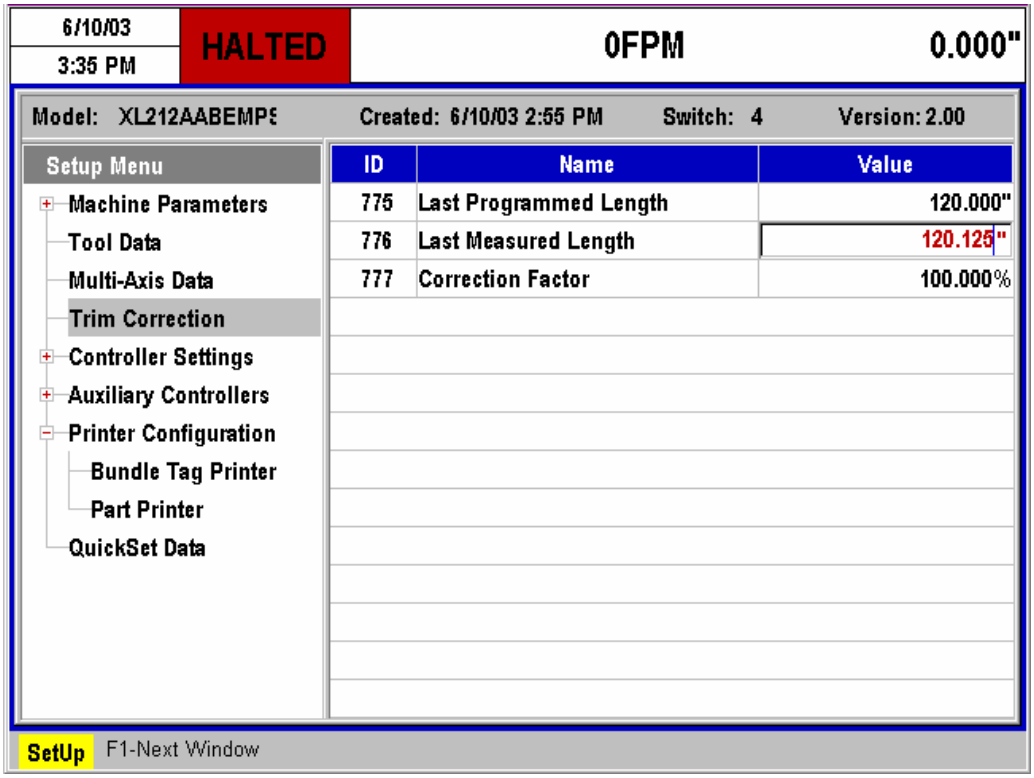


Figure 25: Trim Correction Window

The Last Programmed Length automatically displays, assuming that this is the length that is being corrected for. The Length displayed here can be edited to a different length for a part previously produced and the correction is adjusted according to the new value.

If a correction is desired, press [F1] to tab to the parameter window on the right side of the screen. Highlight the Last Measured Length field and input the actual part length being measured. Remember, it is best to take an average of the lengths being produced and input the averaged length in order to get the best results.

Once the length is Input, press [Enter]. A popup window displays and prompts the user to accept the new correction factor. Select **[Yes]** to accept the correction, or **[No]** to cancel it.

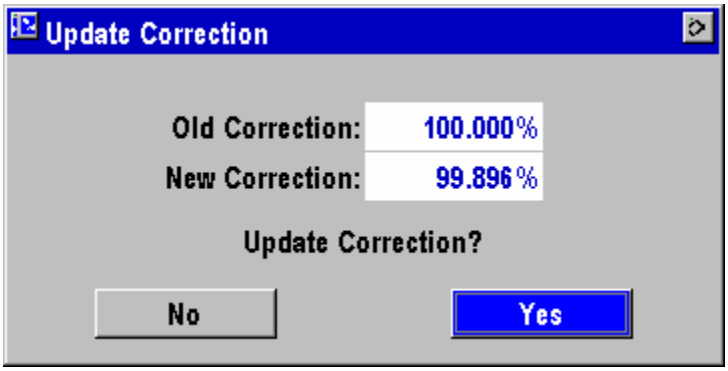


Figure 26: Update Correction Popup Window

As discussed in the Startup and Calibration chapter, the Correction Factor may also be manually calculated using the following steps:

1. Run ten parts of equal lengths, 120" for example.
2. Measure the ten parts.
3. Find the average length by adding up all ten parts (the last eight parts if Shear Reaction has not been set) and dividing by ten (eight if Shear Reaction is not set).
4. Use the following formula for the new Correction Factor. Use the average of the ten parts for "actual measured length."

$$\text{New CF} = \left(\frac{\text{Programmed Length}}{\text{Actual Measured Length}} \right) \times \text{Old CF}$$

Note: CF = Correction Factor

Appendix A: Specifications

Mechanical Specifications

Mounting

Size	11" high x 12.375 wide x 4" deep including cable
Weight	7lbs

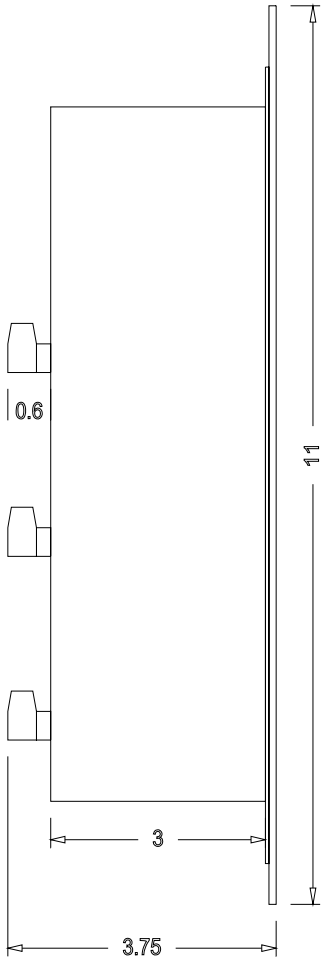


Figure 27: Side Dimensions of the XL200

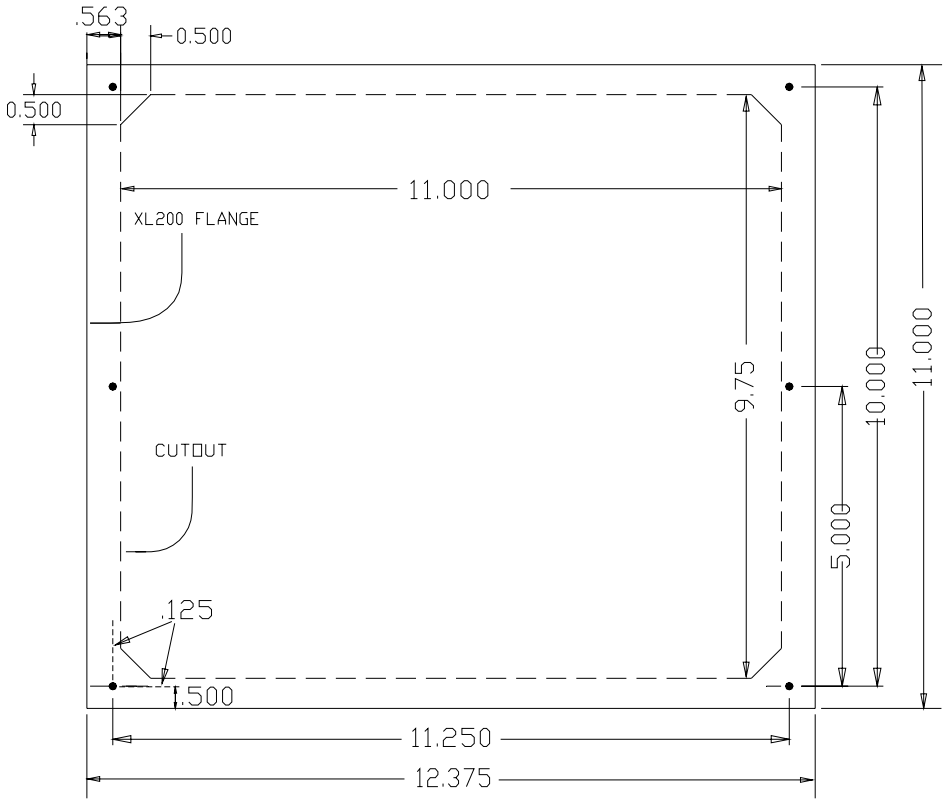


Figure 28: XL200 Cutout Dimensions

Only the dotted line in Figure 28 is to be physically cut out. The outer box displays the actual coverage of the front panel.

Make sure to clean the cutout material to be free of metallic debris that could later drop into the controller and potentially cause problems.

Electrical Specifications

CPU Input Power

Input Voltage	24VDC ±10%
Continuous Power Consumption	20 Watts
Inrush Current	5 Amp
Recommended Supply	2.5 Amps (60 Watts)

Input Characteristics

Green Connectors (Standard)	Current Sourcing

Black Connectors	Current Sinking

Output Characteristics

Green Connectors (Standard)	Current Sinking - Per input (3.5 DC amps continuous, 9 amp 100ms pulse) Per Fused Bank (3-9 DC amps, depending on installed fuse)
Black Connectors	Current Sourcing - Per input (3.5 DC amps continuous, 9 amp 100ms pulse) Per Fused Bank (3-9 DC amps, depending on installed fuse)

Encoder Input

Type	Quadrature with Complements (differential)
Voltage Supplied	5VDC
Maximum Encoder Load	200 milliamperes
Maximum Pulse Rate	200,000 pulses/second

Analog Output Characteristics

Type	Differential Line Driver
Maximum Range	+/- 10 Volt Bipolar Output

Communication Port Characteristics

Port A	RS485
Port B	RS485
Port C	RS485/RS422
Port D	RS485/RS422

Appendix B: Diagrams

Wiring Diagrams

Generic wiring diagrams have been provided in order to give the installer an idea of how each system is to be wired. Adequate safety circuits and guards must be added to any installation

For details on inputs and outputs, see *Input/Output Definitions*, page 14

- **WARNING! AMS Controls provides the following drawings for illustration purposes only. They are not to be taken as literal examples for wiring machinery. Every machine is different and has its own safety considerations.**

- **WARNING! The customer is responsible for the installation of adequate emergency stop circuitry, safety guards, and the enclosure of all equipment that is potentially hazardous to personnel.**

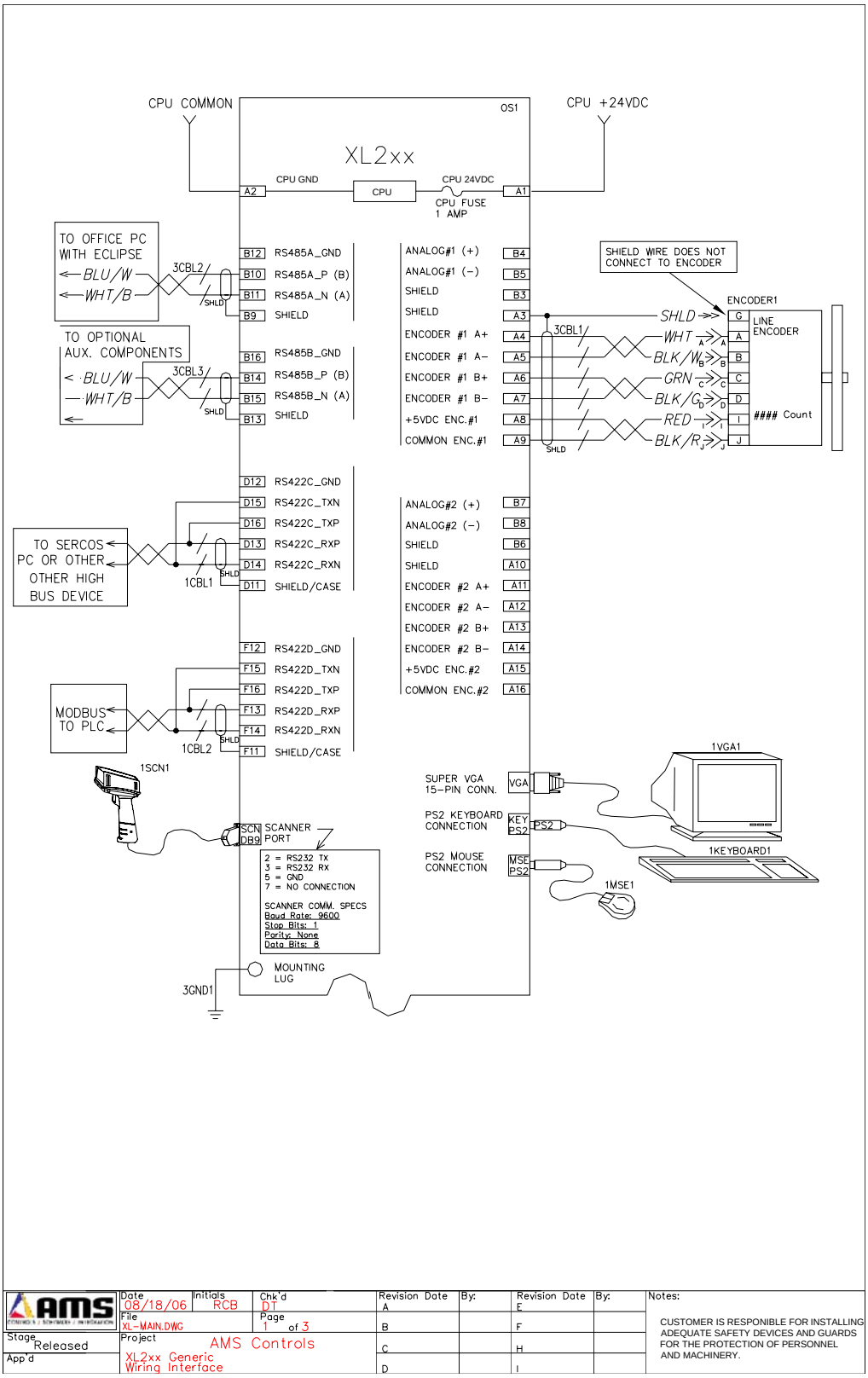


Figure 29:XL200 Main Diagram

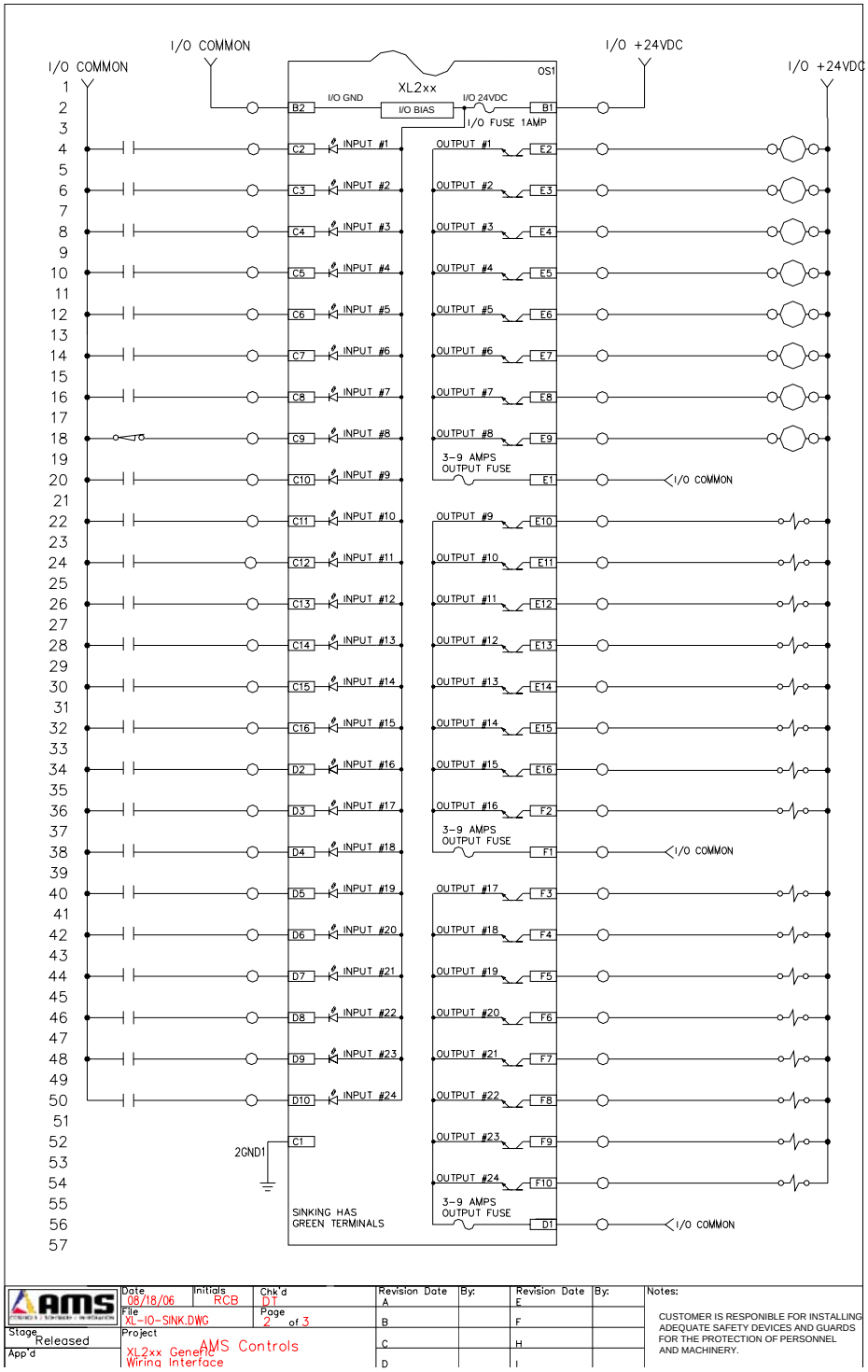


Figure 30: XL200 Sink Diagram

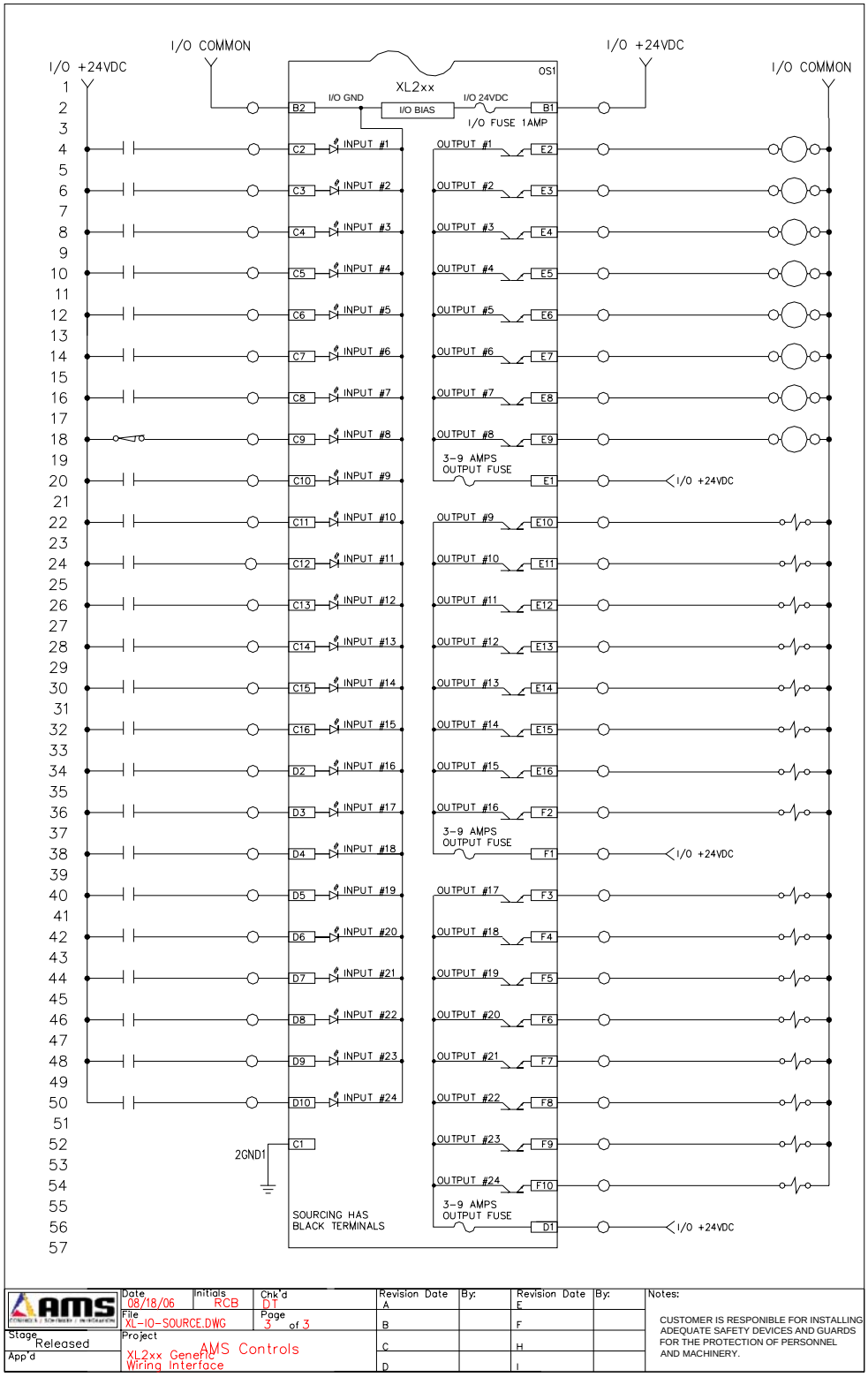


Figure 31: XL200 Source Diagram

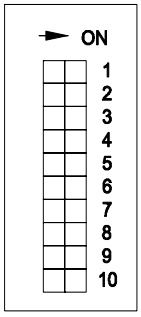
Appendix C: Worksheets For User-Recorded Parameters

Controller Information

Serial Number: _____

Version Number: _____

Switch: _____



Note: Use this sheet to fill in the machine setup values. This list includes all possible parameters and not all controllers have every parameter. Only fill in the values for your machine. Use the switch drawing to show your switch setting.

Machine Parameters Sheet

Machine Parameters

Shear Dwell Down	
Shear Dwell Up	
Shear Boost Dwell	
Shear Reaction	
Shear Boost Reaction	
Shear Boost Enable Velocity	
Expect Shear Complete	
Expect Shear Up Complete	
Press 1 Dwell Down	
Press 1 Dwell Up	
Press 1 Boost Dwell	
Press 1 Reaction	
Press 1 Boost Reaction	
Press 1 Boost Enable Velocity	
Expect Press 1 Complete	
Expect Press 1 Up Complete	
Press 2 Dwell Down	
Press 2 Dwell Up	
Press 2 Boost Dwell	
Press 2 Reaction	
Press 2 Boost Reaction	
Press 2 Boost Enable Velocity	
Expect Press 2 Complete	
Expect Press 2 Up Complete	
Press 3 Dwell Down	
Press 3 Dwell Up	
Press 3 Boost Dwell	
Press 3 Reaction	

Press 3 Boost Reaction	
Press 3 Boost Enable Velocity	
Expect Press 3 Complete	
Expect Press 3 Up Complete	
Press 4 Dwell Down	
Press 4 Dwell Up	
Press 4 Boost Dwell	
Press 4 Reaction	
Press 4 Boost Reaction	
Press 4 Boost Enable Velocity	
Expect Press 4 Complete	
Expect Press 4 Up Complete	
Press 5 Dwell Down	
Press 5 Dwell Up	
Press 5 Boost Dwell	
Press 5 Reaction	
Press 5 Boost Reaction	
Press 6 Boost Enable Velocity	
Expect Press 6 Complete	
Expect Press 6 Up Complete	
Press 7 Dwell Down	
Press 7 Dwell Up	
Press 7 Boost Dwell	
Press 7 Reaction	
Press 7 Boost Reaction	
Press 7 Boost Enable Velocity	
Expect Press 7 Complete	
Expect Press 7 Up Complete	
Press 8 Dwell Down	
Press 8 Dwell Up	
Press 8 Boost Dwell	

Press 8 Reaction	
Press 8 Boost Reaction	
Press 8 Boost Enable Velocity	
Expect Press 8 Complete	
Expect Press 8 Up Complete	
Press 9 Dwell Down	
Press 9 Dwell Up	
Press 9 Boost Dwell	
Press 9 Reaction	
Press 9 Boost Reaction	
Press 9 Boost Enable Velocity	
Expect Press 9 Complete	
Expect Press 9 Up Complete	
Press 10 Dwell Down	
Press 10 Dwell Up	
Press 10 Boost Dwell	
Press 10 Reaction	
Press 10 Boost Reaction	
Press 10 Boost Enable Velocity	
Expect Press 10 Complete	
Expect Press 10 Up Complete	
Press 11 Dwell Down	
Press 11 Dwell Up	
Press 11 Boost Dwell	
Press 11 Reaction	
Press 11 Boost Reaction	
Press 11 Boost Enable Velocity	
Expect Press 11 Complete	
Expect Press 11 Up Complete	
Tool Selected for Manual Punch	

Bundle Quantity Reload Value	
Bundle Quantity Count	
Item Complete Output Duration	
Delay After Shear	
Minimum Slow Distance	
Scrap Part Length	
Halt Mode	
Halt No More Items to Run	
Stopping Reaction Mode	
Deceleration Mode	
Deceleration Factor	
Tolerance	
Alternating Press Mode	
Stitch Gag	
Max Auto Stitch Length	
Slow Output While Halted	
Stacker Dwell	
Stacker Delay	
Parts Per Stack	
Expect Stacker Complete	
Horn Dwell	
Crash Detect Velocity Change	
Crash Detect Time	
Test Part Length	
Use Coil Inventory	
Allow Coil Override	
Bump Tolerance	
Bump Time	
Coil End Point	
Coil End Offset	

Encoder Direction	
Shear Kerf	
Minimum Part Length	
Shear to Encoder Distance	
Machine Material Y Reference	
Enable Multi-Angle Shear	
Clear Queue After	
Enable Shear Encoder Distance 2	
Shear to Encoder Distance 2	
Coil Trim Cut Distance	
Front Shear Tool	
Front Shear Advance	
Hole Mode Select	
No Hole Stop Distance	
Hole Detect Logic	
Minimum Hole Spacing	
Shear to Detector Distance	
Hole Tolerance	
Line Resolution	
Velocity at Max Analog Voltage	
Auxiliary Shear Compensation	
Boost Compensation	
Filter Constant	
Minimum Speed Voltage	
Maximum Speed Voltage	
Length at Maximum Speed	
Jog Speed Voltage	
Correction Factor	

Time Format	
Date Format	
Date Separator	
Network Unit ID	
Network Baud Rate	
Halt Delay Minimum	
Auto-Request Order Footage	
Use Scrap Codes	
Manual Shear Scrap Length	
Enforce Eclipse Coil Validation	
PLC Unit ID	
PLC Baud Rate	
PLC Parity	
Configuration Register Address	
Language Select	
Numeric Display Format	
Auto-Delete Done Orders After	
Set Done Items to Ready	
Enable Virtual Keyboard	
Velocity Display Unit ID	
Show User Data – Program Screen	
Show User Data – Status Screen	
Show Help Preview – Setup Screen	
Select Bundle Tag Printer	
Bundle Tag Copies	
Bundle Tag on Coil Change	

Length of Label	
Select Part Printer	
Printer Output Dwell	
Printer Output Reaction	
Stop To Print	
Slow Speed For Print	
Tolerance Test For Print	
Length of Label	
Encoder Enable	
Print Speed	
Encoder Pulses Per Meter	
Print Height	
Ink Type	
Print Direction	
Printer 2 Direction	
Print Delay (mm)	
Printer 2 Delay (mm)	
Column Spacing (mm)	
Dot Size (mm)	
Double	
Overlap	
Auto Flush Ink	
Auto Flush Time	
Edge Offset	
Backfeed	
Print Speed	
Slew Speed	
Print Bold	
Printer Model	
Message Select Length	
Print Trigger Source	

Use PM5400 Commands _____

Print Mode _____

Gag Setup Time _____

_____

Global Material Width Offset _____

Global Material Gauge Offset _____

Tool Data Sheet

Tool Data

ID	Press	Gag	X-Offset	Y-Offset	Axis	Name

Patterns Sheet

Pattern #: _____

Tool ID	Reference	Offset	Y-Reference	Y-Offset

Pattern #: _____

Tool ID	Reference	Offset	Y-Reference	Y-Offset

Index