



XL200 SERIES CLOSED-LOOP CONTROLLER



Operation & Reference Manual

Version 2

XL200CL SERIES CLOSED-LOOP CONTROLLER Operation & Reference Manual

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XL200CL Series, Version 2
OM-XL2CO-V201

Introduction to AMS

The Model **XL200CL SERIES** controller is the latest and best of a long line of controllers. **AMS Controls Inc.** has decades of experience with controls for roll forming and feeding machinery. Since 1977, the goal of AMS was to construct a control system that not only provided excellent machine control and an easy user interface, but to also provide it in a high quality, industrially tough package and back it up with the best customer support in the business.

The **XL200CL SERIES** is the ultimate controller for roll-forming and cut-to-length applications. Machines that are controlled by the **XL200CL Series controller** may consist of multiple presses that can punch and notch prior to the cutoff. Gags for press dies are controlled by the same control system and are as easy to program.

Unlike general-purpose controllers, AMS controllers are designed specifically for the needs of the roll forming industry. With an AMS controller installed on the roll forming line, many customers report a 20-30% increase in productivity due to the elimination of costly delays and scrapped materials. With the **XL200CL SERIES**, parts are produced with a minimum amount of scrap. The powerful microprocessor can sequence from one part length to another without creating wasteful and costly scrap. This unique feature makes in line punching practical for JIT (just in time) production systems.

Using "Eclipse Production Software"; order information can be downloaded and production information monitored with a PC from the office.

Of equal importance to roll forming, is the ease of interfacing with the program and control system. Many machines are not used to their full potential because the controls are too complicated for the average production worker to understand. This is not the case with the AMS controller. AMS strives to make programming as simple as possible without loss of capability.

AMS incorporated the following objectives into the XL200CL Series Controller:

- Describe a part in finished part dimensions.
- Prompt for data with plain English prompts using standard industry terminology.
- Allow user flexibility to use the same controller on several machine configurations.
- Minimize the amount of data that must be entered.

Accuracy

“Typical” electronic length controllers lose accuracy when machine fluctuations occur. For cut-to-length machines without servo drives, accuracy depends on the repeatability of the machine (The ability to run at a constant speed with repeatable reaction delays for each type of press operation).

The **XL200CL SERIES Controller** constantly monitors the performance of the machine and automatically compensates for these variations, resulting in improved accuracy. Closed loop model controllers also monitor both the material and the die position for improved accuracy. Designed specifically for die-accelerators and feeding devices, the **XL200CL Series** contains features that greatly improve machine productivity and accuracy.

Productivity

The AMS controller improves productivity in several ways:

- **Improved accuracy** with the **XL200CL SERIES Controller** allows machines to run at higher line speeds.
- **XL200CL Series Controller** supports a flying die-accelerator cutoff with an open-loop punch.
- The **multiple-order** feature allows many jobs to be programmed at one time (even while other orders are being processed and run) so delays between orders can be eliminated.
- Built in **scrap control** functions include “Increment Quantity”, “Decrement Quantity”, and “Scrap Bundle”. These features are explained in Chapter 4 (Operation) of this manual.
- Eliminate a large amount of material waste by requiring only a single manual cut at the beginning of a new coil. This cut can be made while the machine is stopped, as opposed to a flying crop cut, which further reduces waste.
- The automatic “Coil End Point” feature helps reduce the amount of scrap created by stopping the line and allowing the operator to cut the coil so that only the required amount of material is used for the order. The controller also includes “Scrap Length” parameters for punching lines
- The **XL200CL SERIES Controller** includes an RS-485 communications port for connection to a remote office computer. With optional **Eclipse Production Software**, orders are scheduled and sent to the controller. Machine performance is monitored from remote offices and locations. Productivity in this application can be greatly increased.

Easy to Use

The **XL200CL SERIES Controller** is a sophisticated computer running complex programs. This does not mean however, that an expert is required to operate it. A large 10-1/2 inch, color liquid crystal display (LCD) prompts the operator for information in plain English and with words that are familiar. On the main "Status" display, the operator can see the current order being run, progress through the order, present material position, and the speed of the line.

Easy to Install

The **XL200CL SERIES Controller** has built-in logic to handle most machine control functions. There is no need to add Programmable Logic Controllers (PLCs) or relay logic circuits to get the correct machine sequence and safety features.

The **XL200CL Series** will control a variety of different machines. For each type of machine, a different set of machine parameters are programmed into the controller. To simplify this procedure, the type of machine is programmed via a set of switches. These "Type Setting" switches are in a single (DIP type) package, which is located on the top of the control console. The controller reads the switches to determine the type of machine it is used with. Only required setup parameters will be displayed once a specific machine configuration is selected.

About this Manual

This manual gives detailed information on the installation, operation and maintenance of the **XL200CL SERIES Controller**. Instructions for installing the controller on most machine types is included. AMS engineers can assist on installation conditions not covered by this manual.

A Customer Service Representative can be reached by Phone at 1-800-344-5213, FAX 1-314-344-9996 or questions can be sent through the website at www.amscontrols.com.

Methods for programming and running orders are also provided, explaining ways to handle a variety of special circumstances that may occur in most machines types. A troubleshooting guide is found in the appendix for guidance should problems arise.

Setup sheets are located in Chapter 11 of this manual to provide a place to record information about specific installations. Be sure to record this information at start-up and keep this manual in a safe place for later referral. If calling AMS for technical assistance, have this manual information, as well as the model number and serial number of the controller. The software version number is also needed and is displayed on the XL screen at power-up.

System Description

An “Electronic Length Control System” controls a machine producing individual parts from a coil of stock material. There are two basic categories of closed-loop cutoff and punching machines: Die-Accelerator systems and Feed-to-Stop systems. With a flying die-accelerator machine (as shown in figure I-1), the material does not stop to perform the cut or press operation. Feed systems position the material before each operation.

Die Accelerator Systems

In a die-accelerator system, the **XL200CL Series Controller** tracks the target as the material moves through the press. As the target approaches the cut point, the die is accelerated along with the material and is positioned so that the blade is directly over the target as it passes through the press. With the die tracking the target at the same velocity as the material, the press is fired at the appropriate time. Since the die is moving at the same speed as the material, the cut occurs as if the material was stopped under a stationary die. A block diagram of a typical roll forming operation with a post-cut die-accelerator is shown in Figure I-1. Other configurations are also possible.

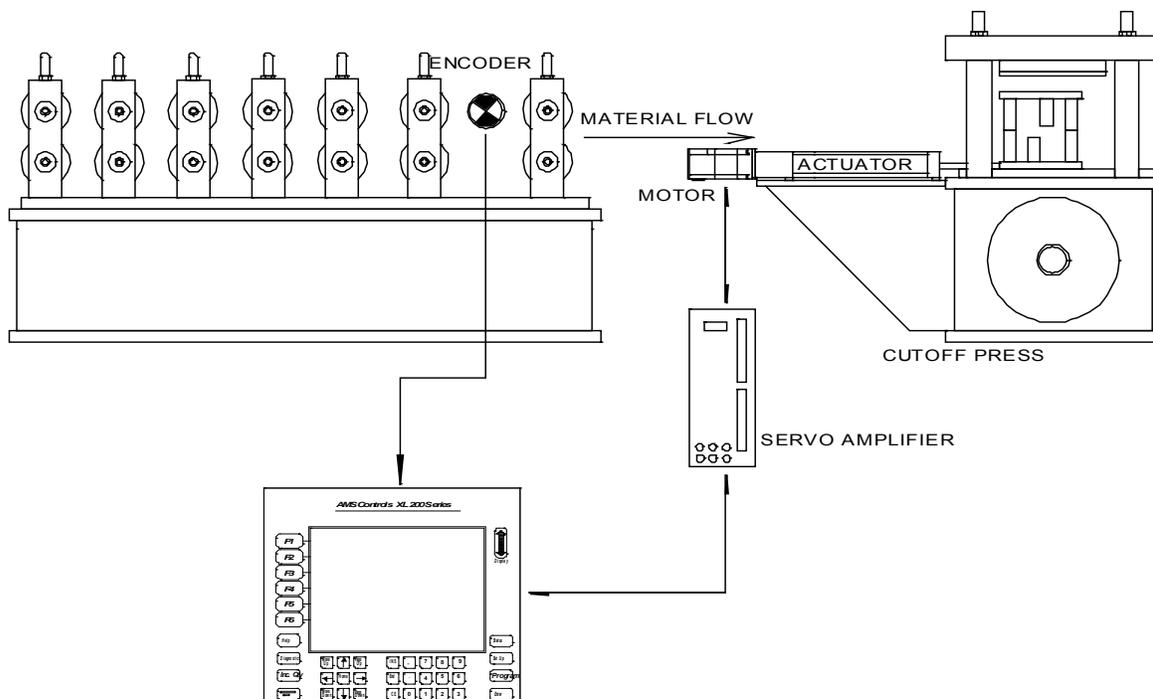


Figure I-1 Typical Roll forming Arrangement with Die-Accelerator

The vast improvement between this system and the open loop cutoff system with a die boost device is the fact that the controller knows the exact position of the die at all times. This allows the controller to make an exact match up of the cut point with the die. With the open loop system, the controller has no control over the position of the die and depends upon material speed matching and consistent machine speed to get accurate results.

The controller performs the following functions:

- Controls the material movement through the machine.
- Measures the amount of material moving past the press(es).
- Cycles the open-loop punch press at programmed points.
- Cycles the closed-loop cutoff press at the programmed length.
- Stops the machine when the correct number of parts are produced.
- Alerts the operator of procedure errors and machine malfunctions.
- Provides built-in help messages and diagnostics.

The measuring device used for this system is an optical shaft encoder, also called a pulse generator. A wheel with a known circumference is attached to the encoder and rides on the material. As the material moves through the machine, the wheel rotates, and the encoder generates electrical pulses proportional to the amount of material moved. The controller counts these pulses to determine how much material has moved through the machine.

When the material past the cutoff press equals the length of the programmed part, the controller cycles the shear press and increments the quantity that is DONE. Depending on Halt Mode, when the quantity DONE is equal to the programmed quantity, the controller stops the machine, unless other items are programmed to run immediately.

Information on the “Halt Mode” and other parameters can be found in Chapter 3

The XL200CL Series controller has the new feature of supporting an open-loop punch with a die-accelerator cutoff, further reducing the need of additional hardware and componentry.

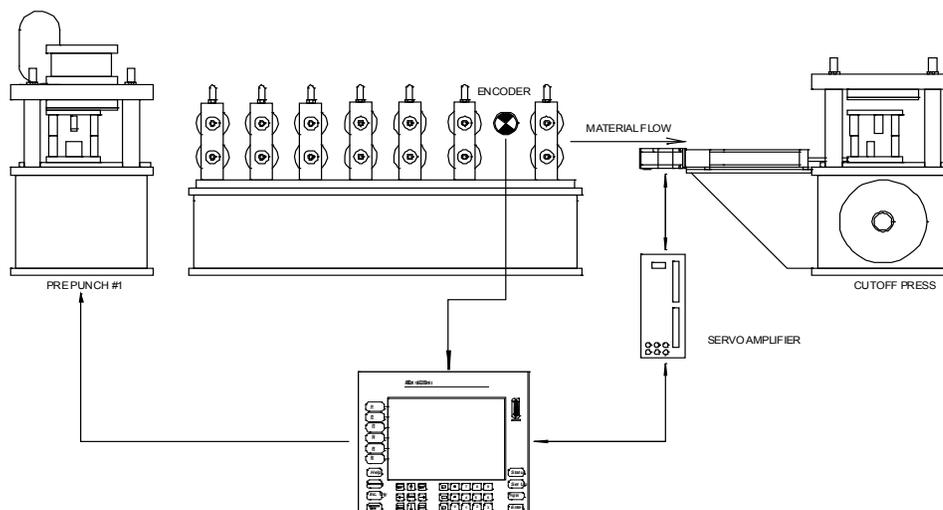


Figure I-2. Accelerator with an in-line punch press

Feed to Stop Systems

With a feed-to-stop machine, the controller positions the material for each press operation while the press die remains at a fixed location. An example of a closed loop feeder is shown in Figure I-3.

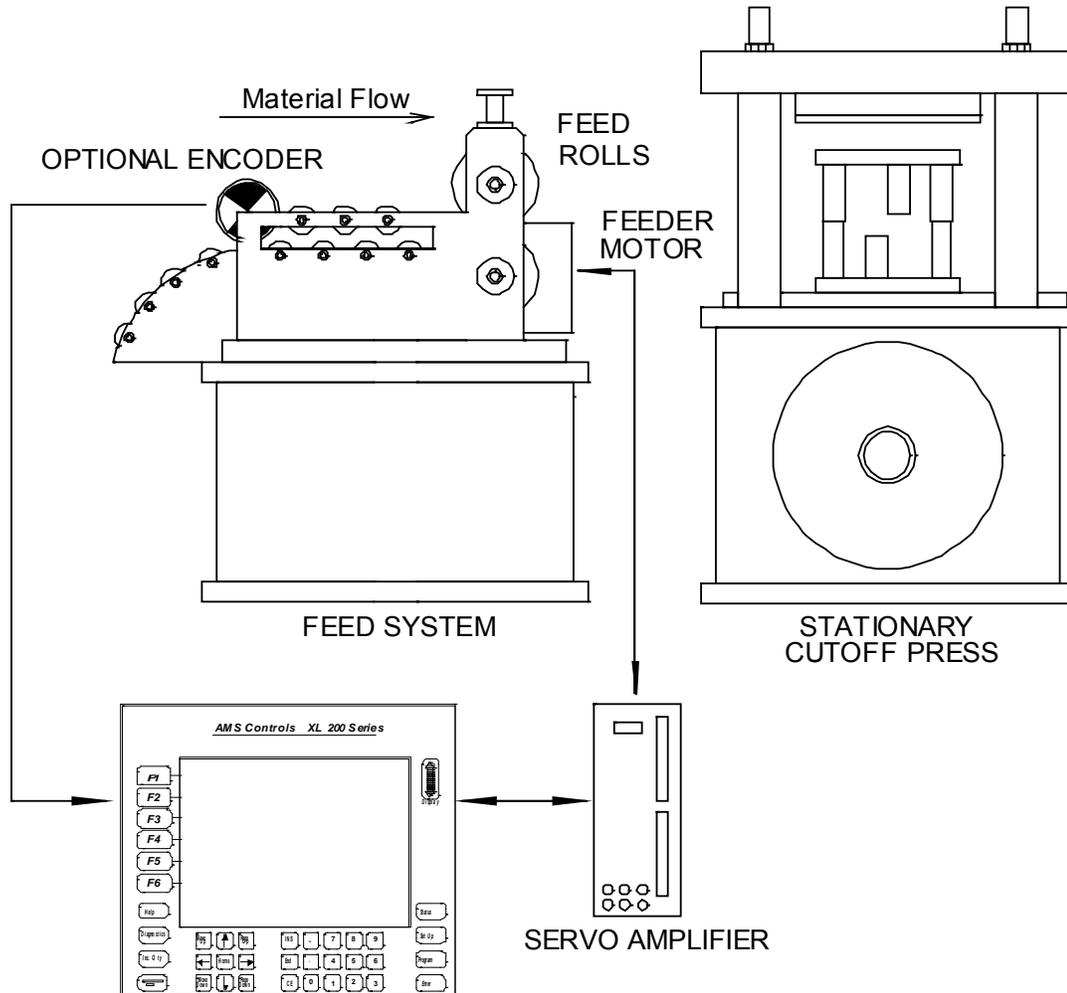


Figure I-3. Feed-to-Stop Machine with Cutoff

The **XL200CL SERIES** controller provides similar control for up to twelve in-line punch presses, eliminating the need for secondary operations on the cut piece. A single press is shown in Figure 1.3. The **XL202CL** can control up to two presses and/or gags, the **XL206CL** can control up to six presses and/or gags, and the **XL212CL** can control up to twelve presses and/or gags.

The **XL200CL SERIES** controller controls the material's position and velocity via the servo amplifier and a set of pinch rollers. The amount of material movement is measured by an encoder (resolver), which is coupled to the motor. This method can generally provide great accuracy.

Introduction

Assuming that there is no slippage between the material and the pinch rolls, the controller is able to track the exact position of the material, control its acceleration and velocity, and stop it at a pre-programmed punch or cut length.

For feed roll systems with a large distance between the feed rolls and the press or with a likelihood of slipping, a material encoder may be added. The encoder should ride directly on the material and should be placed close to the punch press. With the two inputs, the controller will monitor any slip between the line encoder and the drive resolver. If the material slips or jams such that a slip is detected between the encoder and resolver or if the encoder becomes faulty, an error message will be displayed. With such an error, the line will be halted and the drive disabled. Testing for slip will execute when material is detected and the controller is in the run or jog mode of operation.

XL200CL SERIES Hardware Description

Microcomputer

The **XL200CL SERIES** controller is the critical element of an advanced length control system. It is equivalent to a personal computer (PC) packaged in a rugged industrial enclosure. Programs are stored in PROM (Programmable Read Only Memory) electronics instead of temporary disks. These programs were written by AMS to perform the specific task of length control. The PROM is factory programmed.

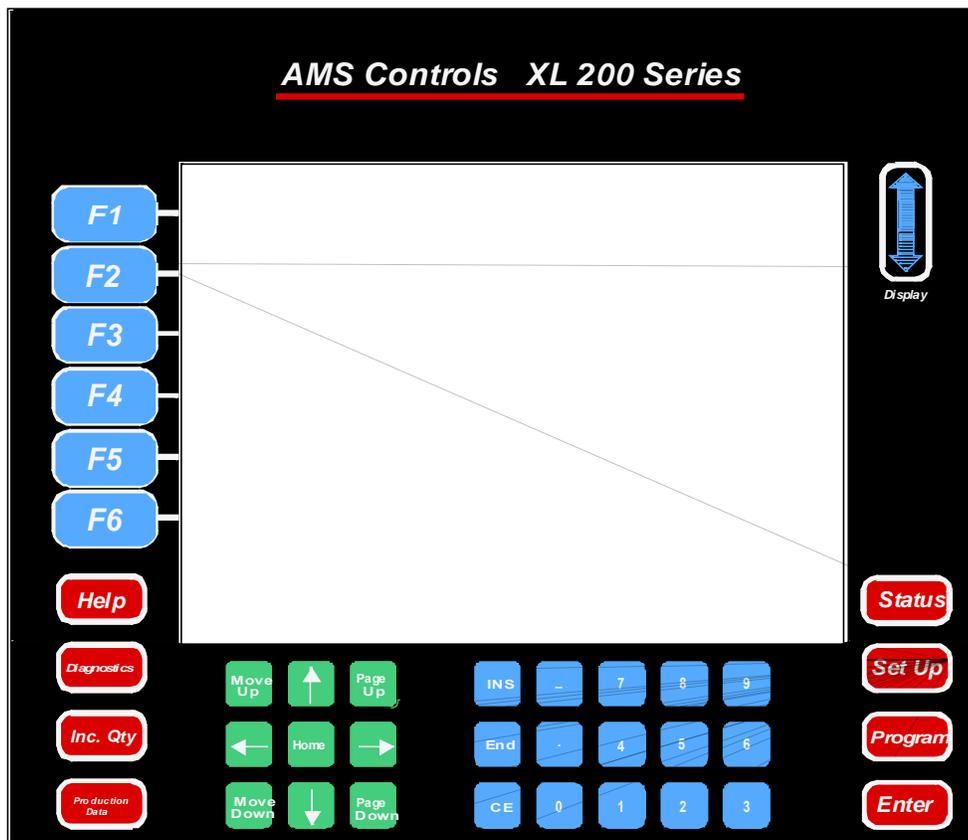


Figure I-4. XL200CL SERIES Front Panel

The user does not need to write programs for the controller and only has to enter data on what to produce. This data is stored in RAM (Random Access Memory). In a normal PC, this memory is erased when power to the PC is removed. In the **XL200CL SERIES** controller, an internal battery maintains this memory upon controller power down. Battery-backed RAM is used to store machine setup and job information data.

Operator Interface

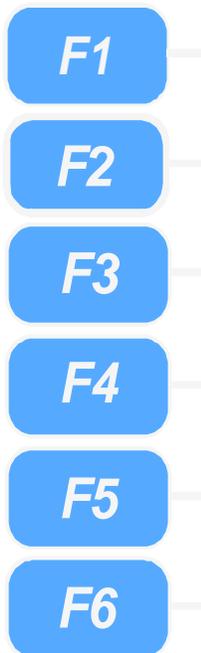
Replacing the monitor and keyboard of a PC, the **XL200CL SERIES** controller has a LCD (Liquid Crystal Display) screen and a keypad. The LCD has 15 lines of display with 40 character positions on each line. The keypad, shown in Figure I.4, has 39 keys for command and data entry. Scrolling through available drop-lists and menus allows for the selection of most non-numeric data. Use the *blue* up ↑ and down ↓ arrow keys to move the highlight bar to the desired position, and press the ENTER key to select the highlighted item. This method keeps the data entry simple and avoids input errors. There is also a way to enter user-defined words to describe orders, coils, and material (see section on OPERATING PROCEDURE).

Controller Keys and Functions

To help the operator become familiar with the keys on the controller, a brief description of each key's function is given. A more detailed description will be given in the Operating Procedure and Part Programming sections of the manual.

Function Keys

The Function Keys are also known as “Soft Keys”. The function of each key will change depending on which screen is being displayed. This enables the control system to have many “one touch” functions without having a burdensome number of keys on the controller. Below are the definitions for the keys when the “Status” display is on screen.



F1 – Next Window

This key will toggle between the two split-window displays. In the status screen, this would be from the “Order” screen on the left and the “Bundles” or “Cutlist” screen on the right.

F2 – Set to Next

Used to select the next order (if in the orders window) or item (if in the cutlist window) that is to be processed.

F3 – Skip/Ready

“Skip” is used to prevent an order (item) from running in its regular sequenced location. The order/lift is put into a skip mode. This skipped order/item can be recalled and run at a later time by highlighting the skipped “item” and pressing “Skip/Ready” again; setting it back to a ready status.

F4- Decrement Quantity

Decreases the number of parts remaining to be processed in an order. Decrementing a part will cause the associated length to be removed from scrap and added to “good” footage in the footage totalizer. This is commonly done when a previously scrapped part is manually modified to be counted as good part.

F5 – Not Used

This key is not currently used in the “Status” screen, but is used in several other display screens

F6 – Print

This key is used to manually print a bundle tag ticket when one is attached. Controllers without this feature will not have the print function available as a selection.

Hot Keys

The “Hot Keys” are keys intended to take the user directly to a menu page related to the hot key label.

Help

Provides guidance and information for a specific topic. It is used at any time to help explain the present messages, prompts, or highlighted items that are currently displayed.



Diagnostics

Provides a menu of helpful selections when troubleshooting problems or checking on the status of specific devices that are attached to the XL200CL series controller. Among the lists are status displays for auxiliary controllers, Y-axis drives, printers, network communications, graphics display, and the input/output status display.




Increase Quantity

Creates an extra piece of the part currently being produced without counting against the completed part count. (commonly used to replace a defective part). Pressing this key multiple times will provide additional increments. Each increment will add an additional length to the scrap footage counter.



Production Data

Provides a menu of items including the coil handling screens, downtime information, quality feedback, and footage totalizers.



Status

Pressing “Status” informs the operator of which order is being processed, how much of the order is completed, and which orders are completed and/or waiting to be processed.



Setup

Used to access the machine setup parameters, define tool data, calibrate the machine, set the time clock, enter printer parameter information, access custom menus, program auxiliary controllers, and to setup the Eclipse program.



Program

Used to program and define order information, patterns, and cutlist dimensions of the parts to be produced. Resequencing of orders can also be done in the “Programming” windows.



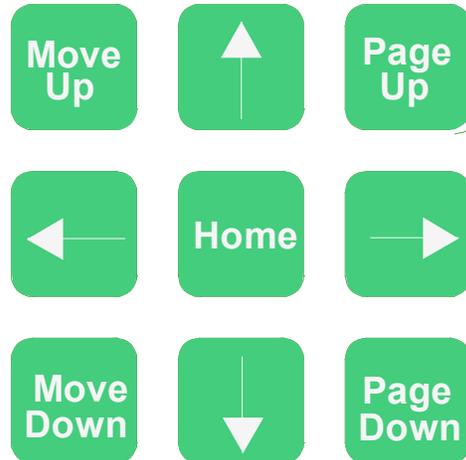
Enter

This key can be defined as a “take it” key, as the controller does not accept the data that was entered into the display until the “Enter” key is pressed.

Navigation Keys

Arrow Keys

Used to move the cursor or “highlight” in the direction of the arrow pressed.



Move Up, Move Down

Used only in the “Programming” windows while editing orders, lifts, or patterns. Pressing the “Move Up” or “Move Down” key will move the highlighted order or pattern in the indicated direction, changing the sequence of operations.

Page Up, Page Down

The “Page Up” will move the highlighted line to the top of the display and “Page Down” will move it to the bottom of the display screen. If there is more data that cannot fit on the current screen, pressing the Page Up or Page Down key a second time, will move to the next page to be displayed.

Home

The “Home” key will display the very first page of the current information being viewed, even if a different page of the information is currently being displayed.

Numeric Entry Keys



INS

Located below the display screen and to the right, the INS key will open the virtual keyboard for data entry if the keyboard is enabled in the “Operator Preferences” parameter list.

End

The “End” key will display the last page of the current information being viewed, even if a different page of the information is currently being displayed.

CE Key

The CE key is used as a “Clear Entry” key. “CE” is used to correct or edit previously entered data. Pressing this button once will put the information in an edit mode, pressing it a second time will clear out the previously entered data so that the data can be entered again from the beginning. This key is also used to clear controller errors and warning prompts.

Decimal Point, •

This key is used to place a decimal point when entering a number. Pressing the decimal point also provides the dividing line of a fraction when in the fractional mode and entering fractions.

Dash (-)

The Dash is used to put a dash in Order Numbers, Material Codes, etc. Example: Order Number 123-456-78.

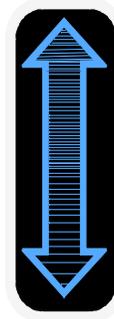
Number Keys, 0-9

Used to enter numerical data.

Display Brightness

Located to the right of the screen. Pressing the up or down arrow will lighten or darken the display respectively.

Note: Display adjustments are only available once the controller has powered up completely.



Display

Inputs

Encoder Input

The main input into the controller is the group of signals from the encoder. A simplified diagram of this circuit is shown in Figure I-5. The encoder outputs are differential line drivers. These work well in electrically noisy environments when using twisted pair cable. In this mode, electrical noise is induced equally on both the normal and the complement signals. The differential line receiver in the **XL200CL SERIES** controller looks at the difference in the two signals only. This causes the noise on the two lines to cancel each other and thus greatly increases the noise immunity of the encoder circuit.

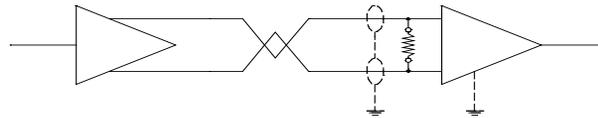


Figure I-5. Simplified Encoder Channel Circuit

Logic Input

There are twenty-four (24) discrete inputs into the **XL200CL SERIES** controller. Each is optically isolated. They sense continuity between the input of the controller and the common connection. A typical diagram of an input circuit is shown in Figure I-6. This circuit uses a 5 VDC and a 24 VDC biasing circuit internal to the AMS controller.

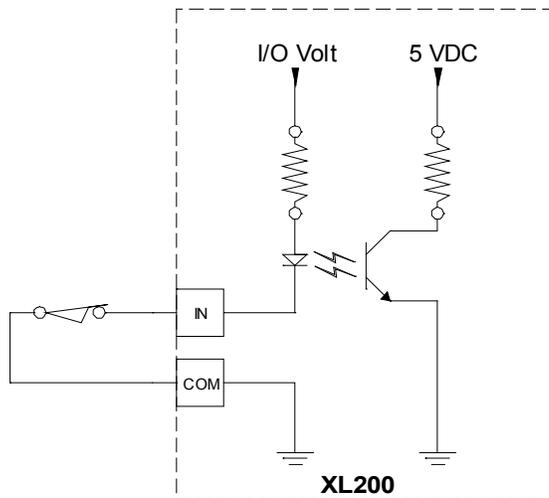


Figure I-6 Typical Input Circuit

Important Notice:

Note: Absolutely No voltage should be connected to a controller input. Doing so can severely damage the controller. See the “troubleshooting” section of this manual for more information on troubleshooting the Input/Output circuitry of the controller.

Relay contacts, limit switches, plc outputs, or control switches are the most common input devices used. The collector of an open collector NPN transistor can also drive the input, with its emitter connected to the common terminal. Current in each input circuit is limited to 15 milliamps.

Outputs

Logic Output

The standard DC output of the **XL200CL SERIES** controller is a 4-Ampere JFET. This is available in all configurations and for all outputs. A diagram of this circuit is shown in Figure I-7. The biasing voltage for the load can be from 5 to 30 volts DC. The standard I/O voltage supply is 24VDC.

The standard The common for the I/O voltage source must be connected to the I/O common of the controller. Ideally, both locations should be connected at the ground bar for the cabinet. The suppression diode shown reduces the noise generated by inductive loads when the JFET turns off. The load can be a DC solenoid, DC Relay or appropriate solid-state device.

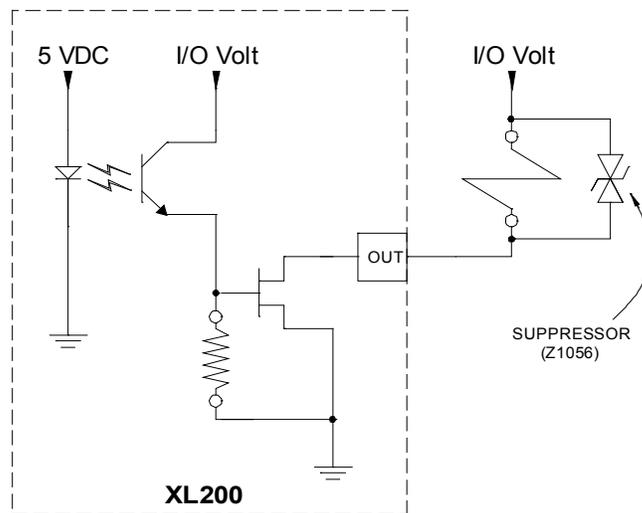


Figure I-7. Typical Output Circuit

Suppression devices should be used on all output devices.

Special Features

The **XL200CL SERIES** controller is designed to offer advanced features for length control that are not available on simple electronic counters. These features offer better accuracy and reduce the amount of waste that can occur. They also eliminate the need for additional control circuits to control the machine.

Material Change Point

Most post-cut roll former machines waste material when a material change occurs and the old coil is returned to stock. If the order is run to the end, the roll former is full of material that cannot be backed out of the machine. The coil must be cut free at the entrance to the roll former. The piece left in the roll former is then fed through and becomes scrap if it cannot be cut into a useful part.

An alert operator can stop the line with a few pieces left and cut the coil free at the entrance to the roll former. If he guesses correctly, scrap can be minimized. If he makes a mistake and does not allow enough material, then the coil has to be threaded through the machine again.

The **XL200CL SERIES** controller solves this problem by automatically stopping the line when the trailing end of the last piece is at a predetermined point at the entrance to the roll former. The AMS controller is always alert and stops automatically at the most opportune time to avoid leaving too much or too little material to finish the order.

Die Jog Mode (Die Accelerators)

When using the DIE JOG mode, the operator will have the ability to jog the die in and out by using the JOG FORWARD and JOG REVERSE inputs. The display will show the position of the die. When the JOG FORWARD switch is made, the die will move forward at the programmed JOG VELOCITY. When the JOG REVERSE switch is made, the die will move in the reverse direction. Pressing the JOG buttons outside of the JOG DIE mode screen will move the roll former or feeding device.

If the parameter call "Jog Mode" is set to "Die", then pressing the jog forward or jog reverse inputs to the controller is cause the die to jog regardless of which window is being displayed.

Graphics Display

The **XL200CL** provides a graphics display feature that greatly enhances the ability to tune and troubleshoot the loop-control parameters and the closed-loop amplifier. This display works in both the feeder and the die-accelerator systems. See Chapter six (Diagnostics) for details.

The graphic display feature looks similar to an oscilloscope screen and contains three graphs depicting line velocity, die velocity, and the analog output. Other indicators are displayed when presses are turned on and off.

Die Test Mode (Die Accelerators)

A closed loop die accelerator system is a highly sensitive and precise system that must be carefully adjusted to achieve good results. Such systems need to be tuned and tested to provide efficient performance. To optimize the system, the die accelerator needs to be tested under normal operating conditions. Test pieces can be cut, but this produces scrap and can cause jamming or die damage if conditions are not right.

To solve this problem, the **XL200CL SERIES** controller has a DIE TEST feature that simulates material movement without actually running the roll former. The operator sets the line speed and part length to run, and the AMS controller will generate internal line encoder pulses to mimic what will happen when the roll former is running. The die accelerator cycles as it normally would. The only difference between this mode and normal operation is that the controller will not stop the line on an OUT OF TOLERANCE error.

Amplifier parameters and controller parameters can be adjusted to achieve stable, responsive results while in the “DIE TEST” mode.

!! Warning !!

Material must be removed from the press before running a “Die Test”. The actuator will actually track the simulated part and the press will fire on simulated targets. The the “Diagnostics” section found in chapter six for more information.

Built-in Programmable Logic Controller

When designing a cut-to-length machine with an electronic counter for the length control device, a programmable logic controller (PLC) or relay logic is normally added to generate the proper sequence for the machine and add standard safety features. AMS has eliminated the need for a PLC by building comprehensive control logic into the **XL200CL SERIES** controller. This logic implements the following features:

- Four output configurations for speed control
- Run-Halt control via direct inputs
- Manual cycle of the Presses only in the Halt mode on feed-to-stop machines
- Jog in manual mode only, selecting only one direction at a time.
- Emergency stop input
- Automatic Shear or Press operation only in Run mode
- Halt on emergency stop or overload

The result is that the **XL200CL SERIES** controller can be adapted to most machines with a minimal amount of external electrical components. The only "programming" that a user must do is selecting the proper TYPE of machine via the type-setting switches. The controller then implements the proper logic based on the TYPE setting of that specific controller.

Punch Press Accuracy

All the accuracy enhancing features apply to the in-line punch presses as well as to the cutoff shear press.

Flexible Punching Options

The AMS controller offers a machine designer many punching options within the same controller. Before the **XL200CL SERIES** controller, complex operations required the use of a PLC that needed an expensive custom program written to handle particular applications. The next project would require re-engineering with new programming developed. This process would be repeated every time the number of presses changed or the different gag arrangement was used.

The **XL200CL SERIES** controller is designed with enough flexibility, to work on virtually any combination of presses and gags. No custom programming is required.

- The **XL200CL** will control one cutoff press and one open-loop punch press if set for a die-accelerator. It will control one cutoff press and one punch press if set for a feeder.
- The **XL202CL** will control one cutoff press with either a gag or a punch press. (Feeder Only)
- The **XL202CLF** will control one cutoff press with one flying-gag. (Accelerator Only)
- The **XL206CL** will control one cutoff press with five gags, five presses, or any combination of presses and gags equaling five outputs in addition to the cutoff press. (Feeder Only)
- The **XL206CLF** will control one press with five flying-gags. (Accelerator Only)
- The **XL212CL** will control one cutoff press with either eleven gags, eleven presses, or any combination of presses and gags equaling eleven outputs in addition to the cutoff press. (Feeder Only)
- The **XL212CLF** will control one press with eleven flying-gags. (Accelerator)

Actual pattern programming is identical between all models.

Controller Installation

1

LOCATION & PLACEMENT

Placement of the control cabinet and associated hardware is an important factor when designing or retrofitting a machine. Items such as wire routing, small signal control, electromagnetic interference, and ease of troubleshooting should all be taken into consideration. Important items to consider will be looked at in more depth.

Power Supplies

The **XL200CL SERIES** controller uses dual power supply inputs to insure clean and reliable operation. A 24VDC power supply is used for its CPU input voltage (2 amp minimum). A regulated supply is recommended for the CPU input. It is advisable to keep the CPU power supply within the control cabinet. This will keep the wire leads as short as possible and will protect against induced electrical noise caused by running long distances with other signal wires.

The I/O voltage input accepts DC supplies ranging from 5 volts to 30 volts. The I/O power supply's amperage rating should be sized according to the loading requirements of the system. As with the CPU supply, proper grounding and routing of the supply wires will apply.

When placing DC power supplies within the control cabinet, take care not to mount them in locations where high voltage or electrical-noise generating devices will be close by. Isolate from items such as drives, motor contactors and 3-phase wiring.

If the DC power supply wiring is brought in from outside the control cabinet, it should be routed in a separate conduit with only 24VDC wiring.

A good recommendation for general control console layout is to keep all of the high voltage items toward the bottom or to one side of the console, and keep the low voltage cables, relays and terminations on the top or opposite side of the console.

Encoder System

The encoder will track the material most effectively when it is mounted on material that is rigid and properly supported. Areas of excessive vibration or areas in the direct path of spray coolants should be avoided. In order to avoid coolants, keep in mind that the encoder may be mounted under the material or on the side of the material. For applications where a side mount is desirable, always keep the wheel bearing facing downward. This will help keep fluids from entering the encoder through the bearing.

The encoder should be mounted as close to the press as permissible, however not mounted so close to the press that the encoder and mount would be subjected to excessive vibration. A large distance between the encoder and the cut-off press may permit the material to bow or buckle, causing a varying amount of material to be measured between them. This may be worsened if the tooling is not properly aligned or if the material is not rigid. Additional support for the material may be required or a different location for the encoder may need to be considered. Locating the mount between the latter stands of the roll former is often the ideal location.

It is critical that the encoder tracks the material properly. It should be mounted at a location that is easily accessed in order to keep the encoder properly aligned and tensioned. Encoder installation is discussed in detail later in this chapter.

Drive Systems

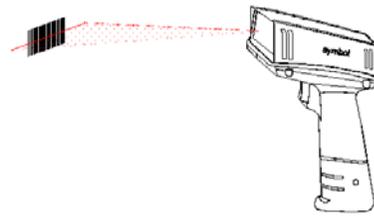
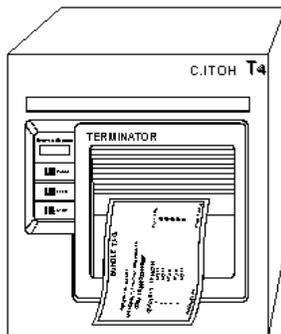
Motor drives that receive a command signal from an **AMS closed-loop controller** should be enclosed in the same controller console or kept in close proximity to the controller, preferably within 20 lineal feet.

Drive systems for feeding material that are controlled by an AMS controller via relay contacts may be placed much further away. If remote speed pots are used, a three-conductor cable with shield is advisable. The shielded cable also applies to drives that are controlled independently or by other control systems.

High amperage drives or motor drives not directly controlled by the AMS controller may be better placed away from the control system. The further away that electromagnetic interference (EMI) generating devices are, the more likely your operation will continue without interruptions. A separate drive/relay cabinet may be a good way to isolate transients from the control system. Please refer to the manufacturers drive manual for recommended installation and isolation practices.

OPTIONAL ACCESSORIES

Items such as BUNDLE TICKET PRINTERS, TICKET APPLICATORS, INK-JET PRINTERS, BAR-CODE SCANNERS and SVGA MONITORS may be attached to the XL200 Series Controller. Each of these devices' ability to operate in an industrial environment may vary and individual considerations need to be applied.


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AMS provides these systems in “local” and “remote” type packages. When a system is defined as local, all operating hardware is located within the control console itself.

Remote units may be supplied with a separate junction box. This junction box will contain the interface boards, extra power supplies and AC connections for the remote device.

As with most items, these optional devices should be mounted in a clean environment that is free of fluids. These devices should not be in harms way and should be accessible by the operator and maintenance staff. Printers will need to be accessed to add new ink or to load new label rolls at regular intervals.

SYSTEM POWER

A/C Power Input

3-Phase supplies (440VAC/220VAC)

Incoming 3-Phase power should be supplied by a separate incoming source from the main power distribution panel. Such power is best supplied through an isolation transformer. This will help protect the controller, drive systems and other processor controlled devices from line spikes and power fluctuations caused by other devices sharing the same power source.

A properly sized ground wire should be included with all three-phase power sources. This should be properly bonded at the power panel or other appropriate grounding point.

Fused disconnects or breakers should be installed and able to completely isolate power from the control console and associated machinery. Proper procedures and applicable regulations should be followed to insure correct sizing of the transformers and fuses. Undersized transformers can become very hot, short internally or cause fuses and breakers to trip repeatedly.

Single Phase 110VAC

For 110 VAC supplies, a Ferro-resonant or shielded isolation transformer is recommended as a source for the 24vdc power supplies used by the AMS controller.

Once again, both input legs to the 110 VAC transformer and the supply leg of the output (X1) should have appropriately sized fuses. Sizing of the transformer should insure that it could carry expected loads with at least 20% additional capacity.

Connecting a UPS system (Uninterruptible Power Supply) between the transformer and powers supplies will provide great benefits toward the control system. These devices will smooth out line spikes and provide a finite amount of continuous voltage even when the incoming line dips below desired levels.

DC Power Supplies

A clean, regulated supply will help insure reliable operation of the AMS controller. This is particularly true of 24VDC power for the CPU supply. A separate non-regulated supply that is properly sized and filtered is sufficient for the input/output supply voltage.

Dual Supply

A minimum of a 2 Amp supply is recommended for the CPU supply. The I/O supply should be sized according to the load that is expected for a given application. The load will consist of contactors, relays, valves and other items that will be driven by the 24VDC power supply. Each component should have a power rating on them; this is often in Watts (W). If you are trying to add up how much current will be required, divide the wattage by the I/O supply voltage (typically 24vdc) and you will get the amount of current (amperage) required for that device.

For example, a 24-volt valve shows a power rating of 1.2 watts. You divide the wattage by the voltage (1.2 watts ÷ 24vdc) and find that the amperage equals .5 amps.

Separate DC supplies are beneficial to the system's performance. Twisted wiring from the CPU supply to the controller is recommended. The CPU supply should not be grounded to chassis ground. The DC common (-) from I/O supply should be connected to chassis ground. See Figure 1-1.

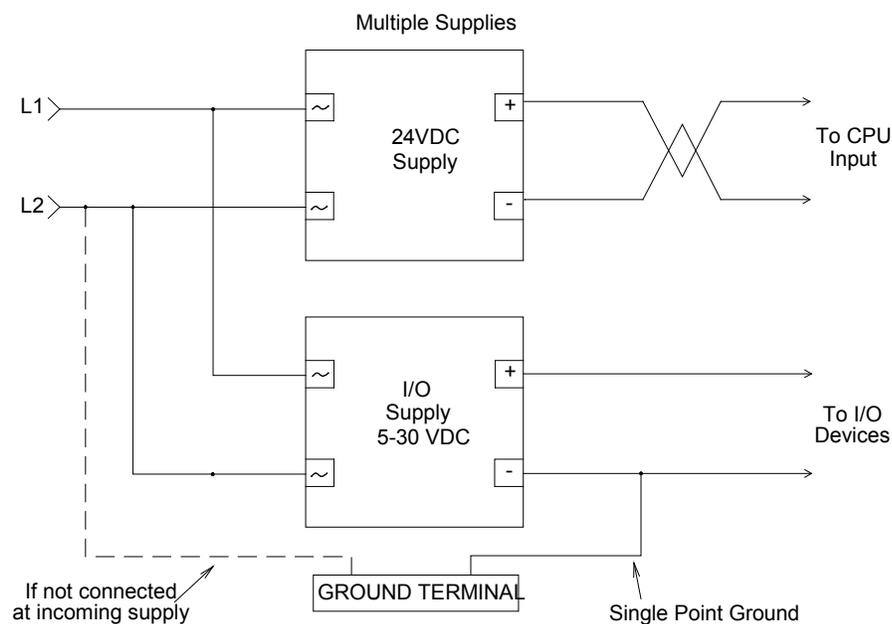


Figure 1-1. Dual supply connections

Drive Supply

Motor and drive AC supplies must meet the specific requirements for voltage and current. Hardware or software modifications may be necessary in order for a drive to operate with the power that is available. See the drive manufacturer's manual for details.

It is recommended (although not always necessary) to use an isolation transformer to supply power to the drive system. A step-up or step-down transformer may be required to provide the correct operating voltage. In all cases, care must be given when sizing the transformer. If the transformer is not large enough to carry the drive and other devices that will draw from it, unreliable operation may occur.

Selecting the proper style transformer is also necessary. Some drive systems require a "Wye" configuration within the transformer while others may require a "Delta" configuration (Shown in Figure 1-2). Mismatching often occurs when replacing old drive units with new ones. Some older drives require that "X0" be attached. This is impossible with a Delta configuration.

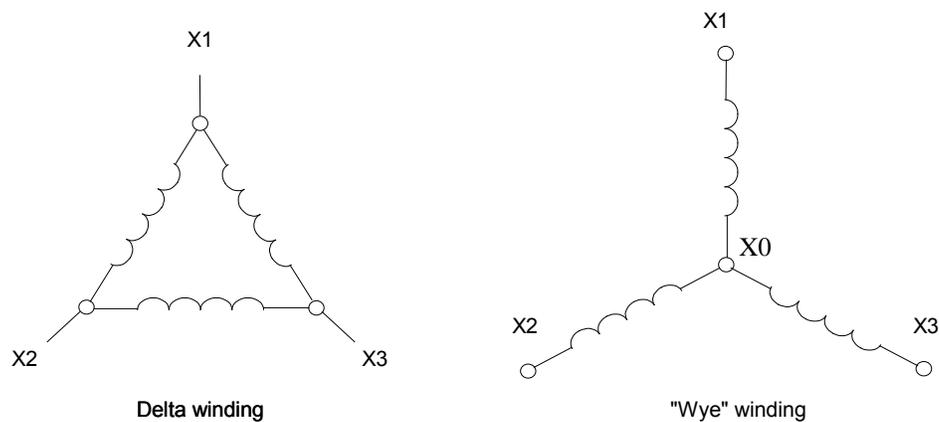


Figure 1-2. Transformer configurations

Optional Supplies

Many accessories may be included with the AMS control system. Optional items such as bundle ticket printers, scanners, print-on-part printers, input/output expansion modules and remote terminals may be included with the system. Each of these may require its own power supply or may share a supply with the AMS controller or with another optional device. Refer to the “AMS Electrical Interface Drawings” found in the back of the controller manual.

- Bundle ticket printers and print-on-part printers will require their own 24VDC and 110VAC supplies. It is recommended that the same 110VAC supply that powers the controller CPU supply also power the printers. The neutrals must be bonded to building ground on both 110VAC supplies, especially if separate 110VAC supplies are used.
- Bar-code scanners and expansion modules will use their own 5VDC supply.
- VGA monitors require 110VAC only.

As described earlier, all DC supplies should be properly grounded at a single point directly from the common of the supply. Twisted wiring should be used from the supplies to the respective devices that they will be powering.

These power supplies are included in the optional supplies package when purchased from AMS Controls.

1

SYSTEM WIRING

Wire Specifications

Installing the proper size and type of wiring will increase the efficiency of the control system and reduce a variety of potential problems. The following suggestions are recommended for reliable operation.

Incoming AC

Incoming power and all other wiring should meet the requirements of all applicable national and local electrical codes. A properly sized ground should be included from the power source. This ground wire should be equal in size to the power cables it accompanies.

All AC wiring should be isolated from DC wiring and signal cables. AC wires must be run in a separate conduit from DC and communication wires and cables.

Most electrical codes specify the minimum safety requirements. They typically do **not** specify the requirements for *proper operation*. This should be considered when designing the system.

Power Supplies

Power supply wires should be sized large enough to meet requirements for the current-carrying capacity demanded by the controller and other devices using it. Standard 16 or 18 gauge wires may be used to wire both the CPU and I/O supply inputs. The CPU supply input wires should be a twisted from the 24vdc supply directly to the CPU input. A manufactured twisted pair will also be suitable (Figure 1-3).

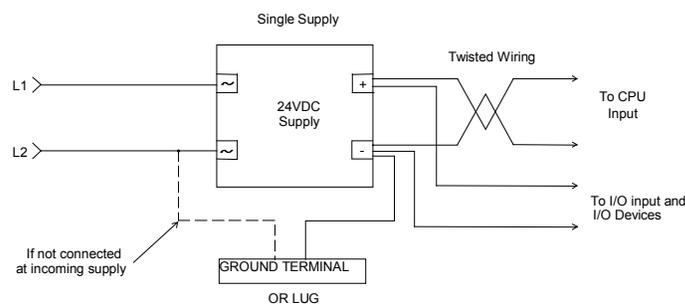


Figure 1-3. Single supply hookups

Keeping the power supply in close proximity to the controller will keep the supply wires shorter, therefore more resistant to noise interference.

Encoder Cables

One or more encoder cables will be needed for the control system, depending on the type of controller installed. In all cases, a quality cable should be used. We recommend a 6 or 8 conductor cable with individually twisted and shielded pairs. Beldon #8777 cable or its equivalent is recommended. This cable should also have an encasement shield running the length of the cable. This will apply to line encoders as well as to encoder feedback cables from motor-drive systems used in closed-loop applications.

The maximum recommended length for a line encoder should be 75 foot or less. This may be longer depending on the quality of cable used and other external factors. Since the signal generated by an AMS encoder is differential, greater lengths can be accomplished by using a AMS 4390-1 encoder driver or a separate 5-volt power supply to drive the encoder signal. See figure 1-4. The 5-volt supply and common from the controller may no longer be needed if this is done.

The line encoder's shield wire should always be connected at the AMS controller unless it is attached to the shield connection on the 4390 board.

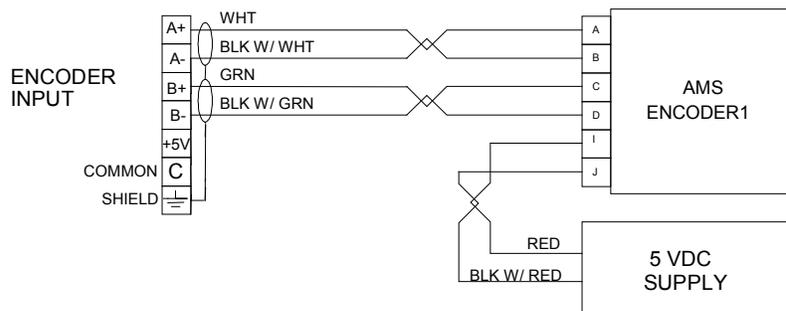


Figure 1-4. Encoder with separate driver supply

AMS Controls Inc. can supply a 4390 encoder driver card that can increase the signal strength of the encoder. The 4390-driver card may also be used to split the encoder output to as many as 4 other devices. Call an AMS representative regarding the use of the 4390 encoder driver. Chapter 8 (Auxiliary Devices) also has the wiring procedures for the 4390 encoder driver-expansion card.

Analog Cable

The analog cable should contain a single twisted pair with a **braided shield**. AMS recommends Belden #8441 or equivalent cable (Figure 1-5). Less expensive cables using foil shields and non-twisted pairs should be avoided. A high-quality cable is especially necessary when tight tolerances and problem-free operation is desired. AMS recommends that the analog cable be shorter than 20 ft., however, drive manufacturers specifications may vary. Signal control can be improved and longer lengths obtained if further protective measures are taken such as running the cable individually through hard conduit and grounding the conduit.

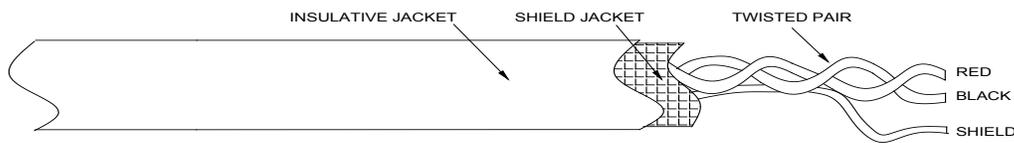


Figure 1-5. Analog cable

Drive and Motor Supply

Specifications from the drive and motor manufacturers should be followed. Wire gauge and insulation factor will vary depending on the size and type of drive and motor used. Make sure to follow the manufacturers' recommendation; undersized wiring may heat up, lose connections or cause damage to the drive unit and motor themselves.

Make sure that equipment ground wires (of equal size to the accompanying carrier wires) are included from the drive to the motor. A similar ground wire should be connected from the drive system to the grounding plate or incoming ground wire.

Barcode Scanner (RS232)

A shielded, three conductor cable (non-twisted) should be used for the Bar Code Scanner. Belden # C2526 or similar is suggested. Standard barcode scanners use a RS232 communications format. In an industrial environment, AMS suggests that the cable be kept shorter than 10 feet. Longer lengths can be achieved with special precautions or additional hardware. A male, DB-9 connector will need to be attached to the cable for connection to the controller's scanner port.

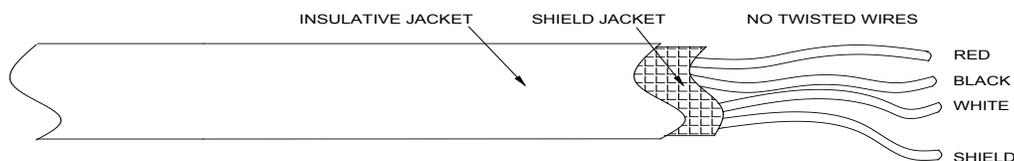


Figure 1-6 Barcode Scanner (RS232) cable

Eclipse (RS485)

The cable used for Eclipse communications should consist of a shielded, twisted pair. The cable should be designed for use with RS485 networks. Typical specifications call for a shunt capacitance of 16 Pico-farad per foot and a nominal line impedance of 100 ohms. Beldon # 9841 or Carol # 4841 is recommended.

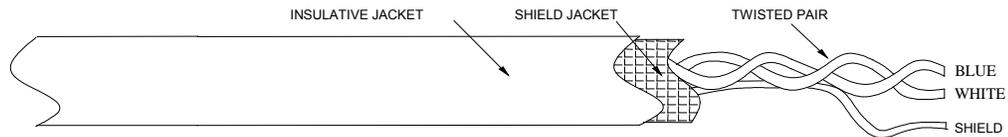


Figure 1-7. RS485 Eclipse-Link cable

The maximum cable distance is 4000 ft. This is a total distance from the PC running the Eclipse program to the last controller in the chain. If multiple controllers are used, they should be wired in series (daisy-chained). Tapped connections will cause communication problems and are not permitted. Proper wiring methods will be covered later in the manual.

Printer Systems

AMS printer systems come with specialized cabling for each type of application. These cables will be supplied with each printer package.

Wiring Methods and Routing

A few general rules should be followed when routing wires and cables. These rules will reduce the transfer of electrical noise and improve the ability to troubleshoot a system should it be necessary.

Cabinets and Junctions

Within the control cabinet itself, wires of different voltages should be run in their own separate bundles. This would include 3-phase, 110VAC, 24VDC, small signal and other voltage levels. When these bundles must run in close proximity, the wires should be routed in different tracks or at least tied off as individual bundles. This will enhance noise immunity during machine operation.

Crossing adjacent bundles at a 90-degree angle will also keep induced noise to a minimum. Wires running at a cross angle to noisy source wires tend to pick up much less noise than ones that are routed parallel to the same source wires. This guideline should also be followed, as much as possible, in other cabinets or junction boxes.

Drive Systems

Some drive systems tend to produce a large amount of electromagnetic noise. Input/output wiring, power supplies and small signal wires should be located away from such devices. When it is necessary to run small signal and I/O wiring to the drive, it should approach the drive at an adjacent angle to any input phase or motor wiring that is already present.

Conduit and Paths

As the wires leave the cabinet to go to their respective destinations, the same rules as mentioned in earlier paragraphs should apply. DC wiring should be bundled and run separately from 110VAC and higher wiring.

Small signal wires such as encoder, analog, RS485 (Eclipse) or RS232 (Barcode Scanner) can be run together, but should always have a separate conduit or path. If they must be run in a common wiring trough, these wires should be bundled separately and isolated from higher voltage wiring.

Wires running in troughs or in other forms of wire transfer should be similarly segregated. Multiple troughs or the use of a trough separator plates are the preferred methods of wire separation.

Specific Circuits

Controller Power

The AMS controller requires a 24VDC supply for operating power. It is preferable to have two 24VDC supplies, one for the input and output supply and the other for the controller's CPU power. Separate power supplies will isolate the input/output circuits from the processor, reducing noise interference. The common of the I/O supply must be connected to the chassis ground. All input power should be within the specification limits.

- CPU Supply: 24VDC +/- 10%
- I/O Supply: 5 to 30 VDC

Power to the controller should be switched independent of other devices. The emergency stop circuit should not interrupt power to the CPU voltage of the **XL200CL SERIES** controller. In an emergency-stop condition, the controller will track any movement of the material with controller power still applied. This allows continued production to resume after the emergency stop condition, without loss in accuracy.

Emergency Stop Circuit

An emergency stop circuit is required for each machine, giving operator safety and protection of system equipment. A typical emergency stop circuit is shown in Figure 1-8. Pressing the guarded push-button RESET switch arms this circuit. The relay remains energized after the RESET switch opens because of the hold-in contacts of the relay. The relay condition depends on current flow through the normally closed emergency stop switches and any other emergency stop contacts in series with the switches. A momentary opening of any switch or contact will cause the relay to de-energize which cuts off power to all load devices. Adding devices in series with the emergency stop contacts or switches easily expands the circuit.

A higher degree of safety is achieved by placing switches behind safety guards and in doors of electric panels. These are wired in the Emergency Stop Circuit, so when opened, the machine is shut down. The emergency stop circuit should not interrupt power to the AMS controller, however the AMS controller must know when an emergency stop has occurred in order to drop the line out of the RUN mode. This can be accomplished by breaking the run circuit or by opening the "E-Stop" input to the control. If an emergency stop condition occurs, power should be isolated from all output devices. This would include all 24VDC devices as well as all 115VAC devices. Please refer again to Figure 1-8.

Installation

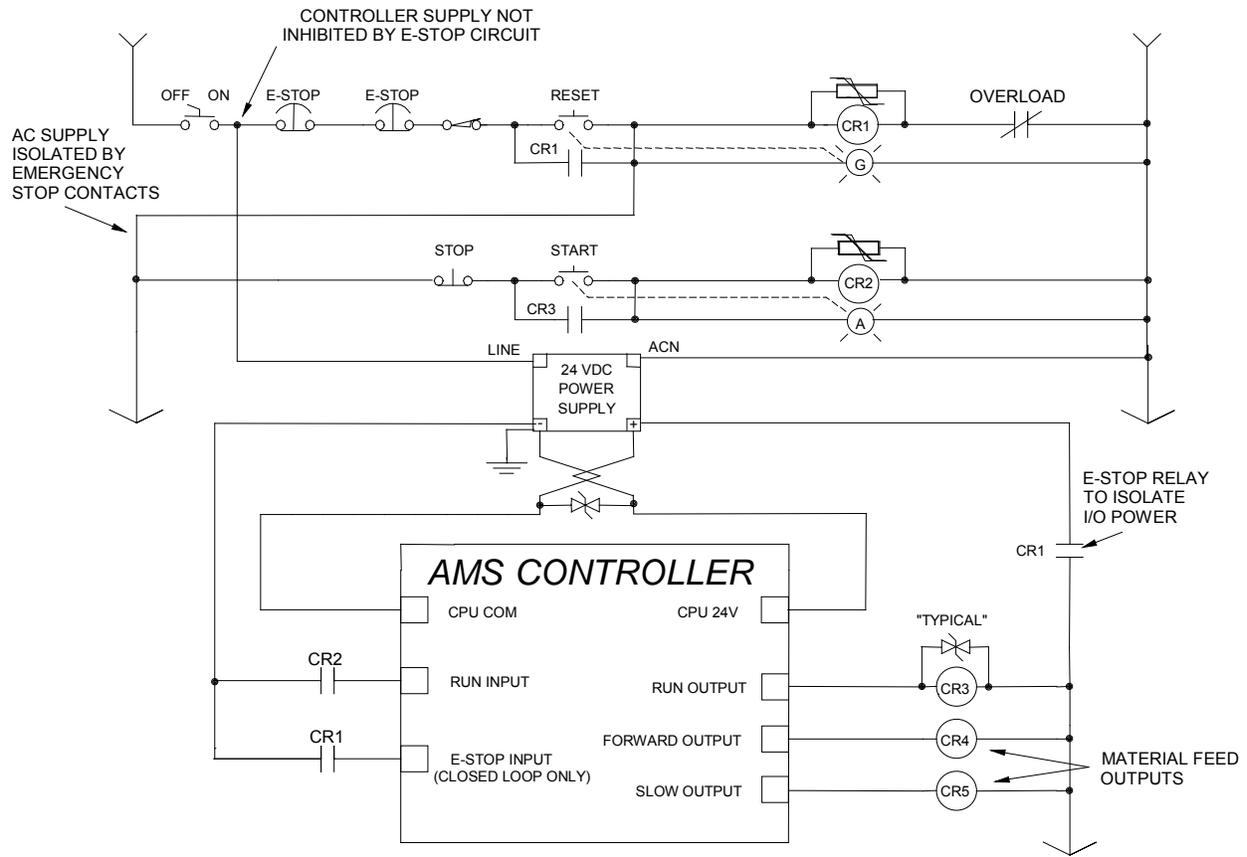


Figure 1-8 Typical E-stop, Run, and motion connections

Run Circuit

Also shown in Figure 1-8 is the proper method for wiring the run circuit. Note that by wiring the controller in this manner, a halt, a controller error or an E-stop will halt the system. The sequence of events follows:

- Operator presses a momentary “Run” switch, energizing the “Run” relay (CR2).
- Once CR2 is energized, this closes the “Run” input to the AMS controller.
- The AMS controller detects the input.
- If a job is programmed, no errors exist, and all other pertinent items are present the controller turns on the “Run” output.
- The output energizes the “Run Latch” relay (CR3)
- CR3 closes a set of contacts that latch in around the momentary “Run” switch, maintaining the Run condition.

The Run output should also energize lights, buzzers or other safety devices to let personnel know that the machine is now in automatic mode.

The “Forward”, “Fast” and “Slow” outputs should be used to put the material into motion. The “Run” output should be used purely as an output to latch the run circuit and to energize run lights or safety devices.

Using the run output to put material in motion can cause some features on the controller to not work properly. First, some controllers will continue to shear or punch after a halt has been performed in order to catch targets as the line coasts to a stop. Second, a “Delay after Shear” feature is available to stop the material motion (Forward Output) after each cutoff. In both cases, the motion output is turned off through the “Forward” and “Fast” outputs, while the “Run” output remains on the entire time to indicate that machine is still active. In addition, if the “Run” output is used as the motion output the line may not stop at the correct times!

Important Notice:
Note: The controller will still fire on targets as the material coasts to a stop.

The XL200CL Die-Accelerator model shares a single output for “Fast” and “Forward”. The “Speed Logic” parameter selects which output is designated for output #1.

On two-speed systems, the motion outputs will energize at different times during fast run, slow run, and jogging operations. The table in Figure 1-9 shows the output logic for each selection.

MOTION AND RUN STATE PER OPERATION					
	FORWARD**	FAST**	SLOW	REVERSE	RUN
Run Fast	ON	ON	OFF	OFF	ON
Run Slow	ON	OFF	ON	OFF	ON
Jog Fwd	ON	OFF	ON	OFF	OFF
Jog Rev	OFF	OFF	ON	ON	OFF
Halted	OFF	OFF	OFF/ON *	OFF	OFF
Run (idle)	OFF	OFF	OFF/ON *	OFF	ON

Table 1-9. Status of Outputs

* NOTE: The “Slow State” parameter controls whether or not the slow output stays on during a halted condition.

**NOTE: Only one output is available between the “Fast” and “Forward” selections. This is selected by the parameter “Speed Logic”.

Shear Control Circuit

Optimal performance of the shear circuit can be met by customizing the AMS controller to a particular type of press and feed control.

AMS controllers are designed to connect directly to 24VDC solenoids for optimal performance. A solenoid-driving device, such as the AMS 3840 power module, can provide more rapid and accurate firing of the press. See Figure 1-10 for a basic wiring example.

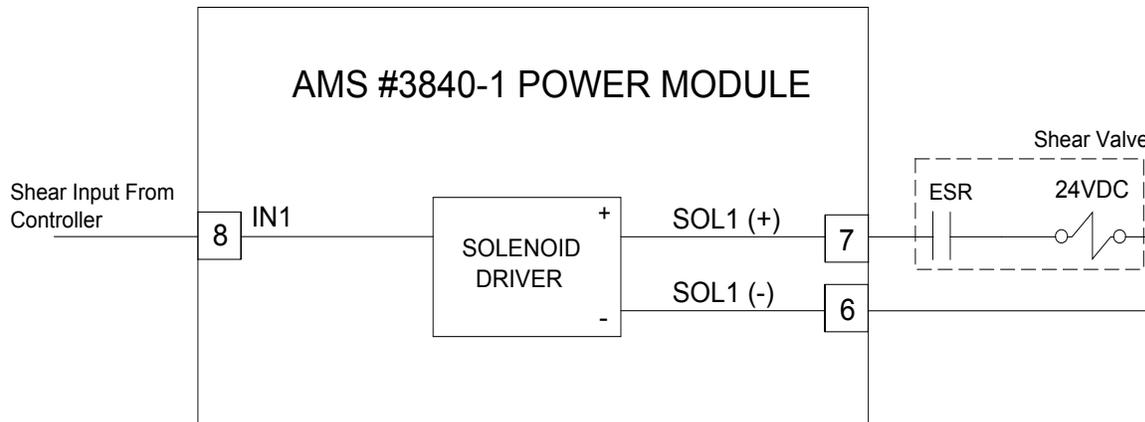


Figure 1-10. Basic Wiring for a 3840 Valve Driver

If the solenoid or valve for the shear output is not 24VDC, then an attempt should be made to replace the solenoid with a compatible 24VDC type. If this is not possible, then a 24VDC relay will have to be installed between the AMS output and the solenoid.

AMS controllers have a timed shear output with an input switch override feature. The duration of the **SHEAR DWELL** or **SHEAR DOWN** output is programmable from 0.000 to 9.999 seconds. Please refer to timing diagram - Figure 1-11. If the AMS controller detects a switch closure at the **SHEAR COMPLETE** input during the dwell time, the shear output will turn off immediately (Figure 1-12). This is especially useful on mechanical presses that need the shear-complete switch mounted in a location that will return the press to top-dead-center. The SHEAR DWELL UP time will time out as programmed regardless of the complete input.

See the Machine Configuration section of this manual for more information on using the Shear Complete input.

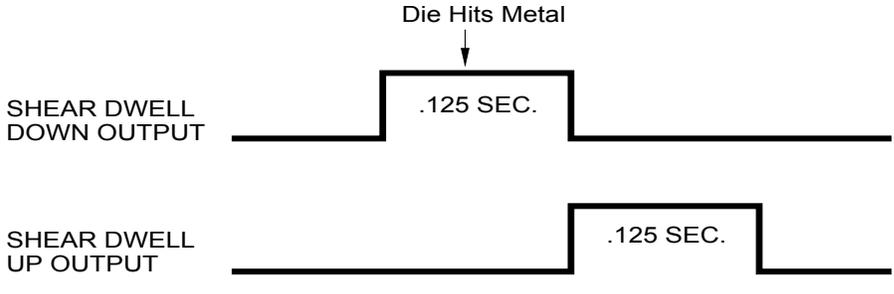


Figure 1-11. Shear Dwell "UP" and "Down"

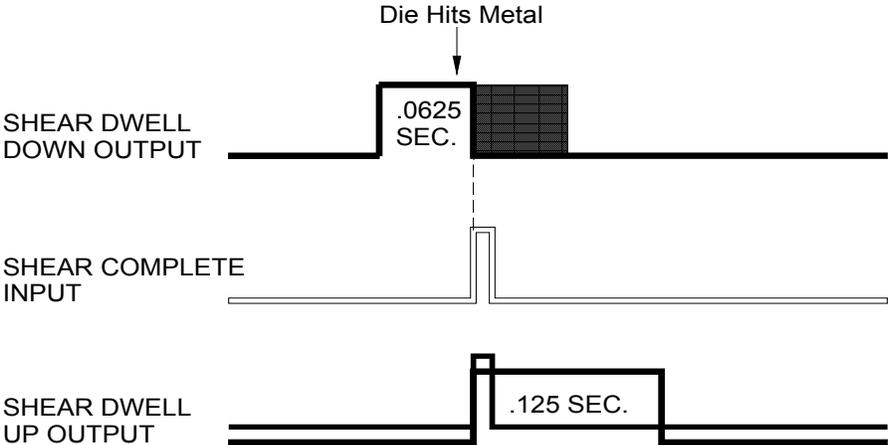


Figure 1-12. Difference with a Shear Complete

Press Control Circuit

The terms and definitions for the press control parameters are identical to its shear control counterparts. The press outputs can also signal the AMS 3840 power module (or similar unit) or isolation relays for use with higher voltage solenoids.

Like the shear output, the **PRESS DWELL DOWN** can be programmed from 0.000 to 9.999 seconds. A **PRESS COMPLETE** input will override the press's timed output and turn the output off immediately upon detection.

See the Machine Configuration section of this manual for more information on using the Press Complete input.

ENCODER INSTALLATION

It is critical that the encoder be properly mounted in order to produce parts that meet or exceed the required tolerances. Everything that the AMS controller knows about the material flow, target location and line velocity comes via the encoder system.

Encoder Placement

1

It is good practice to place the encoder in a location that is away from vibration, cooling fluids and where the material being tracked is most stable. The amount of material between the encoder and cut-off press should not be allowed to fluctuate, so it may be preferable to keep the encoder as close to the cutoff press as possible, provided that vibrations from the press do not cause a problem.

It is best to allow the encoder to ride directly on the material. Sometimes special devices such as couplers or belts are required in order to reach the material in tight locations. Encoders installed on such devices must be mounted in such a way that no slip, backlash or twisting in the coupling mechanism is experienced.

Encoder Mounting and Alignment

The encoder itself should be attached to a bracket. AMS provides brackets that fit most applications (the BRKT-1 and the BRKT-2). These brackets are discussed in detail later in this chapter. The encoder wheel should run as perfectly parallel to the material flow as possible. The wheel should also run perpendicular (at a 90 degree angle) on the material that it is tracking. (Refer to Figure 1-11)

The wheel should not be set to track on curved surfaces of the material or on areas that are not flat or unstable unless no alternative is available. Special adaptations may be required for round, curved or hard-to-track products

Installation

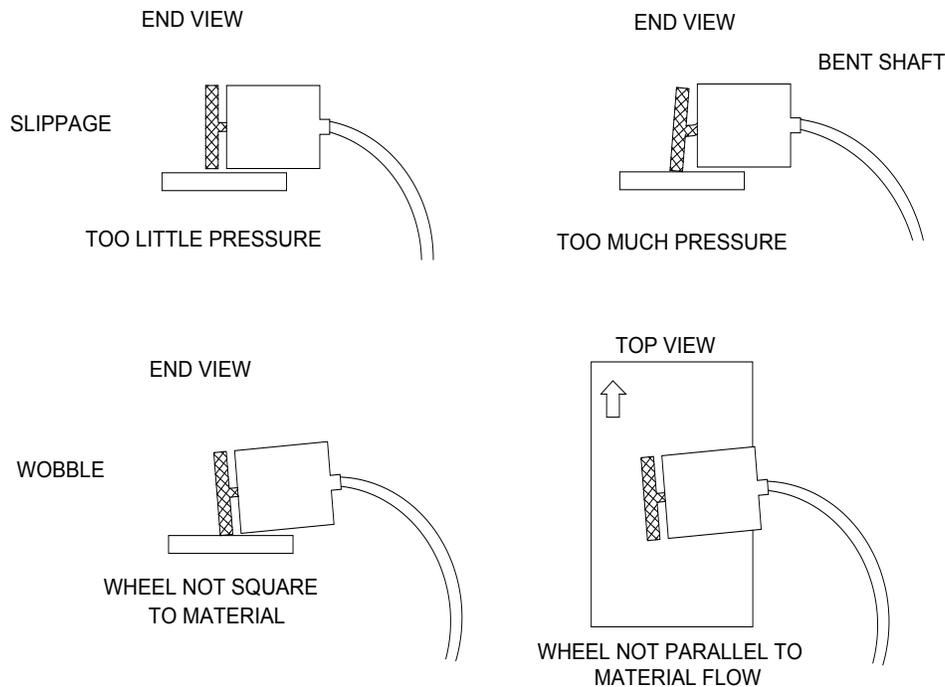


Figure 1-11. Improper Encoder Mounting

A tensioning system is recommended to apply adjustable and “measured” pressure on the encoder and encoder wheel. This should allow the encoder to “float” with the material in order to track the material correctly. Spring tension, pneumatic pressure or a weighting device can be used to allow the encoder to move with the fluctuations in the material, yet continue to track the surface without slippage. Seven to ten pounds per square inch of pressure is sufficient for proper tracking. Excessive pressure will cause binding in the encoder bearing or cause the shaft to bend over time.

Some applications may require special mounting hardware and special types of tracking wheels. It may be necessary to mount the encoder wheel onto the surface of a feed roll or straightener roll, or it may be necessary to mount the encoder itself onto the end of a roll. Tracking in this method may provide the desired results, but there is a potential of slippage between the rolls and the material. Accuracy will be lost if this occurs. Precautions will have to be taken accordingly.

AMS Encoder

The AMS Encoder is specially designed for use in precision material tracking. The encoder is sealed at the amphenol connector and around the main housing. The shaft bearing however is not sealed and should be protected from excessive amounts of fluids. The bearing is not sealed in order to produce a minimal amount of drag on the wheel shaft. The additional drag would tend to cause the wheel to slip as the material underneath it fluctuates.

The output from the AMS encoder is dual-channel with complementary signals (quadrature). A 5VDC supply and common are required to power the encoder. Figure 1-12 shows the pin connections and some of the basic dimensions of the encoder.

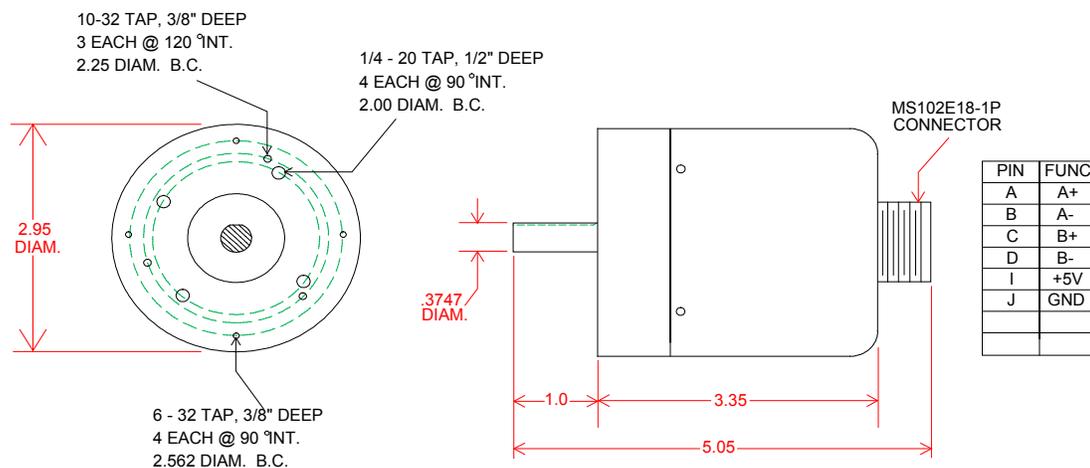


Figure 1-12. AMS Encoder Dimensions

Specifications for the AMS encoders are as follows:

- Bi-directional, incremental optical shaft encoder
- Counts: 256, 500, 1000, and 2000
- PPR: 1024, 2000, 4000, and 8000 Respectively
- Output format: Complementary 2-channel, quadrature
- Electrical Output: TTL Line Driver (26LS31)
- Supply Voltage: +5VDC @ 200mA.
- Mating Connector: MS3106A18-1S.

AMS produces a fluid-resistant encoder for special applications where large amount of coolants or oils are used. The "LW" model uses a pressurized chamber to keep fluids from entering. These encoders have a history of success, even in the wettest of conditions. A 110VAC supply is required to energize the small air pump that pressurizes the encoder's chamber.

Encoder Wheels

AMS also supplies three types of encoder wheels. Each wheel is designed for a particular application. See Figure 1-13 for specifications.

PMW-12 Phenolic Wheel

The PMW-12 encoder wheel is made of phenolic material. This is a special material designed to minimize scarring of the material as the wheel rotates on it. It is similar to a fibrous, wood product. The PMW-12 works well in most applications.

KMW-12 Knurled Wheel

The KMW-12 is a metal wheel that is knurled (cross-hatched) on its surface. This is done to increase the traction of the wheel on slick or oily material, thereby reducing slippage of the wheel. This wheel has exceptional tracking abilities but may leave marks on the materials surface because of the surface knurls.

TMW-12 Saw Blade Wheel

This wheel works well on hard to get to locations, especially on small parts or odd shaped parts. It is much like a small saw blade. This may also leave small tracking marks on the part, especially on smooth or painted surfaces.

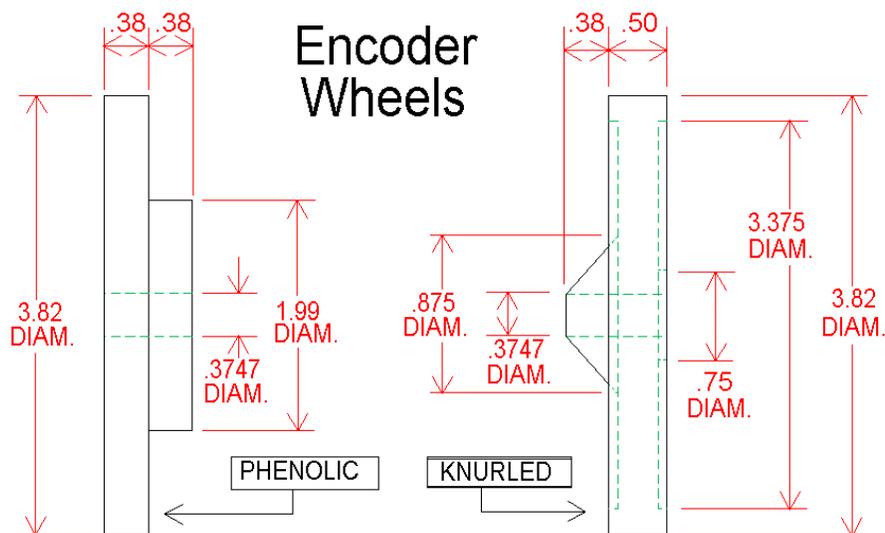


Figure 1-13. AMS encoder wheels

AMS Brackets

BRKT-1

AMS supplies a bracket that is useful in a wide variety of applications. The BRKT-1 bracket (Figure 1-14) is easily installed onto a 1-inch rod and uses a loading spring to provide a constant amount of pressure on the encoder while being able to fluctuate with the material that the encoder wheel is riding on.

1

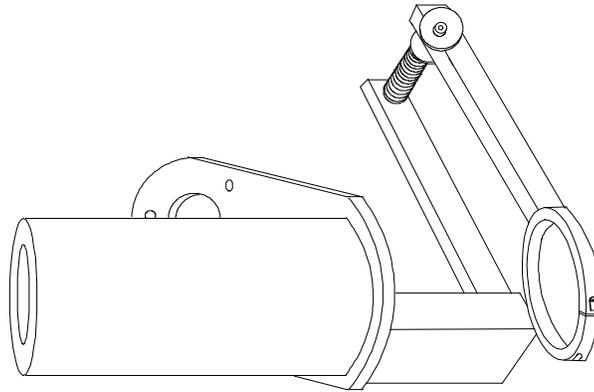


Figure 1-14. AMS encoder bracket (BRKT-1)

The optimum position to mount the BRKT-1 is horizontally level. This will cause the least amount of forward or reverse deflection of the wheel due to any vertical movement of the material. "Figure 1-15"

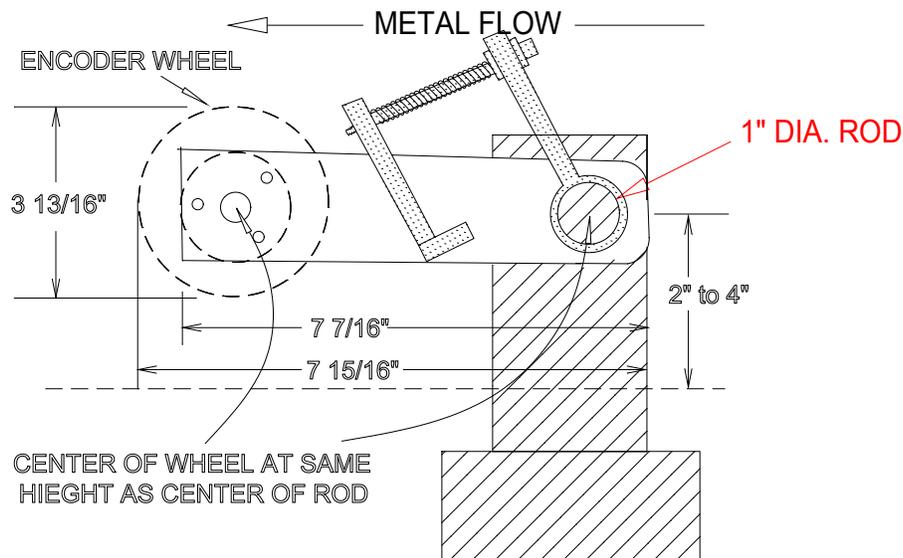


FIGURE 1-15. BRKT-1 alignment.

BRKT-2

The BRKT-2 is a more advanced mounting system that takes away the possibility of wheel deflection due to the vertical motion of the material being tracked. Mounting the encoder so that it cannot move in the forward or reverse directions during vertical fluctuation of the material eliminates wheel deflection.

The encoder holds tension on the wheel by riding on a pressurized cushion of air. The BRKT-2 also can also fit into tighter areas than the BRKT-1. The mounting station is no wider than the encoder wheel itself, allowing the encoder to be mounted between rolls as close as 4 inches apart. Figure 1-16 shows the head of the mounting bracket. **(The adjustable framework is not shown)**

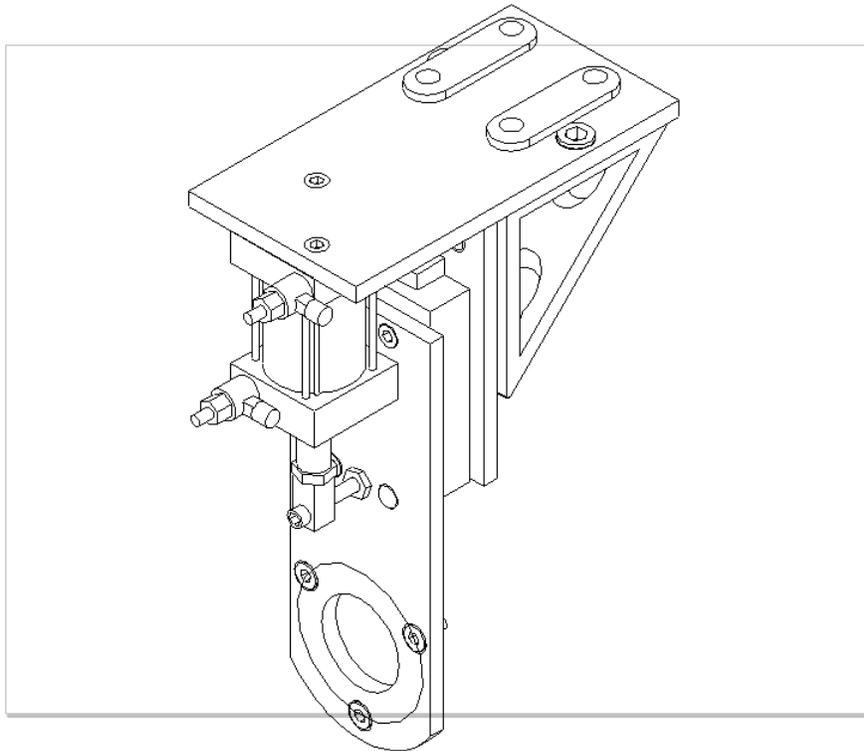


Figure 1-16. AMS encoder bracket (BRKT-2) Input & Output Descriptions

Inputs

Jog Forward

This input typically comes from a momentary switch and is used to jog the material of the line forward. This input is ignored if received while in the run mode. If the line is halted, the slow and forward outputs will be turned on for as long as the input remains on.

Jog Reverse

This input typically comes from a momentary switch and is used to jog the material of the line in reverse. This input is ignored if received while in the run mode. If the line is halted, the slow and reverse outputs will be turned on for as long as the input remains on.

Run

The run input is switched via a dry contact of a relay. When closed, the controller is placed in the Run mode to make parts. When open, the controller is halted and is considered in “manual” mode. To be in the “Run” mode, other conditions must be met in the controller, such as orders being programmed, being clear of errors, and other input conditions. If the controller is not programmed, or if an alarm condition exist, the control will not go into the Run mode but post a warning message instead.

Shear Complete

The shear complete is an input that will go momentarily closed when the shear is at the bottom of its stroke. This can be from a limit switch, cam switch, proximity switch, or similar device. The use of the input is optional. Its function is to remove the shear dwell down signal to the solenoid once the cut has been completed insure that the shear is not over-driven. This input may be required on some mechanical presses to insure that the press stops at top-dead-center after each cycle. In this case, the position of the switch must be adjusted to stop the press in the right position.

Setup Lockout Input

This input will normally be in the form of a security key and will keep the operator from changing critical parameters on the controller. If an operator attempts to change “Locked out” parameters, the following message will be seen: **“Error! The Setup Lockout switch is on. The Setup parameters have been locked out. See maintenance for assistance in programming this item”**. The SETUP LOCKOUT input does NOT lock the operator out of the following parameters:

- Halt After Item
- Halt No Items to Run
- Delay After Shear
- Units of Measure

Manual Shear

This is a momentary switch input. This input is used to cycle the shear, producing a manually cut part that will be classified as “scrapped” material. On shear only systems, firing this input will clear the encoder counts on the display, referencing the controller and clearing the “queue” or the target memory. Punching systems require this the press to be fired twice to achieve the same result.

Manual Punch

This is a momentary switch input. This input is used to cycle the press automatically. Firing the punch press has not affect on the quantity done of a bundle or on scrapping the part.

Sheet Detect

The Sheet Detect input works in reverse logic. The input is normally-closed limit switch that is held open when material is present. This “open” input is recognized as being “ON” (1). If no material is present, this input goes to its closed condition and is recognized at being “OFF” (0).

Press (x) Complete

If the Controller is setup for Punch Presses, each press being controlled by the Controller will have a respective punch complete input. As with the shear complete, a short pulse is momentary closed to show the respective punch is at the bottom of its stroke. The use of this input is optional, its function is to remove the press dwell down signal as soon as the punch is completed and to insure that the press is not over-driven. This input may be required on mechanical-type presses that require an input to stop the press at top-dead-center of the press.

Asynchronous Print Detect:

This input is used to determine the location of the material when the printer is located beyond the cutoff point.

Hole Detect:

The “Hole Detect” input is used to locate a perforation in the material that is to be tracked as a reference point for the next target or to locate the leading edge of the material in order to track the next target. This input may be driven by an actual solid state input switch or by a “Master” AMS controller.

Scrap:

This input is only used when the “Tube Mill (T)” option is enabled. A detection device is connected to this input to inform the controller when the material being detected is not usable, therefore the part that contains the material is scrapped.

Outputs

Fast

The “Fast” output is used to move the put the material in motion when fast velocity is desired. This output only turns on when running in automatic mode.

Reverse

The “Reverse” output will only turn on when the controller is in “Manual” mode and the reverse input is closed.

Slow

The “Slow” output will turn on whenever slow speed is desired in automatic mode or anytime that the line is being jogged in manual mode. The slow output may or may not be left on during a halt condition depending on how the “Slow When Halted” parameter is set. If the parameter is set to “Yes”, the slow output will remain on any time the line is halted or idle, if set to “NO”, the slow output will only be on when slow motion is desired.

Forward

The “Forward” output turns on to feed the material in the forward direction any time forward motion is intended. This will turn on in slow and fast modes, as well as when in automatic or jogging.

Run

The “Run” output is used only to latch in the run circuit and to activate safety devices such as horns and lights to indicate that the line is in “Automatic Mode”. This output is NOT to be used to control material motion.

Shear/Press

The shear and press outputs are connected directly to press solenoids or other press interface to fire the press in the downward direction. This output is a timed output. The programmed time is located in the machine data parameters under “Shear Dwell Down” or “Press Dwell Down”.

Shear Up/Die Boost

This output is selectable by the switch settings of the control. In the Shear Up mode, the output will directly or indirectly energize the shear up solenoid for a pre-programmed amount of time. The amount of time is controlled by the “Shear Dwell Up” parameter. If the Die Boost mode is selected, it is used to directly or indirectly energize the solenoid used to push a die forward for a pre-selected length of time. This time is a combination of the “Shear Dwell Down” parameter and the “Shear Die Boost Dwell” parameter.

Press Up/Boost

This output is selectable by the switch settings of the control. In the Press Up mode, the output will directly or indirectly energize the Press up solenoid for a pre-programmed amount of time. The amount of time is controlled by the “Press Dwell Up” parameter. If the Press Die Boost mode is selected, it is used to directly or indirectly energize the solenoid used to push a die forward for a pre-selected length of time. This time is a combination of the “Press Dwell Down” parameter and the “Press Die Boost Dwell” parameter.

Item Complete Dwell

The Item Complete Dwell output is used for various functions. When each bundle length is completed, this output will become active for a programmed period of time as set by the “Item Complete Dwell” parameter.

Mister

This output is used to spray the cutoff blade with lubricant at programmed intervals.

Dump Trigger

The “Dump Trigger” output is used to offload parts after being cut off. The output is used with multiple parameters that controller the how long after a shear cycle the output is to be turned on and the length of duration the output is on.

Scrap Dump

This output is turned on when a known scrapped part (per the scrap input) is being produced. This will cause the material to be offloaded differently than normal parts.

Signal Ports

Analog Output #1 (Proportional Analog)

A differential +/- 10 Volt output that reflects the velocity of the material being fed by outputting an analog signal that is directly proportional to the line speed. A setup parameter named “Feet per volt” is programmed to select how many feet per minute a volt is equal to.

The positive pin is terminal #B-4, the negative pin is terminal #B-5.

Analog Output #2 (Speed Logic Analog)

A differential +/- 10 Volt output that carries the velocity command signal from the controller to a drive unit or other input card. This is used to set the “Slow” velocity and “Fast” velocity by setting two analog voltages that will be output. The analog output is determined by the “Slow Volts” and “Fast Volts” setup parameters.

The positive pin is terminal #B-7, the negative pin is terminal #B-8

Comm. Port “A” (RS485 Eclipse Port)

This is a RS485, serial communication format that connects the controller to the Eclipse Production Software program via a twisted pair cable. Chapter 1 discusses the type of cable needed and how it is to be installed.

The port contains a Positive connection “B” at terminal B-11 and a Negative connection “A” at B-12.

Comm. Port “B” (RS485 Auxiliary Port)

This is an RS485, serial communication format that will connect several different devices to the XL200CL series controller. Among the items that can be connected are “Part Printing Systems”, “Ticket Printing Systems”, “Expansion Cards”, and “Auxiliary Controllers”.

The port contains a Positive connection “B” at terminal B-14 and a Negative connection “A” at B-15.

Comm. Port “C” (RS422 High Speed Port)

This is an RS422, High-Speed communication port that can be connected to time-critical devices for machine operation. “Y-Axis”, dual part printers, and auxiliary controllers are a few examples of devices that would be attached to this port.

Comm. Port “D” (RS422 High Speed Port)

This is an RS422, High-Speed communication port that can be connected to time-critical devices for machine operation.

Interface Ports

USB Keyboard Port

This is a standard USB keyboard port. Any keyboard supporting USB specifications can be connected to this port.

USB Mouse Port

This is a standard USB mouse port. Any mouse supporting USB specifications can be connected to this port.

SVGA Port

This is a standard Super-VGA port. To output video to this port, switch #9 on the type-setting configuration switches must be turned to the "ON" position. Any terminal supporting the standard SVGA format can be connected to this terminal. The terminal will require a separate 110 VAC supply.

Scanner Port

This is a dedicated port for barcode scanners. The port uses a standard DB-9 connector.

Controller Connections

The **XL200CL SERIES** controller is configured with six 16-pin, terminal style connectors and five interface ports. The drawing (Figure 1-17) shows the back view of the controller and the placement of the terminal plug-in connectors. The interface ports are discussed in detail in chapter 8, “Auxiliary Devices”.

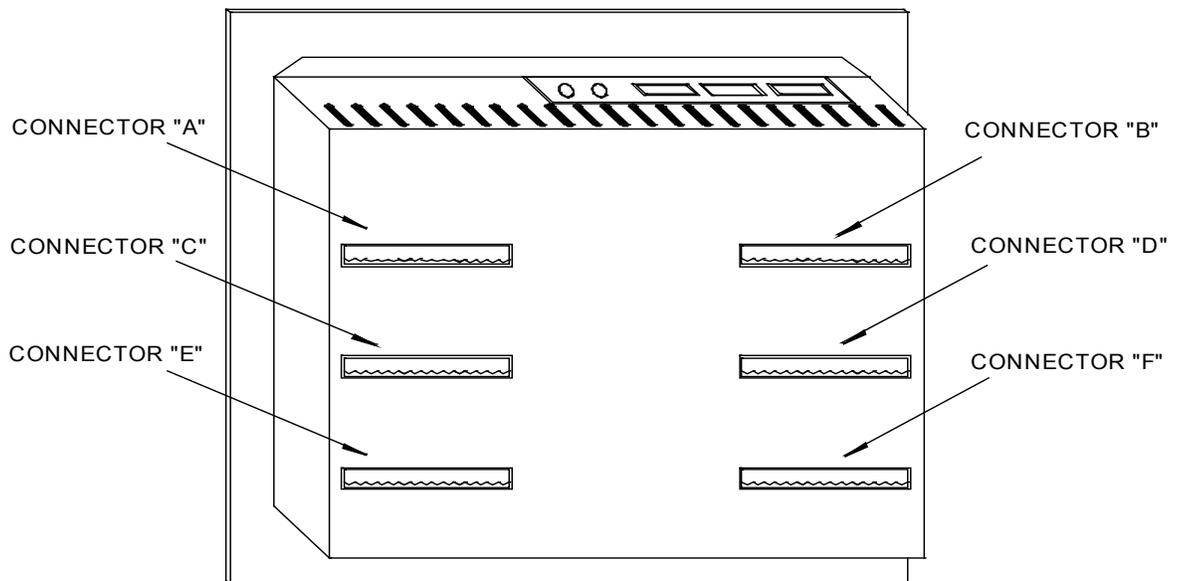


Figure 1-17. Back View of the XL200CL

Important Notice:

Note: Each encoder on connector “A” and respective analog connections on connector “B” have their own, separate 5 volt supply. Do not tie the two 5-volt supplies together at any point. Each system is independent and should be connected only to the device that is sharing the analog and encoder circuit with.

Installation

Connector “A” contains the 24VDC CPU power input terminals. This supply should be a minimum of 2 amps. Both encoder inputs are also on Connector “A”.

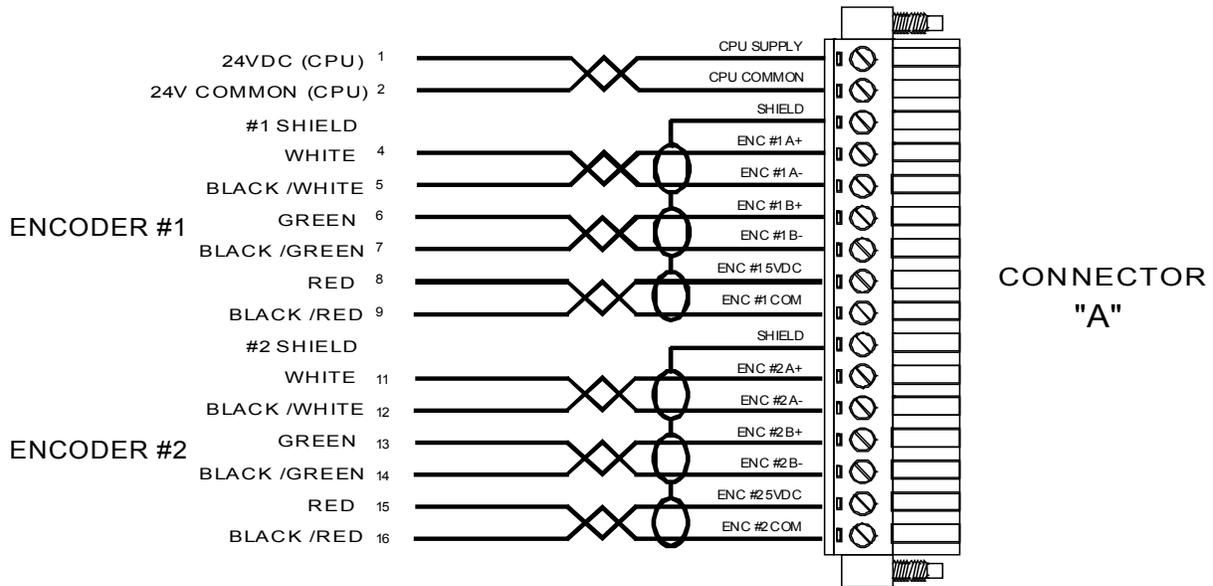


Figure 1-18. Connector “A” with CPU Power and Encoder Connections

Connector “B” contains the I/O power input which may range from 5 to 30 VDC. Also included are the 2 analog output ports (See note on previous page) and the 2 RS485 communication ports. Note that each port has its own shield connection.

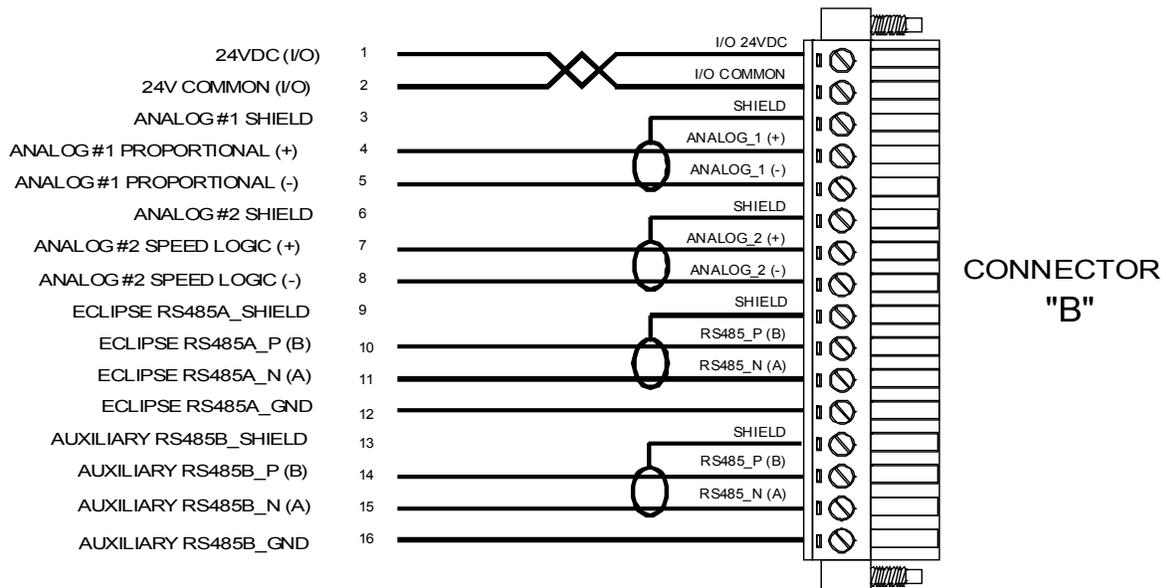
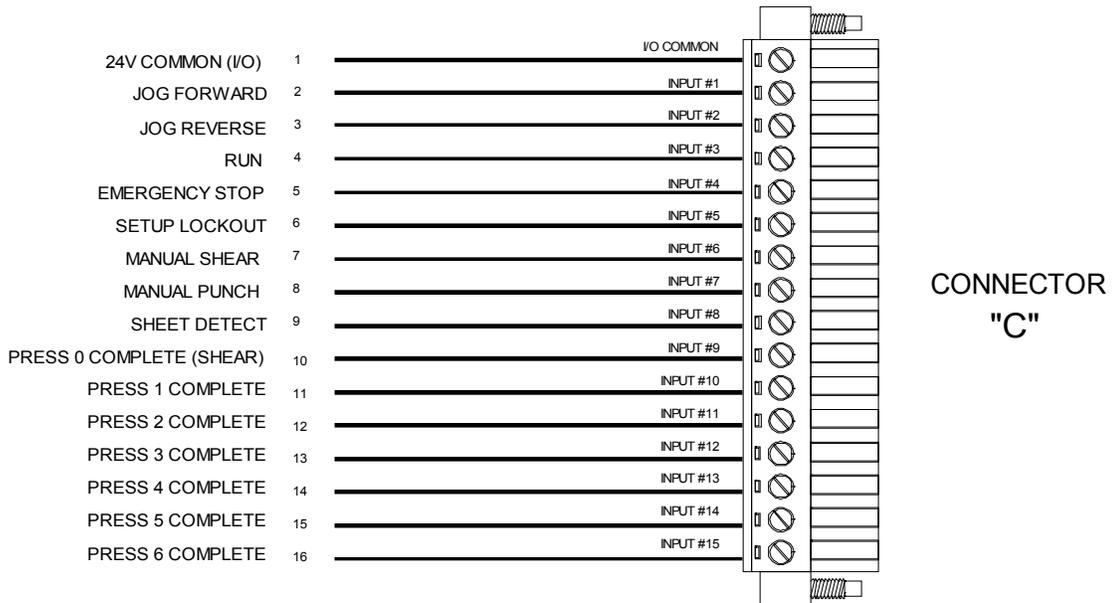


Figure 1-19. Connector “B” with Analog and Communication Ports

Connector “C” contains I/O power and the first 14 inputs for the controller. These are sinking inputs that are switched to I/O common.



1

Figure 1-20. Connector “C” input connector

Connector “D” contains the remaining inputs (#16 thru #24) and a high-speed bus port.

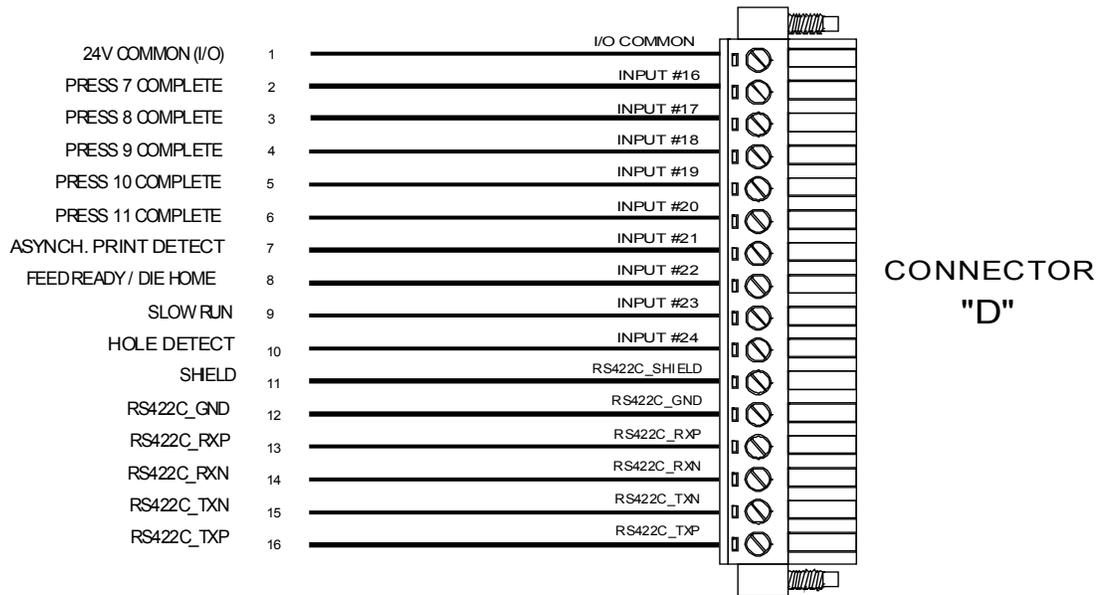


Figure 1-21. Connector “D” input connector

Installation

Connector “E” contains the first 15 output connections. These are sinking outputs that will take the output to common potential.

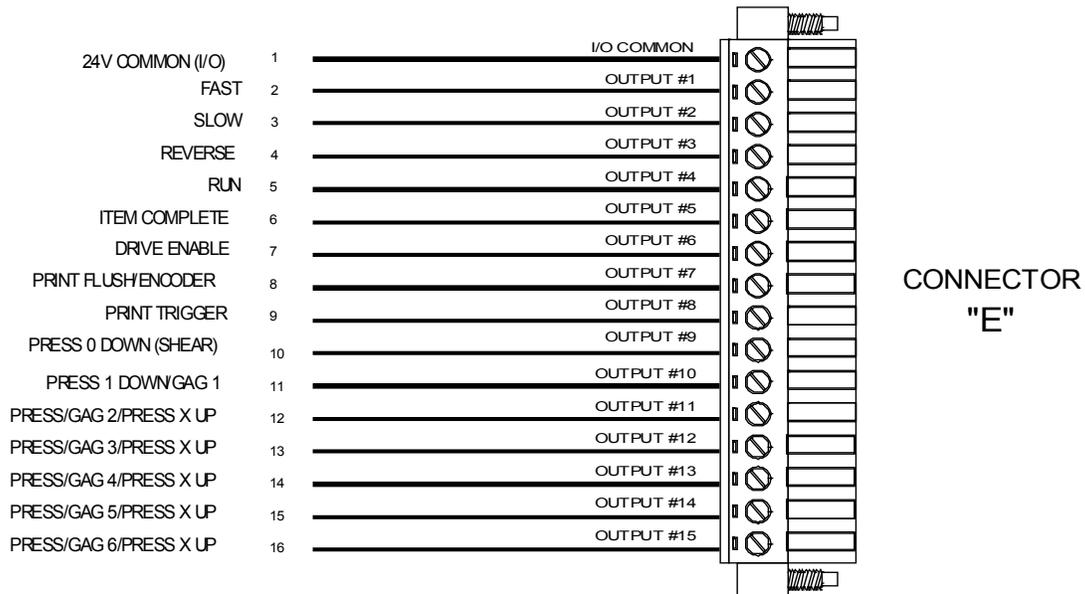


Figure 1-22. Connector “E” output connector

Connector “F” contains the remaining outputs #16 through #24 and a high-speed bus port.

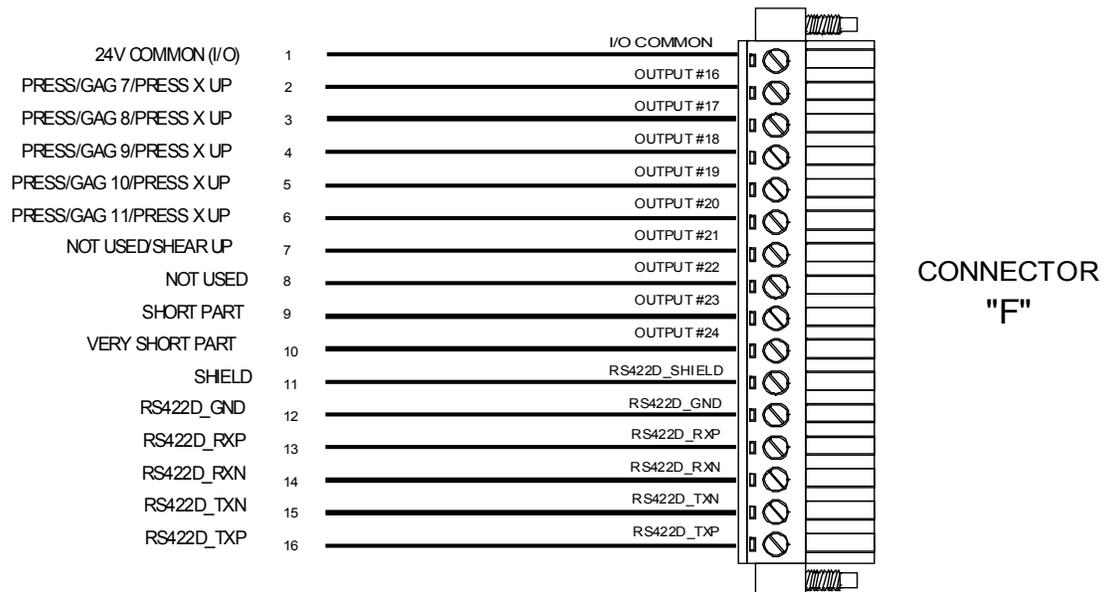


Figure 1-23. Connector “F” output connections

Machine Setup

Setup Menu

Press the **SETUP** key to display a menu of sub functions used to input parameters, controller settings, or to calibrate the controller. A split screen will be displayed with a menu of headings on the left and the actual parameters on the right. Pressing the “F1” function key will toggle the cursor between the two screens.




The highlight bar can be moved up or down the respective lists by using the up and down arrow keys. As the desired menu item is selected at the left of the screen, the corresponding parameters will be displayed on the right side of the display. Once the appropriate parameter set has been selected, press the “F1” key to toggle from the menu list to the parameter list.



7/03/03		HALTED		0FPM		0.000"	
3:26 PM							
Model: XL200CLAABPS		Created: 7/03/03 3:22 PM		Switch: 32		Version: 2.00	
Setup Menu		ID	Name			Value	
[-] Machine Parameters		121	Shear Dwell Down			0.200sec	
Press Data		122	Shear Dwell Up			0.200sec	
Run Mode Options		300	Bundle Quantity Reload Value			0	
Machine Layout		301	Bundle Quantity Count			0	
Advanced Setup		302	Item Complete			0.250sec	
Tool Data		303	Delay After Shear			0.000sec	
Multi-Axis Data		305	Scrap Part Length			0.0000"	
Trim Correction		306	Halt Mode			Bundle Halt	
[+] Controller Settings		307	Halt No More Items to Run			Yes	
[+] Auxiliary Controllers		313	Tolerance			0.1250"	
[+] Printer Configuration		314	Tolerance Mode			Cut And Stop	
QuickSet Data		350	Coil End Point			0.0000"	
		351	Coil End Offset			0.0000"	
		353	Shear Kerf			0.0000"	

SetUp F1-Next Window

Figure 2-1 The Setup Menu Screen

Note: Your controller may or may not match the one displayed above or throughout upcoming examples depending on available options.

Press Data

Shear Dwell Down

SHEAR DWELL DOWN is the time it takes for the shear to move from the top of the stroke to the bottom of the stroke. The range of time allowed is 0.001 to 9.999 seconds and can be set to the nearest millisecond, (see below for special case 0.000). If a SHEAR COMPLETE switch is used, the SHEAR DWELL should be set to a time somewhat longer than the expected time for the SHEAR COMPLETE switch to turn on.

NOTE !! To ensure that a feed-to-stop line is not restarted until the shear complete switch has closed, enter a SHEAR DWELL TIME OF ZERO. With a zero entered, the controller will interpret this as “do not restart the line until the complete switch closes.” If the complete input is not made within 10 seconds, then the line is halted and an error message is displayed.

When the SHEAR COMPLETE switch closes, the SHEAR DWELL time will be overridden and the output will be turned off immediately.

A non-stop line with a SHEAR DWELL OF ZERO will run normally as long as the shear complete is activated after a shear. The controller will remain in run mode for ten seconds as it waits for the “shear complete” input. If the shear complete is not activated in that time, the controller will halt automatically and display an error.

Shear Dwell Up

SHEAR DWELL UP is the time necessary for the shear to return from the bottom to the top of its stroke. On Flying Die machines with boosts, these parameters are combined into the one parameter called, SHEAR DWELL. The SHEAR DWELL time entered into the controller is actually the SHEAR DOWN time, and an equal amount of time is then allotted for the up time. If a shear complete switch is installed, it will override the SHEAR DOWN time.

Shear Reaction

SHEAR REACTION time is used in die-accelerator applications to reduce the overall stroke length of the cut cycle. Without a reaction time, the XL200CL SERIES controller waits until the die has moved to the MINIMUM DIE DISTANCE before the Shear Output is turned on.

The SHEAR REACTION time causes the controller to turn on the Shear Output early, allowing time for relays to activate and solenoid valves to energize while the die is accelerating toward the target. The tolerance test is performed at the end of the Shear Dwell Down signal (after the part has been cut). A SHEAR REACTION of 0 to 0.5 seconds is allowed, but the user

Machine Setup

should note that the Shear Output is not turned on before the die has started its acceleration ramp.

Also note that the SHEAR REACTION time is only in effect when the parameter ON TOLERANCE ERROR is set to “Cut & Stop” or “Warn Only”.

Press Down (With More Than One Press)

For each press on the machine, a dwell time is programmed. This sets the time duration of each press cycle in seconds. PRESS DWELL DOWN is the time it takes for the press to go from the top of its stroke to the bottom. The range of time allowed is 0.001 to 9.999 seconds, and can be set to the nearest millisecond. The PRESS DOWN time is overridden by the closure of a PRESS COMPLETE switch, when one or more of these inputs are used.

Press Up (With More Than One Press)

PRESS DWELL UP is the time it takes to return from the down position to the up position. On flying die machines, these parameters are combined into one parameter called PRESS DWELL. The PRESS DWELL time entered is actually the PRESS DOWN time, with an equal amount of time allotted for the up time.

Tool Select (XL202CL, XL206CL, & XL212CL Only)

On machines using one or more presses with multiple gaged tools, TOOL SELECT determines which tool will be activated when a MANUAL PRESS input occurs. All available tools, presses, and gags must be defined in the EDIT TOOL DATA menu.

Run Mode Options

Bundle Qty Reload Value

The user may desire to break an order down into bundles with a predetermined number of parts in each bundle. This is the function of the Bundle Qty Reload Value. For example, programming a value of “20” into this parameter will cause the controller to automatically halt after cutting 20 consecutive parts.

The controller will still halt at appropriate times such as for bundle number, order, material, and product code changes.

Bundle Qty Count

This parameter will display the current count from the “Bundle Qty Reload Value” parameter. This informational parameter automatically reflects the current bundle count and can be manually over-written to compensate for the loss of parts due to scrap or due to scrapped parts being added back to the bundle after manual corrections.

By changing this value, the bundle count can be manipulated to change the parts actually counted before the next automatic halt for the bundle count. The count progresses from the number programmed into the “Bundle Quantity Reload Value” to zero. Increasing this number will cause the controller to make more parts, decreasing this number will cause the controller to make fewer parts.

Item Complete Dwell

This sets the length of time the ITEM COMPLETE remains on at the completion of each bundle. The output is useful on pre-cut lines that keep the output drive running at the end of a batch in order to process the last few parts. The parameter default is .25 seconds. The parameter limits are 0.00 to 99.99 seconds.

Delay After Shear

This parameter allows the operator to create a separation between parts. The line remains stopped for this amount of time after the shear has cycled.

Important Notice:

The customer is responsible for adequate safety devices as well as visual and audible indicators to prevent personnel from potential hazards. The longer programmable time delay must not be confused for a machine-off condition.

Machine Setup

During this time delay, the RUN output will remain “ON” while the FORWARD output is turned “OFF”. After the designated time delay the forward output will be turned back “ON”. Increase this time to produce a longer pause between parts up to a maximum of 60.0 seconds (previous versions allowed delays of only 10 seconds). For no pause, enter zero.

Minimum Slow Distance (2-Speed, Accelerator Only)

This parameter is used to determine how soon before the target reaches a press operation to put the line into slow speed. With the DECEL FACTOR MODE parameter set to “Auto”, the XL controller will automatically calculate when to start slowing down. The MINIMUM SLOW DISTANCE is added to this calculated value. Increase the MINIMUM SLOW DISTANCE parameter value to shift the material into slow speed earlier in time. Decrease the parameter value for a shorter slow distance. A longer slow distance can improve part accuracy but may slow down overall production.

Adjustment of this parameter is based on the speed of the material and the deceleration characteristics of the machine. It is best to set this parameter to a few inches initially until the system has been calibrated and the controller has had a chance to get accustomed to the behavior of the machine. When the machine is producing good parts repeatedly, reduce the MINIMUM SLOW DISTANCE as much as possible to increase the production rate.

Scrap Part Length (Punching Only)

When a new coil is loaded and the material is threaded through the shear the controller may not immediately produce the next order without incurring some scrap. The next potential part may be past a required punching station and therefore cannot be made. To solve this problem, the AMS controller will insert either shear-only scrap parts of a given length OR count the first piece(s) as good parts even though punch operations are missing.

If a SCRAP LENGTH of zero (0.000”) is entered, the controller will produce pieces at the part length of the current order. It will be assumed that the good pieces will be manually corrected and added back to the bundle as good parts. In this case, no scrap or additional parts will be produced.

If the SCRAP LENGTH is programmed to a specific length, scrap parts of this length will be produced as shear only parts until the next normal part is beyond the first required punch operation. The user can set this parameter to produce usable stock parts or lengths that are at least easy to handle.

For example, if the SHEAR TO PUNCH DISTANCE is 300” and the SCRAP LENGTH is set to 120”, the XL controller will make 3 “stock” pieces at 120 inches each without holes.

Halt Mode

Determines when the controller will execute an automatic line halt. The user has the choice of going from one bundle to the next without stopping, stopping after the completion of a bundle, or stopping after the completion of an order. "HALT MODE" has four available options.

Bundle Halt

In the BUNDLE HALT mode, the controller will halt the machine when the Bundle Number, Order Number, Material or Pcode (Product Code) changes.

Item Halt

When ITEM HALT is selected, the controller will halt the line after the completion of every bundle item, regardless of the bundle Number.

Order Halt

When the ORDER HALT mode is selected, the controller will halt the machine when the Order Number, Material or Pcode changes, but not with a change in the Bundle Number.

Don't Halt

In the DON'T HALT mode, the controller will halt the machine only when the Material or Pcode changes. Otherwise, the controller will halt after all batches are done other than "Skipped" orders or bundles.

To toggle through the choices, use any number key, then press ENTER to lock in your selection.



Halt No More Items? (With Punch Only)

Selecting "YES" will halt the controller when all remaining parts have been loaded into the controller's memory. Typically, this occurs with two or three pieces remaining to be produced. It is typically desirable to program more orders at this time so that scrap is not produced on subsequent orders.

Selecting "NO" will allow the controller to run the last order to full completion. Subsequent orders that are programmed may have targets that are already past needed press operations. Operating in this way may produce scrap when more orders are programmed and run.

Tolerance

TOLERANCE defines the acceptable band of length variation that a user will accept and defines both the upper and lower limits. For a TOLERANCE of 0.01 inch the allowable range of variation would be ± 0.01 inch. If the controller is unable to achieve a length within this band, an error will occur and the machine may be stopped depending upon the setting in the "Tolerance Mode" parameter.

Machine Setup

For example, the tolerance is set at 0.030 inches. Upon stopping for a press operation, the target must be equal to the programmed length plus or minus 0.030" before the press will be cycled. The parameter allows values from 0.0005 inches to 10.0000 inches. The default value for TOLERANCE is 0.1 inches.

Tolerance Mode

Some roll form manufacturers would prefer to have the controller cut an incorrect part when an error occurs instead of having to handle a large amount of material past the shear that can not be easily reversed. They would prefer that the line be stopped and have the operator inspect the part to determine if it is unusable. On the other hand, other users may be concerned with a possible speed mismatch if a cut is made on an error.

When the XL200CL SERIES controller detects that a part is about to be made outside of the specified tolerance range, the operator has two options on standard controllers or four options on tube mill controllers:

If **STOP NO CUT** is selected, the controller will check for tolerance before firing the shear. Tolerance will be checked starting at the Minimum Die Distance until tolerance is achieved. If tolerance is not achieved by the time the die reaches the Maximum Die Distance, the controller will display an error message and stop the line without making the cut.

If **CUT & STOP** is selected, the controller will make the cut at the Minimum Die Distance and then check for tolerance at the end of the "Shear Dwell Down" time (bottom of stroke). If tolerance is not met, the controller will then stop the line and display an error message. The die control parameters must be properly set in order to avoid unnecessary tolerance errors.

NOTE: WARN ONLY and WARN NO CUT are special cases that will drastically affect the operation of your machine. The options are only used when the Tube Mill "T" option is included in the software for use on tube or extrusion lines.

The **WARN ONLY** mode is only available on controllers with the Tube Mill (T) option enabled. If **WARN ONLY** is selected, the controller will make the cut without stopping the line. Tolerance is checked only at the bottom of the stroke while the cut is being made. An error message will remain on the display until it is cleared by the operator, but the line will continue to run.

The **WARN NO CUT** mode is only available on controllers with the Tube Mill (T) option enabled. If the fourth option **WARN NO CUT** is selected, the controller will prompt the operator with an error message, but the line will not stop and the cut will not be made. Operators should be very cautious when using this option. If several parts in a row are out of tolerance, a large amount of uncut material beyond the shear can build up very quickly. The

Warn No Cut mode checks for tolerance between the Minimum and Maximum Die Distances.

Dump Table Delay (Tube Mill “T” Option Only)

This is the amount of time after the shear dwell has expired that the dump output is turned on and the dump dwell starts.

Dump Table Dwell (Tube Mill “T” Option Only)

The programmed amount of time the dump output stays on.

Mist Counter (Tube Mill “T” Option Only)

The mist output will turn on after the number of shear cycles set by the value in the “Mist Counter” parameter. Setting this value to “0” turns the feature off.

Mist Delay (Tube Mill “T” Option Only)

The amount of time after a shear dwell occurs that the mist output turns on.

Mist Dwell (Tube Mill “T” Option Only)

The amount of time that the mist output stays on for once triggered.

Test Part Length (Tube Mill “T” Option Only)

This parameter sets the length of sample parts that are produced when a “test part” is requested.

Continuous Material Flow (Tube Mill “T” Option)

This parameters informs the controller as to how the line operates.

If set to “Yes”, the controller assumes that external devices are controller the material motion and that the material is always moving. Upon entering the run mode, the controller will always perform an “Auto-Crop” to reference the leading edge of the first part.

When set to “No”, it is assumed the line is controlled by the XL200CL. The controller will not auto-crop the part. Manual shear functions will work normally.

Stitch Gag

This parameter selects the gag output that prevents the shear blade from cutting completely through the part, known as a stitch.

Machine Layout

Coil End Point

This feature is used to minimize scrap by halting the roll former prior to cutting the last parts, but with enough material still inside the roll former to finish the order. This will occur each time a different material is required on the upcoming “Next” job.

COIL END POINT is the distance from the back of the shear blade to the point where the material is typically manually cut in order to change coils. The **XL200CL SERIES** controller will display a warning window when it halts the line for a COIL END POINT and will notify the operator of a pending Material or Product Code change.

The COIL END POINT should be long enough to insure the cut point does not coast into the roll former and become inaccessible. This will prevent the material that is not needed for the current job from entering the roll former or to stop at the appropriate time for changing tooling. The general formula is:

$$\text{Coil End Point} = \text{Shear to Roll former Entrance Distance} + \text{Machine Coast Distance}$$

Coil End Offset

The COIL END OFFSET parameter will delay the “Coil End Point” warning. This parameter is used on a system when the customer does not desire the line to be halted within a given distance of the next shear operation. The COIL END POINT message will give the distance that the material went past the COIL END POINT mark. Enter the distance that a “Coil End Point” halt should not occur from press target.

Example:

The COIL END POINT is 120 inches, and the COIL END OFFSET is 12.000 inches. If the controller encounters the COIL END POINT distance but a shear target will occur in less than 12 inches, the line will continue running past the “Coil End Point”. Halting of the line will be delayed so the shear can first take place.

Shear Kerf

The SHEAR KERF is defined as the amount of material removed when the shear cycles. Some cutoff dies have two cutting edges that blank out a slug of material. Shears that have a cutting action similar to a pair of scissors would use a kerf value of zero.

For other types of dies or saws, the SHEAR KERF should be set to the length of the slug removed. This amount will be added to the length of each part programmed so that the resulting part length is correct. The maximum SHEAR KERF is 10.0000 inches.

Minimum Part Length

The MINIMUM PART defines the shortest part length that the **XL200CL SERIES** controller will make. For some applications short part lengths may cause problems for the roll former or other tooling. By setting a value for the MINIMUM PART, the user is not allowed to run items that would result in parts shorter than this length. Values from 0.000 to 999.999 inches may be entered.

2

Shear-Encoder Distance

The SHEAR-ENCODER DISTANCE is the physical length between the encoder and the shear point. The largest acceptable value is 10,000 inches. The controller will load this value as a negative number as a new coil is “detected”.

A “sheet detect” input switch should be used with this parameter in order to record accurate amounts of scrap as material is loaded and unloaded from the new coil. The “sheet detect” switch must be located just in front of the encoder wheel to obtain maximum accuracy.

Shear to Scrap Detect Distance (Tube Mill Option)

This is the actual measured distance between the cutoff blade (or punch reference point) to the scrap detect device if one is used. Set this parameter to 0.000” if a scrap detector is not used.

Minimum Die Distance

The MINIMUM DIE DISTANCE defines the shortest distance from the home position that a cut can be made. With most presses, improper cutting will occur if the die is not near the center of the press, or if it is not up to the full line speed. The MINIMUM DIE DISTANCE defines one side of this acceptable window. As the die accelerates for a cut, the die must be past this MINIMUM DIE DISTANCE and in tolerance (if a “no cut” mode is selected), before a cut can be made. The MINIMUM DIE value must also meet the following criteria:

$$\text{Min Die Dist} = (\text{Line Velocity}^2) / (2 \cdot \text{Acceleration})$$

In the formula, Velocity is the expected speed of the line expressed in inches per second. Velocity is found by dividing the displayed feet-per-minute (FPM) by 5. Acceleration is the programmed parameter in the controller expressed in inch / second².

The formula will produce a MINIMUM DIE DISTANCE that will allow the die to achieve a stable speed prior to cutting. If the current line velocity goes

Machine Setup

beyond velocity with which the Minimum Die Distance was calculated, the line will be halted and an error will be displayed.

Maximum Die Distance

The MAXIMUM DIE DISTANCE defines the furthest distance from the home position that a shear can occur. This defines the other side of the acceptable window within the press. When the machine is being operated in a “no cut” mode and the tolerance is not obtained by the time the die reaches the Max Die Distance, no cut is made.

If the tolerance is obtained at the MAXIMUM DIE DISTANCE, the cut will be made. Because of this, there must be enough travel left to complete a cycle. The MAXIMUM DIE DISTANCE should be adjusted so that there is enough travel left for the die to cycle the press within the remaining travel distance.

Shear Die Distance

This parameter defines the point at which all manual cuts will be made when the controller is not running. This value is measured relative to the “Die Home Switch”.

Short Part Length

The SHORT PART LENGTH specifies the length of what will be regarded as a “Short Part” on a Brake & Hump machine. Part lengths being produced in this length will cause the controller to turn on the corresponding “Short Part” output during the run mode. This output is used to direct the machine in how to respond to the upcoming length.

Very Short Part Length

The VERY SHORT PART LENGTH specifies the length of what will be regarded as a “Very Short Part” on a Brake & Hump machine. Part lengths being produced in this length will cause the controller to turn on the corresponding “Very Short Part” output during the run mode. This output is used to direct the machine in how to respond to the upcoming length.

Hole Detect Options (Hole Models Only)

Hole Mode Select

The HOLE MODE SELECT chooses whether the controller is used to count holes (Count Hole) or operate in the default (Standard) setting as a standard controller. This feature is only active in non-stop applications.

In the STANDARD mode, the controller uses a programmed part length to control the cutoff press. The operator can change this parameter to COUNT HOLE any time the line is halted.

In the COUNT HOLE mode the shear press targets are dependent on the number of holes counted and the distance from the last hole. The number of holes to count and the distance from the last hole to shear is programmed in the Program Orders screen.

No Hole Stop Distance

When in the Hole Mode, this parameter limits the ongoing length of the part in case a hole-detector is faulty or misaligned. With no limitation, a part could become so long as to threaten other machinery or personnel. If holes are not detected within a programmed distance determined by the parameter, the line halts. The default value zero disables this feature.

Shear to Detect Distance

The shear to detector distance is the physical distance from the hole-detect sensor to the shear blade at home position. Default is 10 inches. This parameter should be large enough to allow the controller to react, yet small enough to insure accuracy. Placing the detector from 10 to 20 inches away from the press is ideal.

Minimum Hole Spacing

The MINIMUM HOLE SPACING parameter inhibits the controller from sensing a hole before traveling the programmed distance from the previously detected hole. This is done to avoid getting extra hole counts when the controller is simply sensing the same hole.

The parameter requires a value smaller than the minimum distance between holes of the parts being produced, but larger than the actual holes being detected. The default value for this parameter is 1 inch and should never be set to zero.

Advanced Setup

Line Resolution

The LINE RESOLUTION parameter defines the length of material movement for each increment of the encoder. It is a function of the circumference of the measuring wheel and the number of counts per revolution of the encoder. The formula for calculating LINE RESOLUTION is shown in the info box.

For an AMS encoder, the count of the encoder is the model number of the encoder. Being a quadrature encoder, the PPR (pulses per revolution) is 4 times the number of counts. For example, a Model 256 is a 256-count encoder with 1024 PPR. A Model 1000 is a 1000-count encoder with 4000 PPR.

$$\text{Resolution} = \frac{\text{Circumference}}{4 \times \text{Encoder Count}}$$

The most common wheel used has a circumference of 12 inches. For this size wheel, LINE RESOLUTION would be as follows:

Model Encoder	Resolution (W/ 12 " Wheel)
Model 256	.00171875
Model 500	.006
Model 1000	.003
Model 2000	.0015

It is not necessary to precisely measure the circumference or calculate the formula to any great precision. Nominal values can be used with precise results achieved during calibration. Values between 0.00004000 inches and 0.04000000 inches are acceptable.

Motor Resolution (Feeder Only)

MOTOR RESOLUTION defines the value of one count from the motor encoder. See LINE RESOLUTION above for more details on determining the motor encoder resolution. This parameter is available only on machines using two-encoder operation.

Die Resolution (Accelerator Only)

DIE RESOLUTION defines the value of one count from the die encoder as reflected in the movement of the die. See Line Resolution above.

Loop Gain

LOOP GAIN is a parameter that sets the sensitivity of the servo loop. Lowering this number will make the drive less responsive. If it is too low, the system will become sluggish. Raising this number will make the system more sensitive and responsive. If the LOOP GAIN is too high, the system can become unstable and cause the motor to oscillate. Great care should be used in changing this number. Make gradual changes.

Offset Integral

The OFFSET INTEGRAL defines the integral time constant for the removal of position error (DRIFT), when the closed loop servo system attempts to hold the die/feed rolls in a locked position. An OFFSET INTEGRAL time constant of 100 seconds is recommended and is the default value

2

Offset Voltage (Automatically Updated)

The OFFSET VOLTS is the voltage required to hold the drive motor at a stopped position, with no drift in either direction. The AMS controller automatically updates this informational parameter but allows the user to edit it. This would only be done if the initial value is grossly off, and it would take too long for the controller to integrate out the error. The more common usage of this parameter is for monitoring the amount of offset, and making external balance adjustments to the drive. This parameter should be as close to zero as possible to give the controller the maximum control range.

Lag Integral (Accelerator Only)

The LAG INTEGRAL defines the integral time constant for the removal of velocity error (LAG), when tracking a moving target. The “Lag Compensation” parameter has 66% of its error removed after the accumulated time given in the Lag Integral parameter. This lag time is only accumulated while the die is between the minimum and maximum die locations.

Lag Compensation (Automatically Updated)

LAG COMPENSATION is the integral that is used to correct for a condition where the speed is matched, but the position lags behind the target. This parameter is automatically adjusted and is not normally changed by the user. If this value becomes unstable, there may be a mechanical problem in the system.

Derivative

This parameter is used in special application loop control systems. On systems that use hydraulics or have a lot of inertia, it is possible that the system may have a slow response time. If this is the case, it may be possible to have a faster response by entering a DERIVATIVE value. The sluggish response of the machine will result in an error, and the purpose of

Machine Setup

the DERIVATIVE is to anticipate the rate of change in the error, and amplify the rate of change to improve performance.

If it is determined that this parameter is to be used, start with a value of 3 seconds and then decrease the value until a change in pitch or “hum” is heard in the motor. The “hum” indicates that the controller is overcorrecting the error. When this occurs, increase the value until the system stops oscillating.

CAUTION: Changing this value will amplify any noise in the system, as well as the error, which can cause problems in the system. Entering a zero for DERIVATIVE will disable the parameter.

Jog Select Mode? (Accelerator Only)

This mode will determine how the jog inputs to the controller are used. “Jog Line” and “Jog Die” are the two possible selections. The “Jog Line” selection is the default value. This will cause a jog input to cause the line (material) to jog through the forward, reverse and slow outputs. The exception to this would be when the “Die Jog Screen” is displayed on the controller. At this time, the jog inputs will cause the die to move forward or reverse through the analog output to the drive. If “Jog Die” is selected, the jog inputs only cause the die to jog regardless of which screen is being displayed.

Jog Velocity

The JOG VELOCITY sets the speed that the rolls turn on a feed-to-stop machine during jog operations. On a flying die machine, the JOG VELOCITY sets the speed during die jog operations and also for referencing.

Minimum Die Return Velocity (Non-Stopping only)

When the Die on a Die-accelerator is returning after a cut, it will return only as fast as is necessary to make the next target. If a faster return is desired, the “Min Velocity” parameter can be used to set the lowest allowable return velocity. The range of this parameter is 10 to 500 FPM.

Slow Run Velocity (Feeder Only)

Sets the velocity for material feeding when the “Slow Run” input (input #16) is activated.

Maximum Die Return Velocity (Accelerator Only)

MAX VELOCITY sets the maximum return speed of the die.

Maximum Velocity (Feeder Only)

The MAXIMUM VELOCITY parameter sets the maximum running speed for a feed to stop machine. This is the speed the controller will attempt to run at between operations.

Acceleration (Feeder Only)

ACCELERATION sets the rate of change of velocity for either the feed rolls or the die travel. This parameter controls both the acceleration and deceleration of the forward travel for Die Accelerators.

Return Acceleration (Accelerator Only)

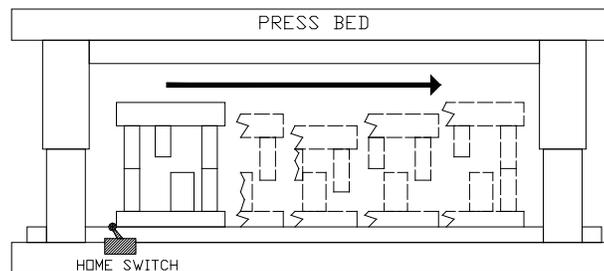
The RETURN ACCELERATION sets the acceleration for the flying die to return to home after the cut has been made. This parameter typically can be set higher than the forward ACCELERATION since the die return is not a critical movement. This will decrease the overall cycle time of each cut. The RETURN ACCELERATION can also be adjusted for a lower value, which will result in less wear and tear on the actuating system. Units are expressed in inches per second, per second (Inches/second²).

2

Die Reference (Accelerator Only)

The DIE REFERENCE parameter adjusts the position where the die waits to make a cut (home position) during the run mode. The new “Intelligent Die Positioning” feature found in Version 2 software allows the operator to customize how the die works by automatically positioning its own home position depending on the speed of the part being produced. By “resting” the die at the closest location to the shear point, production time is increased.

When set to “**Home Switch**” the die sits at the home switch while waiting to make the cut and will travel to the Minimum Die position before firing the press. This has been the mode of operation in software versions previous to the Version 2.



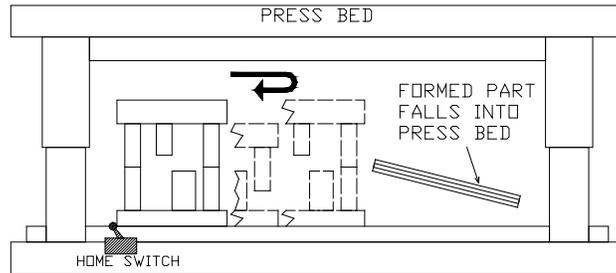
Full Press Cycle from Home Position

When the parameter is set to the “Min Die Distance” or “Max Die Distance” the controller calculates the distance needed to accelerate the die up to match the current line speed and positions the die so that it reaches speed when it hits the Minimum Die Distance.

Some lines must also produce small parts as well as longer parts, though typically at lower line speeds. Because the speed is slow, the die travels only a very short distance within the press bed before the target is found and the cycle completed. The short part is now cut, but because the stroke is so short, falls within the press bed itself. This makes the part hard if not

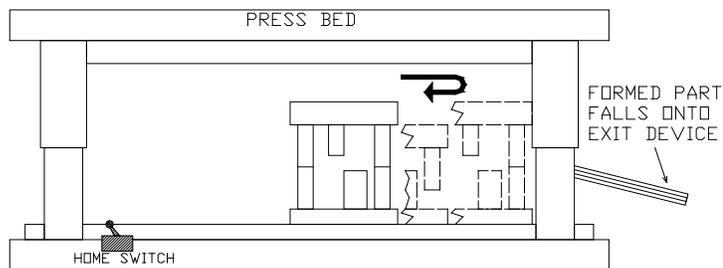
Machine Setup

impossible to safely retrieve. A part lying within a press bed also makes for a safety hazard to the machine itself.



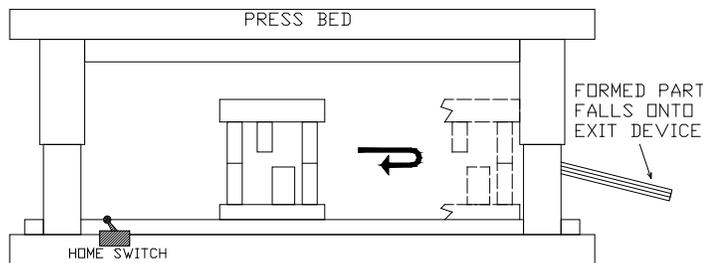
Short Part Made with "Home Switch" setting at slow speed

If the parameter is set to "**Max Distance**" mode, the die will automatically position itself as near the end of travel as possible. The die will be referenced in such a way that the end of the shear cycle will coincide with the "Maximum Die Distance". Enough room must be left beyond the "Maximum Die Distance" to allow the die to decelerate to a stop before returning to the floating home position. If the Maximum Die Distance is set properly, the part is cut and will fall onto the exit conveyor or other loading device.



Short Part Made Using the "Maximum Die Distance" setting at slow speed

This operation works at all speed ranges. With small parts, the line speed is very slow and the die will rest towards the end of the press travel. As line speed increases, the die begins to float toward the home switch, compensating for the additional time the actuator needs to complete a cycle at the higher speed.



The Die "floats" to position as line speed varies

Even as the line is running, the die moves closer to the entry or exit side of the press as the line speed varies.

If the parameter is set to "**Minimum Die**", the die will be positioned in order to make the shortest move to allow the press cycle to begin at the "Minimum Die Distance". The "Home" position will float depending on line speed.

Settling Time (Accelerator Only)

This parameter adjusts the position where the die waits for a target to compensate for overshoot as it accelerates up to match line speed. This parameter only applies when the die is referenced to “Minimum Die Distance” or “Maximum Die Distance”.

Advance After Cut (Accelerator Only)

ADVANCE AFTER CUT is the distance on a non-stop line that the die will advance after the shear down and before the shear up. The purpose of this parameter is to prevent the shear blade from scraping against the leading edge of the metal as it moves up.

2

Filter Constant

The FILTER CONSTANT is used to filter the velocity that is calculated by sampling the number of encoder counts over a fixed period of time. It can be adjusted in order to improve accuracy. A low value should be used on machines with very stable line speeds. A high value (greater than 50 Hz) should be used when significant fluctuations in line speeds occur. The default value of 32 Hz is considered to be a proper value for most lines. The **XL200CL SERIES** controller will allow values from 1.0 Hz to 200.0 Hz.

Minimum Speed Voltage

This parameter is defined for Analog Output #2 on the XL200CL Series Controller and is used to control the line speed or other accessories. It defines the minimum analog output voltage when the part lengths are at the “Minimum Part Length”. This is also the output when in “Slow Run”, “Jog”, or “Reverse” modes.

On two-speed machines, it sets the output voltage for slow speed.

Maximum Speed Voltage (Analog Option Only)

This parameter is defined for Analog Output #2 on the XL200CL Series Controller and is used to control the line speed or other accessories. It defines the maximum analog output voltage when the controller is in “Fast” speed. The MAXIMUM SPEED VOLTAGE is output whenever the part length being run is equivalent or larger than the amount programmed in the “Length at Maximum Speed” parameter.

On two-speed machines, it sets the output voltage for fast speed.

Length at Maximum Speed

The LENGTH AT MAXIMUM SPEED defines the part length that selects the “Maximum Speed Voltage” during the fast run mode. Running parts shorter than this length will result a proportionally lower analog output voltage between the Maximum and Minimum settings.

Auxiliary Shear Compensation

Used on **XL200CL Series Controllers** when configured to use auxiliary controllers. The range of this parameter setting is 0 to 1000, with a default value of zero (disabled). The parameter is used to compensate for a long first part after a cutoff operation by the auxiliary controller.

The cutoff operation is initiated by the XL200CL Series controller giving the auxiliary controller a shear output to trigger it's cut operation. The parameter only applies to machines where an auxiliary device controls the shear. The value should be equal to the Shear to Detect distance plus the Minimum Die Distance of the auxiliary controller in inches.

Aux Shear Compensation = Shear Detect + Minimum Die Distance.

Tool Data

Tooling Terms

The following definitions apply throughout this document:

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 the smallest section of a die set that can be engaged with one cycle of the press. A tool may produce a single hole, notch or shear, or a group of holes, notches and shear. A tool is defined by a press number, an optional gag number (or multiple gag numbers), and an offset distance from the front of the press. A “Y-axis” reference may also be necessary for respective machines.

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 will also be necessary.

Batch Item

A batch item in the AMS controller is used to actually produce parts. Each batch item defines a batch number, quantity, length, pattern number, and production option.

Press & Gag Configuration

The **XL200CL SERIES** feed controller can be adapted to several types of machines.

- The **XL202CL** can control a machine with two individual presses or with a single press and one gag.
- The **XL206CL** can control a machine with six individual presses, a machine with a single press and five gags, or any combination of presses and gags that add up to six.
- The **XL212CL** can control a machine with twelve individual presses, a machine with a single press and eleven gags, or any combinations of presses and gags that add up to twelve.

Once the configuration of the machine is determined, the AMS controller can be set to match that configuration. Please refer to [Chapter 11](#) of this manual for proper controller switch configurations.

Determining the Machine Zero Reference Point

For each application, a Machine Zero Reference Point is required. From this point, an offset to each die can be measured. The only requirement for this point is that it must be downstream from any tool location to avoid a negative reference. See Figure 2-4.

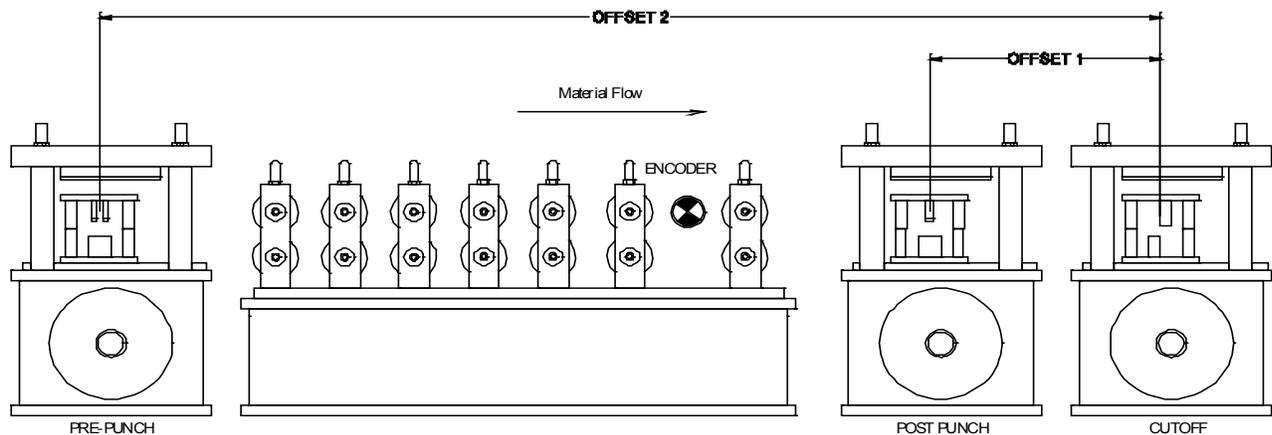


Figure 2-4. Press Reference Distance

In most cases the easiest point to use for a reference point, is the back edge of the shear die (AS SHOWN). Tool offsets are then determined 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 is measured. These dimensions become the tool offsets.

Defining a Tool

ID (Tool Number)

The tool “ID” number is any numeric number from 0 to 974. Tools can be entered in any order and numbers can be skipped. TOOL 0 is reserved for the shear and must always be programmed accordingly as press 0. Tools 975 to 999 can also be programmed, but these are considered macro pattern tools. This is discussed in detail in Chapter 3 (Part Programming). The Extended MACROS options will increase the range of macro pattern tools to 650 thru 999 and are discussed in Chapter 9 (Options) of this manual.

Press

The PRESS number refers to the “Press Output” associated with that tool. The PRESS number must be from 1 to the number of presses programmed into the configuration switches. If any other number is entered, an error will be displayed. Press “0” is always assigned to the cutoff press.

Gag

The GAG number corresponds to the Press/Gag Output that is energized when this tool is to be activated. The number must be greater than the number of presses programmed into the configuration switches and not greater than the number of maximum presses/gags allowed (**XL102** = two, **XL106** = six, **XL112** = twelve). If no gag is to be energized for a specific tool, the gag field should be set to “0”. This designates that no gag is connected. (See Figure 2-5)

X-Offset

The X-OFFSET is a distance measured from the designated machine zero point to a reference point on the tool. The “X” means that this measurement is in the same plane as the material is moving, the “X” axis.

This point may be the center point of a single hole or may be the reference point cluster of holes or a die pattern. In others it may be the leading or trailing edge of a hole die or notching die.

Y-Offset

The Y-OFFSET is the distance measured in the “Y” plane, or adjacent (across) the material motion plane. This provides an offset distance across the breadth of the part to create a reference location for a Y-axis tool. This offset is provided by the drive when a tool is positioned in a specific location.

Axis

The AXIS refers to the drive axis that a particular tool is attached to. Each individual positioning device will have its own “Axis” definition.

Name

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

General Tool Information

More than one tool ID can be defined for the same die tool. For example, a notching die that removes a piece from the corner of both the leading and trailing edges can have a tool defined for both corners. They would have the same press and gag data but different offsets. This allows for dimensions to be programmed directly from the part drawing.

Another use for multiple tool ID entries is for instances where a die tool may be changed to run different parts. Different Tool ID's and Offsets for both die tools would be available. Patterns using one die or the other will contain the corresponding tool reference. This means that no change in tool data is required when dies are changed; simply use the corresponding tool ID for the selected tool.

2

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 die tool can then be independently engaged or disengaged using a different tool number.

When using a gagged die set, the operator is not limited to just one gag per tool. Multiple gags may be assigned to the same tool. As an example, assume that you have a shear for Press 0 and three sets of tools on Press 1. (Figure 2-6)

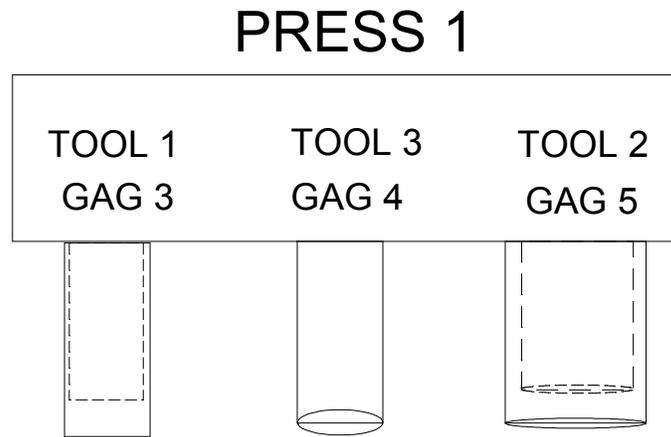
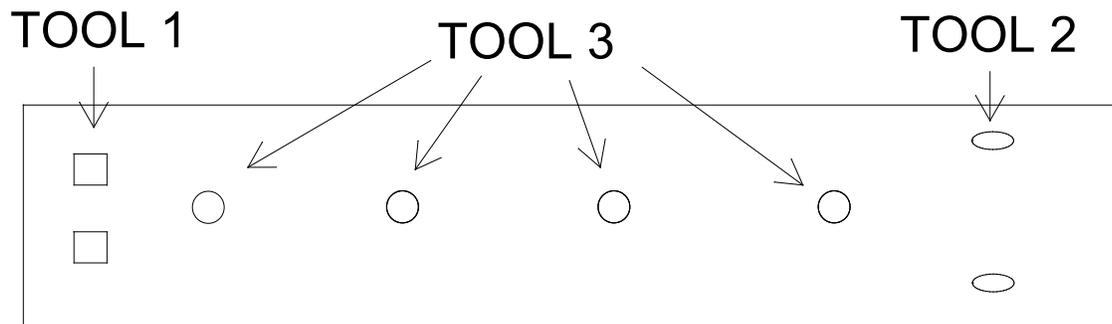


Figure 2-6. Example Punch Press

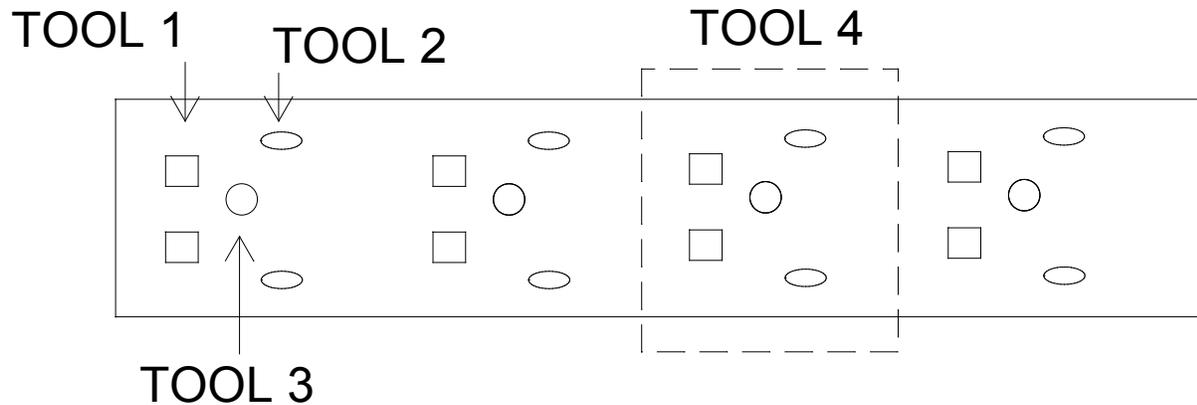
With this tool arrangement, the following part can be made using the individual tools in six press operations and one cutoff operation. See "Example Part 1".



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.

Correction Factor

The **CORRECTION FACTOR** adjusts for errors in the size and tracking of the measuring wheel. It 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.

Calculate the CORRECTION FACTOR using the following steps:

- Run ten parts of equal lengths, 120" for example.
- Measure the ten parts.
- 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).
- Use the following formula for the new CORRECTION FACTOR, using the average of the ten parts for "actual measured length."

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

CF = Correction Factor

The XL200CL SERIES controller's CALIBRATE TRIM feature automatically computes a new CORRECTION FACTOR, which is used in the controller's length calculations to adjust for errors in the size of the measuring wheel. The controller remembers the length as measured by the controller, and asks the user to enter the actual measured length. The controller then calculates and displays a new CORRECTION FACTOR (and asks the user if he/she would like to update the current value with the new value). CALIBRATE TRIM should be used any time part lengths are incorrect but in a consistent pattern (i.e. all parts 3/16" long, etc.).

2

Controller Settings

Clock / Calendar

This menu selection allows the time and date to be set in the XL200CL SERIES controller. The built-in calendar and clock can be set in this menu as well as the time and date display format.

The first clock parameter allows a choice between AM/PM and 24-Hour (Military-style) time display. Press any number key to display a selection window and use the arrows to highlight the desired selection. Press the "Enter" key when the selection has been made.

6/04/03	HALTED	0FPM	2.106"
3:13 PM			
Model: XL206AABPS Created: 6/04/03 2:08 PM Switch: 21 Version: 2.00			
Setup Menu	ID	Name	Value
+ Machine Parameters	600	Time Format	AM / PM ^
- Tool Data	601	Date Format	MM-DD-YY
- Trim Correction	602	Date Seperator	/
+ Controller Settings	603	Set Hours	3
Clock / Calendar	604	Set Minutes	13
- Network Settings	605	Set Seconds	34
- Operator Preferences	606	Set AM or PM	PM
+ Auxiliary Controllers	607	Set Days	4
+ Printer Configuration	608	Set Months	6
- QuickSet Data	609	Set Year	2003
Setup	F1-Next Window		

Figure 2-8 Time Clock Setup Screen

The remaining lines allow entry of the current time, date, and method that each will be displayed in. Changes to these parameters will be reflected on the XL200CL SERIES controller. The controller will begin keeping track of the time and date from that point.

Available parameterized options include:

Time Format

- AM/PM
- 24hour

Date Format

- MM-DD-YY
- DD-MM-YY
- YY-MM-DD

Date Separator

- (/)
- (-)
- (.)

Set Hours

- Numeric entry for hours

Set Minutes

- Numeric entry for minutes

Set Seconds

- Numeric entry for seconds

Set AM or PM

- AM
- PM

Set Days

- Numeric entry for the date

Set Months

- Numeric entry for the month

Set Years

- Numeric Entry

2

When using the Eclipse option, the Eclipse office PC will automatically control the TIME CLOCK and will override any time entered in the controller manually.

Network Settings

The “Network Settings” window displays information for use with ECLIPSE software. If Eclipse is attached, up to 30 XL200CL Series controllers can be connected on a single network for communications with a computer for remote order entry. Each computer can support up to three full networks for a total of 90 controllers. The Baud Rate listed below must be matched to the office computer’s Baud Rate. The default rate is 9600.

The following parameters are used only when the controller contains a Network ID number for communications with Eclipse.

Network Unit ID

The NETWORK UNIT ID must be set to a unique number from 1 thru 30. This provides an identity or “name” for the controller. The number assigned to the controller must have a matching machine assigned and enabled on the Eclipse program in order to communicate.

If multiple communication networks are attached to the PC, the unit ID numbers may also range from 100 to 130 (Comm. Network #2) and 200 to 230 (Comm. Network #3).

Network Baud Rate

Sets the communication speed for the network. Once again, the controller’s baud rate *must* match the settings on the Eclipse PC or communications between the two will not be possible.

The available selections are “4800”, “9600”, “19200”, “28800”, “38400”, “57600”, “76800”, “115200”, “230400”, and “460800”. The Default value for both the XL200CL Series controller and for Eclipse is “9600”.

XL200CL Series controllers can communicate at the highest baud rate available when attached via the Eclipse PC’s USB port. However, communication networks that also support an XL100 Series controller must be kept at 9600 baud.

Halt Delay Minimum

The HALT DELAY MINIMUM parameter sets the amount of time the machine may be halted before the operator is prompted to enter a delay reason. The controller will not be allowed to go back into run mode until the reason is input or selected. This parameter is only available if the controller is given an Eclipse ID code. Entering the number “99” will disable this feature.

A drop list of existing delay codes and employees may be available if downloaded from Eclipse. Simply highlight and select the desired entries.

Auto-Request Order Footage

The XL200CL Series Controller will automatically request more orders from Eclipse when the footage of all present orders drop below the footage specified in the parameter. This value will be displayed as feet or meters depending upon the FORMAT selection.

Use Scrap Codes

If the USE SCRAP CODES parameter is set to “Yes”, it causes the controller to prompt for a scrap code any time scrap is incurred that is longer than the “Manual Shear Scrap Length”. Inputting a predefined scrap code and an employee number will be required before the machine is allowed to run again.

A drop list of existing scrap codes may be available if downloaded from Eclipse. Simply highlight and select the desired entries.

Manual Shear Scrap Length

Sets the maximum length of material that can be manually cut without being prompted for a Scrap Code. Manual cuts producing lengths longer than this maximum length will force the operator to input the Scrap Code before being allowed to run again. Manual cuts that are equal to or less than this length will be automatically assigned a scrap code of “0” for “Normal Production Scrap”.

The Unit ID must be programmed to a valid number and Scrap Codes must be enabled before this parameter is displayed.

Operator Preferences

Numeric Display Format

Length measurements can be programmed and displayed in seven different formats. A part, which is 10 feet and 6 ½ inches, can be displayed as any of the following:

- | | |
|------------------------|-------------|
| ➤ Decimal Inch | 126.5000" |
| ➤ Feet Fractional Inch | 10' 6 ½" |
| ➤ Feet Decimal Inch | 10' 6.500" |
| ➤ Decimal Feet | 10.543' |
| ➤ Metric mm | 3213.100 mm |
| ➤ Metric cm | 321.310 cm |
| ➤ Metric M | 3.2131 M |

Use any number key to toggle through the choices, and then press ENTER to save your selection.

Auto-Delete Done Orders

Completed Orders and Items remain in the **XL200CL SERIES** controller's memory for the number of days specified in this parameter. The default value is 14 days. This allows the operator to quickly review production history. Enter the number of days before a DONE order is automatically deleted.

Items that are flagged as **DONE** will be removed from memory at either **12 AM** or **12 PM** after the specified time has elapsed.

Set Done Items to Ready?

If NO is selected here, when an item is finished running, its remaining quantity is left at zero and its status becomes DONE.

If YES is selected, the remaining quantity is reset to the quantity programmed, and the status becomes READY again. When READY, the item can be run again without manually reprogramming it. If YES is selected, the % Comp. (Complete) will show N/A (not applicable) on the display screen. This mode is typically used to fill a bin or bundle repeatedly with no regard to the overall quantity produced.

Press any number key to toggle between YES and NO, pressing "ENTER" to record your selection.

Enable Virtual Keyboard

Setting this parameter to "Yes" will cause a soft "keyboard" to be displayed on the screen to be used for easy alphanumeric entries when programming orders, materials, or product codes without a hardwired keyboard.

When the screen prompts for data in one of the above fields, typing a number key will cause the virtual keyboard to be displayed, posting the number pressed as the first character. If the “Ins” key is pressed instead, the virtual keyboard will be displayed without any data preloaded on the screen. The “CE” key will perform the same function.

As shown in figure 2-9, simply select the letters required by using the arrow keys to highlight the letter and pressing the “Enter” key to accept it. Select the “OK” command button on the virtual keyboard to accept the entire entry. Select the “Shift” key to capitalize the letters.

2



Figure 2-9. Virtual Keyboard

Quickset Data

The “Setup Lockout” key does not “lock” certain control parameters that are routinely accessed by the operator. This is done to make the machine as productive as possible. Each of these parameters have been included in other parameter lists, but have been placed in this central location as well to make them easy to locate and change for the operator.

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 2-9. Tool Set Data Parameter List

Bundle Qty Reload Value

The user may desire to break an order down into bundles with a predetermined number of parts in each bundle. This is the function of the Bundle Qty Reload Value. For example, programming a value of “20” into this parameter will cause the controller to automatically halt after cutting 20 consecutive parts.

The controller will still halt at appropriate times such as for bundle number, order, material, and product code changes.

Bundle Qty Count

This parameter will display the current count from the “Bundle Qty Reload Value” parameter. This informational parameter reflects the current bundle count and can be manually over-written to compensate for the loss of parts due to scrap and due to scrapped parts being added back to the bundle after manual corrections.

By changing this value, the bundle count can be manipulated to change the parts actually counted before the next automatic halt for the bundle count. Increasing this number will cause the controller to make more parts, decreasing this number will cause the controller to make fewer parts

Delay After Shear

This parameter allows the operator to create a separation between parts. The line remains stopped for this amount of time after the shear has cycled. During this time delay, the RUN output will remain “ON” while the FORWARD output is turned “OFF”. After the designated time delay the forward output will be turned back “ON”.

Increase this time to produce a longer pause between parts up to a maximum of 60.0 seconds (previous versions allowed delays of only 10 seconds). For no pause, enter zero.

2

Important Notice:

In regards to the “Delay After Shear” parameter: The customer is responsible for adequate safety devices as well as visual and audible indicators to prevent personnel from potential hazards. The longer programmable time delay must not be confused for a machine-off condition.

Halt Mode

Determines when the controller will execute an automatic line halt. The user has the choice of going from one bundle to the next without stopping, stopping after the completion of a bundle, or stopping after the completion of an order. “HALT MODE” has four available options.

Bundle Halt

In the BUNDLE HALT mode, the controller will halt the machine when the Bundle Number, Order Number, Material or Pcode (Product Code) changes.

Item Halt

When ITEM HALT is selected, the controller will halt the line after the completion of every bundle item, regardless of the bundle Number.

Order Halt

When “ORDER HALT” mode is selected the controller will halt the machine when the Order Number, Material or Pcode changes, but not with a change in the Bundle Number.

Don't Halt

In the DON'T HALT mode, the controller will halt the machine only when the Material or Pcode changes. Otherwise, the controller will halt after all batches are done other than “Skipped” orders or bundles.

To toggle through the choices, use any number key, and then press ENTER to lock in your selection.



Shear Kerf

The SHEAR KERF is defined as the amount of material removed when the shear cycles. Some cutoff dies have two cutting edges that blank out a slug of material. Shears that have a cutting action similar to a pair of scissors would use a kerf value of zero. For other types of dies or saws, the SHEAR KERF should be set to the length of the slug removed. This length is added to the length of each part programmed so that the resulting part length is correct. The maximum SHEAR KERF is 10.0000 inches.

Part Programming

3

Pattern Programming

The specific location of punch operations on a programmed part is defined in the “PATTERNS” window. All details about the part except the actual length are defined in this window. Patterns are assigned to each cutlist item. This allows patterns to be defined independent of the length.

Often, the same pattern will work for numerous different part lengths. The **XL200CL SERIES** controller allows press operations to be defined relative to the leading edge, trailing edge, or center of the part being produced.

This feature allows users to create the simplest of patterns to complex parts that reference the ends or center of the part. Some patterns may contain complex macro patterns.

To program a pattern, press the “Program” key.



The function of the “F” keys is listed at the bottom of the display. The function of a particular key may vary depending screen presently being displayed.

Once in the program screen, the operator can select the “Patterns” screen by pressing “F6”.



Once in the “Patterns” screen, the user has multiple options for the creation of patterns or for editing patterns. Figure 3-1 shows the menu for pattern numbers in the left hand window and the individual pattern operations located in the right hand window.

Tool ID

TOOL ID is a numeric entry up to three numbers long ranging from 1 to 999. TOOL ID “0” is always reserved for the SHEAR only and does not need to be programmed since part length is specified in the Bundle. If length is programmed into the pattern, it is not necessary to enter a length in the Bundle Program.

Every tool number used in a pattern must also exist in the TOOL DATA table before running the program. A “Tool Data Not Programmed” error will occur if attempting to run a pattern that requires tool that cannot be found in the Tool Data table.

Reference

The **REFERENCE** field (demonstrated in Figure 4-3) consists of the following options:

LEADING EDGE

Tool location measured from leading edge of the part. For example, a 1 inch leading edge hole on a 24 inch part would appear at 1 inch from the leading edge.

TRAILING EDGE

Tool location measured relative to the trailing edge of the part. For example, a 1 inch trailing edge hole on a 24 inch part would appear 23 inches from the leading edge.

LEAD CENTER

Tool location measured relative to the center of the part, offset toward the leading edge. For example, a LEADING CENTER hole at 1 inch on a 24 inch part would appear at 11 inches from the leading edge of the part.

TRAIL CENTER

Tool location measured relative to the center of the part, offset toward the trailing edge. For example, a TRAILING CENTER hole at 1 inch on a 24 inch part would appear 13 inches from the leading edge.

EVEN SPACE

An EVEN SPACE tool is placed at a repeated distance until the end of the part is reached, or until it reaches the spacing limit as described in the next paragraph. The first EVEN SPACE Tool location is measured relative to the a LEADING EDGE entry of the same tool. More than one set of even spaced patterns can be programmed per pattern.

Note: When programming an EVEN SPACE pattern, the EVEN SPACE location must be immediately preceded by a LEADING EDGE location to define a reference point, and then followed by a SPACING LIMIT. In other words, every even space operation **MUST have 3 tool specifications. For example:**

Tool 2	Leading Edge	12.000"
Tool 2	Even Spacing	24.000"
Tool 2	Trailing Edge	30.000"

SPACING LIMIT

Designates how close to the trailing edge that an EVEN SPACE hole can be located. The SPACING LIMIT entry must be entered immediately after the EVEN SPACE entry that it is associated with.

Offset

The **Offset** distance is the distance an operation is to occur in respect to the Reference that was programmed in the previous column.

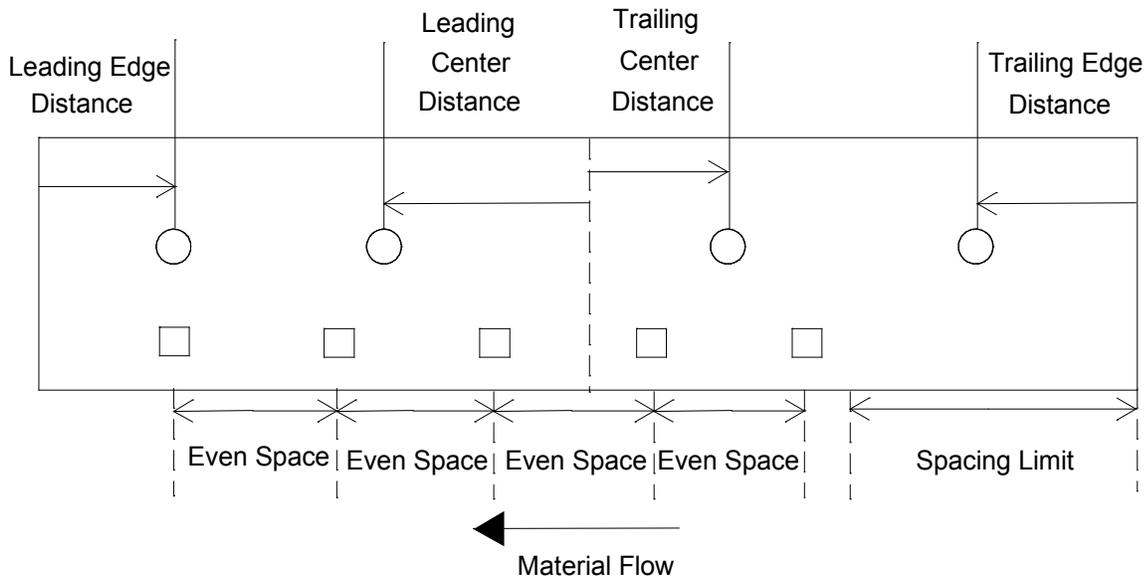


Figure 3-2 Reference Examples

Y-Reference

The Y-Reference field is only active when the controller is configured with the “Y-axis” option. If the controller is not set for “Y-axis”, then the field will be grayed out and non-editable

The Y-Reference describes the physical point that the respective tool is to use as a reference point. This could be the center of the material or the edge of it. This allows the tool to be positioned according to how the pattern is drawn for a specific part. Four choices are available:

Center +

References the Y-Offset distance from the center of the part upward.

Center –

References the Y-Offset distance from the center of the part downward.

Edge +

References the Y-Offset distance from the bottom edge of the part toward the center of the part

Edge –

References the Y-Offset from the top edge of the part toward the center of the part.

When determining which direction is positive versus negative, all referencing is considered with the leading edge of the part facing the left.

Y-Offset

This is the distance the tool will be placed in the Y-axis as referenced in the “Y-Reference” parameter.

The following pattern programming examples will demonstrate the ease of programming, copying, and editing patterns and macro patterns.

Pattern Programming Example #1

Single Press with Multiple Gags

In this example, the user has one large press with a gagged die. The parts produced are components used in metal buildings. These parts typically have a standard pattern of holes on the leading and trailing ends but the total length varies from one order to the next. This makes the pattern scheme of the **XL200CL SERIES** controller ideal for this application.

The two following parts will have patterns created for them. Pattern 100 will be programmed from scratch while pattern 200 will be copied from pattern 100 and modified. Reference the example in Figure 3-5.

Example #1 Parts

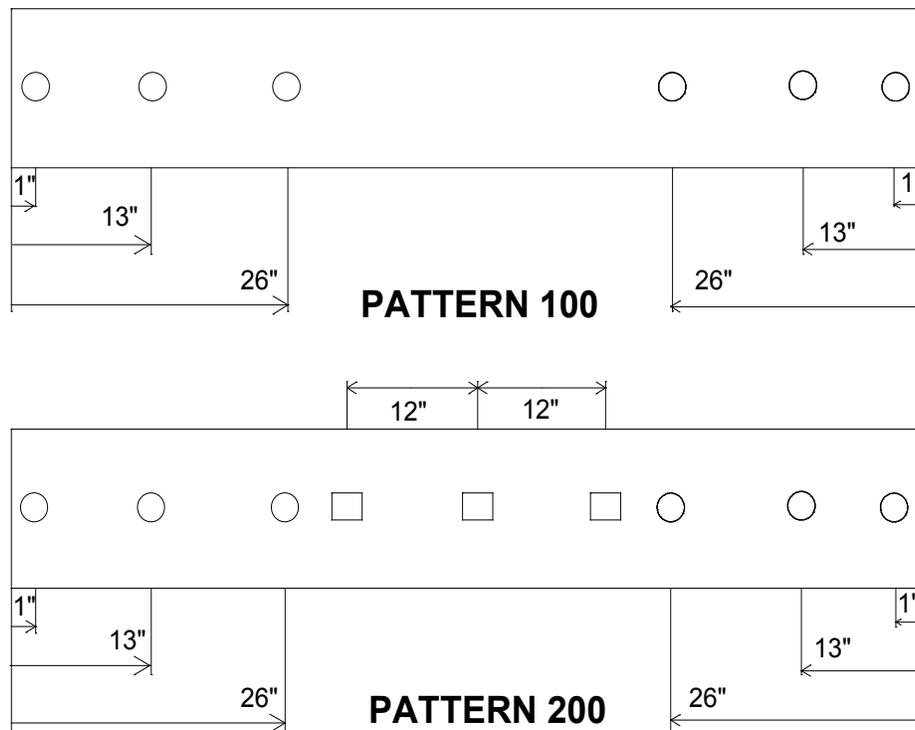


Figure 3-5 Example patterns

Pattern 100 uses Leading Edge and Trailing Edge references.

Pattern 200 uses Leading Edge, Trailing Edge, Leading Center, and Trailing Center references.

Creating a Pattern

As discussed earlier in this chapter, program the desired pattern number in the left hand “Program Patterns” window. Press the “F1” key to tab to the “Operations” window.

Program each punch location exactly as specified in the part description. Use the “F2” key to add the first location. All subsequent punch operations will automatically open in the next sequential line once the current line is entered.

Compare the information below with the respective part in figure 3-5.

6/09/03		HALTED	0FPM		0.000"
10:07 AM					
Program Patterns	Tool ID	Reference	Offset	Y-Reference	Y-Offset
100	1	Leading Edge	1.0000"	Center+	0.0000"
200	1	Leading Edge	13.0000"	Center+	0.0000"
	1	Leading Edge	26.0000"	Center+	0.0000"
	1	Trailing Edge	26.0000"	Center+	0.0000"
	1	Trailing Edge	13.0000"	Center+	0.0000"
	1	Trailing Edge	1.0000"	Center+	0.0000"
Program F1-Next Window F2-Add F3-Delete F4-Copy F5-None F6-Go to Orders					

Figure 3-6. Pattern 100 Screen

Pattern 100 could also be programmed with Leading Edge references only (without the Trailing Edge references), if the order is “mirrored”.

Standard Macro Programming

A MACRO is a single pattern or keystroke that can be used to represent multiple patterns or keystrokes. Pattern program numbers 975-999 are reserved for creating MACRO PATTERNS (multiple operations that can be used in another pattern). If a series of operations are frequently used in other patterns, it can be turned into a MACRO and the operator need only enter one pattern to represent several operations. If more MACROS are required, an Extended MACRO Option is available which uses pattern numbers 650 through 999. See Chapter 9 “Options” of this manual for more information on the extended macro option.

Edit Tool Data

Tool data should be entered by the normal procedure in the TOOL DATA screen. Tool Number zero (“0”) is reserved for the shear and must always be entered. Each tool is defined by a numeric Tool ID from 0 to 974, a Press Number, Gag Number, and Offset Distance. Tool numbers 975-999 may not be programmed. These Tool Numbers are reserved for MACRO patterns that will be defined as a tool. Detailed information on Tool ID is located in the “Machine Setup” chapter.

Macro Patterns

Programming Macro Patterns is very similar to non-macro applications.

Program

- Press the PROGRAM key to enter the Program Window
- Press “F6” to open the Patterns Window
- Press the “F2” key (Add) to add a new pattern or the “F4” key to copy (Copy) an existing pattern to be edited
- The controller will create a new pattern and highlight it in light blue
- Input the new pattern number and press the “Enter” key (Patterns 975 to 999 must be used as these numbers are reserved specifically for Macro patterns)
- With the pattern number entered, press the “F1” key to tab over to the “Operations” window to program the individual operations

F6

F2

Program an Operation

- Enter the Tool ID number. Use any Tool Number that has been defined in the Edit Tool Data mode. Tools 975 thru 999 may not be used (placing a macro within a macro).
- Enter a Reference location for the tool. Within a MACRO pattern the only valid Reference locations are LEAD CENTER and TRAIL CENTER. This “Center” point will be the reference for all operations

within the macro pattern and will be used as the reference or “Handle” when placing the macro into other patterns.

- Enter a Length (offset from the “Center” Reference location) for the tool. This is the same procedure that is used on non-macro applications.

After entering the offset length of each tool, the controller will automatically create a field for the next tool operation. Pressing the “F2” key will also create a new tool operation. Enter as many tools in the pattern as required. When finished, press the “F1” key to enter more patterns or press the STATUS key to return to the Status mode. This pattern may now be run as a standard pattern or inserted into another pattern as a MACRO.

3

Inserting Macros Into Other Patterns

To insert a MACRO pattern into an ordinary pattern use the MACRO Pattern number in place of the tool number. Enter the Reference location and offset length for the MACRO Pattern. All of the tool operations within the MACRO will be located with respect to this location (remember only LEADING CENTER and TRAILING CENTER are valid). You may insert as many MACROS as you like within the same standard pattern and the macro will be used just like any other tool. When finished, press the “F2” key to enter more patterns or press the STATUS key to return to the Status mode.

Bundles can be run with ordinary patterns, with MACRO Patterns, or with ordinary patterns that contain MACROS.

Programming examples for macro programs follow:

Programming Example #2 (Macro Patterns)

Suppose you have an **XL212** controller with one press and seven gags, and your tool locations where as follows:

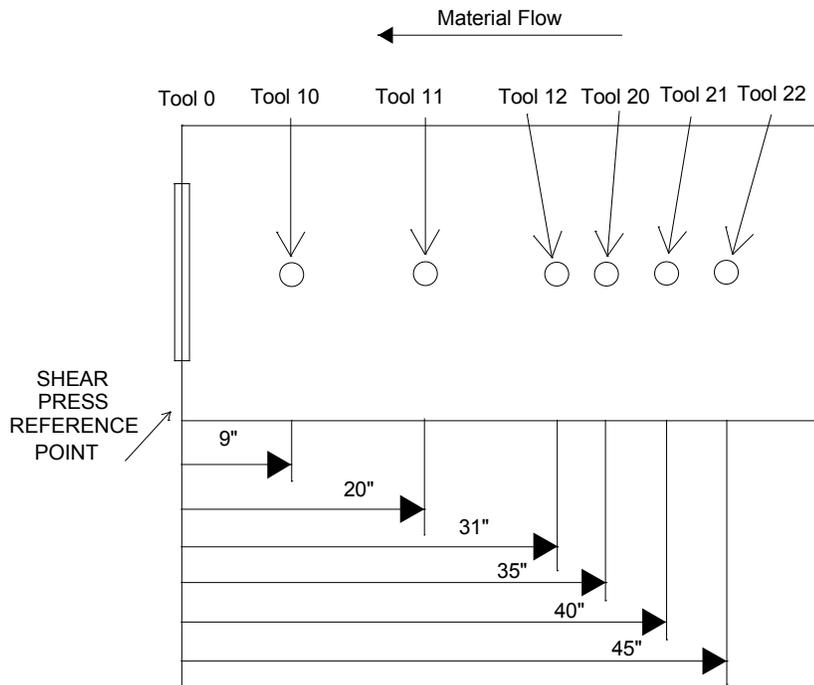


Figure 3-8. Tool Layout for Example #1

The following “Tool Data” should result

7/07/03		HALTED	0FPM		0.000"			
10:56 AM								
Model: XL212CL		Created: 7/07/0310:54 AM		Switch: 8		Version: 2.00		
Setup Menu		ID	Press	Gag	X-Offset	Y-Offset	Axis	Name
+ Machine Parameters		0	0	0	0.0000"	0.0000"	0	Shear
+ Tool Data		10	0	1	9.0000"	0.0000"	0	Tool 10
+ Trim Correction		11	0	2	20.0000"	0.0000"	0	Tool 11
+ Controller Settings		12	0	3	31.0000"	0.0000"	0	Tool 12
+ QuickSet Data		20	0	4	3.0000"	0.0000"	0	Tool 20
		21	0	0	40.0000"	0.0000"	0	Tool 21
		22	0	6	4.0000"	0.0000"	0	Tool 22

Setup F1-Next Window

Figure 3-9. Example #1 – Tool Offsets as programmed

Program macro pattern 975 for the desired pattern in Figure 3-11.

6/09/03	HALTED	0FPM			0.000"	
10:28 AM						
Program Patterns		Tool ID	Reference	Offset	Y-Reference	Y-Offset
975		10	Trailing Center	1.0000"	Center+	0.0000"
980		11	Trailing Center	3.0000"	Center+	0.0000"
985		12	Trailing Center	5.0000"	Center+	0.0000"
1						
2						
Program F1-Next Window F2-Add F3-Delete F4-Copy F5-None F6-Go to Orders						

3

Figure 3-10. Pattern 975

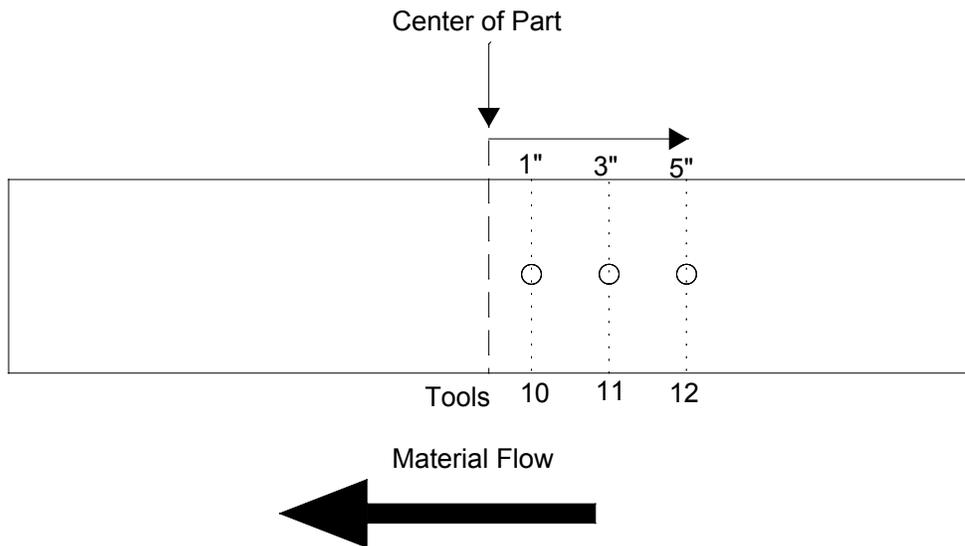


Figure 3-11. Actual Pattern 975

Part Programming

Program macro pattern 980 for the pattern desired in figure 3-13.

6/09/03	HALTED	0FPM	0.000"		
10:28 AM					
Program Patterns	Tool ID	Reference	Offset	Y-Reference	Y-Offset
975	20	Leading Center	5.0000"	Center+	0.0000"
980	21	Leading Center	0.0000"	Center+	0.0000"
985	22	Trailing Center	5.0000"	Center+	0.0000"
1					
2					

Program F1-Next Window F2-Add F3-Delete F4-Copy F5-None F6-Go to Orders

Figure 3-12. Macro Pattern 980

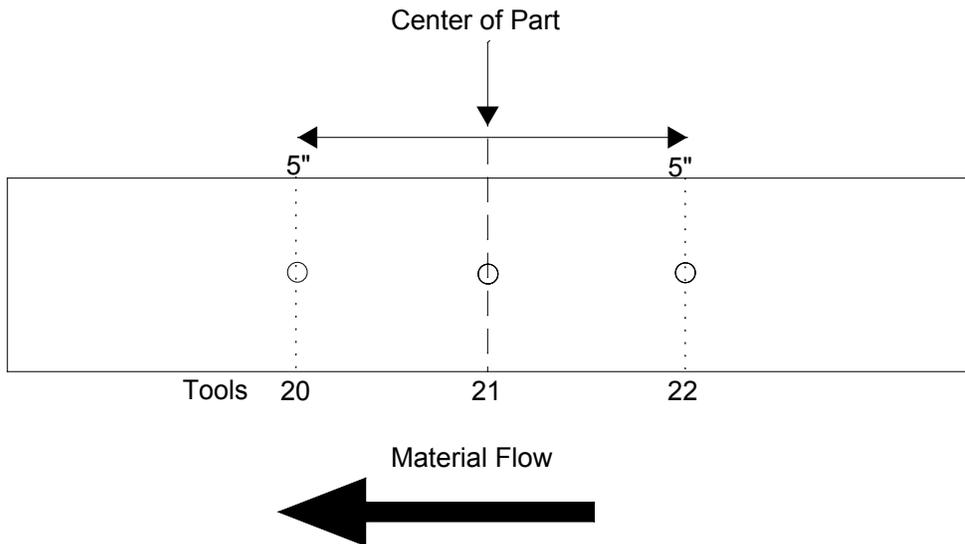


Figure 3-13. Actual Pattern 980

Program macro pattern 985 for the desired pattern in figure 3-15.

6/09/03	HALTED	0FPM	0.000"		
10:29 AM					
Program Patterns	Tool ID	Reference	Offset	Y-Reference	Y-Offset
975	12	Leading Center	12.0000"	Center+	0.0000"
980	11	Leading Center	10.0000"	Center+	0.0000"
985					
1					
2					

Program F1-Next Window F2-Add F3-Delete F4-Copy F5-None F6-Go to Orders

3

Figure 3-14. Macro Pattern 985

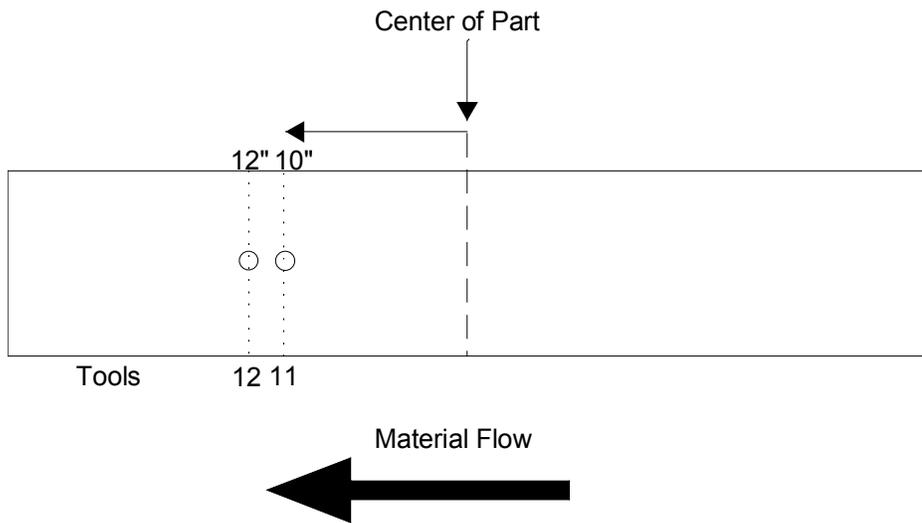


Figure 3-15. Actual Pattern 985

Part Programming

With the macro patterns programmed, they can be added to a standard program. Pattern 1 uses all three macro pattern plus two standard operations to create the part shown in figure 3-17.

6/09/03		HALTED	0FPM		0.000"	
10:31 AM						
Program Patterns		Tool ID	Reference	Offset	Y-Reference	Y-Offset
975		10	Leading Center	10.0000"	Center+	0.0000"
980		975	Leading Center	30.0000"	Center+	0.0000"
985		980	Leading Center	0.0000"	Center+	0.0000"
1		985	Trailing Edge	30.0000"	Center+	0.0000"
2		10	Trailing Edge	10.0000"	Center+	0.0000"
Program		F1-Next Window F2-Add F3-Delete F4-Copy F5-None F6-Go to Orders				

Figure 3-16. Pattern 1 with internal Macro patterns

Note: Notice that the operations using MACROS are placed as needed at the center and at 30 inches from either end of the part. The "center" reference from each macro is used as the "Handle" to reference the macro on the standard pattern.

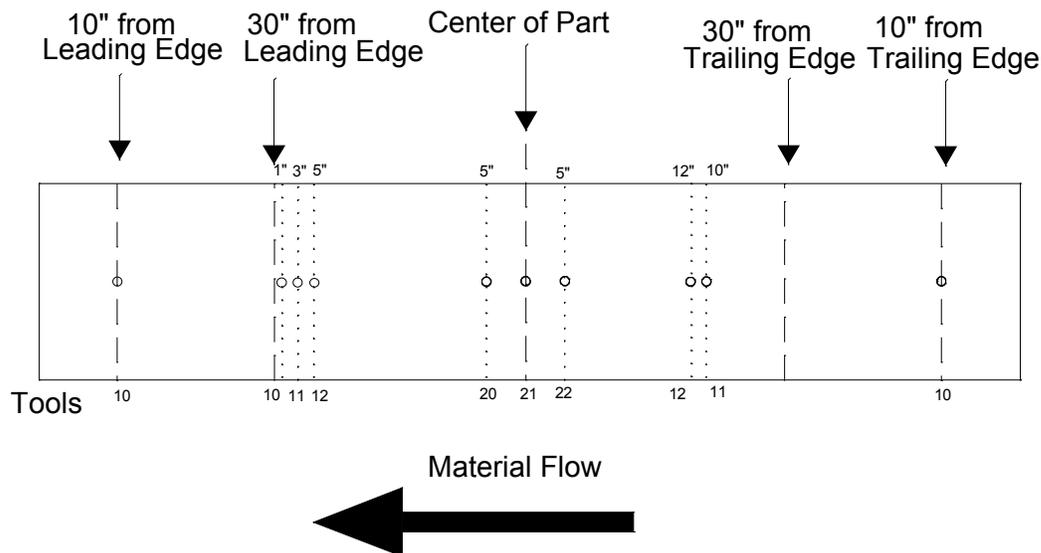


Figure 3-17. Actual Part with Pattern 1

Order Programming Overview

An order consists of an “Order Number”, “Material” and a “Product Code”. Each order contains one or more cutlist items, each consisting of a Bundle Number, a Quantity, a Part Length, Pattern Number (if configured for punching) and a Punch Option Mode. Order Numbers may be programmed and used without a material code or product code, but must be accompanied by at least 1 programmed bundle length with a quantity of no less than 1.

Programming the **XL200CL SERIES** controller is a simple matter of keying data into the blue, highlighted fields. Once an entry has begun, the letters turn red on a white background to enhance the information being entered. The ENTER key is a "take it" command from the operator to the controller. This means that the currently displayed value is stored into memory when the ENTER key is pressed. The ENTER key can also be used to move the cursor from one field to another when reviewing previously programmed data.

Note: You must use the ENTER key to enter new or edited data into memory.



Edits (or changes) are simply made by writing over the old value. Pressing the first numeric key causes the old value to be erased and the new numbers to shift in from the right. In case of a mistake during an entry, press the “CE” (Clear Entry) key to erase the entry and start over. A new correct value can then be keyed in. When the correct value is displayed, press the ENTER key save the entry and move to the next field.



The programming screen is divided into two windows. The left window is known as the “Order” window. The right window is known as the “Bundle” or “Cutlist” window. Press the “F1” key to tab from one window to the other window. Pressing the “F1” key will cause the controller to move its highlighted cursor to the opposing window. To program an Order number, the left window must have the highlight. The program a bundle or cutlist item, the right window must have the highlight.



The function of each of the “F” keys is listed at the bottom of the screen. This includes the “F2” key that is used to “Add” a new item. When the highlight is in the Orders window, pressing “F2” causes a new ORDER to be created. If the highlight is in the Bundles window, pressing “F2” causes a new BUNDLE to be created.



Creating an Order

Order Number

Enter the Programming window by pressing the PROGRAM key. Once in the “Program” screen, press “F2” to create the new order.



Once pressed, the order field will turn blue. Enter the Order Number. The Order Number can consist of up to eighteen alphanumeric characters. The order number field turns to white with red lettering once information is typed in. If a prompt is red, it requires the “Enter” key to be pressed before the information will be saved. Once the order number is typed in and the Enter key is pressed, the field turns back to a light blue.





Material Code

Next to be programmed is the Material Code, which can be up to twenty characters long, and may include numbers, letters, and some symbols. In order to program a material code, the Order number must first be highlighted and then expanded. Highlight the order and press the “Right-Arrow” key on the controller or keyboard to expand the order.



Once pressed, the order will expand to the right and downward by two layers. The first layer under the Order number is the Material Number. The second layer is the Product Code. Use the “Arrow Down” key to highlight the material field. As before, the field will be highlighted in blue. Enter the Material number then press the “Enter” key to save the information.

The Order number can be expanded or closed in order to show or hide the Material code and the product code numbers. With the Order numbers closed, more orders can be shown on the display at one time.

Product Code

Once the Material is programmed, press the “Down Arrow” key again to highlight the PRODUCT CODE field. The Product Code can be 5 characters long and can consist of numbers and letters.

After inputting the Product Code, press the “Enter” key to save the information. At this point the operator can press “F1” to tab over to the cutlist window and enter the bundle information, press “F2” to create another order, or highlight the order number and press the “Left Arrow” key to close the order back up (no longer display the material and Pcode).

If a new order is being created, “F1” will be the typical choice to tab over to the “Bundle” screen and begin programming the cutlist.



Programming Bundles (Cutlist)

Bundle Number

The first input field is for the BUNDLE NUMBER. Finished parts that are kept together or bundled as a unit should be sequenced together and have the same “Bundle Number”. The machine will automatically stop when it encounters a different bundle number depending on the “Halt Mode” parameter (if the BUNDLE HALT mode is selected). This enables the operator to take whatever action is needed to get the just-finished bundle out of the way so that the next one can be produced.

The “Halt Mode” parameter has four settings that determine when the controller will be allowed to halt throughout the cutlist, therefore improving productivity. Details are found in Chapter 2.

Note: When a lift number of 0 or any numbers in the range, 900-999 is used, the controller will count all parts produced as scrap. This block of numbers is used with the Eclipse program to produce reports for scrap accountability.

While programming the cutlist, the previously used “Bundle Number” is automatically repeated when entering subsequent cutlist items. If the Bundle Number needs to be different, the existing number can be over written.

Quantity (QTY)

After the Bundle Number is entered, the QUANTITY field will be highlighted. Enter here the number of pieces needed of a given length. The specific quantity can be set from 1 to 9998 pieces.

If 9999 parts are programmed, the controller will assume a bin is simply being filled and no parts will be decremented. This allows a given length to be run without limit.

Length

After the Quantity is programmed and entered, the LENGTH field will be highlighted. Length designates the finished length of the part to be produced, regardless of any patterns assigned to it. Do not count the shear kerf when programming the length, the controller will automatically add in this amount, if any. The “Kerf” is programmed in the “Machine Layout” parameter list. This is detailed in Chapter 2.

Punch Pattern

The PATTERN number designates the pattern used for this cutlist item. Pattern “0” is recognized as a SHEAR ONLY part.

Pattern numbers 1 thru 999 will reference an already-programmed punch patterns. Macro patterns (975 – 999) will apply the operations within that pattern a part or to a standard pattern. Any patten listed in this field must also be entered into the “Patterns Table” before the bundle is run.

Option

The OPTION field specifies different punching modes that can be used on a particular bundle. This is designed to make the creation of parts extremely flexible. The four options are shown in Figure 3-18.

➤ **Rgt (RIGHT)**

A standard part is produced as programmed. I.e: Punch patterns that have been referenced to the leading edge of the material are punched accordingly.

➤ **Lft (LEFT)**

The part is produced with the pattern reversed. I.e: Punch patterns that have been referenced to the leading edge are now referenced to the trailing edge.

➤ **Alt (ALTERNATE RIGHT-LEFT)**

Two parts are produced for each quantity, a RIGHT and a LEFT. This pair is only counted as single quantity part. If a quantity of 25 is requested, 25 left hand parts and 25 right hand parts will be produced in pairs for a total of 50 parts.

➤ **Mir (MIRRORED)**

The part pattern for the leading edge (Leading edge to center of part) is mirrored onto the trailing edge. Symmetrical parts are produced. Punch operations beyond the center of the part will not be mirrored.

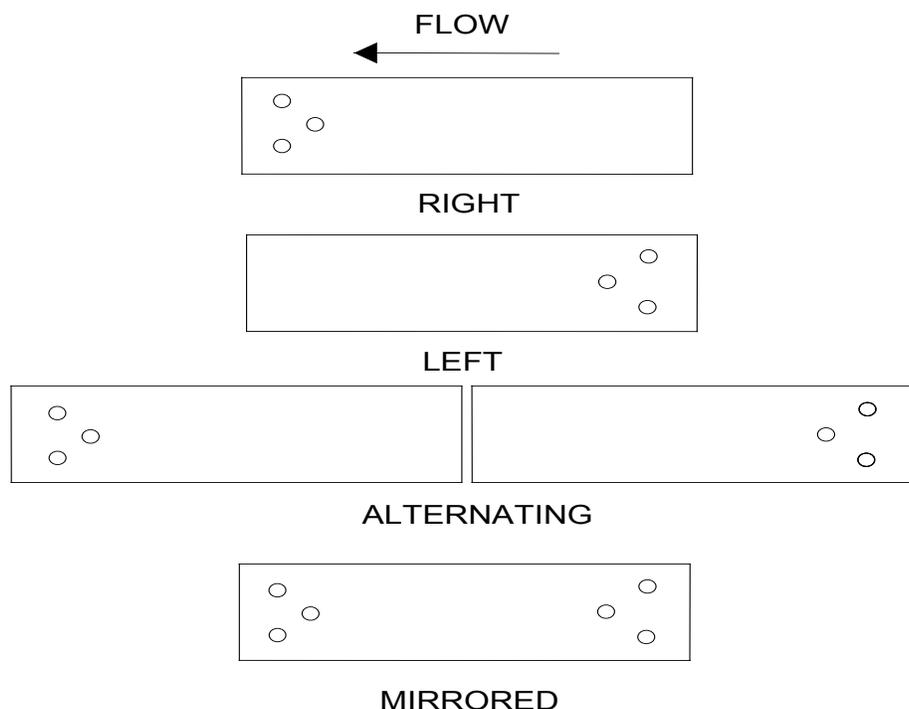


Figure 3-22 Examples of Options

Copying Orders

The XL200CL controller also has a feature that will allow the operator to copy an existing order and rename it as a new order.

Highlight the desired order to be copied. Press the “F4” key to create a copied order. A new order containing the same name will be created directly below the original order. The order name can then be overwritten. The copy will have an identical cutlist and can be used as-is or can be modified.

A blue rounded rectangular button with the text "F4" in white, representing the F4 function key.

Exiting the Program Mode

A red rounded rectangular button with the text "Status" in white, representing the Status function key.

Once the orders and bundle cut lists have been created, simply press the “Status” key to exit the programming screens (Which saves all edits) and open the “Status” window.

Operation

4

Referencing Controller to the Material

The **XL200CL SERIES** controller measures relative movement of the material through the machine. A controller has no way of measuring the absolute amount of material that is past the shear without a reference point. In order to cut accurate lengths, the controller must know how much material is past the shear at some point in time, enabling it to make relative measurements thereafter. This is a process called referencing.

“Referencing” provides the controller a known point to measure from and is simply done by loading material into the machine past the shear point and initiating the MANUAL SHEAR input. At the bottom of the shear stroke the part is cut at a known point and the length counter is set to zero; the controller is considered “referenced”.

Firing the Shear will clear all targets (the Queue) on cut-only parts. On punched parts, a single shear will cut the material, but will not clear the queue. Firing the shear twice will clear targets on a punched part.

If the controller is configured for punching and there are FILLED parts, the shear must be cycled twice in order to reference the AMS controller. The controller will remain referenced as long as the encoder stays in contact with the material and the material does not move while the controller is turned off.

Die-accelerators will move the position the die at the “Shear Die Distance” before firing the press. The material must be loaded past this point to create an effective reference.

Manual Shear

On closed-loop feeders, the MANUAL SHEAR input is active only when the machine is halted. Most accelerated dies have the capability to shear on the fly. The MANUAL SHEAR may or may not be active in the RUN mode depending upon the switch configuration.

➤ Shear Only

If shear-only parts are being produced and a MANUAL SHEAR input is given, the part will be cut and the controller's counter will be reset. Production will resume from where it left off.

➤ Punched Parts

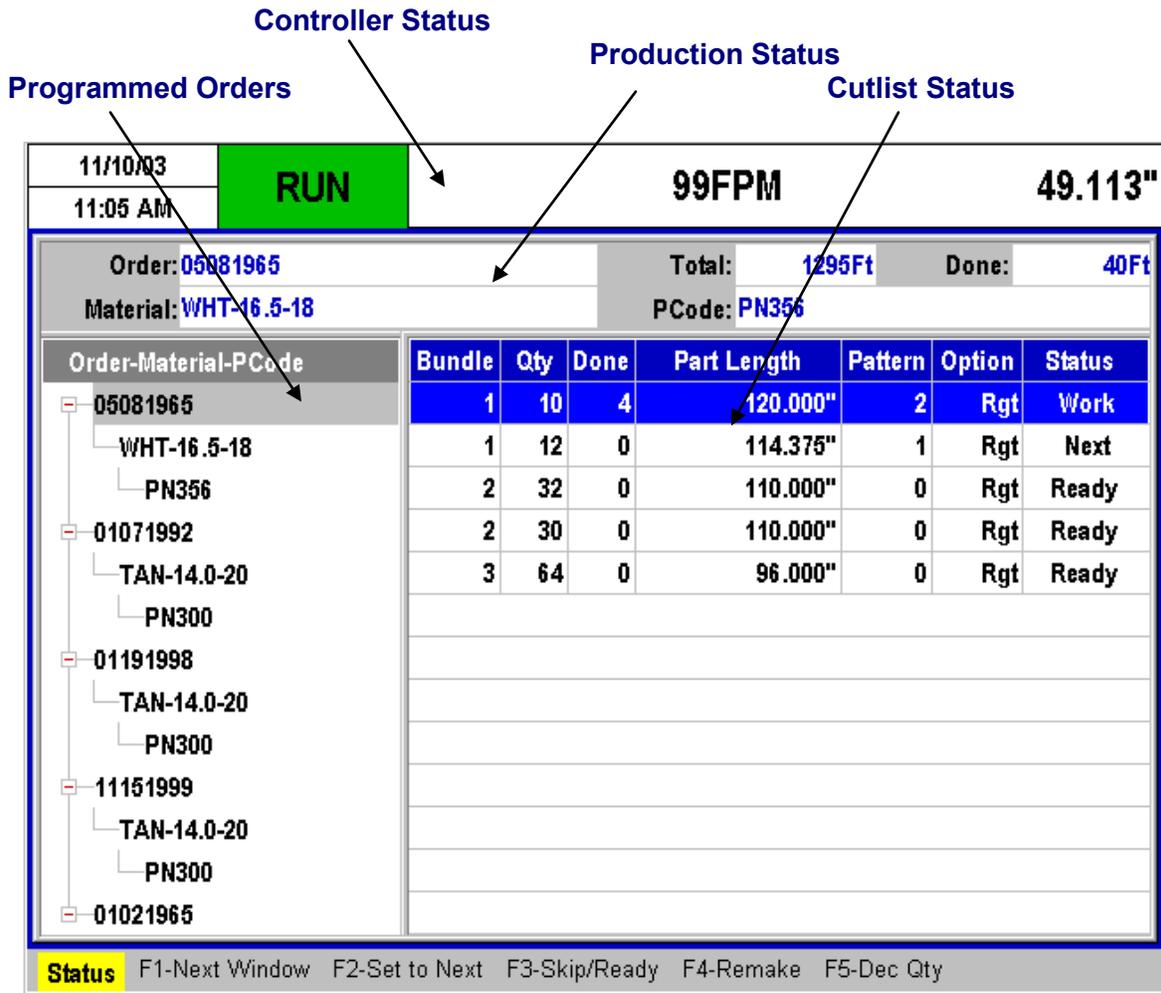
If production has started and the material has to be cut, perhaps to clear a jam up, no other effect occurs except to destroy the current piece being produced. However, if the MANUAL SHEAR is cycled a second time before the line is placed back into the run mode, all pending operations will be canceled. In other words, all punch operations that have already been performed but not cut off will be ignored. This double shear operation should be done each time a new coil is loaded so that operations pending before the coil ran out will not occur.

Any part with a part-printed message is also considered a "Punched Part" and will have a pattern associated with it including cut only parts. This is due to the fact that a print message is treated like a press output and can be targeted in the same manner as any other press, including even spaced print messages.

Running the Machine

Main Status Display

When the **XL200CL SERIES** controller is in the Status mode the display is separated into four main windows of information.



4

Figure 4-1. XL200CL Series status display

Controller Status Window

The top section of the **XL200CL SERIES** controller's display is called the "Status Window" and always shows the current status, regardless of the controller's current programming mode.

6/10/03	HALTED	0FPM	0.000"
3:05 PM			

The "Status Window" consists of the current time of day, date, line speed, amount of uncut material past the shear, and the controllers current operating status. This critical information is shown at this location at all times.

Production Status Window

The "Order Status" window is just under the controller status window and contains information regarding the current order being ran. Information such as the Order Number, Material, Product Code, Total Footage, and Footage Completed are displayed here. The "Status" screen is the one display where all this information is in one place.

Order: 07-0923F5	Total: 1296 Ft	Done: 0Ft
Material: WHT-16.5-18	PCode: PN356	

Orders Window

All programmed orders are listed in this window. With the order expanded, the material code and product code for each order is also displayed.



Highlight the desired order and press the "Right Arrow" key to expand an order. Upon pressing the key, the material and product code will be displayed in step down fashion from the order with the material being the first step and the product code being the second.

Order-Material-PCode	
<input type="checkbox"/> 07-0923F5	
└─ WHT-16.5-18	
└─ PN356	
<input type="checkbox"/> 07-0923G6	
└─ WHT-16.5-18	
└─ PN356	
<input type="checkbox"/> 08-09908H1	
└─ BRN-16.5-18	
└─ PN356	
<input type="checkbox"/> 10-0983W3	
└─ GLV-11.5-10	
└─ PZ208	

Bundle (Cutlist) Status Window

The “Cutlist” status window displays the individual Bundles as they are being run. Included in this display is all information relating to each bundle including the Bundle Number, Quantity Programmed, Quantity Remaining, Length, Pattern Number, Punching Options, and Bundle Status.

Bundle	Qty	Done	Part Length	Pattern	Option	Status
1	10	0	120.000"	2	Rgt	Next
1	12	0	114.375"	1	Rgt	Ready
2	32	0	110.500"	0	Rgt	Ready
2	30	0	110.000"	0	Rgt	Ready
3	64	0	96.000"	0	Rgt	Ready

4

Figure 4-2. Bundle (Cutlist) Status Screen

Each individual Bundle can be observed as the machine is in operation. A table of the possible Bundle Statuses is shown below.

Status Screen	Status
Work	The item currently being cut
Fill	Item is queued (targeted) but not yet being cut
Next	Next item to run
Ready	This item is ready to run
Skip	This item will not be run until set back to “ready”
Done	This item is done

Order Sequencing

Setting an Order to be Next

To set the Next Order or Item to run, press the STATUS key to enter the Status Display Window. If the Orders window does not currently have the highlight cursor in it, press the “F1” key to tab the cursor from the Bundle Window to the Orders Window.



Use the green “Up” and “Down” arrow keys to highlight an Order that has bundles with a status of READY or SKIP. When the desired order is highlighted (a light blue highlight), press the “F2” key (Next Line) to cause the status of this Item to change to NEXT. This can be done **ONLY** while the machine is halted.



If a bundle item with a punch pattern has been partially completed when another Order (Item) is set to NEXT; two changes of status will occur. The new bundle item will obtain a status of “NEXT” while the partially completed Item will obtain a status of “FILL”. A status of FILL means that the next two or three parts have already been targeted in memory (also known as the Queue). See Figure 4-3.

Bundle	Qty	Done	Part Length	Pattern	Option	Status
1	2	0	120.000"	2	Rgt	Fill
1	1	0	114.375"	1	Rgt	Fill
2	5	0	110.500"	0	Rgt	Next
2	7	0	110.000"	0	Rgt	Ready
3	64	0	96.000"	0	Rgt	Ready

Figure 4-3. Bundles with Status of “FILL”

The **XL200CL SERIES** controller will make these targeted pieces with a status of “FILL” immediately after the RUN input is closed regardless of which line is set to NEXT. The machine will then halt (depending upon the halt mode), and the new order with the status of “Next” will be ready for production.

The XL200CL Series Controller sets cutoff and punching targets up in advance in order to stay accurate. Targets are typically set for the next two to three pieces to be made. These targets are called the “Queue” and have a status of “FILL”.

If the operator desires to halt the current Item that is running and immediately begin making parts from a different Order (Item), these steps must be followed to avoid running items that are already loaded into the “queue”.

- Halt the machine.
- Manually cycle the shear (**Once** for shear only parts / **Twice** for punched parts) to clear the queue (eliminate the parts that have already been targeted).
- Highlight the desired order and set it to “Next” by pressing the “F2” key.
- Initiate the Run input to continue production using the new order.

(Doing this may cause one or more scrap pieces to be generated.)

Skipping an Order or an Item

To temporarily skip an entire order or to skip an individual Bundle item, press the “Status” key to enter the Status Display Window. If the Programmed Orders screen does not currently have the highlight cursor in it, press “F1” to tab the cursor from the Bundle Window to the Programmed Orders Window.

Status

F1

Use the green “Up” and “Down” arrow keys to highlight an Order that has bundles with a status of READY.



When the desired order is highlighted, press the “F3” key (Skip/Ready) to cause the status of this Item to Toggle between “Skip” and “Ready”. This can be done **ONLY** while the machine is halted.

F3

11/10/03	RUN	99FPM	8.566"				
11:12 AM							
Order: 05081965		Total: 1295Ft	Done: 100Ft				
Material: WHT-16.5-18		PCode: PN356					
Order-Material-PCode	Bundle	Qty	Done	Part Length	Pattern	Option	Status
05081965	1	10	10	120.000"	2	Rgt	Done
WHT-16.5-18	1	12	0	114.375"	1	Rgt	Skip
PN356	2	32	0	110.000"	0	Rgt	Skip
01071992	2	30	0	110.000"	0	Rgt	Skip
TAN-14.0-20	3	64	0	96.000"	0	Rgt	Work
PN300							
01191998							
TAN-14.0-20							
PN300							
11151999							
TAN-14.0-20							
PN300							
01021965							
Status F1-Next Window F2-Set to Next F3-Skip/Ready F4-Remake F5-Dec Qty							

Figure 4-7. Status Display showing a variety of Bundle Statuses

Orders or Bundles that have been skipped are still available to be run and produced, simply follow the exact same instructions to set them back to “Ready”. The “F3” key will toggle between the two choices

Deleting an Order

Orders can only be manually deleted while in the Programming screen. This is to avoid the accidental deletion of information while in the status screen.

To delete an order or a bundle item, press the Program key. Use the “F1” key to tab between the “Orders” window on the left and the “Cutlist” window on the right. Highlight the item that requires deletion. Once selected, press the “F3” key to delete the highlighted item.



F3

To delete an Order (Item) that has been partially run, these steps must be followed:

- Halt the machine.
- Manually cycle the shear (**Once** for shear only parts / **Twice** for punched parts) to clear the queue (eliminate parts that have already been targeted).
- Highlight the next order (Bundle) to be produced and press the “F2” key to set it to “Next”.
- Delete the partially run Order (Item) as above.

4

Re-sequencing Orders and Bundles

Orders and Items will be run in the sequence in which they appear on the AMS controller screen (Top to bottom). To modify the sequence, press the PROGRAM key to enter the PROGRAM mode. Highlight the line containing the order or item to be moved, then press the green “**Move Up**” or “**Move Down**” keys as many times as needed to move the selected line to the desired position. This can be done only while the line is halted and the controller is in the PROGRAM mode.



This operation will move information in both the “Orders Window” and the “items window”. Refer to the example below. The operator desires his longest part to be first and wishes to move the longest item to the top of the cutlist. He highlights the desired bundle.

Bundle	Qty	Done	Part Length	Pattern	Option	Status
1	20	0	96.000"	0	Rgt	Ready
2	30	0	84.000"	1	Rgt	Ready
3	40	0	108.000"	2	Lft	Ready

Figure 4-5. Highlighting the item to be moved

He then press the “MOVE UP” button twice, taking the highlighted item to the top of the cutlist. All other bundles remain in their location unless individually moved.

Bundle	Qty	Done	Part Length	Pattern	Option	Status
3	40	0	108.000"	2	Lft	Ready
1	20	0	96.000"	0	Rgt	Ready
2	30	0	84.000"	1	Rgt	Ready

Figure 4-6. Press “Move Up” until item is in correct location

Starting the Machine

After a Bundle item is set to “NEXT”, the machine may be placed in the RUN mode by closing the RUN input. The **XL200CL SERIES** controller will turn on its motions outputs and begin shearing parts at the programmed length as the material passes through the die. As each shear operation occurs, the quantity completed will increment for the item.

When the quantity completed reaches the programmed total, the controller will automatically halt or continue running the next sequential line without halting. What happens at the end of each bundle item depends on how the Machine Data parameter ‘HALT MODE’ is set. See Chapter 2 of this manual for the ‘HALT MODE’ settings.

Halting Production

The movement outputs will be turned off immediately but the XL200CL SERIES controller will remain in the RUN mode until the material has stopped or until 5 seconds has past. Because of this, the material feeding device should be connected to the FAST output, not the RUN output.

At any time, the operator can halt the line by opening the Run contact. Depending on how the controller is installed, this may take the form of pressing a HALT button located on the machine. This allows for an automatic cut to be made as the material decelerates. The controller will remain in the RUN mode until the material has stopped or 5 seconds have elapsed. Normally, the operator would halt the machine just after a shear is made and a cut would not occur during deceleration. If the RUN contact is opened while a press is operating, the movement outputs will remain ON until the press has completed its cycle (SHEAR or PRESS DWELL time).

4

Completed Orders (Items)

When an Order (Item) has been completed it will take on a status of DONE and remain on the main Status Display of the AMS controller for recording purposes. When the completed Order (Item) information is no longer needed it may be cleared from the display by entering the “Program” window and simply highlighting the Order or Bundle item and pressing the “F3” key (Delete). If DONE Orders (Items) are not cleared within the number of days specified for “Auto-Delete Done Orders” in Machine Parameters, they will be automatically erased during the POWER UP TEST or by running the MEMORY TEST.

Length 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 XL200CL SERIES controller’s “Trim Correction” feature automatically computes a new Correction Factor, which is used in the controller’s length calculations to adjust for errors in the size of the measuring wheel. The controller remembers the length as measured by the controller and prompts the user to enter the actual measured length. The controller then calculates and displays a new Correction Factor and asks the user if he/she would like to update the current value with the new value. Trim Correction should be used any time part lengths are incorrect but in a consistent manner. (i.e. all parts 3/16” long, etc.)

The XL200CL 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”.

6/10/03	HALTED	0FPM	0.000"
3:35 PM			
Model: XL212AABEMPE Created: 6/10/03 2:55 PM Switch: 4 Version: 2.00			
Setup Menu	ID	Name	Value
+ Machine Parameters	775	Last Programmed Length	120.000"
Tool Data	776	Last Measured Length	120.125"
Multi-Axis Data	777	Correction Factor	100.000%
Trim Correction			
+ Controller Settings			
+ Auxiliary Controllers			
- Printer Configuration			
Bundle Tag Printer			
Part Printer			
QuickSet Data			
SetUp	F1-Next Window		

Figure 4-7. Trim Correction Window

The “Last Programmed Length” parameter will display the length of the last part made, assuming that this will be the length that is being corrected for. The Length displayed here can be edited to a different number and the correction will be adjusted according to the new number.

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

Once the length is Input, press the “Enter” button. Upon doing so, a popup window will be displayed and prompt the user to accept the new correction factor by selecting the “Yes” command button. Selecting the “No” command button will cancel the correction.

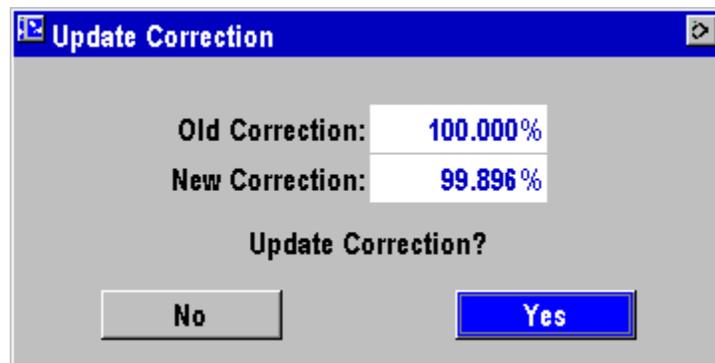


Figure 4-8. Update Correction Popup Window

4

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

- Run ten parts of equal lengths, 120" for example.
- Measure the ten parts.
- 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).
- Use the following formula for the new CORRECTION FACTOR, using the average of the ten parts for "actual measured length."

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

CF = Correction Factor

Handling Material Flaws

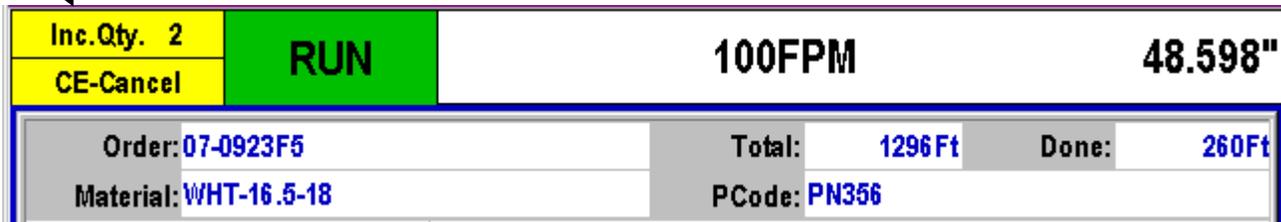
With most roll formers and cut-to-length machines, material problems are common. The **XL200CL SERIES** controller has features that aid the operator when these flaws occur.

The best method of handling material flaws depends on when the flaws are detected and the duration of the flaw. If random small flaws occur, they are not likely to be detected until after the controller has cut the part. In this case, the only thing that the operator can do is make another part to replace it. This is easily done with the INCREASE QUANTITY key.

Increase Quantity

Inc. Qty Pressing the INCREASE QUANTITY key will cause the fourth line of the Status Display to flash "Inc. Qty. 1". It will continue to flash until a shear is fired. The current part will be completed with no decrease in quantity, and the controller will continue running the item with no interruption.

If the "Inc Qty" key is pressed multiple times, the numbers of additional parts are increased accordingly. If pressed 2 times, the controller will display "Inc. Qty. 2" and reduce the displayed number by one after each shear operation until the number reaches "0" and the display is cleared.



The screenshot shows a control panel with a yellow 'Inc. Qty. 2' button and a green 'RUN' button. The status display shows '100FPM' and '48.598"'. Below this, a table displays production statistics: Order: 07-0923F5, Total: 1296 Ft, Done: 260 Ft, Material: WHT-16.5-18, and PCode: PN356.

Inc. Qty. 2	RUN	100FPM	48.598"
CE-Cancel			
Order: 07-0923F5	Total: 1296 Ft	Done: 260 Ft	
Material: WHT-16.5-18	PCode: PN356		

Figure 4-9. Incremented quantity displayed in controller status window

If a small flaw is detected before the shear, the operator may wish to crop the flaw out to minimize the amount of scrap material. On die-accelerator machines, the MANUAL SHEAR input is active while the machine is running. The crop starts the production of the part over again and the operator can repeat this process until good material occurs. A MANUAL SHEAR in the Run Mode will not produce a part smaller than the "Minimum Part Length" parameter setting. The **XL200CL SERIES** controller will delay the cut until this amount of material has past. In the case of feed-to-stop machines, the machine must be halted before the MANUAL SHEAR input is active. The operator would most likely jog the material forward until the flaw is past the shear and then close the MANUAL SHEAR input a second time.

All manual shears that are performed will count the amount of material that is past the shear as scrap, and will automatically adjust the scrap total in the Coil Footage Totalizer.

There are times when material flaws can be extensive and last for a large portion of a coil. A user may find that this material is easier to handle if it is cut into short lengths rather than relying on the operator to crop repeatedly. There may also be secondary outlets for such material if they can be cut to standard lengths of perhaps 8, 10, and 12 feet. If this is the case, jobs for this purpose can be programmed at lift number 0 or between 900 and 999 beforehand, and the operator can switch production to these jobs when extensive flaws occur.

Any parts made from jobs that have Lift Numbers 0 or are between 900 and 999 will be recorded as scrap material in the "Footage Totalizer". Scrap numbers consist of a two-digit number. For instance, scrap code #02 is for bad paint, scrap reason #08 is for bent edges.

Programming a lift of 9 + the desired scrap code provides an easy means for programming lifts to compensate for large quantities of material that were scrapped. If programmed this way, then bundle #902 = bad paint; 908 = bent edge, etc.). If **Eclipse** is installed, these scrap codes can be sent to the Eclipse PC and allow for the detailed tracking of the different types of scrap encountered on the machine. Eclipse simply removes the "9" from the bundle number and reads the remaining scrap code from the bundle number.

If it is discovered that completed items that were counted as "good" parts are later determined to be scrap, the controller will compensate for this by allowing Done items to be incremented. When the INCREASE QUANTITY is used on a "Done" item the controller will prompt the operator requesting the number of pieces to increment and the coil to which the action applies.

When performing a normal INCREASE QUANTITY it is important to highlight the current item that is running before pressing the INCREASE QUANTITY key, otherwise you may increase an item that you do not wish to increase. If the highlighted line is on an item that is not done, the current running item will be incremented. If, however, the highlighted line is on a DONE item, the total for the item that is DONE will be increased.

Remake Feature (F4)

If it is discovered that completed items that were counted as “good” parts are later determined to be scrap, the controller can compensate for this by allowing done orders or bundles to be “remade”, either partially or completely.

Press the “Remake” (F4) key to remake part or all of a selected bundle. If the remake feature is used on a bundle item, a popup window will be displayed asking for how many parts are to be remade (Figure 4-10). If the “Use scrap Codes” parameter is turned on, the popup window will also request a scrap reason (Figure 4-11).



Figure 4-10. Remake Popup Window (not using scrap codes)

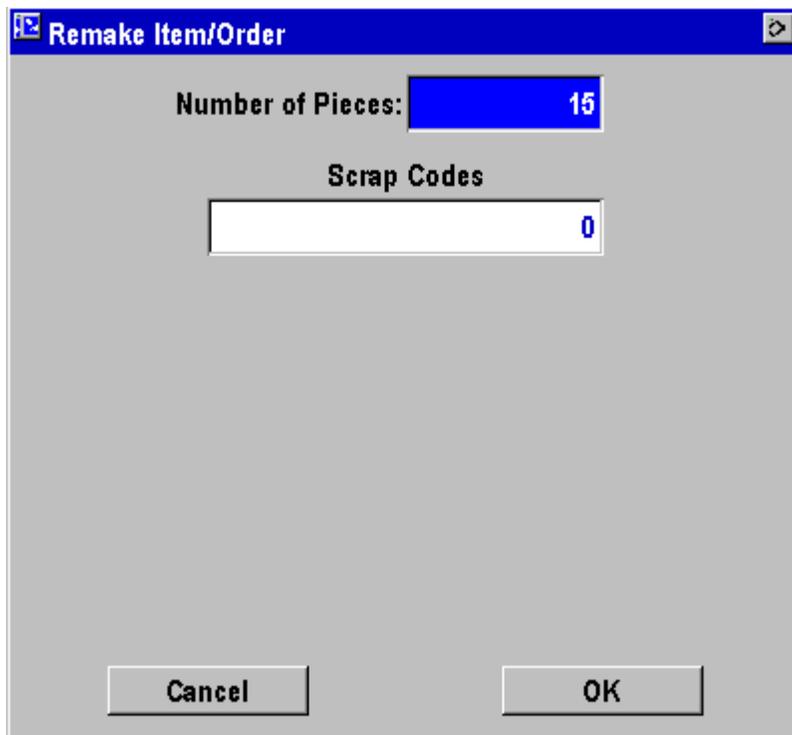


Figure 4-11. Remake Popup Window (Using Scrap Codes)

Only quantities equal to or less than what was actually produced can be remade. If an order is highlighted and the “Remake” feature is used, all bundles within the order will be set to as status of “Ready” with no parts produced.

The remake feature is available on the “Status Screen” and on the “Program” screen. If used in the program screen, the “Remake” command shares the “F4” function key with the “Copy” command. If the highlighted order or item is partially done when “F4” is pressed, the controller considers the action as a request to remake. If the order or bundle has not had any parts produced from it when the “F4” key is pressed, the controller will consider it a request to “Copy”.

When performing a “Remake” command, it is important to highlight the correct item, otherwise you may increase an item that you do not wish to increase.

Decrease Quantity

“Decrement Quantity” is used when it is necessary to decrease the quantity of a bundle item. A common use of this function is to adjust for previously produced scrap that has been altered so that it is no longer considered to be scrap. Using the “Decrement Quantity” at this point can adjust what needs to be produced after the “once scrap” parts are now made usable again. This is common occurrence when the end of a coil is manually cut. Scrap is registered when the coil comes off of the sheet detect switch, but manual cuts at manually positioned targets make the “scrap” parts good again. These are added to the bundle and a decrement value equal to the number of “good” manual cuts balances the quantity produced.

Scrap may have occurred after manual shear cycle, Increment Quantity, or from a lift that is dedicated to scrap (900 plus bundles). When the line is halted, press the “Status” key then press the “F5” key to increase the number DONE on the STATUS screen. Decrementing can only be performed from the “Status” window while the line is halted.



If the “Decrement Quantity” is initiated while the machine is halted, a popup window will prompt the operator for the “Number of Pieces” to be decremented. If the number to be decremented is one, then just select the “OK” command button. If the number to be decremented is another number, enter that number then select the “OK” command button.

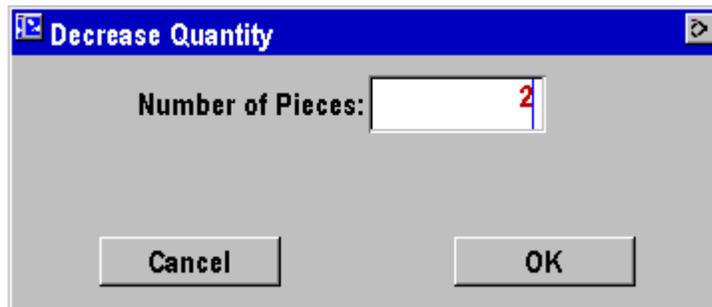


Figure 4-11. Decrease Quantity Popup Screen

If the “Decrement Quantity” is initiated while the machine is running, an error will be posted that the machine must first be halted.

If there are parts already in the controller’s queue, they will not be decremented. To decrement parts that are in the queue, first double cycle the shear or press to clear the queue, then initiate the “Decrement Quantity” and enter the number to be decremented.

Requesting Orders (When using Eclipse Only)

When Eclipse is used to download orders to the **XL200CL SERIES** controller, the operator may not have to perform any order entry at all. However, an operator can request specific orders or request orders that contain a specific material, product code, or both. This gives the operator the flexibility to run orders similar to what he is already setup to produce. For instance, an operator already has tooling set for a particular product but has run out of orders for it. The operator can then send a “Request” for any allowable orders that exist in the Eclipse database that contain the same product code.

To request an order, press the “Program” key and verify that the “Order” window is currently highlighted. If it is not, press the “F1” key to tab the highlight from the cutlist to the order menu. Press the “F2” key to add a new order. Upon doing so, the controller will prompt the user to program the new order manually or to request it from the office computer.

Program

F2

4



Figure 4-12. Program Orders Popup Window

Select “Yes” and press the “Enter” key to display the request screen. If a particular order number, material, or product code is desired, enter the appropriate information into the respective fields. These can also be requested in combinations of two or all three fields. If no particular order is desired, leave the spaces blank and Eclipse will download the next available job. Once the desired order information is input, highlight the “Request the Specified Job” button and press “Enter”. The order will be downloaded within a few seconds.

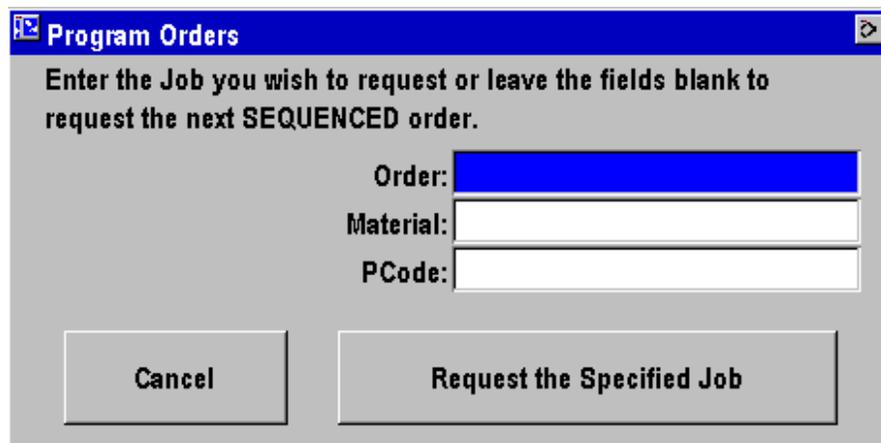


Figure 4-13. Request Order Information Popup Window

Changing Coils

Unloading Coils

The following procedure should be used when changing coils to ensure proper accounting of the material used on a coil and an accurate first part after the new coil is loaded:

A coil material will eventually be completely consumed or will have to be cut free of the stock reel in order to load a different material. At these points, the material is automatically run as far as the machine can do so. At this point the operator must manually feed the material through the shear in the forward direction, make manual cuts to create good parts when possible, then dispose of any remaining scrap.

If good parts are made by manually positioning the material and manually firing the shear, then as many parts must also be “Decrement” from the current bundle item. This must be done before loading the new coil in order to automatically correct the scrap amount versus good footage for the previously used coil.

The “Sheet Detect” input of the XL200CL Series Controller monitors when the material has run out. Once the switch no longer senses the material, the XL200CL will immediately halt the line and display a warning message on the screen that a new coil must be loaded. The “Sheet Detect” switch is to be mounted next to the material encoder. This enables the controller to determine how much material is left in the machine by using the “Shear to Encoder” distance parameter in the machine data parameters. With this information, the measured amount of scrap material is accurate to a fraction of an inch. The “Shear to Encoder” distance is the measured distance between the cutoff press and the encoder/sheet detect switch combination.

Example

The “Shear to Encoder” distance is 80 inches. The material drops off of the sheet-detect switch as 40 inches of uncut material is past the press. By simple addition, the controller reports that 120 inches (80 inches before the press and 40 inches after the press) of material is left in the machine and is now registered as scrap.

In addition, the material position display will be reset to (–) 80.000 inches and will not count until material is detected again. As the new coil is loaded, the detect switch will again sense its presence and allow the controller to start counting from minus 80 inches. By the time the material gets to the shear blade, the display shows approximately 0.000 inches. The material has been perfectly accounted for both in unloading and in loading.

Here is the correct sequence of operation for a majority of lines:

1. **Machine runs out of material or reaches coil end point. The remainder of material is registered as scrap unless manually adjusted.**
2. **If possible, manually position material to make good parts, manually shearing them and adding them to the existing bundle.**
3. **Decrement an equal number of parts that were just manually made to account for good footage created from scrap.**
4. **Load new coil.**

Cut-to-length machines with no roll former or post-rollformers can often rewind leftover material back onto the mandrel for later use. In this case, back the material out through the entrance end of the shear until it is out from under the encoder.

4

To register scrap and good footage properly when changing a coil, follow this exact pattern every time:

1. **Machine runs out of material or reaches coil end point. The remainder of material is registered as scrap unless manually adjusted.**
2. **If possible, manually position material to make good parts, manually shearing them and adding them to the existing bundle.**
3. **Decrement an equal number of parts that were just manually made to account for good footage created from scrap.**
4. **Load new coil.**

If a sheet detect switch is used, a “Change Coil” window will automatically prompt the operator for the new coil number as the new coil is loaded past the sheet detect switch. Jog the material past the shear die.

1. The operator must first select whether the previous coil was “Completely Consumed” or if it was “Returned to Inventory” for later use.

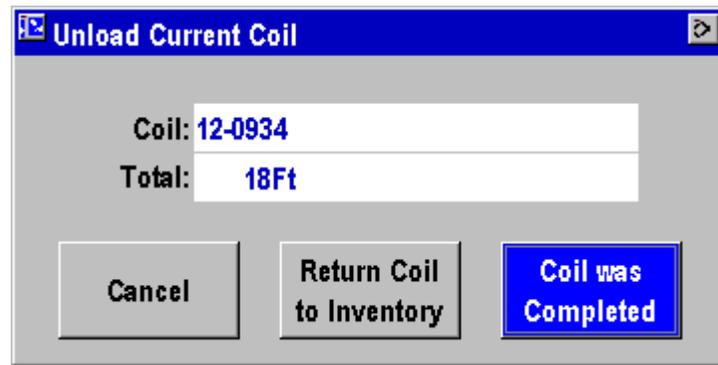


Figure 4-16. “Unload Coil” Popup

2. The new coil number is to be input.

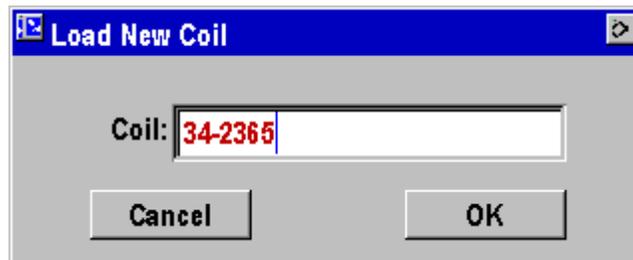


Figure 4-17. “Load Coil” Popup

3. Initiate the Manual Shear input to cut the leading edge of the material and reference the new coil.

When No Good Footage is Run for a Coil

The material from the current order will be assigned to a coil after it is initially loaded into the controller. If after a coil is loaded and no acceptable parts are ran for that coil, the material for the order that is assigned a status of “NEXT” will be assigned to that coil. If the operator changes the priority of the orders and designates a different order to be NEXT, this order’s material will now be assigned to the coil as long as no good parts are run. The operator will not receive a warning in this case.

If good parts are run from a coil and a different order containing a different material is assigned to be “NEXT” the operator will receive a warning that the “wrong coil is loaded.”

Special Procedures

When used in conjunction with the Eclipse production management software, the XL200CL Series controller becomes an input device for production tracking. This includes the addition of several operator prompts and drop-down lists for feedback. Among these listed codes are “Scrap Codes”, “Delay Reasons”, and “Employee Numbers”. Explanations for these codes follow.

Scrap Code

The “Scrap Code” production listing defines what type of scrap is being produced in a particular instance and reports the reason to the Eclipse program. Scrap codes are enabled at the controller by opening the “Setup” Window and selecting “Controller Settings”. A parameter setting called “Use Scrap Codes” is located in the parameter window on the right. When set to yes, the user will be prompted for a “Scrap Code” whenever scrap is incurred.

Scrap codes can be assigned a number between 0 and 99 at the controller. These Individual scrap codes can be assigned a name via the **Eclipse** program. Eclipse can then download a scrap list that the user can select from when scrap occurs rather than inputting a memorized or recorded number.

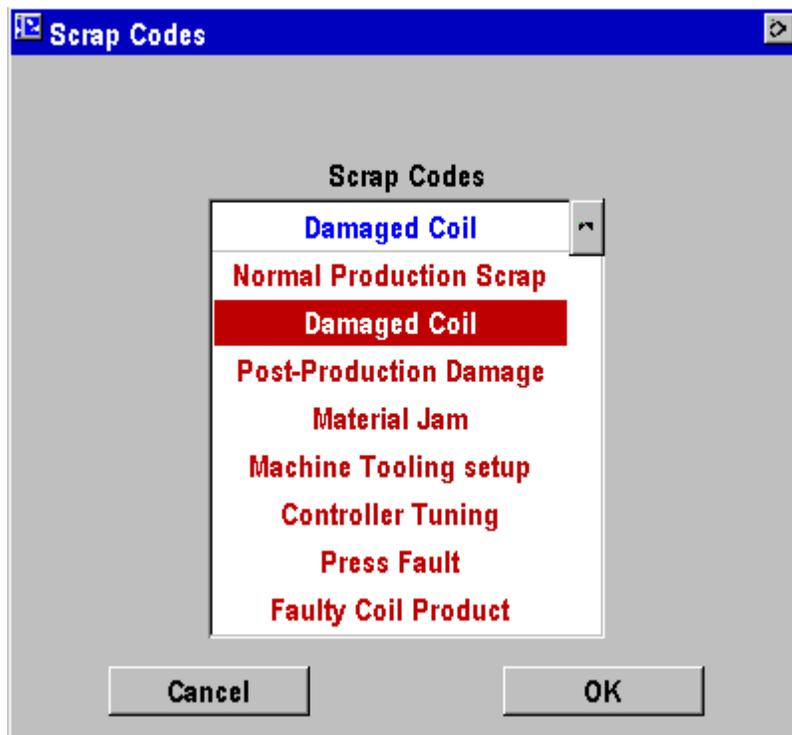


Figure 4-18. Scrap drop-down list

Scrap is “produced” during different controller events:

- When “Increment Quantity” is selected
- If a manual cut is made.
- When a bundle item is programmed with a bundle number of 900 or higher. When bundle numbers 900 and up are used, the last two digits of the bundle number is considered the “scrap code”. For instance, Bundle # 900 would be considered scrap reason “00”, therefore is general production scrap. Bundle #908 would be considered scrap reason “08”, and will be associated to the scrap reason defined for reason number 8 in the Eclipse program.
- When the “Remake” feature is used to add quantities to a lift.

Employee Numbers

Each time an operator is prompted to enter a “Delay Reason”, a prompt for an “Employee Number” will also be displayed. This number can be up to 7 digits long (1-9999999), and will be included on all production records that are returned to the **Eclipse** Production Software. Once selected, the chosen employee number becomes the default value for subsequent prompts until the start of the next shift.

The operator is prompted to enter the employee number at every shift change. The employee number may be changed at any time by entering the “Production Data” window and selecting “Downtime” menu selection. Press the “F2” key to change the default downtime reason or the employee number.

Eclipse can also assign a written name to each employee number. Names can be downloaded to the controllers so that the employee only need to select their own name rather than enter in a memorized number.

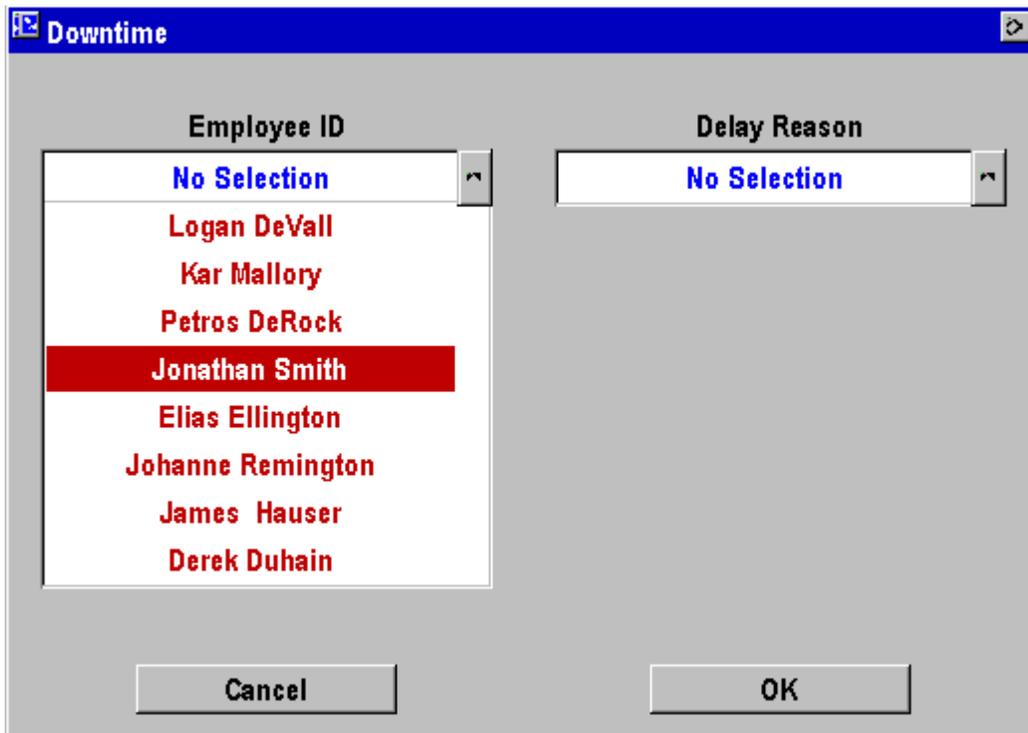


Figure 4-19. Employee Name/Number drop-down list

Reason

Any time the line is halted longer than the “Halt Delay Minimum” parameter, the operator is prompted to enter a 2-digit “Delay Reason” before he is allowed to re-enter the RUN mode. This code is added to all production records to be used by the **Eclipse** software. If the **Eclipse** is not being used, a “Delay Reason” is not necessary.

The limits for the HALT DELAY MINIMUM are 0 to 99 minutes. A value of zero will force the operator to enter a “Delay Reason” after every line halt. A value of 99 will disable the function and the controller will never force the operator to enter a “Delay Reason”.

As with “Scrap Codes”, delay reasons can be assigned a written label by the Eclipse program and downloaded to the controller as a written list of reasons. Each listed reason is assigned to a downtime code. The user can then select from a list of reasons rather than enter in a memorized set or recorded set of numbers.

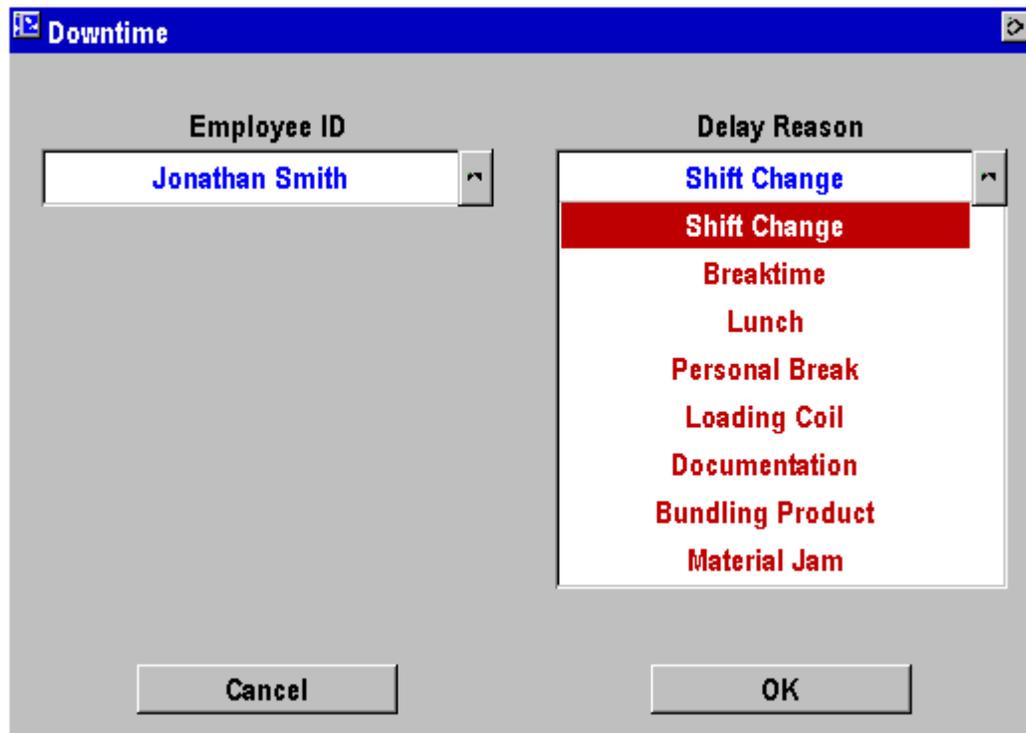


Figure 4-20. Delay Reason Screen

Changing Employee or Downtime

The employee and the downtime reason can be manually changed anytime by selecting the "Downtime" menu item and pressing the "F2" key.



7/01/03	RUN	307FPM	125.360"
11:05 AM			
Coil: 2667-0923	Material: AXX-18-12GG		
PCode: 14-12	Employee: 189		
Production Menu	Downtime		
Footage Totals			
Downtime			
Coil Inventory			
Employee ID	Jonathan Smith		
Delay Reason	Shift Change		
Prod. Data F1=None F2=Change Delay/Employee			

Figure 4-21. Manually editing the employee and downtime

Footage Totalizers

There are three footage totalizers for keeping track of the amount of material used during a shift, for a given coil, and for general use. Each of these totalizers may be viewed or cleared. They cannot be set to arbitrary values. The totalizers show the amount of footage that has gone past the shear and cut, since the last time the totalizer was cleared.

By selecting the “Production Data” key and highlighting the “Footage Totalizer” menu selection, the three totalizers are displayed together, each containing a column for “good” footage and for “scrap” footage. All footage totalizers are rounded to display in whole feet (or whole meters if the controller is set to a metric display mode).

The shift totalizer can be manually cleared by pressing the “F3” key. This may also be set up to occur automatically at the start of each shift via the Eclipse production software. Regardless of which method, the shift totalizer should be cleared at the beginning of each shift.



The job totalizer has been termed in such a way as to allow the customer to use it to their best advantage. This may be used to track production for a particular customer, for group of orders, or a running total for a given space of time such as day or week. Pressing the “F2” key while in the “Production Data” window will clear the “Job” totalizer.

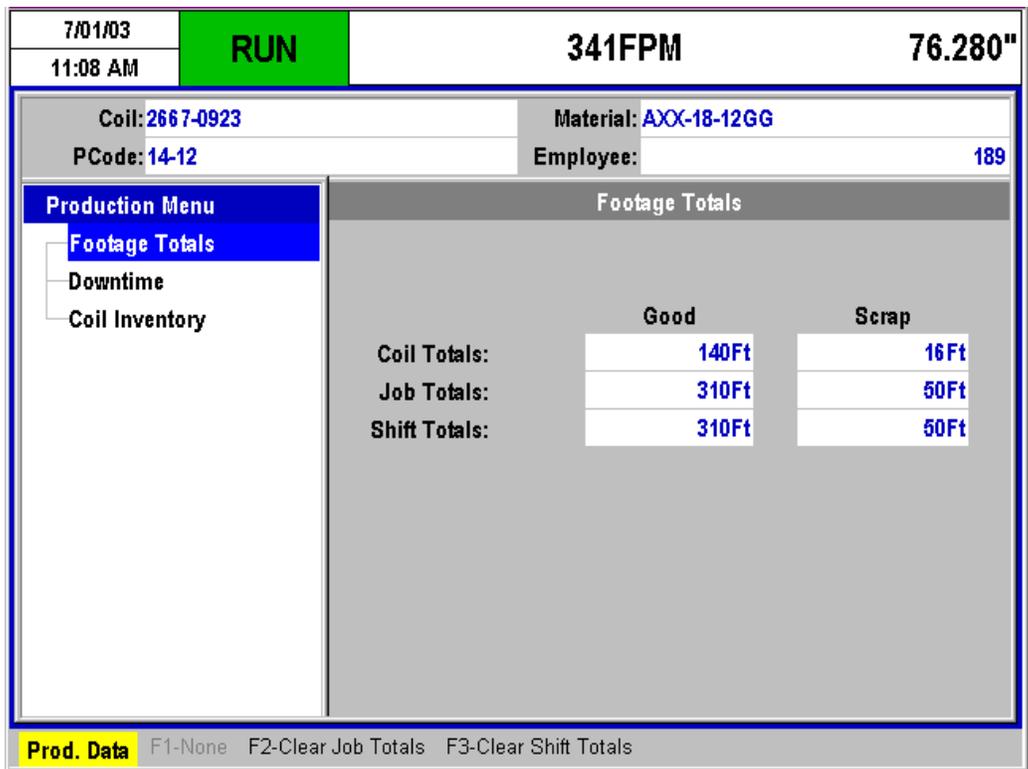


Figure 4-23. Footage Totalizers Window

Startup & Calibration

Initial Tests and Settings

Wiring Verification

As in all installations, the wiring of the machine should be thoroughly checked for shorts and miss-wires. Applying voltage to the controller's inputs or will result in a damaged controller and an unsuccessful installation. The same is true if improper voltages are connected through the controller's outputs.

A thorough understanding of the parameters should be gained by reading Chapter 2 of this manual (Machine Setup). Certain parameters will be reviewed in detail in this chapter for the purpose of installing the controller and producing good parts.

5

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 it's factory source to verify the correct voltage level.
4. Turn on the factory source (probably 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.

Setup and Calibration

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 **XL200CL** series controller can be set up to run in a variety of configurations including closed-loop feeder or die-accelerator, punching or non-punching, and for models with multiple punches, the number of punches and gags.

Refer to Chapter 12 (Controller Model Customization) to locate the correct switch configuration that best fits the specific application that the controller will be used for.

Die Accelerator Installation and Calibration

Please refer to the section on “Installation” in Chapter one as the AMS controller and drive system is being installed. Make sure that the wiring being used meets all specifications and routed properly.

Servo Drives

Isolation

Because of potentially large ground currents in a drive system, it is usually best to electronically isolate the AMS controller from the drive system. More simply, do not directly connect the I/O points together. Interfacing signals such as DRIVE ENABLE and DRIVE OK can be handled through relay contacts, thereby isolating these signals. However, the encoder common, encoder signals, and analog signal must be connected directly.

The analog signal to the drive is differential in nature and may not require a common reference; therefore, no supply voltage need be connected between the drive and the AMS controller for this signal. If a single-ended input is necessary, AMS can provide a converter board to perform that function.

Encoder feedback from the drive may or may not require 5 volts and common from the AMS controller. Please refer to the drive manufacturer’s specifications.

5

Settings

Most servo drives have the ability to program or select a manner of operation that fits a particular control system the best. This may be done via switch banks, potentiometers, or through a digital interface. An AMS controller requires certain interface controls from servo drives that are connected to it.

- The drive must accept a bipolar command signal of +/- 10 volts. This is the analog signal that will drive and control the motor. AMS analog command signal uses a differential line driver. A differential input is recommended on the servo drive, but a single-ended converter can be used for drives without the ability.
- The drive must have the option of outputting a simulated encoder output that reflects the motor feedback. This must be a quadrature output with complementary pairs using 5-volt differential line drivers.
- Servo drives for metal forming applications must have an ability to control the maximum RPM of the motor and the “RPM per Volt” command signal setting.

Home and Over-travel Switch Inputs

Limit switches will need to be installed for the forward and reverse over-travels of the die motion. These should be included in some type of emergency stop circuit that will remove power from the drive system and the material feeding system if the die travels outside of its normal operating range. The ideal location for these switches will vary from one machine to another. Once an over-travel switch is tripped, it is necessary to have some room for the die to start decelerating before hitting a physical stop.

It is always recommended to have some kind of compressible, physical stop (spring loaded, dashpot, etc.) at both ends of travel to protect personnel, machinery, and the die actuating system.

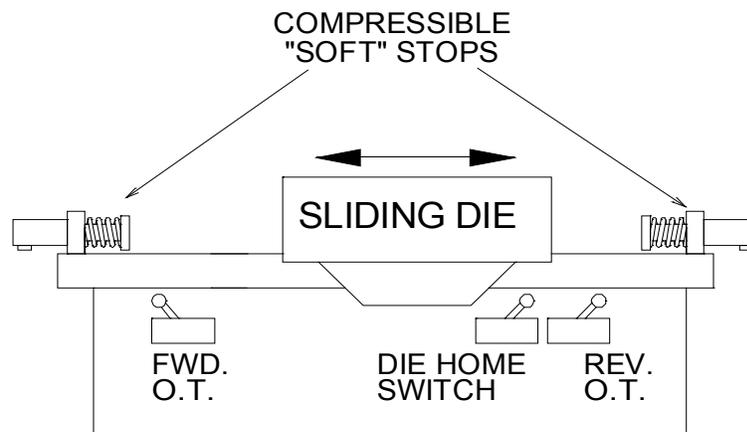


Figure 5-1. Compressible Stop Required

The SHEAR COMPLETE and DIE HOME limit switches are direct inputs to the AMS controller. These are both 24VDC inputs. The DIE HOME switch should be placed in such a position that it will locate the die at its rest, or "home", position. There should be enough room between the Die Retract switch and the closest over-travel limit switch that, should the die overshoot the retract switch by a small degree, it will not activate the over-travel switch unnecessarily.

Once the activating device for the Die Retract switch causes a switch closure, the switch should be held closed for the remaining travel in that direction. The controller "knows" its operating position by the status of the switch, so the switch must be closed anytime the die is on or beyond the home location.

Machine & Actuator

Several types of actuating devices can be used with the AMS controller. Among these are the various ballscrew actuators used in the AMS TRU-TRAC System. Other types of ballscrews, rack and pinion, and belt-driven devices may also be used. In all cases, the mechanism driving the die needs to be truly aligned with the flow of the die. Misalignment between the actuator and the die can cause length variations, particularly as the speed of the material changes. It may also cause binding of the die, which can lead to several other types of problems.

Proper lubrication of the die will also enhance performance. When the slides or gibs are dry or “tacky” from residue, the die can become jerky due to an ever-changing load on the driving system. Some ballscrews and rack systems also require lubrication within the driving mechanism.

Whatever kind of actuator is used, it must be truly aligned with the flow of the die itself, not aligned with the material. Stress on the rod or other actuating device can occur if the actuator is not aligned with the die. Premature wear and tear can occur or even damage the actuator, die or coupler.

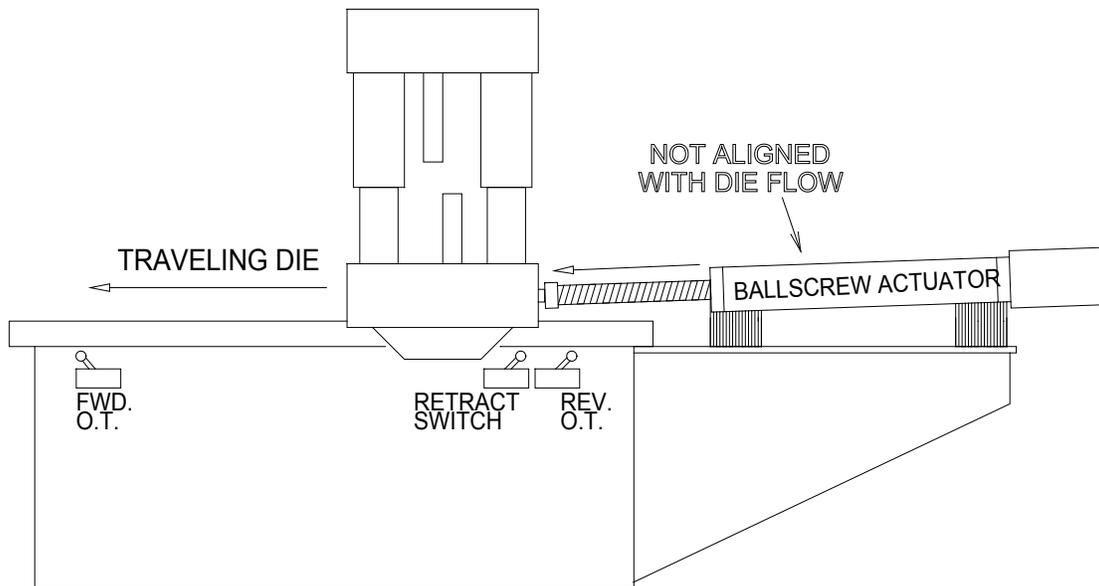


Figure 5-2. Actuator not vertically aligned.

The die should run parallel to the die flow, both vertically (as shown in figure 5-2) as well as horizontally (as shown in figure 5-3).

Setup and Calibration

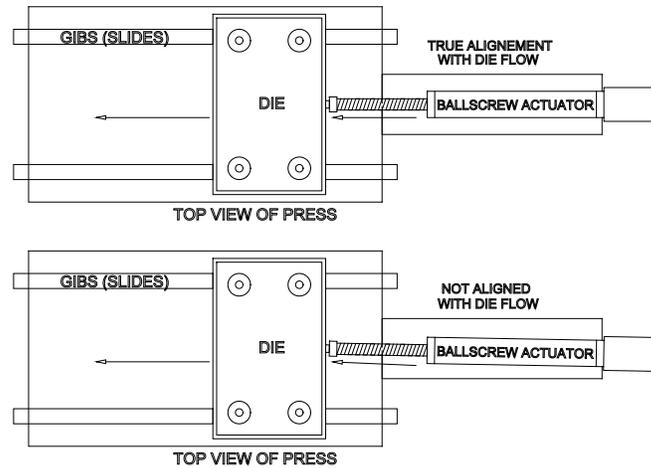


Figure 5-3. Actuator not horizontally aligned.

The **BALLSCREW ACTUATOR** should be solidly mounted to the press that it is used on. Extra support may be necessary to keep the actuator from flexing or twisting as torque develops during acceleration and deceleration.

It is best to use some type of coupler that will allow some degree of flexion between the actuator and the die to allow for any twisting or misalignment in the die. If the coupler is rigid, then early wearing of the actuator may result. As mentioned earlier, the actuator needs to be properly aligned with the motion of the die (not the material or feed system) to receive the best results. Notice that Figure 5-4 shows the accelerator aligned truly with the flow of the die.

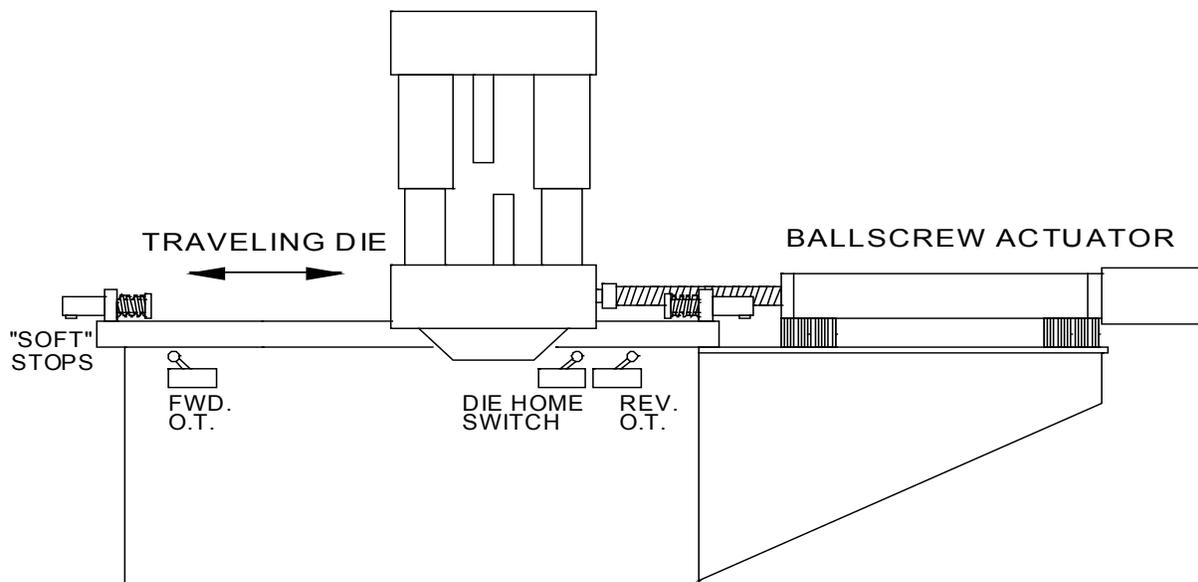


Figure 5-4. Example of a properly mounted actuator.

Die Accelerator Setup

Starting Out

It is recommended to isolate the motor such that the die and actuator will not actually move if the motor turns! If disconnected from the machine, the motor should be bolted or strapped onto a platform to keep it from flipping during acceleration. This is a safety precaution in case of mis-wiring or improper setting of the controller or drive system. Failing to do this may result in the loss of motor control and subsequent injury to personnel or damage to the motor.

It is recommended that anyone installing and/or starting up a new AMS control system should become familiar with the machine configurations and parameters. These are available in chapter two of this manual. Persons installing closed-loop systems should also have some previous knowledge of basic drive parameters and operation.

Initial Setup Parameters

After the controller has been properly installed and all wiring has been double-checked, the basic controller parameters can be programmed. Required parameters will include the Shear Dwell Down, Shear Dwell up, Line Resolution, Die Resolution, Loop Gain, Max Velocity, Acceleration, and Return Acceleration.

5

Shear Control Parameters

AMS 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 9.999 seconds. On controllers that do not use a SHEAR BOOST output, a **SHEAR UP** is also programmable with a range of 0 to 9.999 seconds. Please refer to the timing diagram on Figure 5-5, each parameter has a dwell time of .125 seconds.

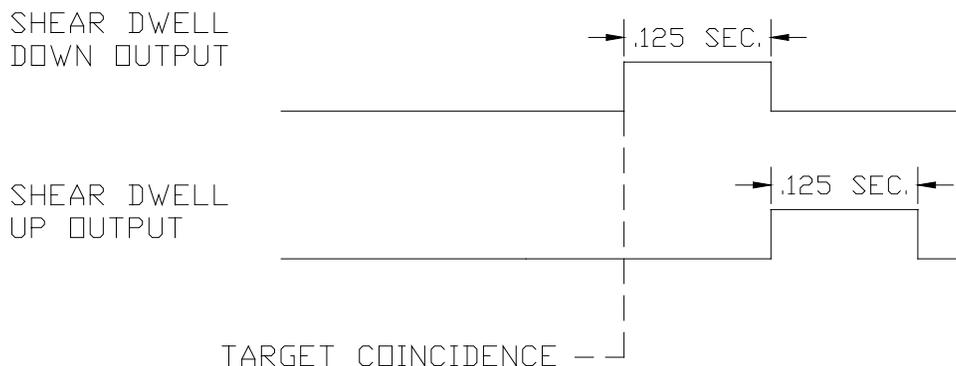


Figure 5-5. Timing Sequence of Shear Dwell Times

Setup and Calibration

Input number four (#4) on the controller is the “Shear Complete” input. If the AMS controller detects a switch closure at this input during the “Shear Dwell Down” time, the dwell time is overridden and the output will turn off immediately (Figure 5-5).

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 will “time out” as programmed regardless of the complete input.

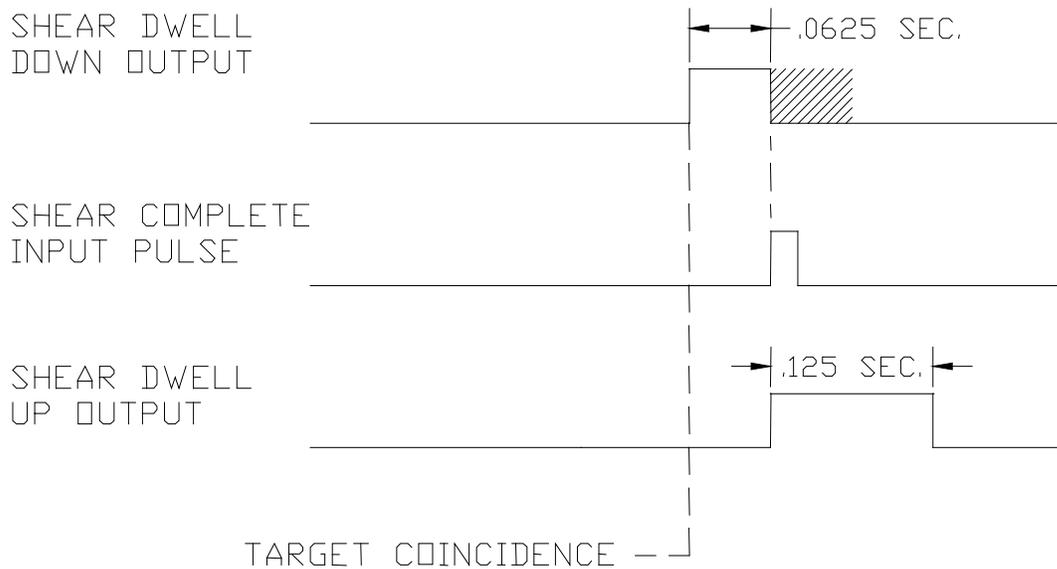


Figure 5-5. Shear Output/Dwell Time Relationship

Set the shear dwell times to some value that would be expected to work. 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.

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 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 from “normally closed” to “normally open”. The location of the switch or cam will not have to be moved in most cases.

Line Resolution

The LINE RESOLUTION parameter will need to be entered before testing is performed. This 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.

The way to figure the LINE RESOLUTION is by dividing the circumference of the encoder wheel by the number of PPR (Pulses per Revolution) from the encoder.

- Determine the **circumference** of the wheel by measuring the diameter of the wheel and multiplying that number by pi (3.1416).
- Calculate the PPR (pulses per revolution) by multiplying the rated number of encoder counts by four (4). The model number of an AMS encoder represents the number of counts from 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.

5

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

Example

A wheel 5.0 inches wide is mounted onto a model 1000 encoder. The formula shows how the resolution is calculated.

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

Die Resolution (Rack & Pinion Accelerator)

The DIE RESOLUTION parameter will reflect the amount of die movement per count from the motor encoder. The final movement of the die after one revolution of the motor will replace “Circumference” in the previous formula as used in “Line Resolution”. Using Example 5-6 we can calculate the die resolution for a Rack & Pinion system as follows.

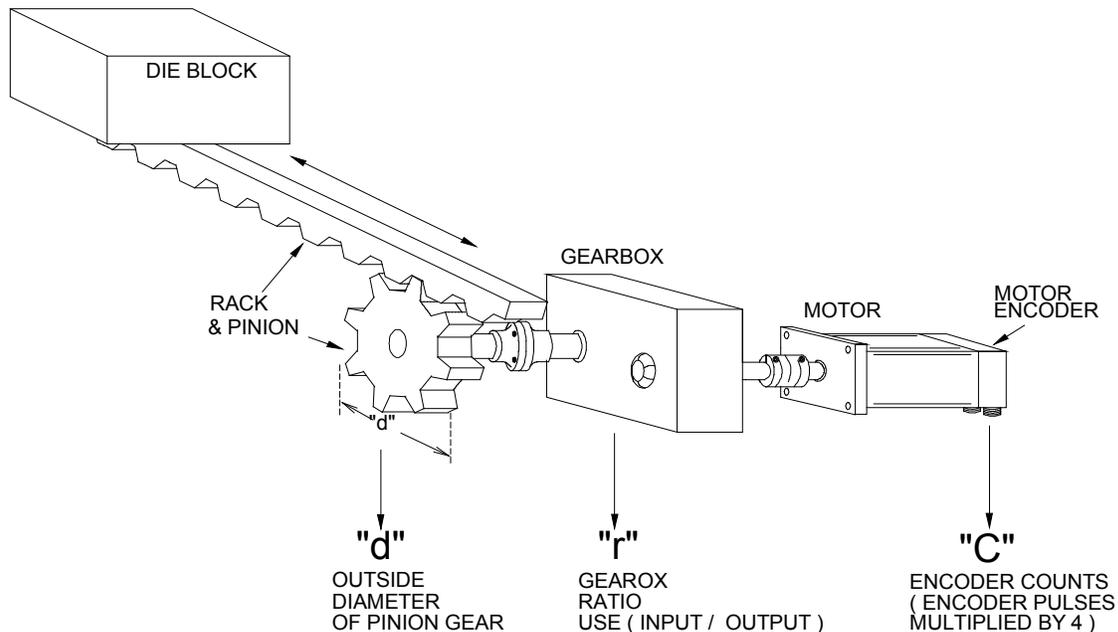


Figure 5-6. Rack & Pinion Resolution Calculation Example

"d"	=	7 inches
"r"	=	10:1
"C"	=	4096 counts (1024 pulses x 4)

First, find the Circumference of the pinion gear to determine how far the die will travel when the gear turns one time. Use the method shown on the next (Figure 5.22) to calculate this.

Gear circumference can be figured in a similar manner as the circumference of an encoder wheel. Measure the outside diameter of the gear. Multiply this by pi (3.1416). This will give you gear circumference. See figure 5-6. This will be needed when figuring the resolution on many accelerator and feed systems.

If the pinion gear is connected to a rack, there is another quick method for figuring the gears circumference. Count the number of teeth on the gear. Now, count out the same number of teeth on the rack. Measure the distance between the two teeth on the rack. Make sure you measure between a common location on both teeth (upper right hand corner of both teeth).

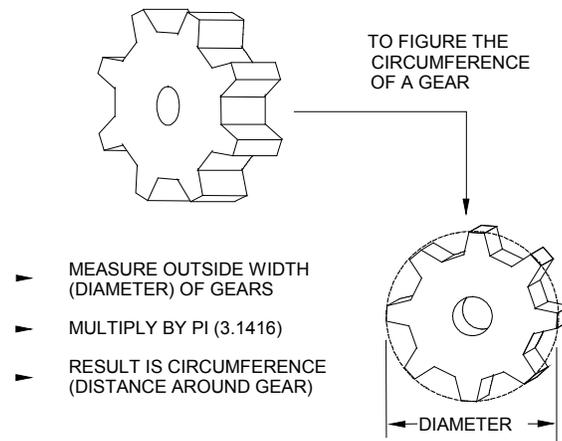


Figure 5-7. Figuring gear circumference

If the diameter of the output gear is 7 inches, then we can see that the circumference will equal 21.9912 inches. For simplicity, we can round this to 22 inches.

We also know that the gearbox ratio is 10 to 1 (10:1). This means that in order for the output shaft to turn a single time, the input shaft must turn 10 times. Since Die Resolution is determined by how many encoder counts occur during one revolution of the motor, then we must find out how far the die travels when the motor turns one time. This is calculated by dividing the total movement of the output gear (22 inches) by the gearbox ratio (10). This gives us 2.2 inches of movement each time the motor turns one full turn.

We now divide these 2.2 inches by the number of pulses received from one revolution of the motor encoder. Remember that the total number of pulses from the encoder is actually the rated number of counts multiplied by four. Thus, a 1024 pulse motor encoder will actually equal 4096 counts. If this is the case, then we will divide our 2.2 inches by 4096. This gives us a die resolution of 0.005371093.

Die Resolution (Ball screw Accelerator)

The resolution of a ball screw actuator must be calculated using a different method. Once again, the distance of die movement per one revolution of the motor is what will determine the die resolution.

The distance that the die moves as the screw makes one revolution is known at the screw's pitch. This will coincide with the distance between threads of a single bearing-channel as shown in Example 5-8. Keep in mind that some ball screws use multiple sets of channels. Many typical ball screws use a pitch of .5 inch, 1 inch, or 2 inches.

The motor drive will typically have a selection or parameter for setting the number of encoder counts it provides. For the below example, let's set the output counts to 1000 per motor revolution. The counts per revolution needs to be multiplied by 4 to calculate pulses per revolution (PPR).

Setup and Calibration

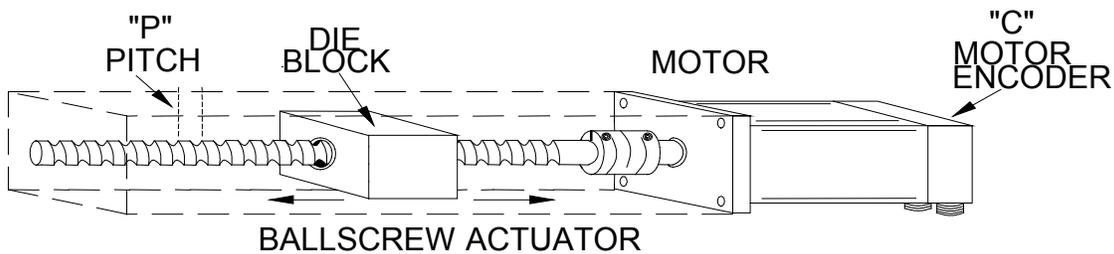


Figure 5-8. Ball screw Resolution Calculation Example

$$\begin{aligned} \text{"P"} &= 1 \text{ inch} \\ \text{"C"} &= 4000 \text{ (1000 counts per rev) } \times (4) \end{aligned}$$

Since the Pitch (1 inch) equals the amount of travel per revolution, and 4000 equals the number of pulses per revolution, then we can simply determine Motor resolution by dividing the pitch by the counts.

$$\text{RESOLUTION} = \frac{\text{"P"}}{\text{"C"}} = \frac{1}{1000 \text{ PULSES} \times 4} = .0002$$

Many ball screw accelerators will have gear reduction between the motor and the ball screw. Simply divide the pitch by the gear reduction ratio and then divide by the number of pulses to get the resolution.

Loop Gain

The loop gain parameter controls how quickly the controller drives the motor to correct for any position error between where the motor is commanded to be and where it is actually measured to be. A low loop gain will sluggishly compensate for any position error. A high gain may actually overshoot the target and oscillate. When starting a system up, a low loop gain such as 2 is a good starting point to avoid jerking or oscillations.

Acceleration

The Acceleration parameter controls the rate at which the motor will change velocity while moving in the forward direction. A low acceleration rate will cause the motor to take off slowly and gradually increase speed, whereas a high acceleration will move the motor quickly to the next commanded speed. A low acceleration is best to start with, such as 50 to 100 inches per second squared.

Return Acceleration

The Return Acceleration parameter controls the rate at which the motor will change velocity while moving in the reverse direction. A low acceleration rate will cause the motor to take off slowly and gradually increase speed, whereas a high acceleration will move the motor quickly to the next

commanded speed. A low acceleration is best to start with, such as 50 to 100 inches per second squared.

Jog Velocity

This parameter will set the motor velocity when jogging the die. A small number such as 10 to 25 feet/minute is advisable when setting up for the first time.

Maximum Return Velocity

This sets the highest velocity allowed for the die while returning to the home position after completing a press cycle. As all other parameters, this should be kept at a low number while doing initial motion tests. 50 to 75 fpm would be suggested for most lines. Lower speed lines should be set to no more than 20% of expected full speed.

Initial Directional Check

Begin by verifying that the directional settings for the Motor encoder, line encoder and Analog command signal are correct. The previously covered parameters will need to be entered in order to accomplish this. Only parameters relating to setup of the system will be dealt with in this section.

As discussed, input low, starting values into the necessary parameters for initial startup:

- **Line Resolution** = **Calculated**
- **Die Resolution** = **Calculated**
- **Loop Gain** = **2**
- **Acceleration** = **50**
- **Return Acceleration** = **50**
- **Jog Velocity** = **10**
- **Minimum Return Velocity** = **50**

Once programmed, the system can be tested. Press the DIAGNOSTICS key to display the diagnostics menu. Highlight the “Closed Loop Data” menu selection. Upon doing so, the function key bar will display the purpose of each function key while in that screen.

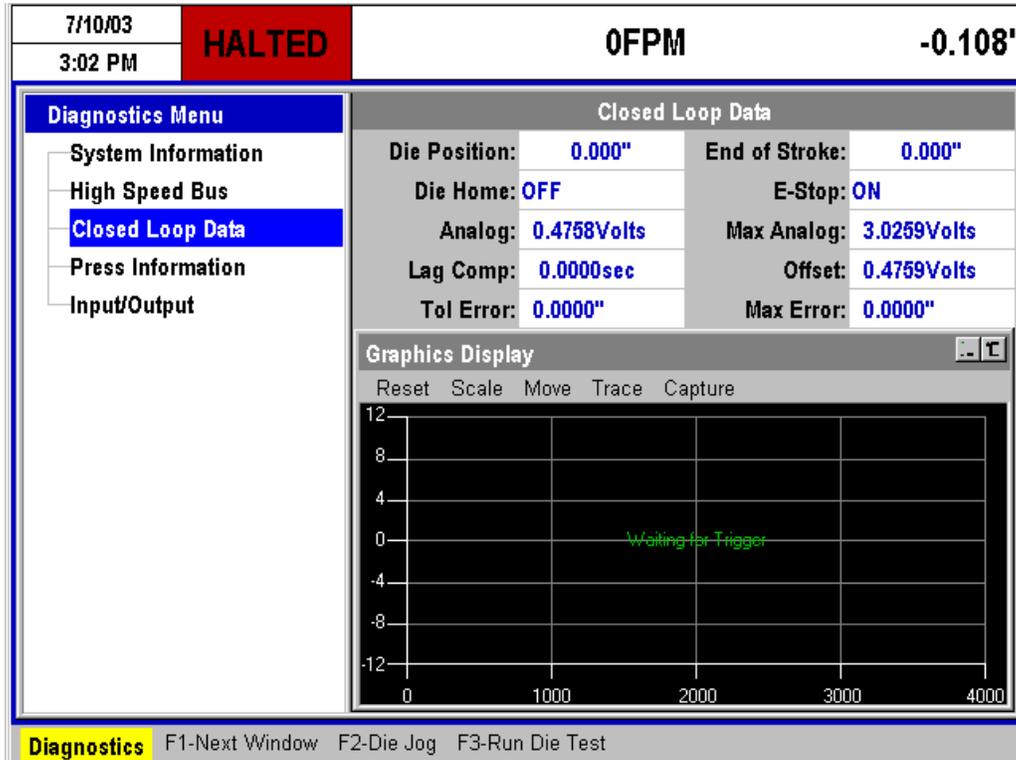


Figure 5-9. Closed Loop Data Selection Screen in “DIE JOG” mode

Since the first test needs to be very simple, press the “F2” key to place the controller into “Die Jog” mode.



The information shown in the right-side window displays pertinent information regarding the loop control and die position. The status bar at the top of the display and to the left should be yellow and display “DIE JOG” once the “F2” key is pressed.

Before enabling the motor by initiating a jog, run, or shear input, spin the motor shaft in the direction that will be considered the forward direction. This window displays the “Die Position” relative to the home switch so the counts on the “Jog Die” screen should count in a positive direction when moving forward. The main status screen will show an increasingly negative count when moving forward since it is referenced to the materials edge. If the counts are not going in the right direction, review the type setting switches found on the back of the controller. This manual provides a switch-setting guide in chapter 11. You will need to change typesetting switch #2 for “encoder #2 feedback” (Die Encoder Feedback).

Once the type-setting switch is changed, cycle power to the controller. Anytime the typesetting switches are changed, the change in operation will not occur until after power to the controller is cycled.



Perform the directional test over again to double check and verify that the motor is spinning in the forward direction and that the “Die Position” display in the “Jog Die” window is counting positive.

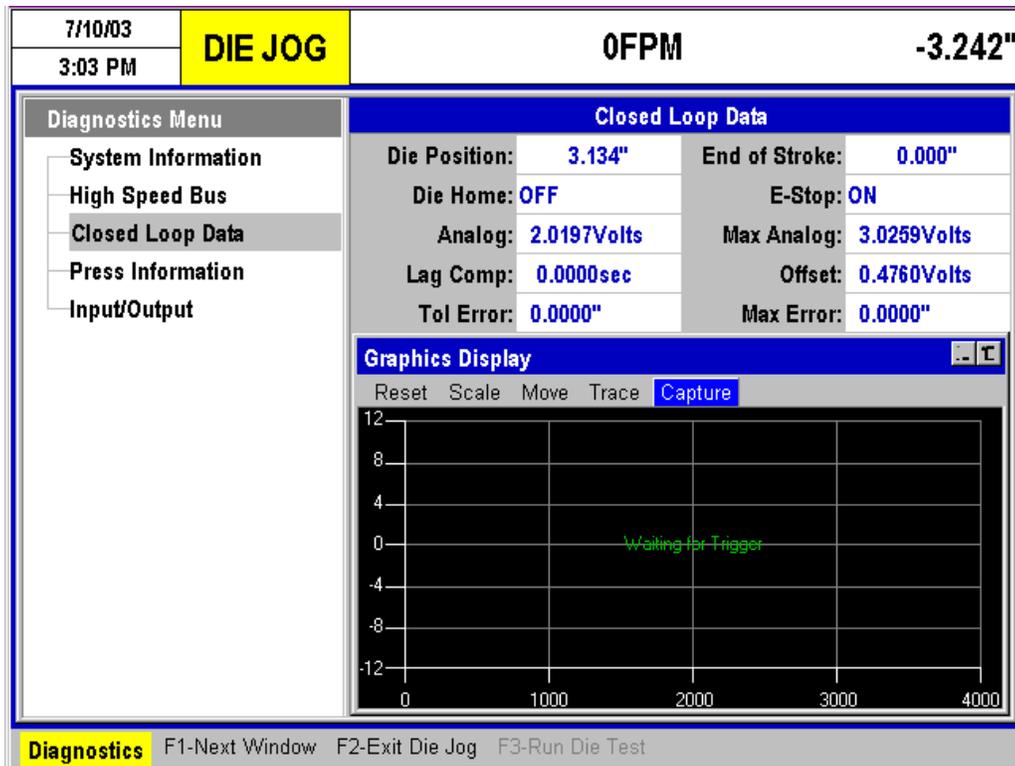


Figure 5-10. “Jog Die” Screen on the XL Series controller

Setup and Calibration

At this point, initiating a “Jog Forward” input to the controller should make the die motor turn in the “forward” direction. If the motor runs away or gives control errors, the “Analog Polarity” type-setting switch may need to be reversed from its present position. Change the setting on the “Analog Polarity” switch and cycle power. If the same problem reoccurs, the simulated encoder feedback from the drive to the controller may not be attached or not setup properly in the motor drive itself. Make sure that the drive is setup to provide a simulated, quadrature encoder output. Verify that the resolution is correct.

The line encoder should also be checked for the proper direction. Spin the encoder in the direction it will track as forward. Verify that the position display in the upper-right hand corner of the XL200 Series controller is counting upward in the POSITIVE direction.

At this point, pressing the initiating the “Die Jog Forward” or “Die Jog Reverse” inputs should jog the die in the appropriate direction. Jog the die in both directions, verifying that the motor moves in the correct direction and at a consistent speed between the two directions. The direction parameters and switch settings should now be correct. If other problems occur, check [Chapter #6](#) for possible corrective actions.

Tuning the Motor Drive

Once the directional settings have been verified, the remainder of the parameters can be modified.

Drive Command Signal

The XL200CL Series controller uses a +/- 10-volt analog signal to control servo motor controllers. This is a differential output, also known as a “10 Volt Bipolar” output.

The servo motor controller (drive) should have an adjustment that sets how much analog voltage equates into rpm of the motor. This may be digital, programmable, a potentiometer setting. For instance, a 3000 rpm motor is connected to a servo drive with a “Command Voltage” of 1 volt = 250 rpm. If this is the case, the motor will spin at 2500 rpm when commanded with the full 10 volts and top speed will not be attainable.

To test for the command signal level, set the “Jog Velocity” parameter to 50 fpm. Now, jog the die and measure the analog output out of the controller on terminals “B4” and “B5” with a voltmeter. If the expected line speed of the machine is 300 fpm, then the voltmeter should measure no more than 1/6th of the 10 volt command. This is because voltage at 50 fpm will be 6 times higher when running at 300 fpm ($50 \text{ fpm} \times 6 = 300 \text{ fpm}$). If the value is higher, then top speed will be unattainable.

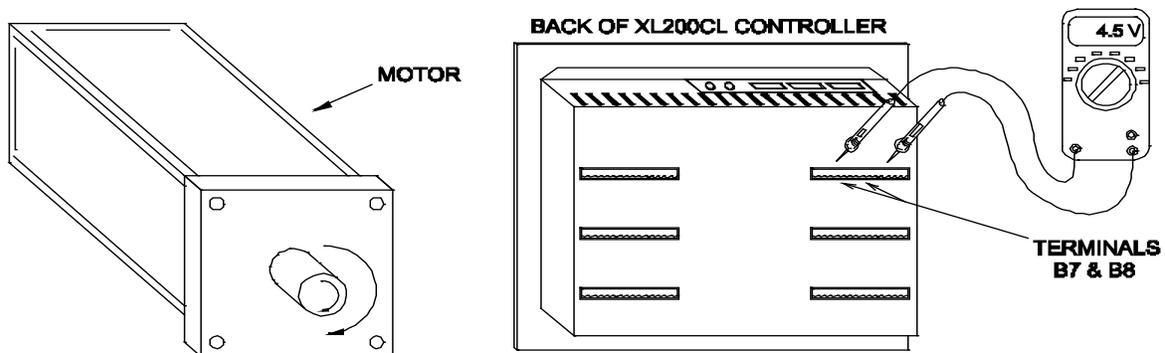


Figure 5-11. Setting the Drive Command Signal Level

If the voltage value is too small, loss of fine control may be lost. For instance, a command signal setting in the drive is set to “1 volt = 1000 fpm”. The line is running full speed at 300 fpm, the controller is only using 3 volts to control the accuracy of the line, less than 1/3 of the available control voltage. Controllability and better tolerances could be achieved if more of the available 10-volt output was used.

It is also advisable to keep the top expected analog output at no more than 9 volts. This provides room for analog overshoot and possible line velocity variations.

Adjust the Loop Gain

The **LOOP GAIN** parameter controls the “responsiveness” of the system and should be adjusted next. The best way to adjust this gain is while jogging and halting the motor and observing how it stops and starts. The “Jog Velocity” parameter should be set to 50 fpm.

The motor should “snap” to a stop. Increase the gain if it coasts to a stop. If the motor begins to overshoot at a stop and “snaps back” to a position, it may be on the verge of oscillating and the gain should be adjusted down slightly. Gain should be kept as high as possible without going into oscillation or becoming unstable.

Acceleration

The **ACCELERATION** is the rate at which the die changes speed while going in the forward direction. It is best to keep this number as low as required performance will allow since most of the wear on the actuator system is inflicted during acceleration and deceleration. The higher this number is, the faster the die accelerates to full line speed and is able to stop.

As in all closed loop parameters, this value should start low and be gradually increased. A setting of 50 to 75 in/sec² is a good starting value for a majority of systems. This setting would also work well for the **RETURN ACCELERATION**, which is used for returning the die to home position. The die will decelerate at the same rate that it accelerated at previously.

Maximum Return Velocity

The **MAXIMUM RETURN VELOCITY** is the maximum speed that the die is allowed to return to the home position while in automatic mode. While running, the die will return home only as fast as is necessary to track the next target. This is done to reduce early wearing of the actuator. As part lengths get shorter or line speed increases, the die will return faster in order to regain its “idle” position before the next target arrives. The **MAXIMUM RETURN VELOCITY** is set to keep the controller from running the drive beyond its velocity range.

If the drive cannot return the die to the home position in time, then an error is displayed on the screen. Regardless of how the **MAXIMUM RETURN VELOCITY** is programmed, the controller will attempt to track a target at whatever line speed is generated by the line encoder. Some caution is necessary not to run the material feeding system faster than the actuator is specified or adjusted for.

Die Reference

The “Die Reference” parameter controls which reference point the XL200 Series controller will use while automatically tracking and firing on targets. Selections for “Min Die Distance”, “Max Die Distance”, and “Home Switch” are available. For the purpose of this setup section, the “Min Die Distance” should be selected. The other choices can be selected if your machinery works best with it.

Minimum Die Distance

The **MINIMUM DIE DISTANCE** and **MAXIMUM DIE DISTANCE** will set the starting and ending points for the cycle dwell time. The MINIMUM DIE DISTANCE is used to set the minimum travel from the home position before allowing a cut; this only applies when in “Minimum Die” or “Home” reference modes. This insures that the press only fires when the die is at a desirable location within the press, usually toward the center. If properly calculated, this will also insure that the die is stabilized at full speed before the blade or tooling penetrates the material at the target. A formula for calculating the required distance for the die to attain line speed is also the smallest recommended MINIMUM DIE DISTANCE. The formula is as follows:

$$\text{Minimum Die Distance} = V^2 \div (2A)$$

Where V = Expected Velocity in in/sec (or ft./min \div 5)

Where A = Acceleration Programmed in in/sec²

Example

A table with 28 inches of available travel is used. This would be the travel between the home switch and the opposing over-travel switch. The velocity of the line is 200 ft/min and the acceleration is also 200 in/sec². Calculate the velocity in inches per second by dividing the speed in Feet per Minute by 5. This equates to 40 inches/second

1. **Minimum Die = (200 FPM \div 5)² \div (2 * 200 In/Sec²)**
2. **Minimum Die = 40² \div (400)**
3. **Minimum Die = 1600 \div (400)**
4. **Minimum Die = 4 inches**

Because of how the press it built, it is desired to fire the press no less than 8 inches into its travel in order for the press to work properly. A “Minimum Die Distance” of “8.000 inches” is programmed into the setup parameters. The press uses a “Shear Dwell Down” time of .125 seconds and a “Shear Dwell Up” of .125 seconds. Since the total shear time is $\frac{1}{4}$ second and the line is moving 40 inches per second, then 10 inches of travel will be used during the cycle time alone.

Using the “Minimum Die Distance” formula, it will take 4 inches to accelerate to the MINIMUM DIE DISTANCE and another 4 inches to decelerate to a stop. This example is graphed in Figure 5-12. The “Minimum Die Distance” is 8 inches and it takes 4 inches for the die to get up to speed using an acceleration of 200. The die sits at the most ideal location for tracking the target, 4 inches from the home switch. This allows for the 4 inches required to get up to die speed without creating additional travel.

Set the “Minimum Die Distance” parameter to the required value for your specific press layout. This will be the point at which the press is fired. Make sure that this distance is no less than what the minimum die formula above will allow to insure that the die is up to speed before engaging the material.

Setup and Calibration

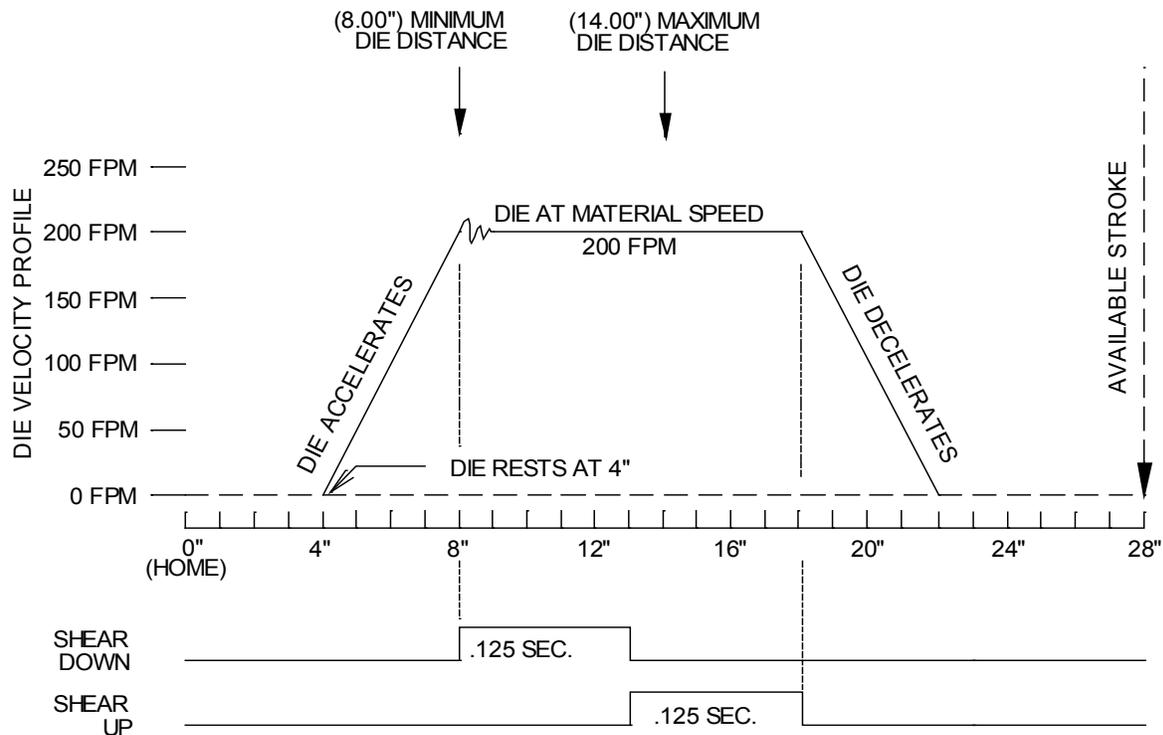


Figure 5-12. Shear trigger at minimum die distance

Maximum Die Distance

The **MAXIMUM DIE DISTANCE** defines the furthest distance from the home position that the press is allowed to fire. Turning on the press after this point could result in the die over traveling during the remainder of its cycle. The formula used to calculate “Minimum Die Distance” also calculates the distance it takes to stop the die. This is identical to the acceleration length.

Using the example (figure 5-12), note that when the die actually is triggered at the minimum die distance, there is 6 inches of travel remaining at the end of the dies stroke. In other words, the die could have traveled for another 6 inches before firing the press and still be able to complete the cycle before running out of room and hitting the over travel switch.

If the “Tolerance Mode” parameter is set for “Stop No Cut” or “Warn Only”, the controller will not fire immediately upon reaching the “Minimum Die Distance” but will first check that the die is in tolerance. If tolerance is not achieved at that point, the controller will continue checking tolerance as the die continues to travel from the minimum die toward the maximum die distances, allowing for it to fire only once tolerance is achieved. If tolerance cannot be achieved before reaching the Maximum Die Distance, then the target is abandoned and an error is displayed. This is why the maximum die distance must not be beyond the point that a full cycle can be completed without hitting the end stops or over travel switches. Figure 5-13 shows a press cycle triggered right at the maximum die distance.

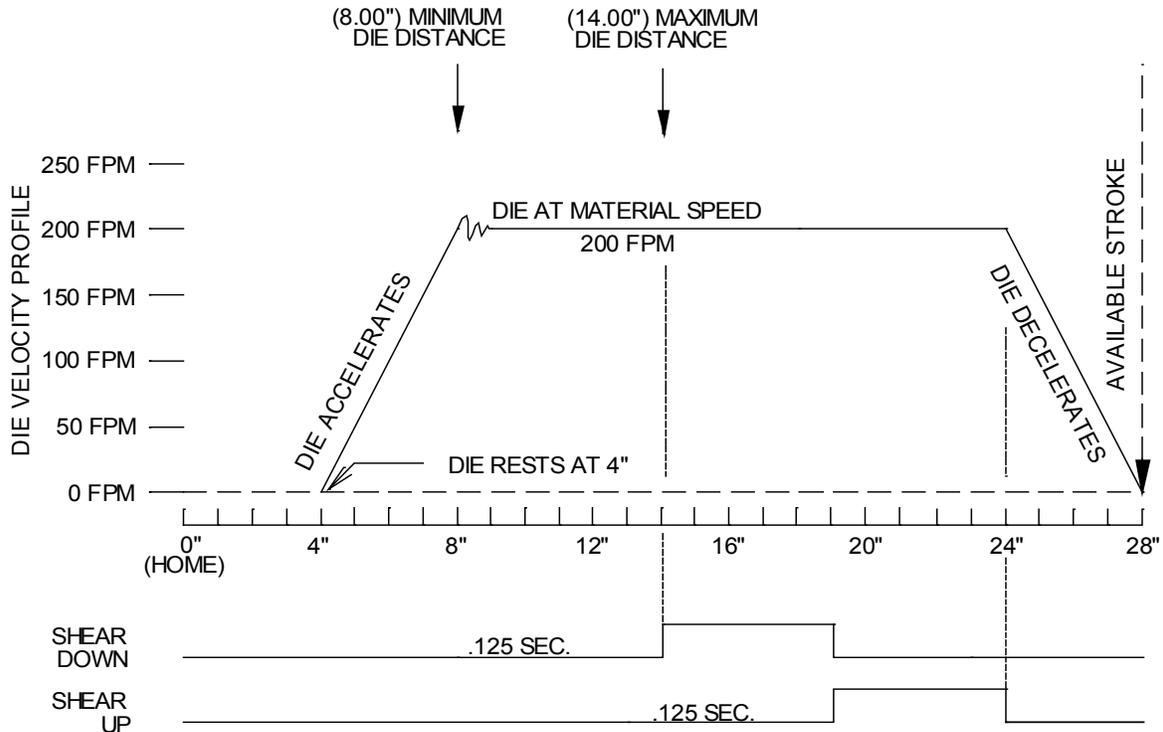


Figure 5.13 Shear trigger at maximum die distance

The main idea is to make sure that the press is actuating while the die is in the desired area and that the full cycle is completed within the allowable range of travel.

Lag Compensation

LAG COMPENSATION is an automatically adjusted parameter that corrects for a condition where the speed is matched but the position of the die lags behind the target. This parameter is automatically updated by the controller whenever the die is between the MINIMUM DIE DISTANCE and MAXIMUM DIE DISTANCE and should not need to be adjusted manually unless problems occur. It is updated at a rate set by the **LAG INTEGRAL** parameter. As the LAG INTEGRAL becomes smaller, the controller will adjust for error more quickly. This could improve the accuracy of the line. If the LAG INTEGRAL is set too small, the die may become unstable, jerky or begin oscillating while tracking the target. A typical value of .2 to .5 seconds works well in most applications, but these values should be reached gradually while working toward them from the default value of 1.0 second.

Tolerance

The **TOLERANCE** parameter will set the upper and lower range of length variation that will be regarded as acceptable. The controller compares the length from the line encoder to the length from the die encoder to check tolerance.

Setup and Calibration

For example, a Tolerance setting of .015 will create an acceptable range of .030 inches (+. 015 to -.015). Anything outside this range will cause an error to be displayed. . The controller always strives for being exactly on target and making this parameter lower may not result in tighter tolerance parts unless the controller is set up in a special manner using the **TOLERANCE MODE** parameters of “STOP-NO-CUT” or “WARN-NO-CUT”. These parameters are described in the next paragraphs.

Tolerance Mode

Setting the **TOLERANCE MODE** parameter will result in operational changes in the machine. There are four available options as described in Chapter 2 for “Machine Setup”. The “Cut And Stop” selection works best when performing initial setup. The appropriate “Tolerance Mode” selection can be set for your specific machinery after initial tuning is performed.

CUT & STOP is the default setting. In this mode, the controller will make the cut at the MINIMUM DIE DISTANCE and the tolerance will be checked at the end of the SHEAR DWELL DOWN period or upon the SHEAR COMPLETE input, whichever is first. If the cut was made out of tolerance, the controller will automatically halt the line and display an error message.

If a manual shear input is given to reference the die, the controller will first move the die toward the home position if it is not already there, locate the Die-Retract switch, move to the SHEAR DIE DISTANCE, cycle the press and then return to the “idle” position. The count is cleared after the press cycle is completed and before returning to the home position. Entering the {Jog Die Accelerator} screen and supplying a manual shear input can perform a manual standing-cut.

Offset Volts

The **OFFSET VOLTS** parameter is an information value that is automatically calculated and displayed by the AMS controller to hold the motor stable and at a complete stop. If the drive system is balanced well, this number should be very small, .003 volts for example. If this number gets over .1 volts, some adjustment on the drive may be necessary. This parameter is automatically adjusted anytime the motor is at rest over a time interval as given in the **OFFSET INTEGRAL**. The default value is set at 100 seconds and will probably not need to be changed unless the drive system has some instability.

If the OFFSET VOLTS value becomes too large due to drive mis-adjustment, faulty wiring, or other external forces, the die may become jerky or unstable. The controller will disable the drive system if OFFSET VOLTS rises over .2 volts and display a “Drive Not Responding Error”. The “Drive Enable” output must be off in order for the operator to change the value in OFFSET VOLTS back to “0.0”. Removing the E-stop input can accomplish this.

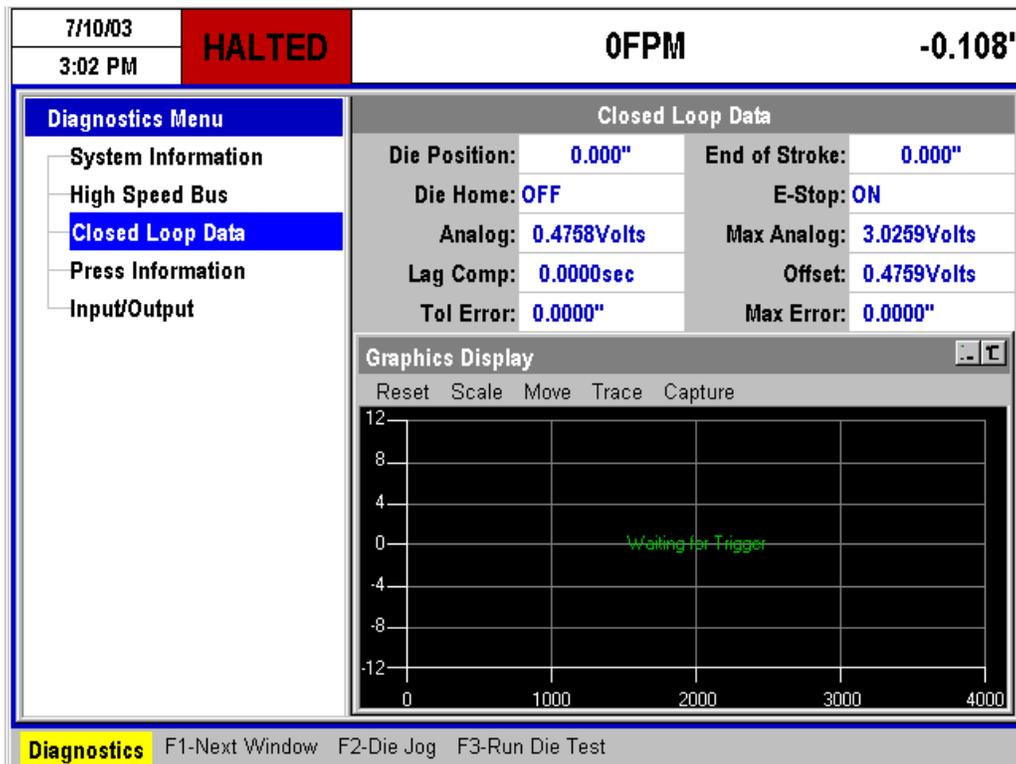
Testing the Motor

It is usually best to test the motor by itself before tuning the actual actuator. Press the “Diagnostic” key to open the diagnostic menu window. Highlight the “Closed Loop Data” menu selection.

Diagnostics

Use the Die Jog function “F2” to place the controller in “Die Jog” mode. Use the jog forward and reverse inputs to verify once more that the motor direction is correct and that it is displayed as going the correct direction. Press the “F2” key again to disable the “Die Jog” function.

F2



5

Figure 5-14. Closed Loop Data Screen

The die must be referenced to the home switch before the line can be run or a die test performed. Press and hold the “Manual Shear” pushbutton to cause the XL200 Series controller to fire the shear and reference the die. Continue holding the manual shear pushbutton until the press is fired. Upon receiving the manual shear input, the die will go in reverse in search of the home switch. Since the motor is disconnected from the actuator, the “Die Home” limit switch will have to be manually activated. The switch will have to be activated twice to reference the die since the die will locate the switch once, back up off the switch, then creep back onto the switch.

A “Die Test” can now be performed that will simulate the line running at a specified speed with a specified part length. While in the “Closed Loop data” window, press the “F3” key to open the “Die Test” popup window. The window will prompt the operator for a simulated part length; the default length being 120 inches.

Setup and Calibration

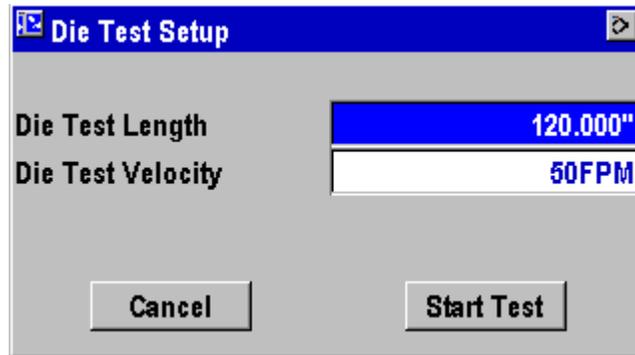


Figure 5-15. Die Test Popup Window

When starting a die test, start with a longer part and work your way down to shorter parts. The controller will next prompt the operator for a simulated line speed; the default for this is 50 ft./min. Start slow and speed up gradually. Select the “Start Test” command button to start the simulation. The window will place a warning to “Remove material from Die!”.



Figure 5-16. Die Test Material Warning

The warning is displayed because the die motor will actually turn and fire the press at measured target locations. When the actuator is attached, it will actually track and cycle the press as if tracking a real target.

Once this is done, the controller will display the material position as though material were going through the press. When the simulated target reaches the press, the motor will turn in the forward direction, attain line speed, cycle the press at the target, and then return to its original position. This test will continue until the “F3” key is pressed again.

! Caution should be taken because the press will actually fire during the simulation and the motor will be turning as though tracking a target!

Pressing {SETUP} while running the test will enable you to change machine data such as LOOP GAIN, ACCELERATION, and other items. This is useful in fine-tuning the parameters.

Caution should be practiced while changing these parameters during this test or during a run. DIE RESOLUTION, LINE RESOLUTION, OFFSET VOLTS, and LAG COMPENSATION should NEVER be changed while the test is being performed or while the line is actually running once set up is completed. This can result in erratic operation of the motor and possible loss of control.

The “Diagnostics” screen will display information for stroke length (End of Stroke), tolerance, and analog output voltage. Adjust the drive and XL200CL controller parameters until operating within your machine’s operating guidelines.

Once operating properly, install the motor onto the machinery for continued installation and setup.

Testing the Actuator

Mount the motor onto the actuator or gearbox once it is thoroughly tested by itself. With the motor is coupled, rotate the shaft by hand (if possible) so that the die will move from one extreme of its travel to the other. Check for tight areas in the travel that may need attention. The die may be easy or hard to move depending on the application or die weight, but the load should remain constant throughout the stroke.

Once the die movement seems satisfactory, the die should be moved to the center of the press. Power can now be applied once the wiring has been double-checked. The over-travel switches and emergency stop devices should have already been checked, if not, it should be done before proceeding further. All the appropriate parameters should be already installed from earlier testing of the motor.

Press the “Diagnostic” key to open the diagnostic menu window. Highlight the “Closed Loop Data” menu selection. Place the controller in “Die Jog” mode by pressing the “F2” key. Use the jog forward and reverse inputs to jog the die forward and reverse. Verify proper direction and smooth feed. If it is not, return to the section on **MOTOR TESTING**.

When in “Die Jog” mode, the press will make a standing crop wherever it is presently sitting, without referencing the die. Press the “Manual Shear” input to the controller. Make any “Shear Dwell Down”, “Shear Dwell Up”, or “Shear Complete Switch” mounting adjustments as necessary. Continue fine-tuning the shear parameters in this mode until the results are satisfactory. More information on setting the shear dwell time is given in Chapter 1. Taking time now to get these values set may save much time later on! Once satisfied with the press operation, return to the Diagnostic/Closed Loop Data Window and press the “F2” key again to disable the “Die Jog” function.

Reference the die by pressing the manual shear input switch. Continue to hold shear input on until the die locates the home switch and then fires the press at the “Shear Die Distance”. Some presses require the die to be at a certain location before the press should be allowed to fire. The **“SHEAR DIE DISTANCE”** parameter controls this location for a manual cycle.

Removing the manual shear input before the press fires will result in the die halting and an error being displayed on the controller. When referencing, the die should contact the retract switch (home position switch), back away from the switch slightly, and then contact the switch again.

You should now be ready to begin testing the actuator using the “Run Die Test” feature. This feature can be used in the “Diagnostics” window under the menu item “Closed Loop Data”. A “Die Test” can now be performed that will simulate the line running at a specified speed with a specified part length. While in the “Closed Loop data” window, press the “F3” key to open the “Die Test” popup window. The window will prompt the operator for a simulated part length; the default number is 120 inches. Start with a larger part and work your way down to shorter parts. The controller will next prompt the

operator for a simulated line speed; the default for this is 50 ft./min. Start slow and speed up gradually.

Select the “Start Test” command button to start the simulation. The window will place a warning to “Remove material from Die!” because the die motor will actually turn and fire the press at measured target locations.

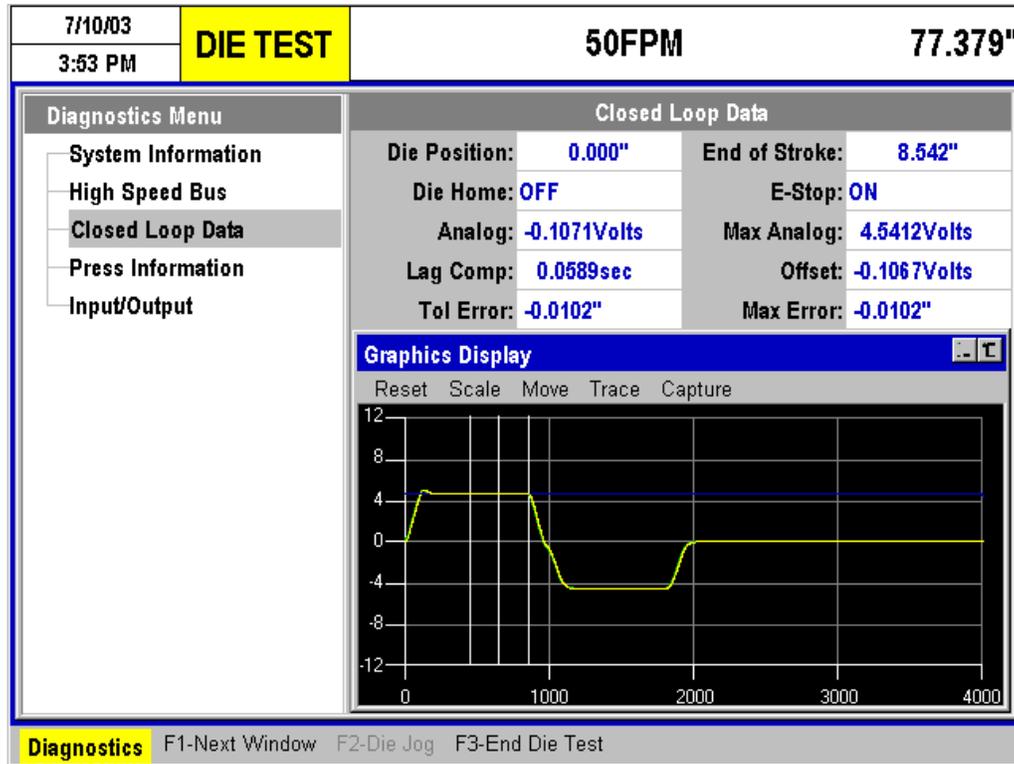


Figure 5-17. Die Testing to display feedback

While running at the lower speed, check the cycle of the press. The Die should never begin returning to the home position before the blade or tooling comes back up to a location where it would be back out of the material. The “Shear Dwell Up” time is used to insure that the die will continue forward until the die is a safe distance above the material. The die will continue tracking the material until after the “Shear Dwell Up” time is completed. This should not be larger than necessary.

If the operation looks OK, the installer can begin increasing the simulated speed a little at a time. Press the “F3” key to stop the “Die Test”, make speed or length adjustments, then press “F3” to put back into the die test mode. Make sure that there is enough stroke remaining before increasing speed so as to not trip an over-travel switch.

Use the graphic display to view the analog output, motor feedback, line velocity, and press outputs. If full-expected speed cannot be obtained, parameters such as **ACCELERATION**, **MAXIMUM VELOCITY**, or **SHEAR REACTION** may need adjustment. You will also notice that as simulated line

Setup and Calibration

speed increased, the press will start impacting “metal” further beyond the MINIMUM DIE DISTANCE. SHEAR REACTION can correct for this.

Setting Shear Reaction

The **SHEAR REACTION** time is used to fire the shear in advance of the **MINIMUM DIE DISTANCE**. This feature assists in increasing productions by firing the press early, allowing time lags associated with firing the press to occur while the die is accelerating to line speed. The following example in figure 5-18 shows a line running at 250 FPM. Higher lines speeds are not possible since the die is nearly at the end of its travel.

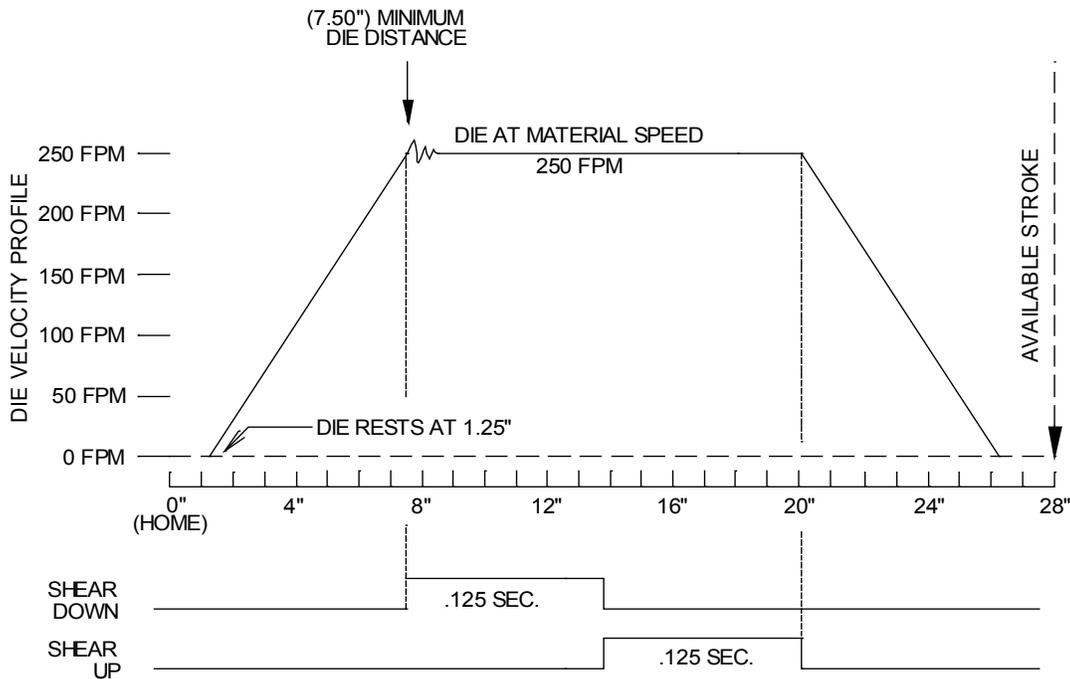


Figure 5-18. Shear die 250 FPM with no available die travel

A certain amount of time is used between the time the controller turns on the shear output and the time that the die actually impacts the material. Time lags due to relays energizing, cylinders filling with air or fluid, and the overcoming of inertia cause this time lapse called "Shear Reaction". The "Shear Reaction" parameter can correct this the press can be fired before the **MINIMUM DIE DISTANCE** if it is adjusted in such a way that by the time the die actually contacts material, it is past the minimum die distance and at a stable speed. Refer to Figure 5-19 for a graph of **SHEAR REACTION** being properly used.

With a shear reaction of .050 seconds, the press fires 2.5 inches in front of the minimum die distance. This gives the firing of the press a head start, but the die still does not hit the material until after the die has reached line speed under the target. In addition, since the die was able to begin its cycle earlier, the end of stroke is now 2.5 inches less (See figure 5-19), allowing line velocity to be increased another 10 to 12 FPM. That's approximately one additional mile of product for every 8 hours of production time!

Setup and Calibration

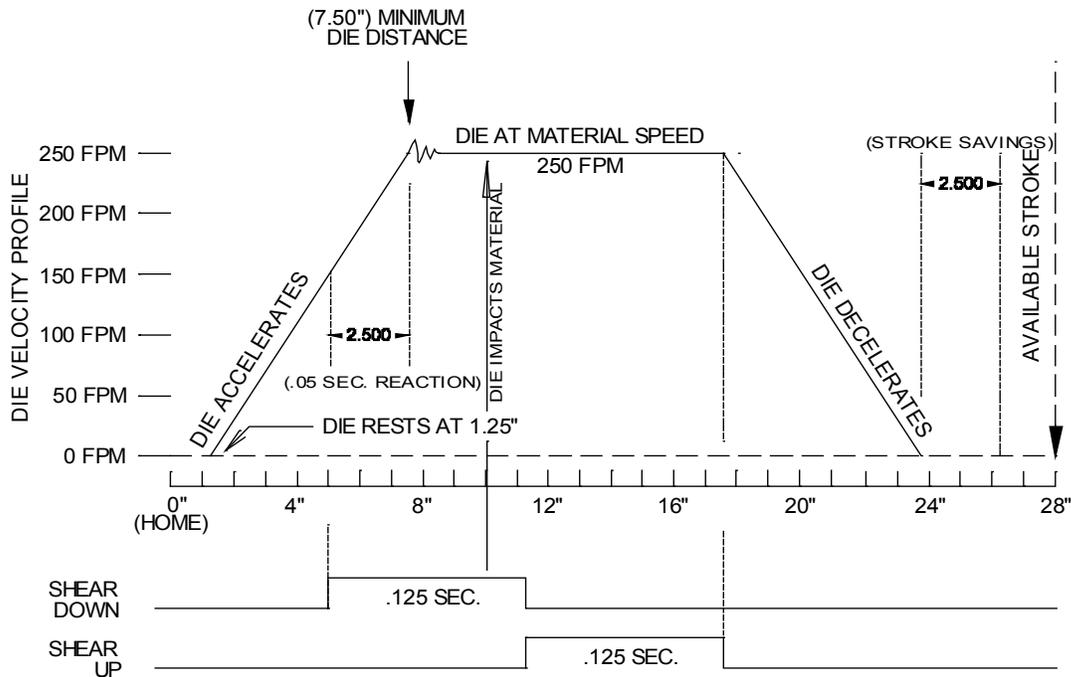


Figure 5.19 properly used shear reaction

The values used in the previous example works well for the next example. Every machine is different and reaction times will range from large to small to totally unnecessary.

- When the simulation is at its highest speed, the press will contact metal beyond the minimum die distance. Begin increasing the SHEAR REACTION time in increments of no more than 20% of the SHEAR DOWN time.
- The point of impact should start getting closer to the MINIMUM DIE DISTANCE as SHEAR REACTION increases. You will also notice the press firing earlier and a shortening of the overall stroke.
- You may be able to get to a point where the die contacts the material at the MINIMUM DIE DISTANCE while running at full speed. Keep in mind, that at slower speeds, the SHEAR REACTION may cause the die to impact before the minimum distance, so a nominal value may be desirable.
- The controller will not permit the “Shear Reaction” to be larger than the acceleration time so that it will fire the press before acceleration has begun.
- Even though the controller will limit maladjustments to some degree, some care and forethought is still required when using the SHEAR REACTION parameter.

- A SHEAR REACTION that is too large can cause the die to contact the material before the die is at full material speed or in an area of instability after attaining line speed. See Figure 5.20 for a graph of a faulty SHEAR REACTION setting. This can cause the material to be damaged and the die to “crash”.

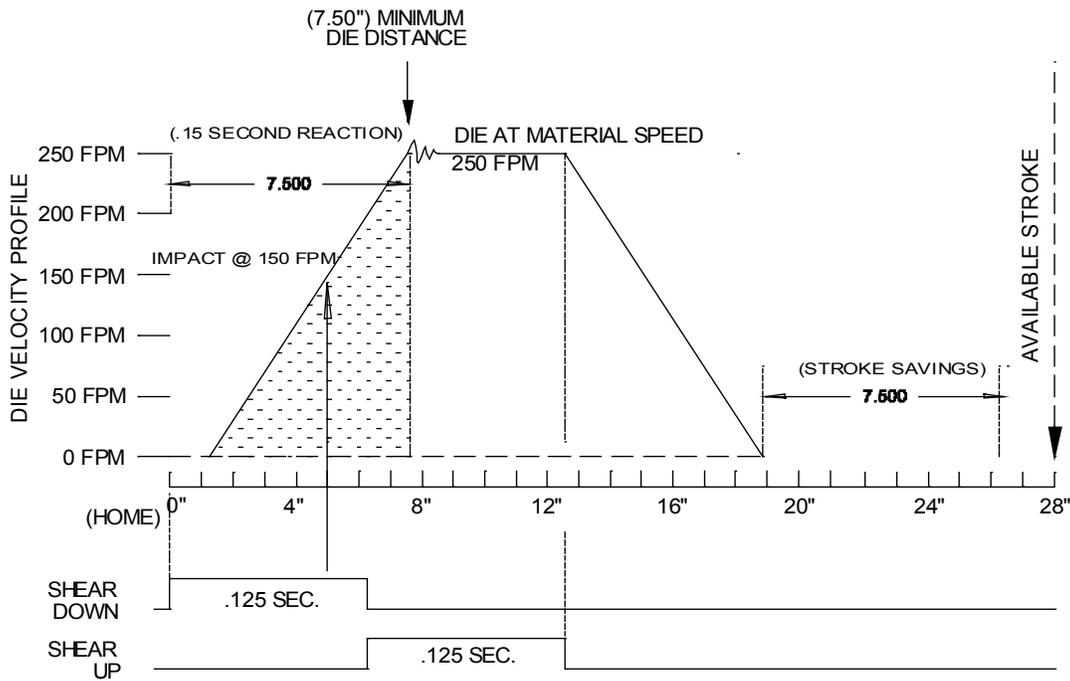


Figure 5-20 Improper use of shear reaction

A “Shear Reaction” can be programmed too large, causing a die to crash. In figure 5-20, note how the die hits the material about 5 inches into its travel. The die is only moving at 150 FPM at this point while the material is traveling at 250 FPM. With a differential of 100 FPM at the cut point, something is likely to get damaged.

Once full-expected speed of the line has been simulated, start reducing the length of the part to determine the minimum length part that can be ran at full speed. With this information, the installer should be able to load metal into the die and begin true testing of the system.

Final Accelerator Testing

Program some parts into the controller, preferably parts that are 10 foot or longer. The die should be cycled to make a referencing cut on the material. You can now begin running the machine. It is recommended to start at a low speed, and gradually increase speed to its maximum. Before increasing the speed, make sure that the die is clearing the metal before returning to the home position. Other items such as stroke length and return of the die to top-center (for mechanical presses) should also be checked for proper performance.

The Graphics Display screen will provide a good visual image of how the system is performing. A detailed explanation of this feature is available in chapter six of this manual.

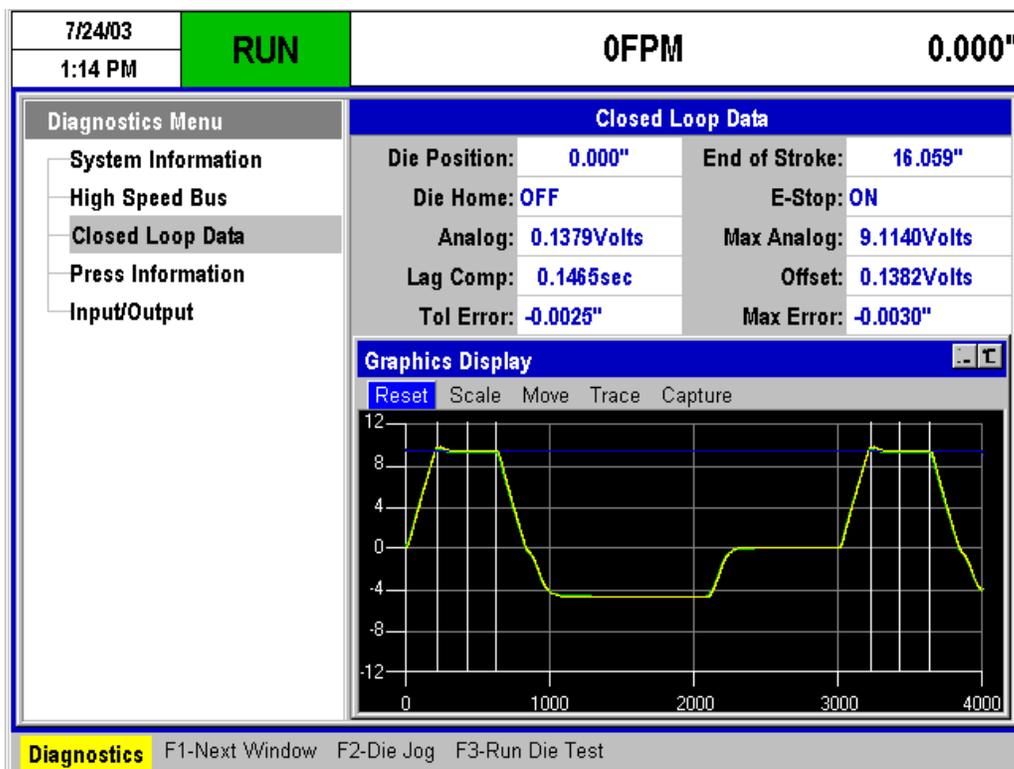


Figure 5-21. Test run using the graphic display

The installer can calibrate for length inaccuracies at any time now. Use the "Trim Correction" feature found in the SETUP screen. The controller will show the size of the parts being produced and will prompt the operator for the lengths that are actually being measured. It is best to use an average from a sample of lengths. The operator will then be prompted to change the CORRECTION FACTOR by selecting "yes" or "no". The CORRECTION FACTOR will correct for any consistent length variation caused by imperfections in the measuring wheel or other tracking devices used by the encoder.

Once the system is tuned in for optimum performance, all of the setup parameters from {Machine Data} should be recorded for future Reference.

CLOSED-LOOP FEEDER SETUP

Motor Isolation

It is recommended to isolate the motor or the material from the feed rolls so that the material will not actually move if the motor turns! This is a safety precaution in case of mis-wiring or improper setting of the controller or drive system. Failing to do this may result in the loss of feed roll control and subsequent injury to personnel or damage to the machine and controlling equipment!

It is recommended that anyone installing and/or starting up a new AMS control system should become familiar with the machine configurations (chapter 11) and parameters (chapter 2). Persons installing closed-loop systems should also have some previous knowledge of basic drive parameters and operation.

Please refer to the section on “Installation” in Chapter one as the AMS controller and drive system is being installed. Make sure that the wiring being used meets all specifications and that it is routed appropriately.

Initial Setup Parameters

After the controller has been properly installed and all wiring has been double-checked, the basic controller parameters can be programmed. Required parameters will include the Shear Dwell Down, Shear Dwell up, Line Resolution, Motor Resolution, Loop Gain, Jog Velocity, Max Velocity, Acceleration.

Shear Control Parameters

AMS 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 9.999 seconds. On controllers that do not use a SHEAR BOOST output, a **SHEAR UP** is also programmable with a range of 0 to 9.999 seconds. Please refer to the timing diagram on Figure 5-22. Each dwell time is programmed for .125 seconds.

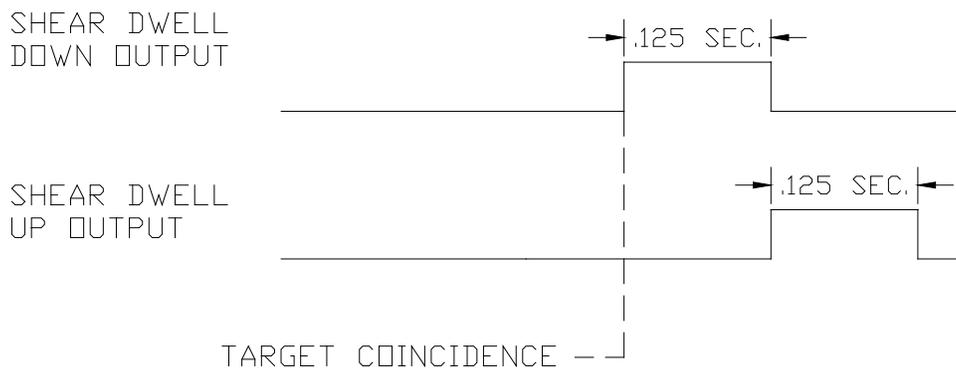


Figure 5-22 Timing Sequence of Shear Dwell Times

Setup and Calibration

Input number four (#4) on the controller is the “Shear Complete” input. If the AMS controller detects a switch closure at this input during the “Shear Dwell Down” time, the dwell time is overridden and the output will turn off immediately (Figure 5-23).

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 will “time out” as programmed regardless of the complete input.

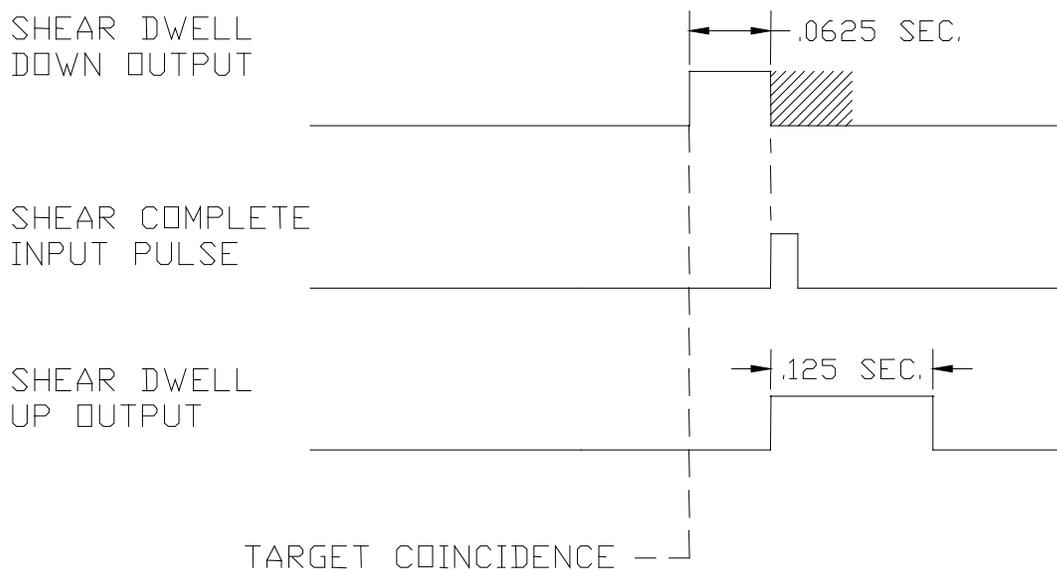


Figure 5-23 Shear Output/Dwell Time Relationship

Set the shear dwell times to some value that would be expected to work. 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.

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 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 from “normally closed” to “normally open”. The location of the switch or cam will not have to be moved in most cases.

Line Resolution

It is always critical to correctly calculate your Line and Motor resolutions before installing parameters and testing your system.

Keep in mind, that all feedroll systems do not require a line encoder, although a line encoder may insure higher tolerance parts.

If the “Single Encoder” mode is selected via the type setting switches, then only the motor encoder input on Encoder Input #1 will be used.

If “Two Encoder” mode is selected, the line encoder input will go to Encoder Input #2.

A “Sheet Detect” switch input must be used when using two encoders! See Figure Chapter 10 for proper mounting of the Sheet Detect switch!

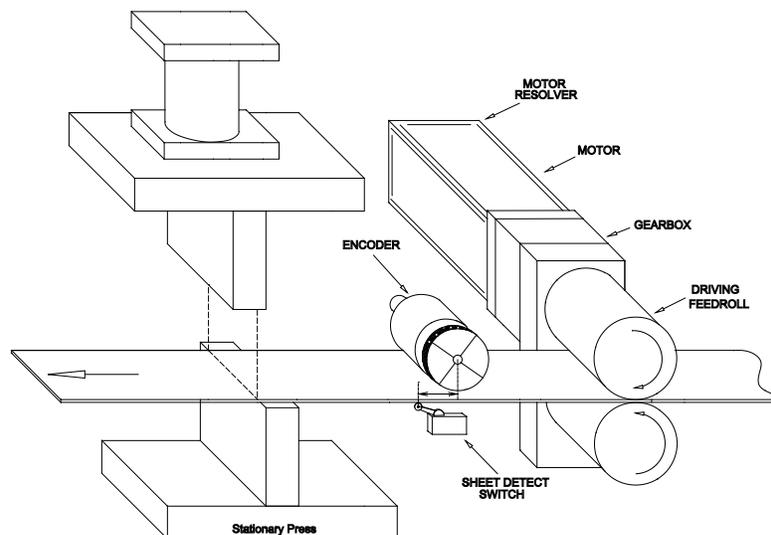


Figure 5-24 Typical two-encoder feed-to-stop system.

The sheet detect must come just after the material travels under the line encoder. This signals when the AMS controllers switches its material tracking from the motor encoder to the line encoder. The line encoder must be on the material and stable before the sheet-detect input is given. If this switch is not mounted correctly, control over the feed rolls may be lost and rapid, uncontrolled movement of the material may occur.

IF used, the LINE RESOLUTION parameter will need to be entered before testing is performed. This 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.

Setup and Calibration

The way to figure the LINE RESOLUTION is by dividing the circumference of the encoder wheel by the number of PPR (Pulses per Revolution) from the encoder.

- The **circumference** of the wheel is determined by measuring the diameter of the wheel and multiplying that number by pi (3.1416).

$$\text{Circumference} = \text{Wheel diameter} \times \text{Pi (3.1416)}$$

- The PPR (pulses per revolution) is determined by multiplying the rated number of encoder counts by (4). The model number of an AMS encoder represents the number of counts from 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.

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

EXAMPLE

A wheel 5.0 inches wide is mounted onto a model 1000 encoder. The formula will show how the resolution is calculated.

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

Figuring Motor Resolution

A feedroll motor may be attached to a feedroll directly, to a gear, to a pulley, a chain sprocket or other such device. The MOTOR RESOLUTION parameter will reflect the amount of material movement per count from the motor encoder. The final movement of the material after one revolution of the motor will replace “Circumference” in the “Resolution” formula.

$$\text{Motor Resolution} = \frac{\text{Material_Motion} / \text{Motor_Revolution}}{(4 \times \text{Motor_Encoder_Counts})}$$

First of all, the motor drive will provide a “counts per rotation” setting or settable parameter. This will direct how many counts the drive gives every time the motor turns one time. The drive system being used may require what kind of feedback is to be given. “Simulated encoder output” needs to be selected for the AMS controller to work properly with most drives

EXAMPLE

- **Feedroll 6 inches in diameter**
- **Drive motor that feeds back 2000 counts per revolution of the motor**
- **Motor is driving a gear with 8 teeth.**
- **Feedroll is driven by a gear with 16 teeth.**

5

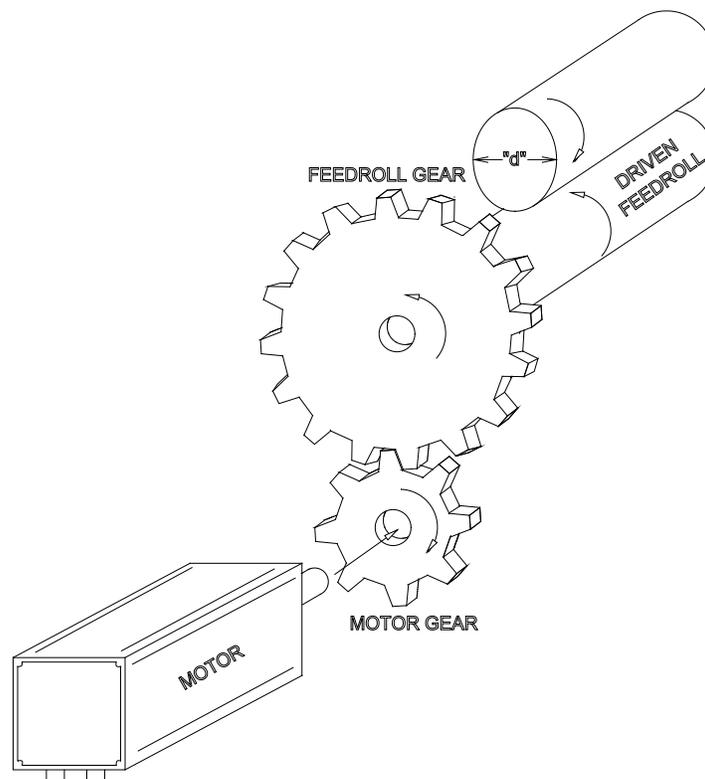


Figure 5-25 Example for Figuring Motor Resolution

Setup and Calibration

1. Figure the circumference of your feedroll. You can get the feedroll circumference by multiplying the diameter of the feedroll by pi (3.1416). In our example, this equals 18.85 inches. This will be how much material is fed per one revolution of the feedroll.
2. Divide the number of teeth on the feedroll gear by the number of teeth on the motor gear (this will work the same for pulleys, except you divide the circumference of the feedroll pulley by the circumference of the motor pulley). You will come up with a ratio of "2".
3. Divide the feedroll circumference by the gear ratio. Divide the 18.85 inches by the ratio of "2" to find out far the material moved during one revolution of the motor gear. The answer will be 9.425 inches.
4. Divide the distance per revolution by the number of pulses from the motor encoder. The drive was set to 2000 counts per revolution, but like the line encoder, it must be multiplied by 4 to find the number of encoder pulses. This makes the pulse count 8000. 9.425 inches divided by 8000 gives us a resolution of .0011781.

This formula would apply:

$$\text{(Feedroll Circumference X 3.1416) / Gear Ratio / (Simulated Encoder Counts X 4)}$$

Our example supplies these variables:

"d"	=	6 inches
Feedroll Gear	=	16 teeth
Motor Gear	=	8 teeth
Motor Counts	=	2000

The formula is then solved for Motor Resolution:

$$\begin{aligned}\text{Resolution} &= (6 \times 3.1416) / 2 / (2000 \times 4) \\ \text{Resolution} &= 18.8496 / 2 / 8000 \\ \text{Resolution} &= .0011781\end{aligned}$$

Loop Gain

The loop gain parameter controls how quickly the controller drives the motor to correct for any position error between where the motor is commanded to be and where it is actually measured to be. A low loop gain will sluggishly compensate for any position error. A high gain may actually overshoot the target and oscillate. When starting a system up, a low loop gain such as 2 is a good starting point to avoid jerking or oscillations.

Acceleration

The Acceleration parameter controls the rate at which the motor will change velocity while moving in the forward direction. A low acceleration rate will cause the motor to take off slowly and gradually increase speed, whereas a high acceleration will move the motor quickly to the next commanded speed. A low acceleration is best to start with, such as 50 to 100 inches per second squared.

Maximum Velocity

This parameter will set the motor velocity when running in automatic. A small number such as 50 to 75 feet/minute is advisable when setting up for the first time.

Jog Velocity

This parameter will set the motor velocity when jogging the die. A small number such as 10 to 25 feet/minute is advisable when setting up for the first time.

Initial Directional Check

Begin by verifying that the directional settings for the Motor encoder, line encoder and Analog command signal are correct. The previously covered parameters will need to be entered in order to accomplish this. Only parameters relating to setup of the system will be dealt with in this section.

As discussed, input low, starting values into the necessary parameters for initial startup:

➤ Line Resolution	=	Calculated
➤ Motor Resolution	=	Calculated
➤ Loop Gain	=	2
➤ Acceleration	=	50
➤ Maximum Velocity	=	50
➤ Jog Velocity	=	10
➤ Slow Velocity	=	20

Once programmed, the system can be tested. Press the DIAGNOSTICS key to display the diagnostics menu. Highlight the “Closed Loop Data” menu selection. Upon doing so, the function key bar will display the purpose of each function key while in that screen. Since the first test needs to be very simple, press the “F2” key to place the controller into “Die Jog” mode.



The information shown in the right-side window displays pertinent information regarding the loop control and die position. The status bar at the top of the display and to the left should be yellow and display “DIE JOG” once the “F2” key is pressed.

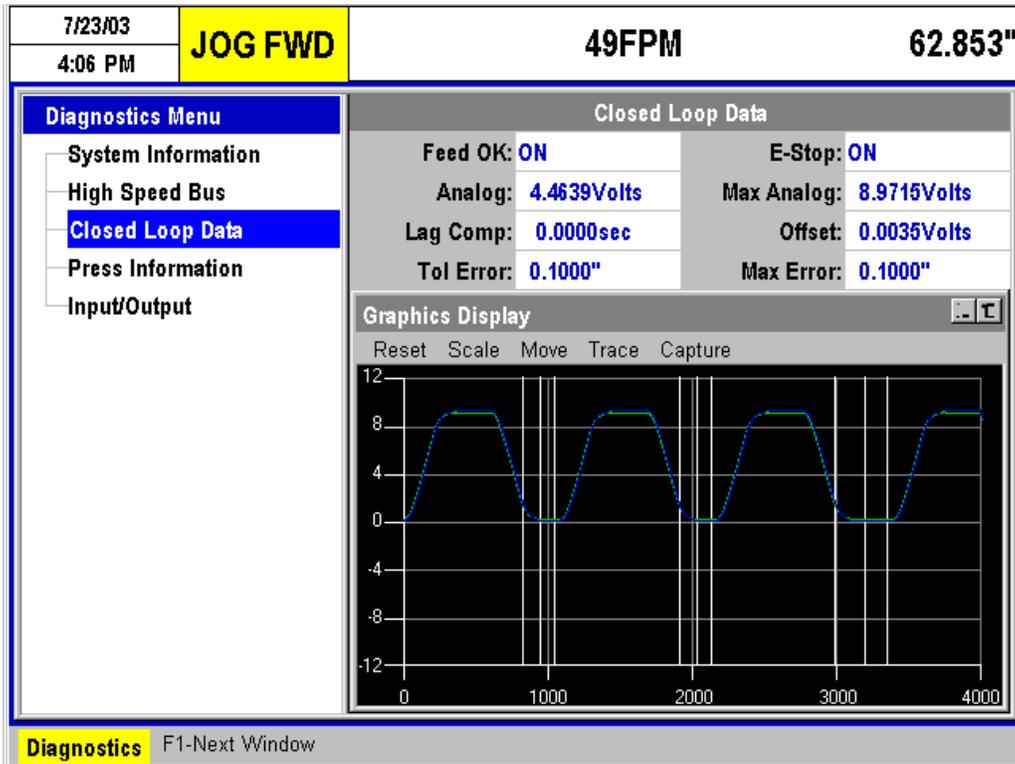


Figure 5-26. *Closed Loop Data* Selection Screen in "DIE JOG" mode

Before enabling the motor by pressing a jog, run, or shear input, spin the motor shaft in the direction that will be considered the forward direction. This window displays the motor position so the counts on the "Jog Die" screen should count in a positive direction when moving forward. The main status screen will also show an increasingly positive count when moving in the forward direction. If the counts are not going in the right direction, review the type setting switches found on the back of the controller. This manual provides a switch-setting guide in chapter 11. You will need to change the typesetting switch #1 for "encoder #1 feedback" (Motor Feedback).

Once the typesetting switch is changed, cycle power to the controller. Anytime the typesetting switches are changed, the change in operation will not occur until after power to the controller is cycled.

Perform the directional test over again to double check and verify that the motor is spinning in the forward direction and that the encoder display on the "Jog Die" screen is counting positive.

At this point, initiating a "Jog Forward" input to the controller should make the motor turn in the forward direction. If the motor runs away or gives control errors, the "Analog Polarity" type-setting switch may need to be reversed from its present position. Change the setting on the "Analog Polarity" switch and cycle power. If the same problem reoccurs, the simulated encoder feedback from the drive to the controller may not be attached or not setup properly in

Setup and Calibration

the motor drive itself. Make sure that the drive is setup to provide a simulated, quadrature encoder output. Verify that the resolution is correct.

If a line encoder is also used, it should be checked for the proper direction. Spin the encoder in the direction it will track as “forward”. A sheet detect input switch needs to be connected so that the controller will pick the line encoder feedback when the switch is activated. Verify that the position display in the upper-right hand corner of the XL200 Series controller is counting upward in the POSITIVE direction.

At this point, initiating the “Jog Forward” or “Jog Reverse” inputs should jog the die in the appropriate direction. Jog the die in both directions, verifying that the motor moves in the correct direction and at a consistent speed between the two directions. The direction parameters and switch settings should now be correct. If other problems occur, check [Chapter #6](#) for possible corrective actions.

Tuning the Motor Drive

Once the directional settings have been verified, the remainder of the parameters can be modified.

Drive Command Signal

The XL200CL Series controller uses a +/- 10-volt analog signal to control servo motor controllers. This is a differential output, also known as a “10 Volt Bipolar” output.

The servo motor controller (drive) should have an adjustment that sets how much analog voltage equates into rpm of the motor. This may be digital, programmable, a potentiometer setting. For instance, a 3000 rpm motor is connected to a servo drive with a “Command Voltage” of 1 volt = 250 rpm. If this is the case, the motor will spin at 2500 rpm when commanded with the full 10 volts and top speed will not be attainable.

To test for the command signal level, set the “Jog Velocity” parameter to 50 fpm. Now, jog the die and measure the analog output out of the controller on terminals “B4” and “B5” with a voltmeter. If the expected line speed of the machine is 300 fpm, then the voltmeter should measure no more than 1/6th of the 10 volt command. This is because voltage at 50 fpm will be 6 times higher when running at 300 fpm ($50 \text{ fpm} \times 6 = 300 \text{ fpm}$). If the value is higher, then top speed will be unattainable.

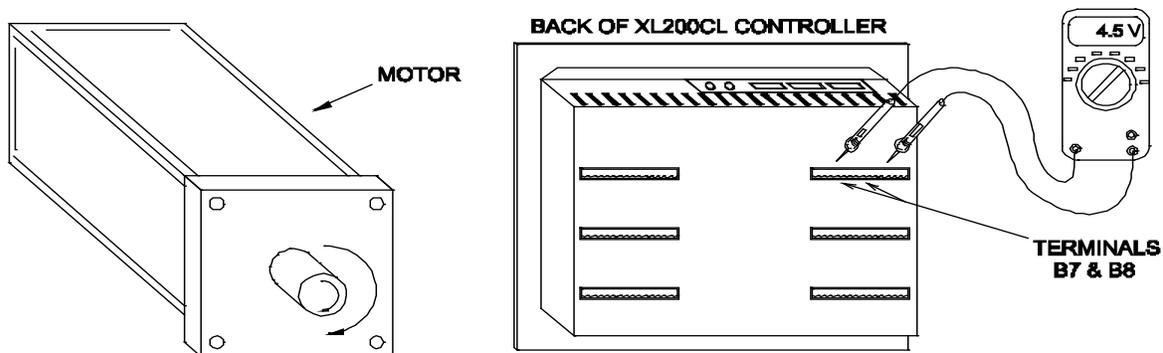


Figure 5-27. Setting the Drive Command Signal Level

If the voltage value is too small, loss of fine control may be lost. For instance, the command signal setting in the drive is set to “1 volt = 1000 FPM”. If the line is running full speed at 300 fpm, the controller is only using 3 volts to control the accuracy of the line, less than 1/3 of the available control voltage. Controllability and better tolerances could be achieved if more of the available 10-volt output was used.

It is also advisable to keep the top expected analog output at no more than 9 volts. This provides room for analog overshoot and possible line velocity variations.

Adjust the Loop Gain

The **LOOP GAIN** parameter controls the “responsiveness” of the system and should be adjusted next. The best way to adjust this gain is while jogging and halting the motor and observing how it stops and starts. The “Jog Velocity” parameter should be set to 50 fpm.

The motor should “snap” to a stop. Increase the gain if it coasts to a stop. If the motor begins to overshoot at a stop and “snaps back” to a position, it may be on the verge of oscillating and the gain should be adjusted down slightly. Gain should be kept as high as possible without going into oscillation or becoming unstable.

Acceleration

The **ACCELERATION** is the rate at which the material changes speed. It is best to keep this number as low as required performance will allow since most of the wear on a feeder system is inflicted during acceleration and deceleration. The higher this number is, the faster the material will achieve the “Max Velocity” speed setting as well as decelerate to a stop.

As in all closed loop parameters, this value should start low and be gradually increased. A setting of 50 to 75 in/sec² is a good starting amount.

Tolerance

The **TOLERANCE** parameter will set the upper and lower range of length variation that will be regarded as acceptable. For example, a Tolerance setting of .015 will accept a range of .030 inches (+. 015 to -.015). Anything outside this range will cause an error to be displayed.

Offset Volts

The **OFFSET VOLTS** parameter is an informational parameter that is automatically calculated by the controller to hold the motor stable and at a complete stop. If the drive system is balanced well, this number should be very small, .003 volts for example. If this number gets over .1 volts, some adjustment on the drive may be necessary. This parameter is automatically adjusted anytime the motor is at rest over a time interval as given in the **OFFSET INTEGRAL**. The default value is set at 100 seconds and will probably not need to be changed unless the drive system has some instability. If **OFFSET VOLTS** becomes too large due to drive misadjustment, faulty wiring, or other external forces, the die may become jerky or unstable. The controller will disable the drive system if **OFFSET VOLTS** rises over .2 volts and display a “Drive Not Responding Error”. The “Drive Enable” output must be off in order for the operator to change the value in **OFFSET VOLTS** back to “0.0”. Removing the E-stop input can accomplish this.

***** IMPORTANT!*****

On stopping lines, the AMS controller will fire the shear before the line stops moving. The controller waits until tolerance is reached, then checks for a “maximum line speed” at which it can fire the shear. This speed is calculated based on tolerance and shear dwell time. To find the speed at which your line must be slowed to fire the shear, use the following equation.

$$“S2” = 5(“S1”) = “T”/”D”$$

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 in Seconds as programmed in the Dwell Parameter

Testing the Motor

It is usually best to test the motor by itself before tuning the feedroll system coupled to the material. Press the “Diagnostic” key to open the diagnostic menu window. Highlight the “Closed Loop Data” menu selection. Use the jog forward and reverse inputs to verify the motor direction is correct and that it is displayed as going the correct direction.



The controller must be referenced before the line can be run. Press and hold the “Manual Shear” pushbutton to cause the XL200 Series controller to fire the shear. For punching machines, the shear must be fired twice to totally clear all targets and reference the controller.

With a job programmed, press the run input to run a test job. The Graphics Display will be triggered with the run input and a waveform will be recorded. This waveform can then be used to further tune the system.

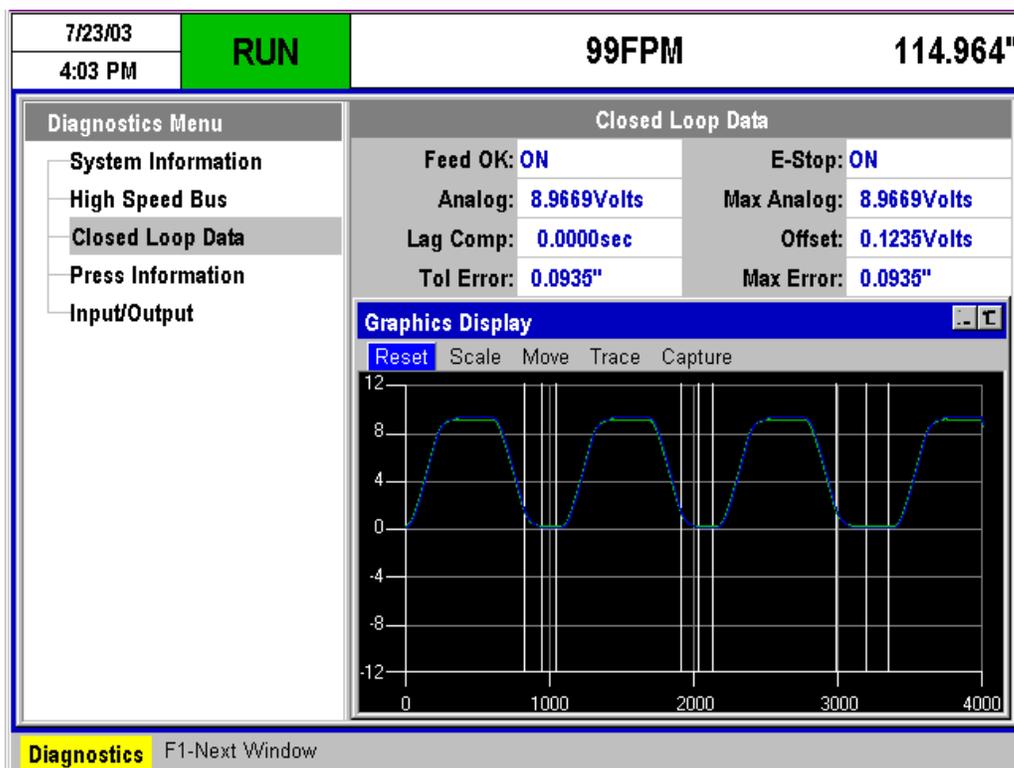


Figure 5-28. Closed Loop Data Screen

Caution should be practiced while changing these parameters during this test or during a run. DIE RESOLUTION, LINE RESOLUTION, OFFSET VOLTS, and LAG COMPENSATION should **NEVER** be changed while the test is being performed or while the line is actually running. This can result in erratic operation of the motor and possible loss of control.

Testing the Feeder System

Couple the motor onto the feeder system or gearbox once it is thoroughly tested by itself. Once the motor is connected, the input shaft should be rotated by hand (if possible) to check for backlash in the system. Backlash in a feeder system can cause faulty tolerances.

Power can now be applied once the wiring has been double-checked. The emergency stop devices should have already been checked, if not, it should be done before proceeding further. All the appropriate parameters should be already installed from earlier testing of the motor.

Press the “Diagnostic” key to open the diagnostic menu window. Use the jog forward and reverse inputs to jog the feedroll forward and reverse. Verify proper direction and smooth feed. If it is not, return to the section on **MOTOR TESTING**.

Manually fire the press and make any “Shear Dwell Down”, “Shear Dwell Up”, or “Shear Complete Switch” mounting adjustments as necessary. Continue fine-tuning the shear parameters in this mode until the results are satisfactory.

You should now be ready to begin testing the system by running a test job. It is recommended to start off with a slower speed and gradually increase the maximum velocity. Program in a basic order with short pieces and run the system. Go to the diagnostics Window and select “Closed Loop Data” to view the graph of the feed command and motor feedback.

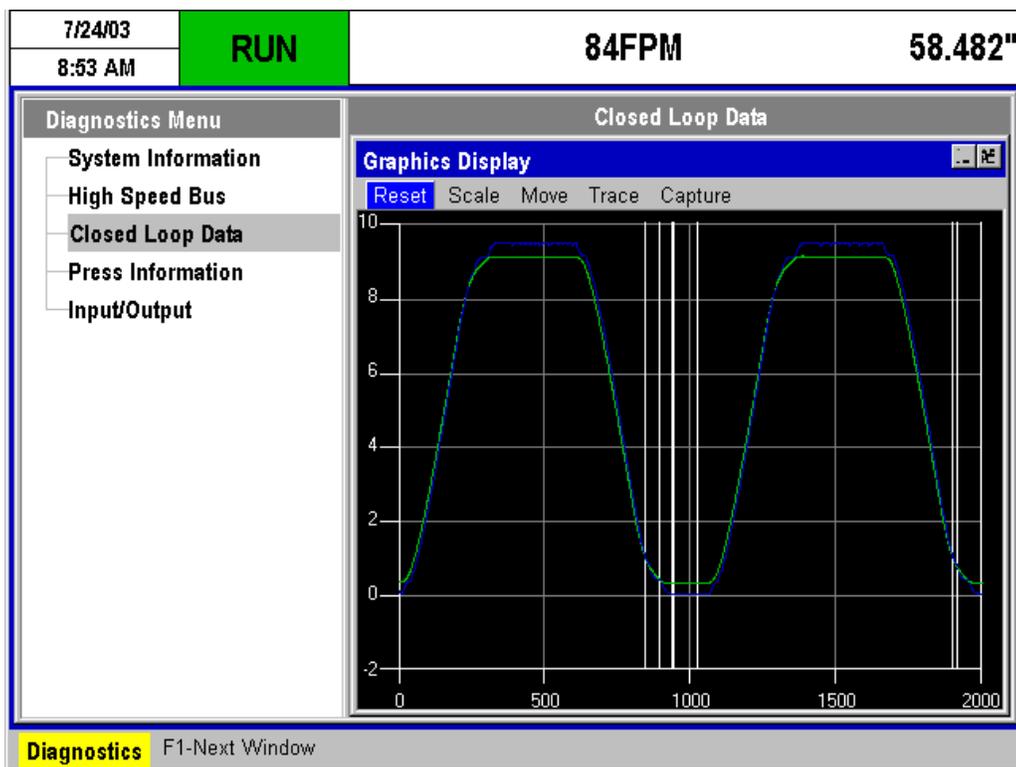


Figure 5-29. Maximized graph of parts being run

Setup and Calibration

If the operation looks OK, the installer can begin increasing the simulated speed, gradually increasing the “Maximum Velocity” parameter.

If full-expected speed cannot be obtained, parameters such as **ACCELERATION**, **LOOP GAIN**, or **MAXIMUM VELOCITY** may need adjustment.

General Input and Output Testing

Testing jog outputs (Accelerators Only)

The jog inputs and motion outputs should be tested for proper operation and direction. If the outputs do not energize properly, the XL200CL series controller has an input/output screen with which to view the states of the inputs and outputs. These screens are selected via the “Diagnostic” window of the respective controller and provide a handy means for troubleshooting. This is discussed in further detail in the “Diagnostics” chapter (Ch. #7).

If the “Jog Mode” parameter is set to “Line Jog”, initiating the jog forward input should result in the material-feeding device moving in the “forward” direction. For two speed machines, this should be at the “slow” velocity. Jogging reverse should provide the opposite feed at slow speed.

Test Encoder Direction

Manually spin the line encoder (if used) in the forward direction. The encoder should provide counts to the controller that are growing more positive when moving forward. Keep in mind that the number may be growing, but growing more negative. If the controller counts more negative while moving in the forward direction, the switch setting for “Encoder Direction” will need to be reversed. This is typesetting switch #1 on a “Die Accelerator” and typesetting switch #2 on a “Feeder”.

5

Testing shear outputs

Press dwell times can be set simply 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.

If the shear input is initiated but no shear output occurs, verify that the “Shear Complete” switch is not either stuck “on” or activated for another reason. This will cause the controller to turn the shear off immediately after turning it on, giving the appearance that it did not fire at all.

Testing the E-stop and run outputs

Before testing too many items on the line, 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.

!! 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 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. The display diagnostic information may assist the operator in the case of a problem.

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. 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. A feeder system will merely begin turning its feed rolls.

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.

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 XL200CL 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. (i.e. all parts 3/16” long, etc.)

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.

The XL200CL 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”.



6/10/03	HALTED	0FPM		0.000"
3:35 PM				
Model: XL212AABEMPE		Created: 6/10/03 2:55 PM	Switch: 4	Version: 2.00
Setup Menu	ID	Name	Value	
+ Machine Parameters	775	Last Programmed Length	120.000"	
Tool Data	776	Last Measured Length	120.125"	
Multi-Axis Data	777	Correction Factor	100.000%	
Trim Correction				
+ Controller Settings				
+ Auxiliary Controllers				
- Printer Configuration				
Bundle Tag Printer				
Part Printer				
QuickSet Data				
SetUp F1-Next Window				

Figure 5-30 Trim Correction Window

Setup and Calibration

The “Last Programmed Length” will automatically be displayed, assuming that this will be 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 will be adjusted according to the new value.

If a correction is desired, press the “F1” button 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 the “Enter” button. Upon doing so, a popup window will be displayed and prompt the user to accept the new correction factor by selecting the “Yes” command button. Selecting the “No” command button will cancel the correction.

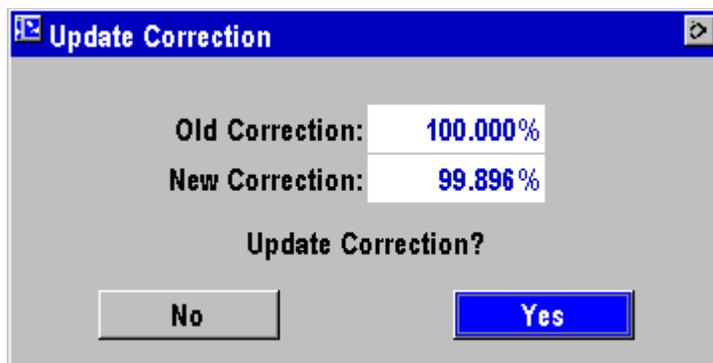


Figure 5-31 Update Correction Popup Window

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

- Run ten parts of equal lengths, 120" for example.
- Measure the ten parts.
- 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).
- Use the following formula for the new CORRECTION FACTOR. Use the average of the ten parts for "actual measured length."

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

CF = Correction Factor

Diagnostics

System Information

Information regarding software version, memory usage, and model type is located in the “System Information” window found under the “Diagnostics” Menu. This information is ideal to have on hand if calling in for service or questions regarding your control system.

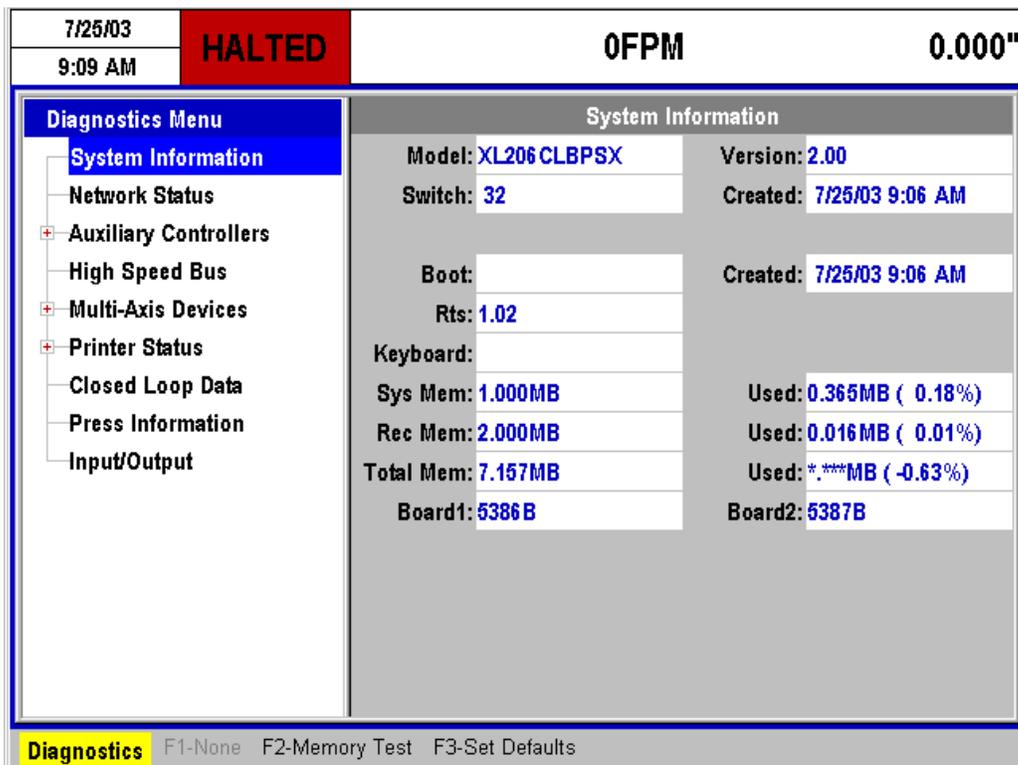


Figure 6-1. System Information Screen

6

Model:

Displays the software model installed in the controller. A specific model of software is installed for each individual application. The example in Figure 6-1 shows the controller is a Model XL206CL with, bundle ticket printer, part printer, slave controller, and multi-axis options.

Switch:

This reflects the pattern of the configuration switches located on top of the controller. These switches determine the personality of the controller such as a flying cut, stopping cut, number or presses vs. gags, and other configurations. There are 10 dip switches. The “Switch” Type setting number

Diagnostics

is the hexadecimal equivalent of the binary switches. In our example, the switches are set to 0000000100 which equals a hexadecimal “004” or “4”.

Version:

This is the version of software that is currently loaded in the controller. New software upgrades and improvements are ongoing. These new releases will be tagged with a new version number.

Created:

Displays the date that the current software version was released. This is not the date the chip itself was created.

Boot:

This is the “Boot” software version that is currently loaded into the controller. The boot code will typically not get upgraded, even though the software version may be updated several times over the life of the controller. The “Boot” program takes care of the most basic processor operations and is used for uninstalling and reinstalling versions of software.

RTS:

This is the current version of the operating system that is included with the software version.

Sys Mem:

This is the available “System Memory” that is used for the actual operating software for the controller. The amount of “Used” memory is displayed just to the right of this display.

Rec Mem:

This is the available “Record Memory” for the operators use. This will include order programs, patterns, tool information, setup values, etc. The total amount of actual “Used” memory is displayed just to the right of this value.

Total Mem:

This displays the total amount of memory installed on the controller. The example shows a large expanded memory. The standard controller will contain 1.000 MB of memory, but can be expanded for applications requiring large numbers of orders and/or patterns.

Board 1:

The model and revision number of the processor board is displayed.

Board 2:

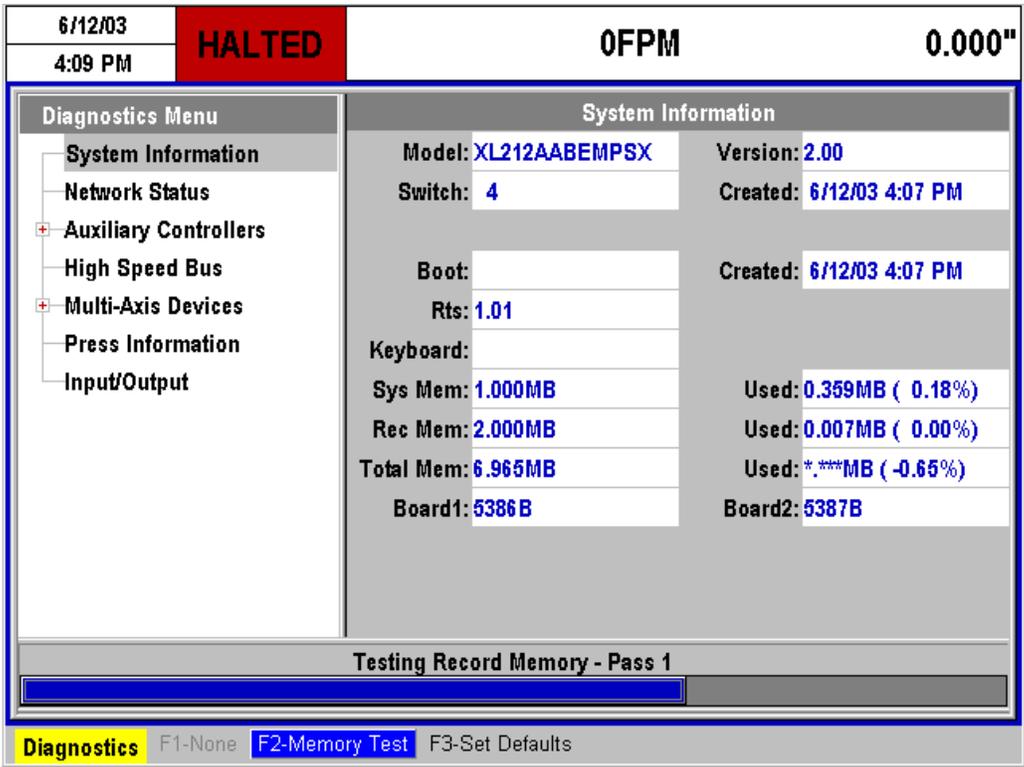
The model and revision number of the I/O board is displayed.

“F2” Memory Test

Performing a “Memory Test” causes the **XL200CL SERIES** controller to enter a self-test mode. In this mode the controller verifies all internal memory "chains." If no errors are reported, all memory can be considered good. If bad chains are detected, the number of faulty chains is displayed and the operator is prompted to clear memory or to rebuild the chains by replacing data.



To perform a memory test, press the “Diagnostics” button and highlight “System Information” as displayed at the bottom of the screen. Press the “F2” key to begin the memory test. The “Memory Test” in process is shown below in figure 6-2.



6

Figure 6-2. Memory Test Screen

Clearing Memory

Clearing memory will erase all Setup, Pattern, Tool information, and Order information in the controller's memory.

Do not clear the memory unless you have written down all Setup, Pattern, Tool information, and Order information for re-entry.

If you are experiencing controller problems, it is not recommended that you clear the memory unless you have made extensive troubleshooting checks (Found in appendix "D"). The steps listed include: checking the encoder, checking the press, performing the calibration procedure, rechecking setups, using the built-in diagnostic features, checking incoming power, and cycled power off and on.

You can clear all storage in the controller (including Setup and Order data) by following this sequence:

- Turn off power to the controller
- Wait five seconds
- Turn the controller back on
- Wait until the AMS logo is displayed on the screen and the prompt for "Click or press Enter to – Continue" is displayed in the center of screen.
- As soon as "Click or press Enter to – Continue" is displayed on the screen, press the number "5" key.
- A new window will provide a warning that memory is about to be cleared. Press the "CE" key to continue. At this point, the controller's memory will be cleared.

5



Figure 6-3. Warning window that memory will be cleared

- The screen will reset and power back up to "Click or press Enter to – Continue". Press the Enter key.
- The controller will power up and the Machine setup screen will come up with the first parameter highlighted and ready for new entry.
- Enter parameters, tools, patterns and orders back into the controller.

Auto-Download

A benefit of using the Eclipse program is that libraries of setup and tooling information can be saved at the pc. The library information can even be automatically downloaded to the controller once Eclipse-Comm recognizes that the controller's memory had been cleared.

The "Unit ID" number of the controller can be installed in one of two ways after a memory clear.

Once controller memory is cleared, the controller will display a window asking if the unit is to be connected to Eclipse. If the operator selects to connect to Eclipse, the controller will immediately prompt for a Unit ID number. With this installed, all parameters and orders will be automatically loaded right away.

Another method is to allow the controller to power up without connecting to Eclipse.

- Select the "SETUP" menu
- Highlight the "Controller Settings" menu selection.
- Press "F1" to tab back to the parameter window and highlight "Network Unit ID".

Enter in the ID number of the specific machine. Setups, Tools, Patterns, and Orders should be downloaded to the controller from Eclipse within a few minutes (provided that Eclipse-Comm is running).

6

"F3" Set Defaults

Selecting "F3" while in the "System Information" screen will cause all programmed parameters to go back to their default values.



Network Status

Viewing the “Network Status” window can monitor Eclipse communication settings and its real-time communications.

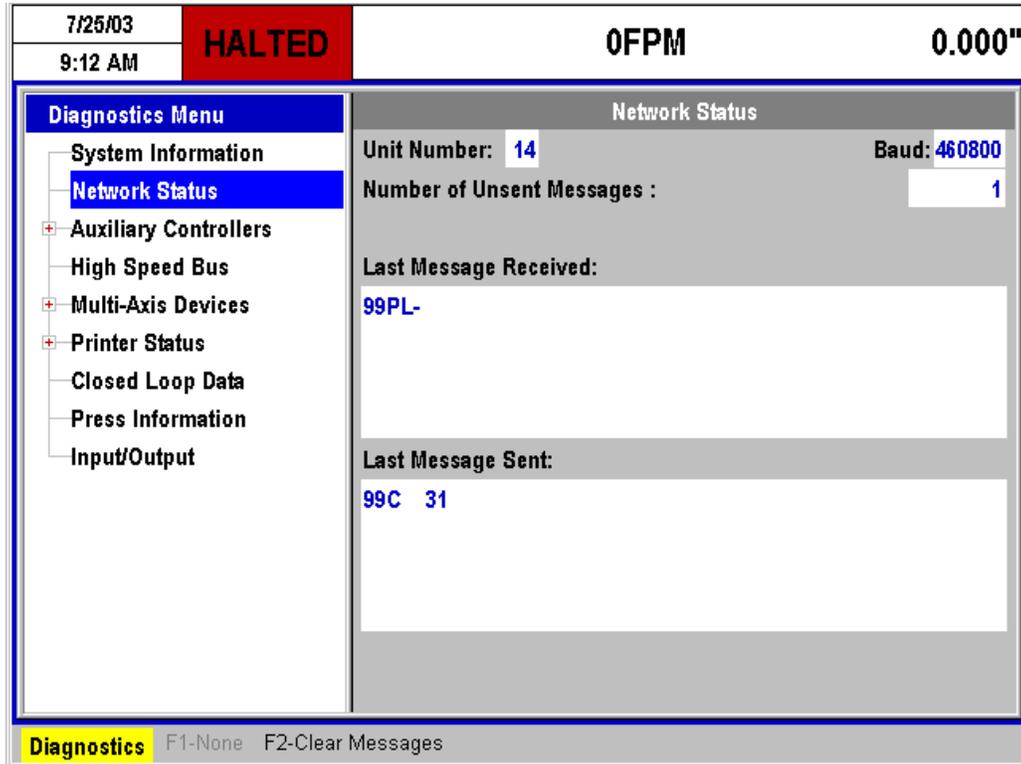


Figure 6-4. Network Status Window

Unit Number:

The “unit number” is the unique identity (or name) for the specific control system it is associated with. When multiple control systems are on the same Eclipse Communications link, each must have a unique identifier to assure that information is transferred to the correct controller.

Baud:

The “Baud” rate is the speed at which Eclipse communications are occurring. It is important to note that the “Baud” rate on all controllers and on the Eclipse communications port MUST ALL BE THE SAME. If communications are not working properly, verify that the baud rates are identical in all systems.

Number of Unsent Messages:

This displays the number of production messages that are currently recorded in the controllers memory. Every action is recorded at the controller when

connected to the Eclipse productions software. Every shear, run, and halt is recorded and will add a record to this list.

If for some reason these messages are to be deleted, this can be done by pressing the “F2” key. The “Setup Lockout” switch must be turned off to allow clearing of the message list. Once the “F2” key is pressed, a popup window will be displayed to verify this is what the user wants to do.

A blue rounded rectangular button with the text "F2" in white.

Figure 6-5. Verification Window to Clear Production Messages

If the messages are cleared, all production information contained within these messages will be lost and cannot be recovered.

Last Message Received:

Displays the last message received from the Eclipse Production Software. This is a handy tool for troubleshooting issues and in determining if the controller is communicating.

Last Message Sent:

Displays that last message that was sent to the Eclipse Production Software from the controller. This is a handy tool to verify that the controller is responding to commands from the Eclipse program.

6

Auxiliary Controllers

This menu selection is displayed only when the “Auxiliary Controller” option (or “S” option) is installed in the software program. If auxiliary controllers are connected, the menu selection can be expanded to view the status of each individual slave controller. Highlight the “Auxiliary Controllers” menu selection and press the right arrow key. 

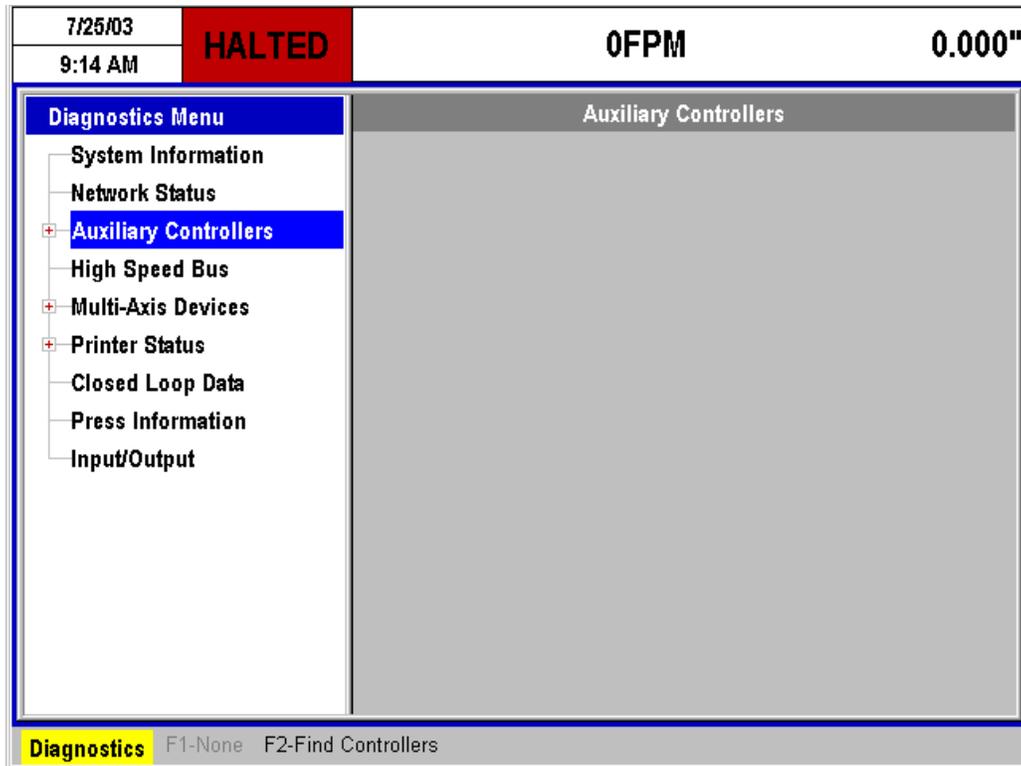


Figure 6-6. Main Auxiliary Status Screen

High-Speed Bus

A high-speed communications port is used for critical communications to devices such as drives, special controllers, and some printer systems. Critical information regarding this bus is displayed in the “High-Speed Bus” status window.

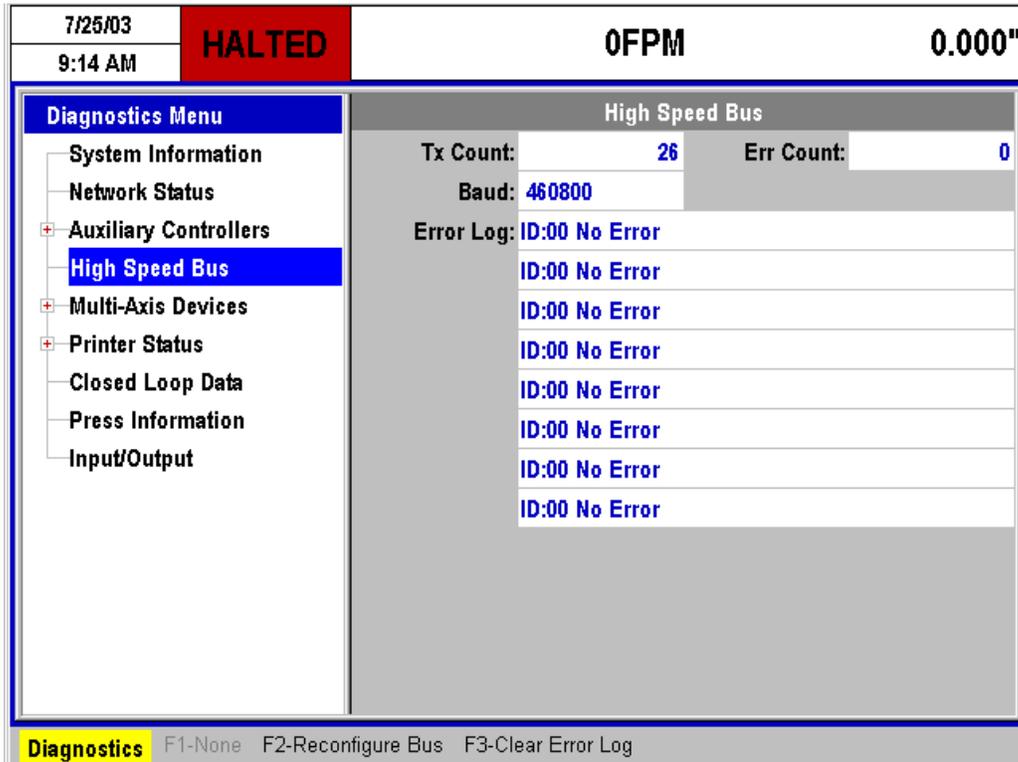


Figure 6-7. High Speed Bus Status Display

6

Tx Count:

This displays the total number of “Transmissions” that have been sent on the high-speed bus since the window was opened.

Err Count:

Displays the number of faulty or missing responses from devices on the high-speed bus. This is useful in locating problems on the communication line.

Baud:

The communication speed for the bus is displayed in this location. The example in Figure 6-7 shows a communication speed of 460.8KB. This value will vary depending on the devices being communicated with.

Error Log:

This shows the current status of devices being communicated to via the high-speed bus. Errors or special information will be displayed here until scrolled off the screen by newer, incoming messages.

Multi-Axis Devices

This “Multi-Axis” option on the XL200CL Series controller provides the ability to control the motion of dies, tools, guides, and other devices that are perpendicular to the flow of the material. Devices positioning in a direction other than the material feed (the “X-Axis”) are considered to be “Y-Axis” devices. Such devices can be viewed in the “Multi-Axis Devices” window.

Individual components within this network can be further branched by highlighting the desired field containing the (+) sign and pressing the right arrow key.

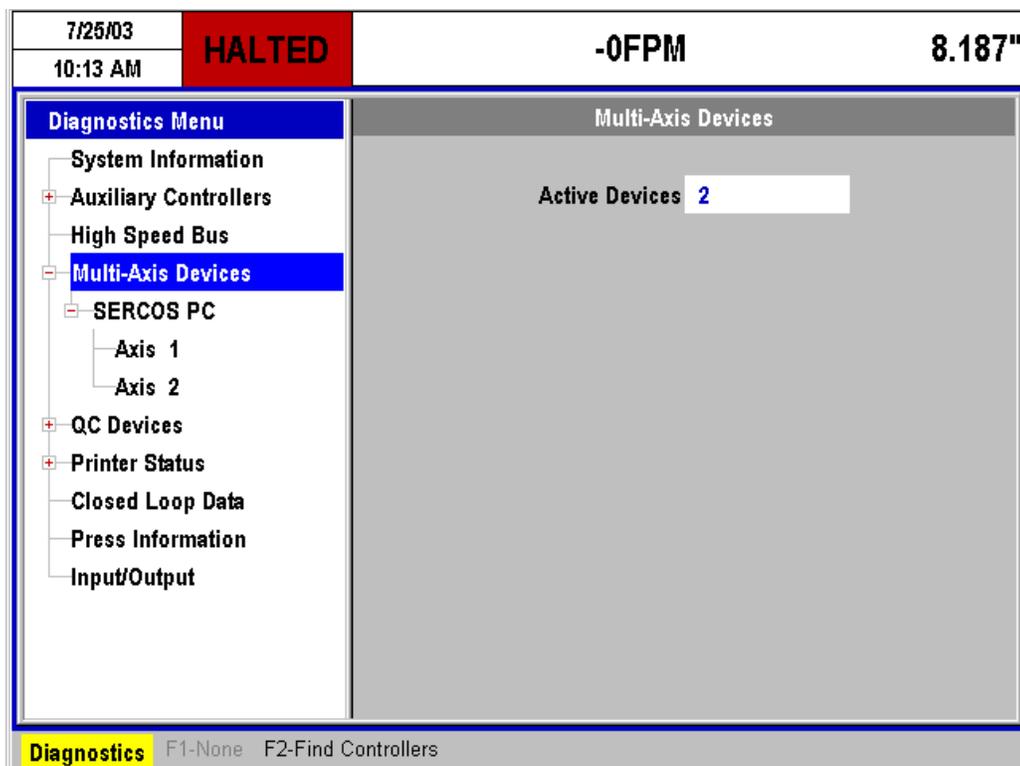


Figure 6-8. Main Multi-Axis Display

Active Devices:

The main display window will simply show the total number of devices included in the present multi-axis network.

Sercos PC

“Sercos” is the selected communication protocol for the multi-axis devices as shown in figure 6-9. Sercos is one of several industrial standardized communication schemes. Other methods are also available.

AMS uses an industrial PC to handle the Sercos interface. This Window will show the general communication settings for this particular port.

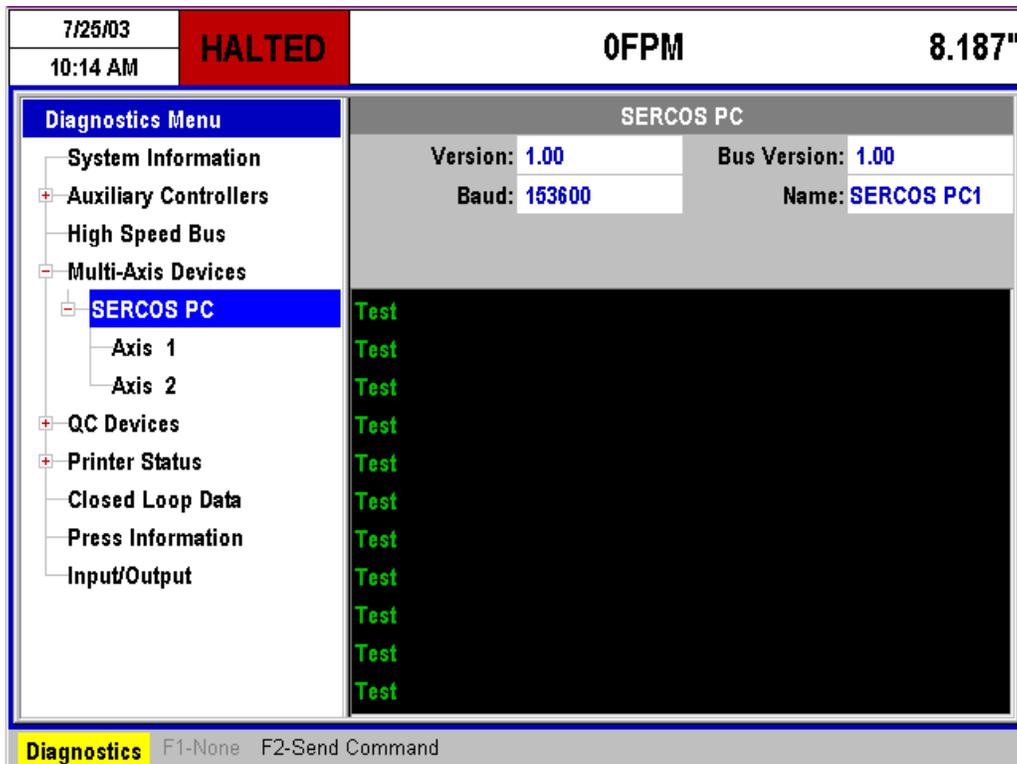


Figure 6-9. Sercos General Status and Message List

Version:

Displays the current to PC software version that is installed on the Sercos interface PC.

Bus Version:

This is the current communication software used on the PC.

Baud:

Displays communication speed between the controller and the Sercos PC.

Name:

This field displays the name given to the communication device.

The open field in the lower part of the display shows the current communication information as it is transferred.

Axis (#) Selection

Each available “Y” axis will have a separate status screen for current conditions and commands. Figure 6-10 shows an example controller window containing two “Y” axis components displayed as “Axis 1” and “Axis 2”.

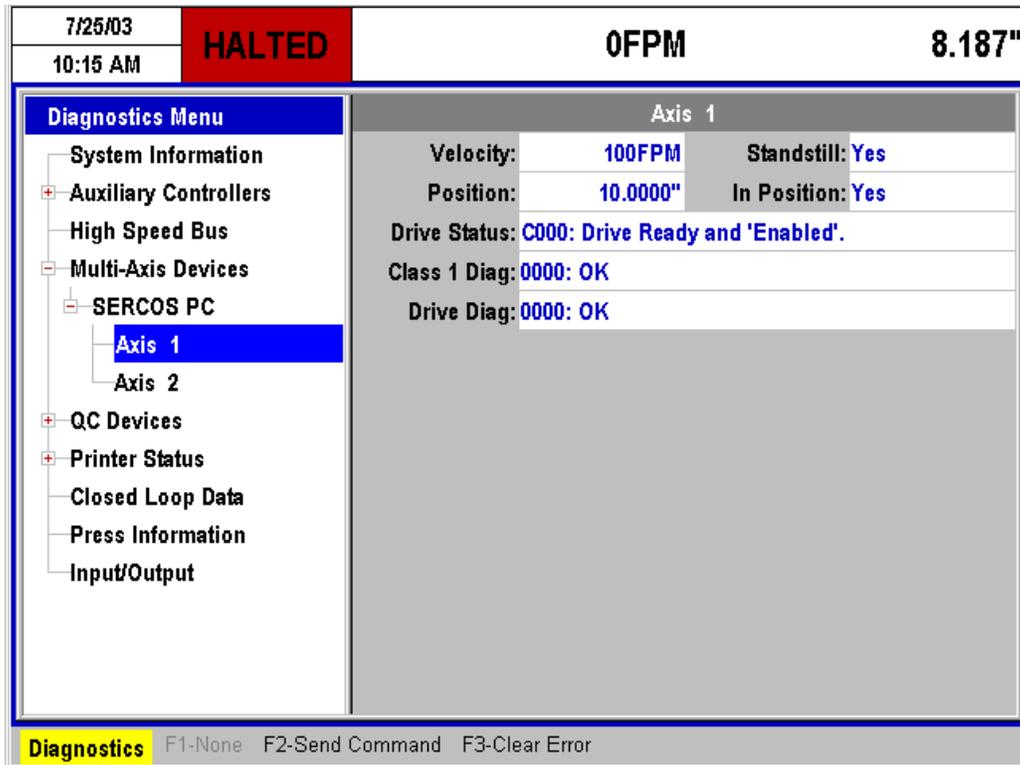


Figure 6-10. Axis 1 Status Information

Velocity:

This is the velocity that this particular axis will be moved. Shorter moves may never reach the maximum value of this parameter while longer moves will be limited by it. This value should be use in conjunction with motor speed and controllability of the system.

Position:

This value displays the current position of the “Reference Point” on the device that is being positioned by the axis. This is in reference to the center of the part.

Standstill:

The axis is continually providing feedback to the controller; whether it is still in motion or if it is idle. The “Standstill” value will tell the controller if the axis is holding still, allowing the controller to perform other operations. The value will be “Yes” or “No”.

In Position:

The axis is continually providing feedback to the controller if it has reached its target. The “In Position” value will tell the controller if the axis is ready for an operation to occur on that axis. The value will be “Yes” or “No”.

Drive Status:

The drive connected to the axis will give feedback on its condition. Typically, the system will be ready or not ready, and enabled or not enabled. The example in Figure 6-10 shows the axis controller to be “Ready and Enabled”.

Class 1 Diag:

This displays any error or status messages that are received from the axis controller regarding the internal settings and operating system of the axis control. Ideally, “OK” should be displayed.

Drive Diag:

This displays errors or status messages (Drive Diagnostics) that are generated due to operational or setup conditions at the axis controller. Ideally, “OK” should be displayed.

“F3” Function

The “F3” function key is used to clear errors that have previously been displayed on either of the diagnostics fields. Press “F3” to reset such errors and attempt to operate the device or troubleshoot it for the specific condition.




“F2” Function

The “F2” function key can be used to open a “Command Window” that allows the user to “Enable” or “Disable” the axis controller, to jog the axis in either direction, or to send the axis device to a specified position.

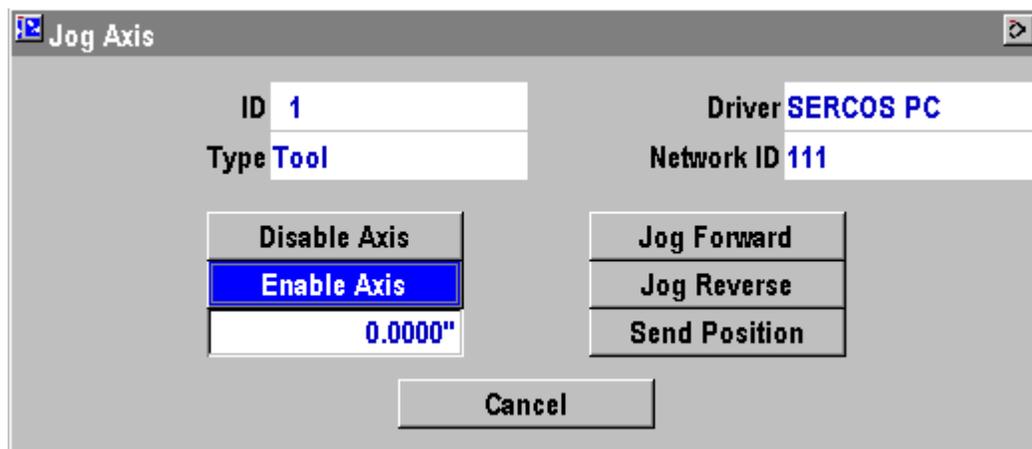


Figure 6-11. Y-Axis “Command Window”

“F2” Axis Function Displays

ID:

This field displays the ID number of the specific axis being commanded. Each axis will have a unique identifier number. If three axis's are programmed, then Axis 1, 2, and 3 will be displayed regardless of the communication links.

Type:

Provides a simple description field for the device being controlled. In the example from Figure 6-11, the device being controlled is a “Tool”.

Driver:

This field displays the type of driver (controller) that is currently controlling the axis. The communication driver for the example in figure 6-9 is “Sercos PC”.

Network ID:

This field provides the detailed identifier for the communication link between the XL200CL Series controller and the communication port for this specific axis. Each number signifies a communication identity. The example shows “111” as the network ID. This actually signifies “PC#, Communication Card #, and Device #”

“F2” Axis Function Command Buttons

Disable / Enable Axis

These two command buttons will provide the function as labeled. Highlight the “Enable” button then press the “Enter” key to cause the drive controller to be enabled. Likewise, highlight the “Disable” button and press the “Enter” key to disable the specific drive.

Jog Forward / Reverse

These two command buttons work as labeled. Highlight the “Jog Forward” or “Jog Reverse” button. Press the “Enter” button and hold it for as long as you desire the axis to jog. Let go of the “Enter” button to stop jogging. The drive will be allowed to go outside its programmed limits only when in jog mode.

When using the “Jog Forward” or “Jog Reverse” functions, the die will be allowed to go outside its specified limits. Care must be taken to avoid running the positioning device or actual component being positioned into a hard limit.

Send Position:

The field just to the left of the “Send Position” command button is used to input a desired position for the device to move to. Once the “Position” is

input into this field, highlight the “Send Position” command button and press the “Enter” key. The device will automatically move to that location. The device will not be allowed to move to a position outside of its “limits”. Limits are set in the axis “Setup” screen (Chapter two).

QC Devices (Quality Control)

“Quality Control” feedback is a new feature introduced with the Version 2 series of software for the XL200CL line of controllers. Quality devices will be attached to the “high speed bus” to communicate to the XL200CL controller.

After opening the “Diagnostics” window, highlight the “QC Devices” menu selection. This selection will only be displayed in the diagnostics window when a quality feedback device is attached and communicating to the AMS controller. Once the “QC Devices” menu item is highlighted, press the “Right Arrow” key to branch the selection out in order to view the quantity and type of feedback devices that are attached.



The example in Figure 6.12 shows that a QC100L length calibration device is attached to the XL200CL Series controller.

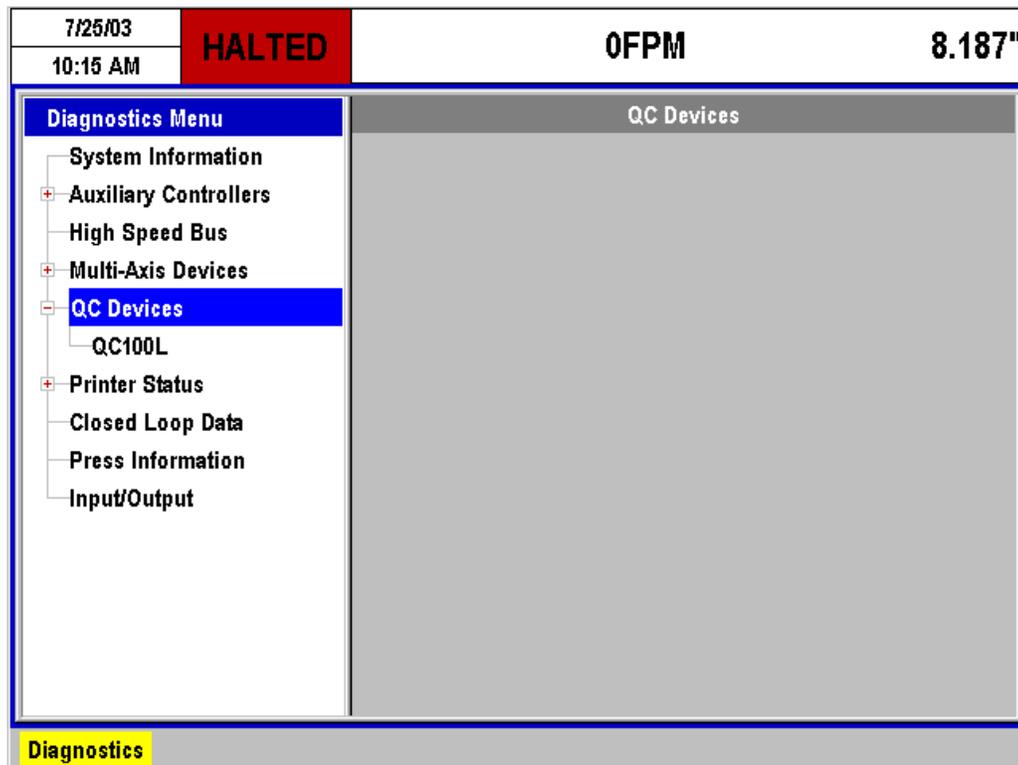


Figure 6-12. Quality Control Window

Highlight the QC100L (or other device) to view its status information. Upon highlighting the selection, status information for that device will be displayed in the parameter window on the right.

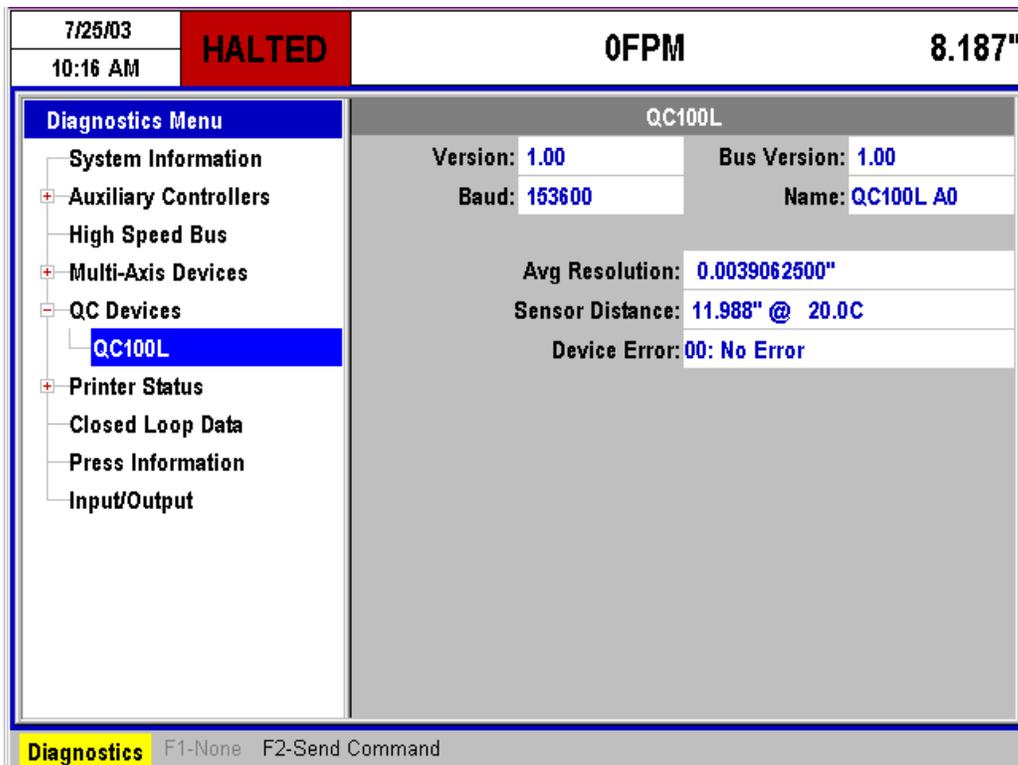


Figure 6-13. QC100L Device window

Version:

This is the current version of software used in the actual quality feedback device.

Baud:

Displays the current baud rate that the device is communicating at. The default value is 153,600 baud.

Bus Version:

This parameter displays the current software version for the "bus" driver software that handles communication between the controller and the quality feedback device.

Name:

Provides the assigned name of the quality device.

Average Resolution:

Gives the average resolution of the material encoder as recorded by the QC100L. This may or may not be upgraded automatically via the quality feedback device.

Sensor Distance:

Provides the exact distance between the two photo-sensors on the QC100L measuring block. The present measured temperature is also displayed. Temperature will cause the measuring block to expand or contract.

The controller automatically calibrates the distance between the detectors by measuring the temperature of the measuring block.

Device Error:

This is the current version of software used in the actual quality feedback device.

Send Command (F2)

Press the “F2” key to give the QC100L commands to either “Clear Memory” or to set the sensor distance to a specified length.

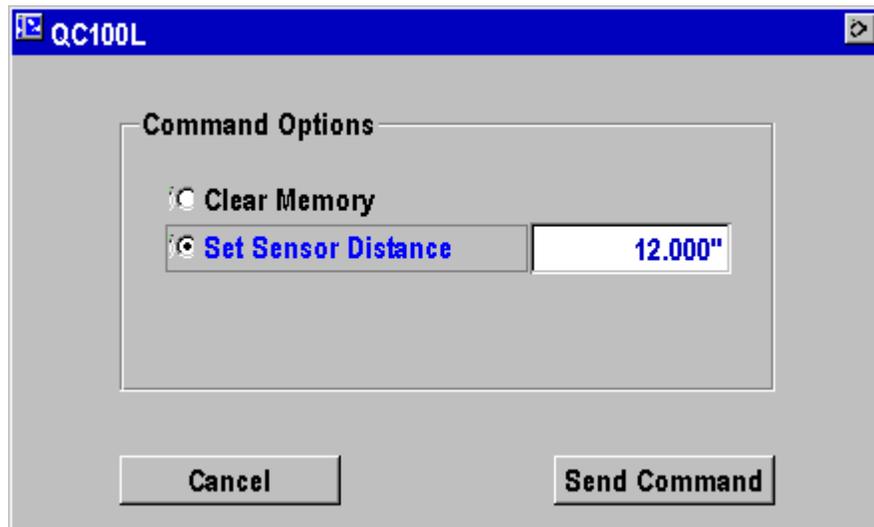
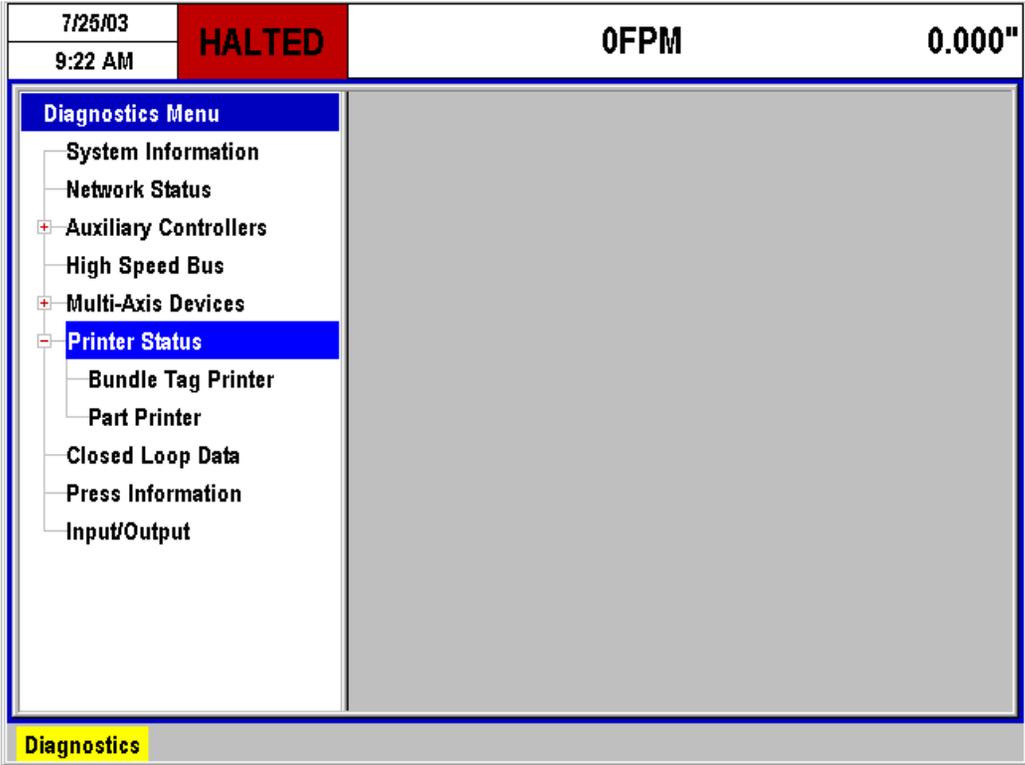


Figure 6-14. QC100L Command Popup Window

Printer Status

The status for all attached printers is available in this window. If a printer driver for a bundle ticket printer or an ink-jet printer is not selected in the "Printer Configuration" menu item (Found in the XL200CL "Setup" Menu) then the "Printer Status" selection will not appear in the diagnostic list.



6

Figure 6-15. Printer General Status

As shown in figure 6-15, no relevant information is given for the general menu selection. Highlight the "Printer Status" selection and press the right arrow key to branch out the individual printers. In the example above, a "Bundle Ticket Printer" and a "Part Printer" are both setup for operation on this controller.

Individual printers are reviewed in detail in chapter seven.

Bundle Tag Printer

A single bundle tag printer can be connected to each XL200CL Series controller. Individual printers are configured in the “Printer Configuration” window located by pressing the red “Setup” key on the controller or the “Scroll Lock” key on the keyboard.

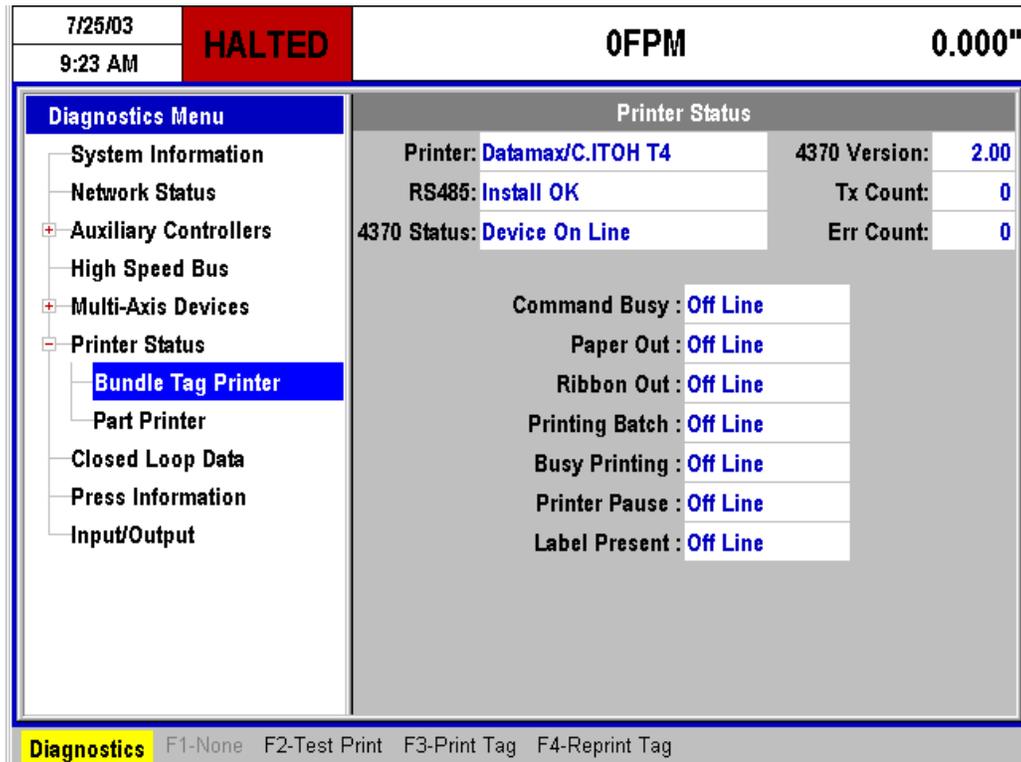


Figure 6-16. Bundle Tag Printer Status

Printer:

This field displays the make and model of the tag printer.

RS485:

Displays if the controller communications to the 4370 interface board is working properly. If the 4370 is communicating with the controller, the display will read “Install is OK”.

4370 Status:

This displays the status of the communications between the 4370 interface board and the actual printer it is attached to. If the two are communicating successfully, the field will read “Device On Line”.

4370 Version:

Displays the version of software located on the 4370 interface board.

Tx Count:

This displays the total number of “Transmissions” that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Feedback Statuses

The lower section of the window shows the present status of several conditions that are available on this particular model of bundle tag printer. These will vary depending on the model selected. For the example given (Datamax/C.Itoh T4), the feedback statuses are:

- Command Busy
- Paper Out
- Ribbon Out
- Printing Batch
- Busy Printing
- Printer Pause
- Label Present

Detailed information for feedback statuses can be found in the user manual for the respective printer.

6

Test Print (F2)

A test print can be performed to verify proper operation of the printer and printer buffer. Press the “F2” key to initiate the printer to create a test tag. This tag will print out all possible characters and then an assortment of textured lines.

A blue rounded rectangular button with the text "F2" in white.

Print Tag (F3)

A bundle tag can be printed at any time throughout the production process. Highlight the “Bundle Tag Printer” in the menu screen then press the “F3” key to cause the controller to print a current bundle tag. The controller will automatically increment the total number of bundles by 1 after this operation is performed.

A blue rounded rectangular button with the text "F3" in white.

Reprint Tag (F4)

Pressing the “F4” key while in the Bundle Tag Printer window can reprint the previously printed bundle tag. This will initiate the printer to create an identical tag to the one just produced.

A blue rounded rectangular button with the text "F4" in white.

Tx Count:

This displays the total number of “Transmissions” that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Print Information Window:

This window displays the current information transmitted to the part printer. In the given example, the AMS test message is loaded into the part printers buffer (or memory).

Test Print (F2)

A test print can be performed to verify proper operation of the printer and printer buffer. Press the “F2” key to initiate the printer to print the test message. The printed test message will look best if the line is being jogged or ran.

A blue rounded rectangular button with the text "F2" in white, representing the F2 function key.

If the material is standing idle when performing this test, it may be advised for the user to place cardboard or paper under the printer to absorb excess ink.

Closed Loop Data

The Closed Loop Data menu selection provides the ability to view several critical feedbacks and statuses of a closed loop system at one time as well as provide a visual feedback of the primary signals involved in a closed loop system.

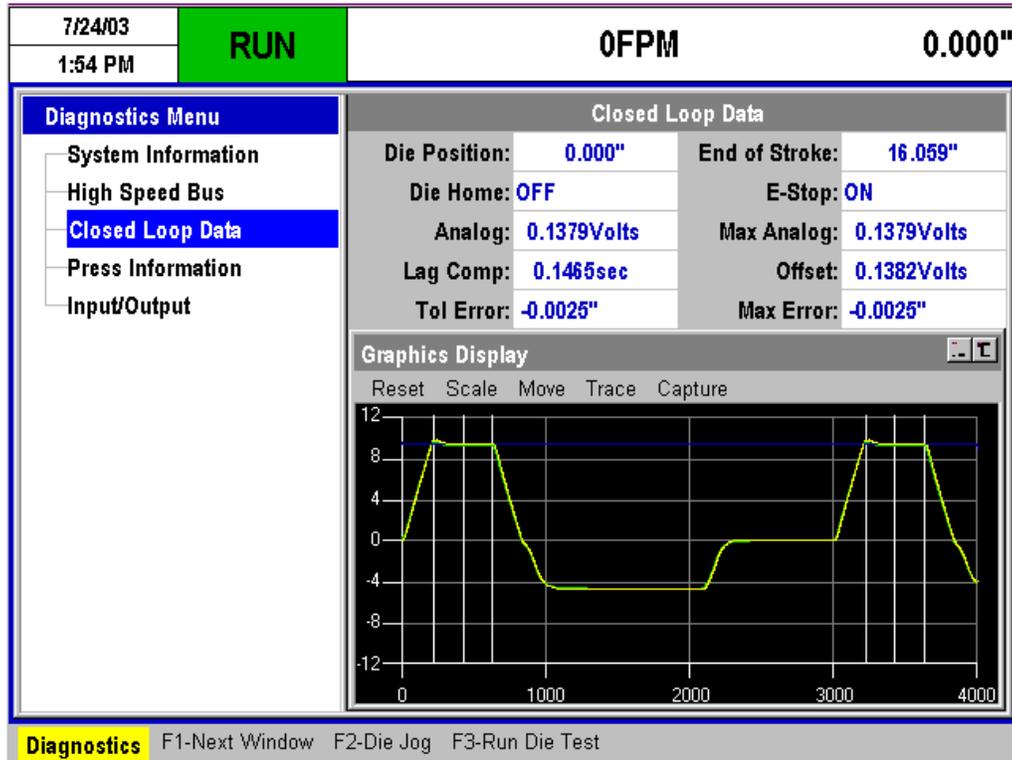


Figure 6-18. Graphic Display for Closed-Loop Systems.

Die Position:

Shows the position of the die relative to the home switch.

Die Home:

Displays the status of the home switch. The example shows that switch is "OFF" to indicate the die is away from the switch and not in the home position.

Analog:

Displays the current analog output from the AMS controller. The analog signal's range is -10.00 VDC to +10.00 VDC.

Lag Comp:

Reports the current value of the "Lag Compensation" parameter.

Tol Error:

Displays the measured error on the most recently cut piece.

End of Stroke:

Shows the overall distance the die traveled to in the forward direction during the most recent cycle of the press.

E-Stop:

Reports the current status of the E-Stop input at the AMS controller.

Max Analog:

Displays the largest analog value since the window was opened.

Offset:

Shows the amount of analog voltage required to hold the motor in position while the motor is idle.

Max Error:

Reports the largest amount of tolerance error since the window was opened.

Die Jog (F2):

Pressing the “F2” key will put the controller into “Die Jog Mode”. This enables the “Jog Forward” and “Jog Reverse” inputs to jog the accelerator die rather than the material when in jog mode. Pressing “F2” a second time removes the controller from this mode.

Run Die Test (F3):

Pressing the “F3” key will place the controller in the “Die Test” mode. In this mode, parts can be fully simulated as the controller generates material counts and runs as if material was actually running through the machine.

The “Graphics Display” window

The GRAPHIC DISPLAY window is a visually graphed representation of the Line Velocity, die motor response, and analog signal to the drive system. Select the “Diagnostics” menu and highlight the “Closed-Loop Data” menu item to display the main graphic display screen. Figure 6-19 shows a typical display of a Die Accelerator system that is not yet triggered.

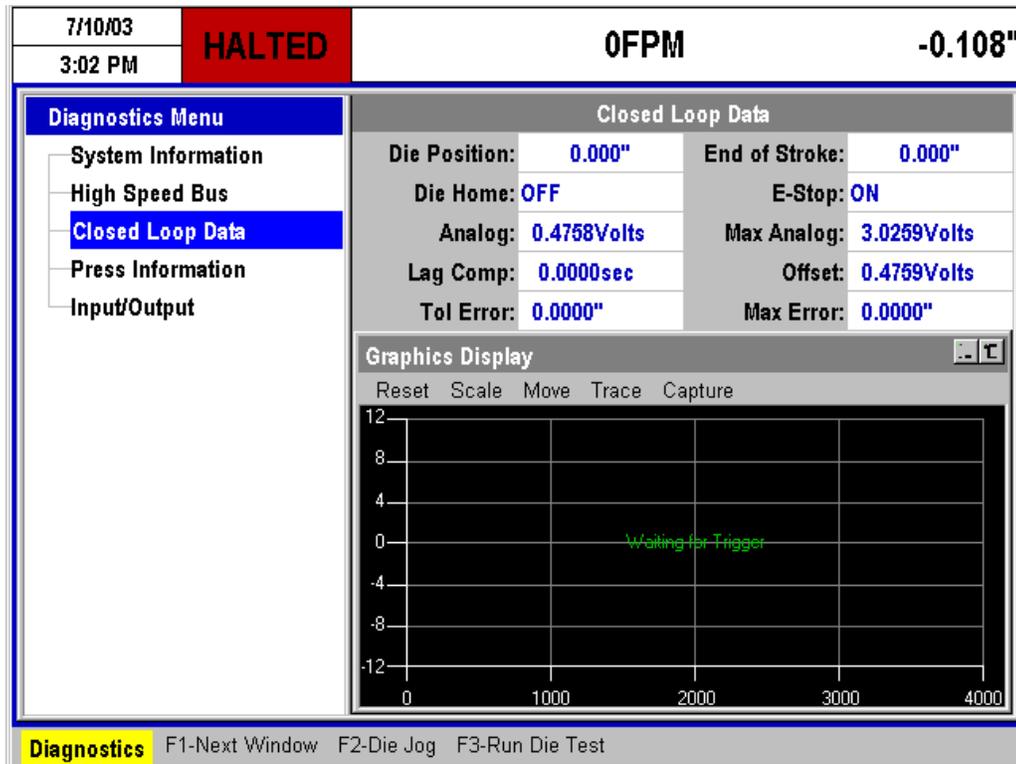


Figure 6-19. Closed Loop Data Graphics Window

The controller will display this screen when performing a Die Accelerator Test. Otherwise the controller will display the Tolerance Display information while the Die Accelerator Test is being performed. An updated Graphic display will be started if the “End” key is pressed.

NOTE: The Graphic Display will take a 4 to 32 second sample of the operation being performed (once it has been triggered). Be sure to wait for this period of time before trying to reset the machine.

Die Jog (F2)

Press the “F2” key to place the controller into “Die Jog” mode. This will cause the controller to jog the die instead of the material with a jog forward or jog reverse input. The status display at the top left of the controller screen will display in yellow background that the controller is in “Die Jog” mode.

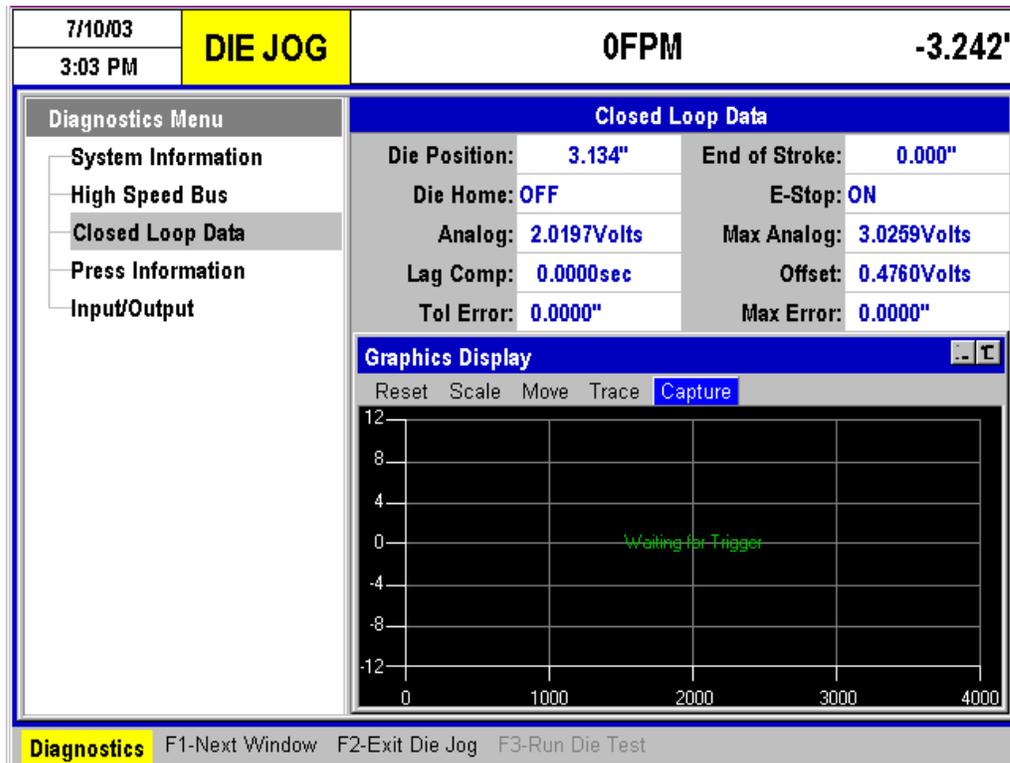


Figure 6-20. Graphic display screen in “Die Jog” mode

Note that as the die is jogged forward, the “Die Position” display counts positive, but the main status display displays the motion as negative. The two measurements are in respect to two different reference points.

The “Die Position” is displayed relative to the home input switch, therefore showing more positive as the die is moving forward.

The status display is shown relative to the edge of the material, therefore showing more negative as the die is moving forward.

Die Test (F3)

To begin a die test, take the die out of “Die Jog” mode by pressing the “F2” key again. Press the “F3” key to display the prompt for “Die Test”.

F3

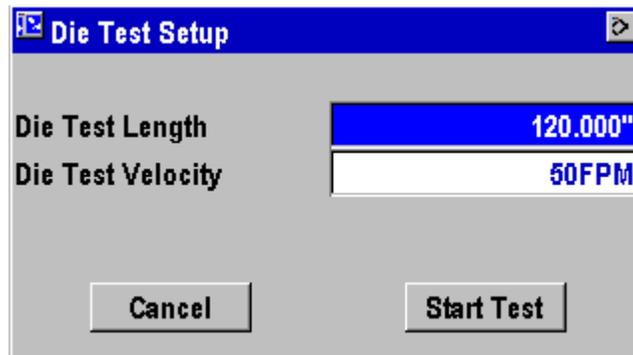


Figure 6-21. Die Test Popup Window

The “Die Test” popup window will prompt for a “Die Test Length” and a “Die Test Velocity” to perform the simulated test. This will cause the controller to operate just like the programmed part and velocity were actually running on the machine. The press will fire and cycle the die motion accordingly, so be careful of all moving parts. Once the “Start Test” command button is selected, the controller will automatically prompt for the operator to remove material from the die (since the die will actually cycle and the press will fire).



Figure 6-22. Die Test Popup with Warning

Click on the “Start Test” a second time to begin the die test. The controller will begin obtaining a new sample with the next “trigger” (cycle of the press). The first couple of cycles will probably be slightly rough as the controller automatically adjusts parameters such as “Lag Compensation” and “Offset

Volts". The example graph in figure 6-23 shows a four-second sample being displayed.

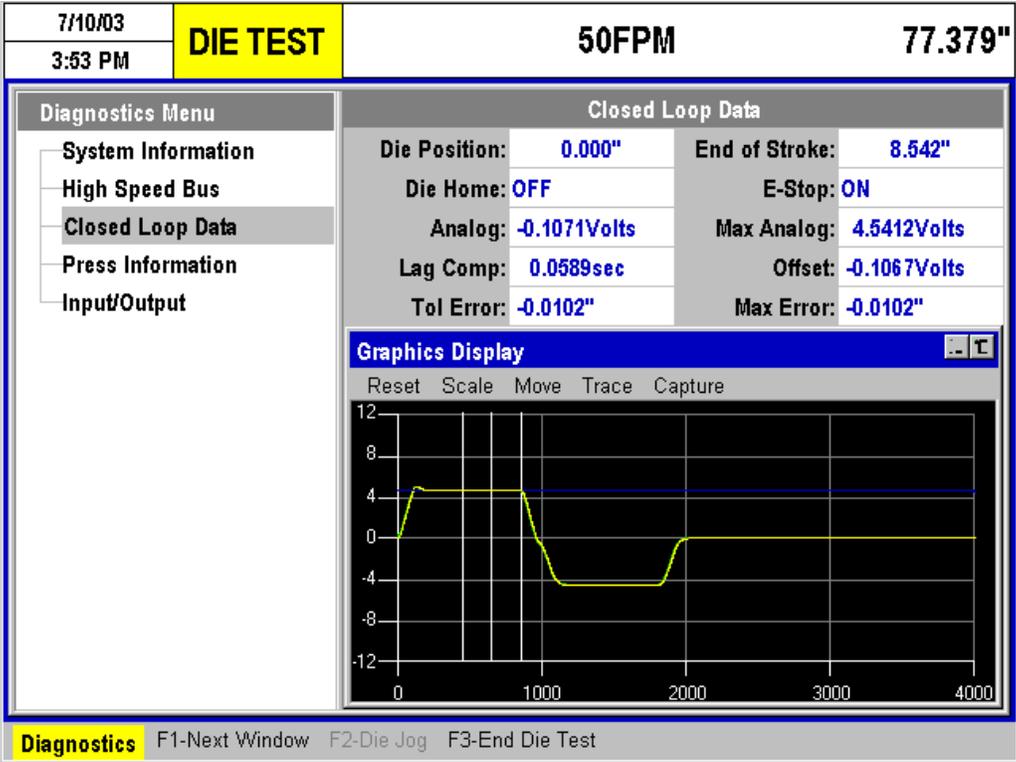


Figure 6-23. Initial Die Test Display Window

Display Description

Here is an explanation of the waveform found on the graphics display.

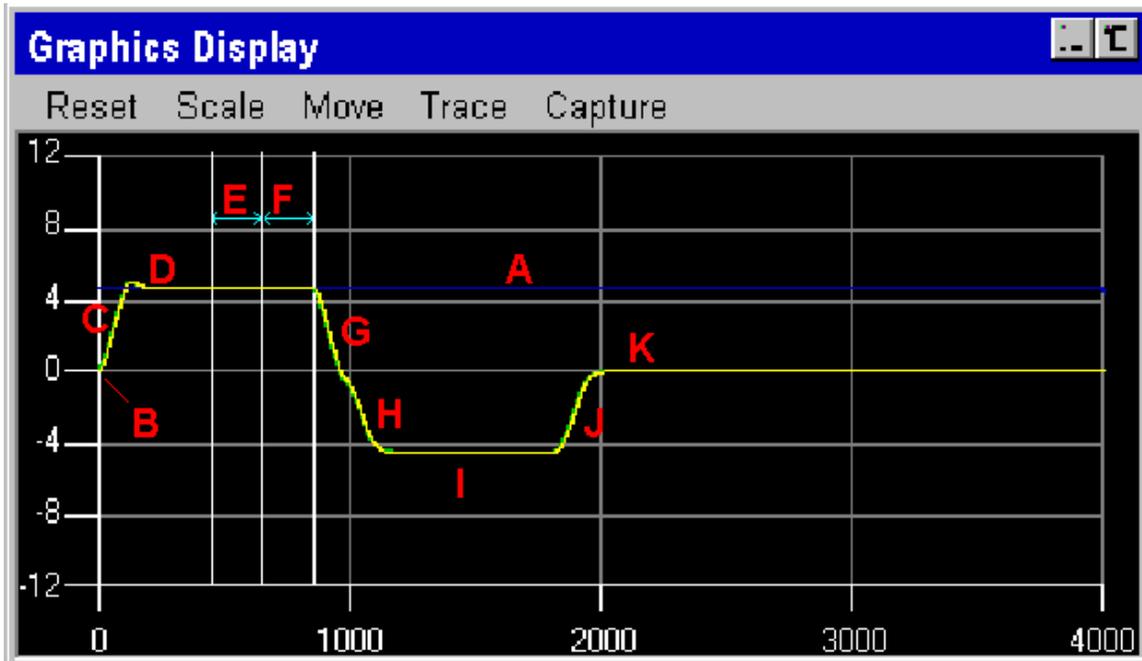


Figure 6-24. Graphics Display Description

- A. The speed that the line is moving (Line Velocity).
- B. The Analog “zero” volt reference point.
- C. The acceleration of the die to try to match the line speed.
- D. The point in which the die has matched the line speed and is tracking the material prior to the shear.
- E. The shear down time that was programmed in the Machine Data Mode. The actual shear will take place near or at the line between E and F.
- F. The shear up time that was programmed in the Machine Date Parameters. If an Advance After Cut time was programmed, it will be seen during this time as an increase in the positive direction.
- G. The deceleration of the die to a stop after the shear is made.
- H. The return acceleration necessary to force the die to return to the home position.
- I. The constant speed movement of the die as it returns back to the home position.

- J. The deceleration of the die to stop at the home position.
- K. The die is now home and not moving. During this time the controller will wait for the next target to again approach the shear point and when it does, another acceleration is generated as the waveform repeats itself.

Reset Controls

The reset menu provides for some of the basic functions for the graph. Each function is listed along with the key that is to be pressed to initiate the command. The key that is to be used is surrounded by quotations “ ”.

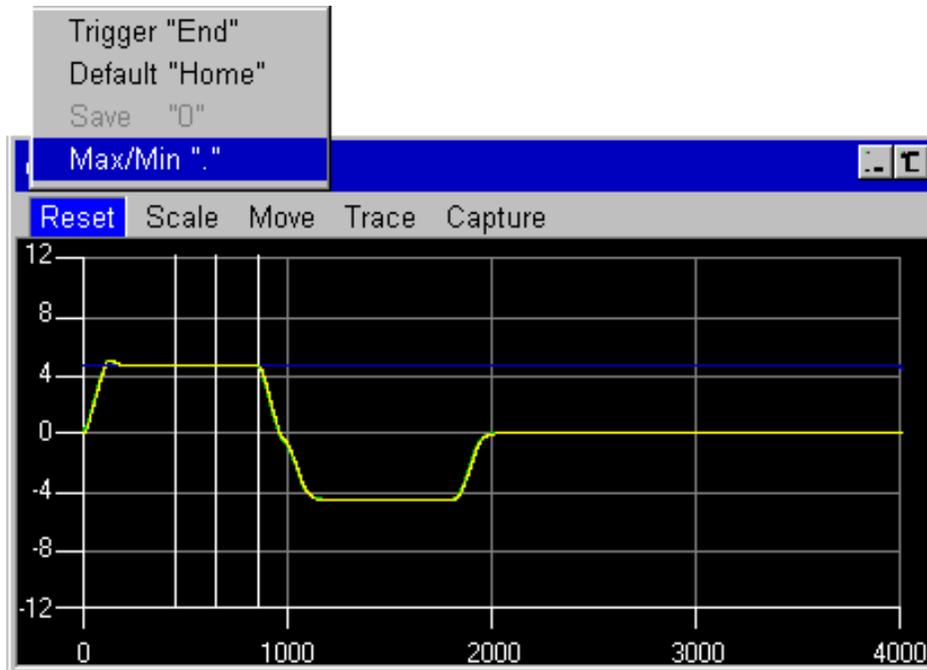


Figure 6-25. The “Reset” screen controls

Trigger

Re-triggers the controller to display a new graph, displaying the most recent cycle of the die. Use the “END” key to initiate this function.

Default

Sets all graph settings back to default value. Use the “HOME” key to set the defaults.

Max/Min

Creates a full window graph when set to “Maximum” and sets window size back to default size when “Minimized”. When the display is maximized by pressing the “.” Key, the entire right window is used for displaying the closed loop graph as shown in figure 6-26.

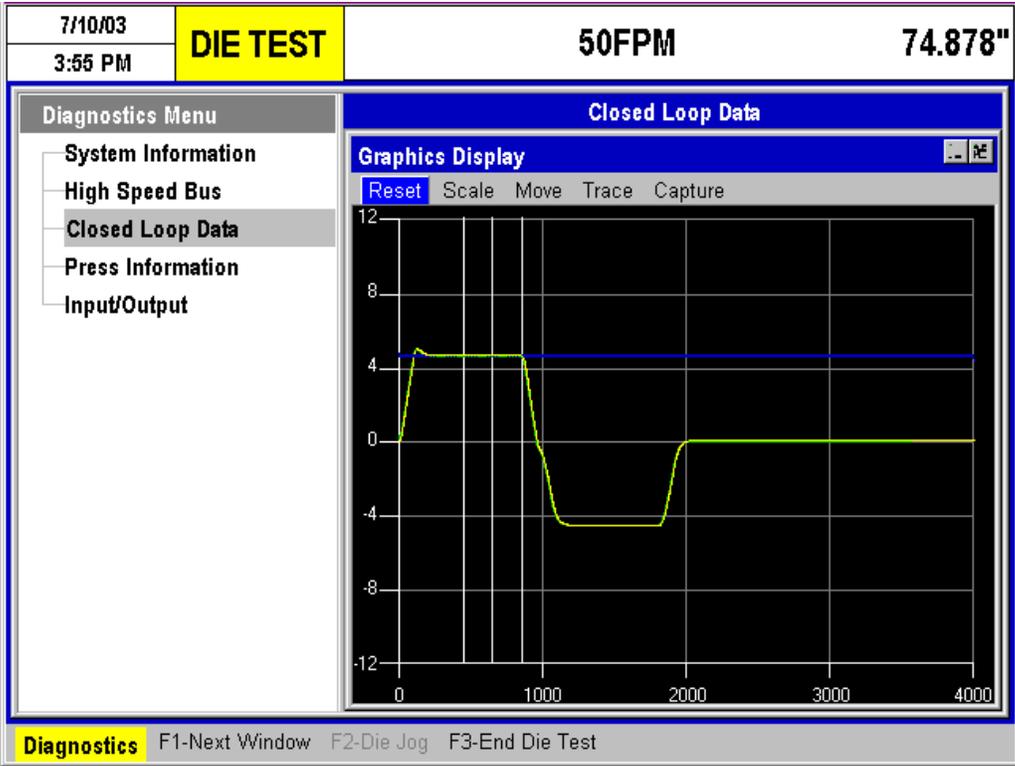


Figure 6-26. "Maximized" graphic display

Scale Controls

Scale controls provides the user a means of controlling the detail in which the waveform is viewed. The signal can be “stretched out” by pressing the “Y-“ function or made taller with the “X-“ function

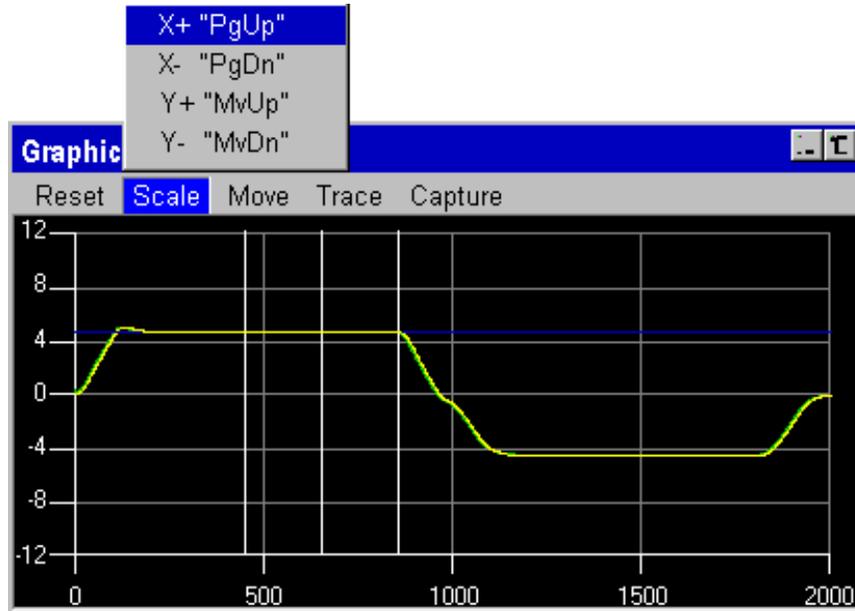


Figure 6-27. Scale Controls

Note that the example in figure 6-27 is identical to figure 6-26, except that the waveform has been stretched out using the “X+” function to view the graph in greater detail.

X+ (Wider Signal)

Makes the cycle waveform longer and more detailed. Use the “Page Up” key to initiate.

X- (Narrower Signal)

Makes the cycle waveform shorter and less detailed. Use the “Page Down” key to initiate.

Y+ (Taller Signal)

Makes the waveform taller and more detailed. Use the “Move Up” key to initiate.

Y- (Shorter Signal)

Makes the waveform shorter and less detailed. Use the “Move Down” key to initiate.

Move Controls

The reference point for each graph can also be moved independently of the waveform itself. This can allow a user to take a long sample, but to view only a small portion of the sample at a time by sliding up and down the waveform and up and down the analog scale.

The example below shows the graph starting at .5 seconds rather than at 0 seconds. Pressing the “6” key (Slide Right) function will start the graph further in time.

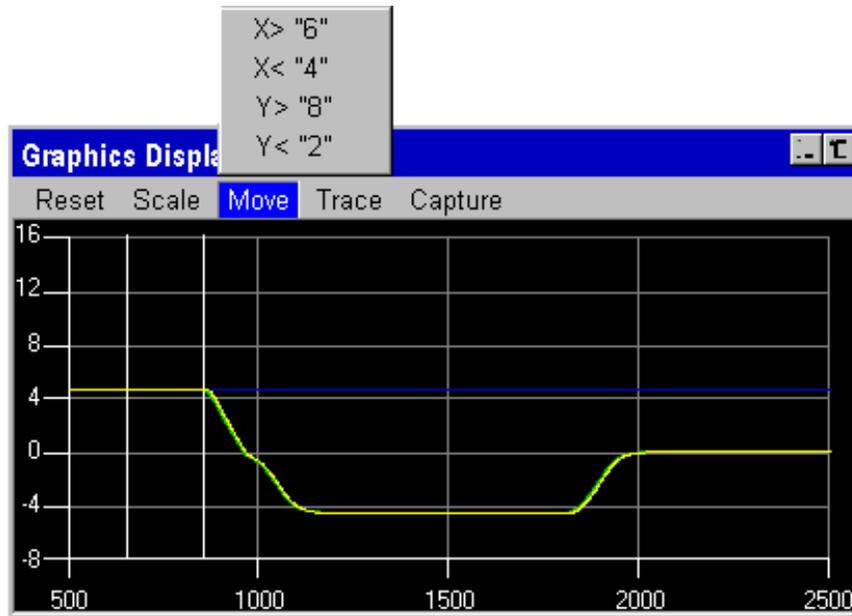


Figure 6-28. “Move” Controls

6

X> (Slide Right)

Moves the reference point to the right. Use the “6” key to initiate.

X< (Slide Left)

Moves the reference point to the left. Use the “4”key to initiate.

Y> (Slide Upward)

Moves the reference point upward. Use the “8 key to initiate.

Y< (Slide Downward)

Moves the reference point downward. Use the “2” key to initiate.

Trace Controls

Aside from the Dwell start and stop points, the graph displays three ongoing signals. The “Analog”, “Motor Feedback”, and “Line Velocity” signals can be independently displayed or not. The example below shows the “Analog” and “Motor” trace signals are selected and are being displayed, while the “Line” trace has been deselected. Note that no line velocity trace is displayed.

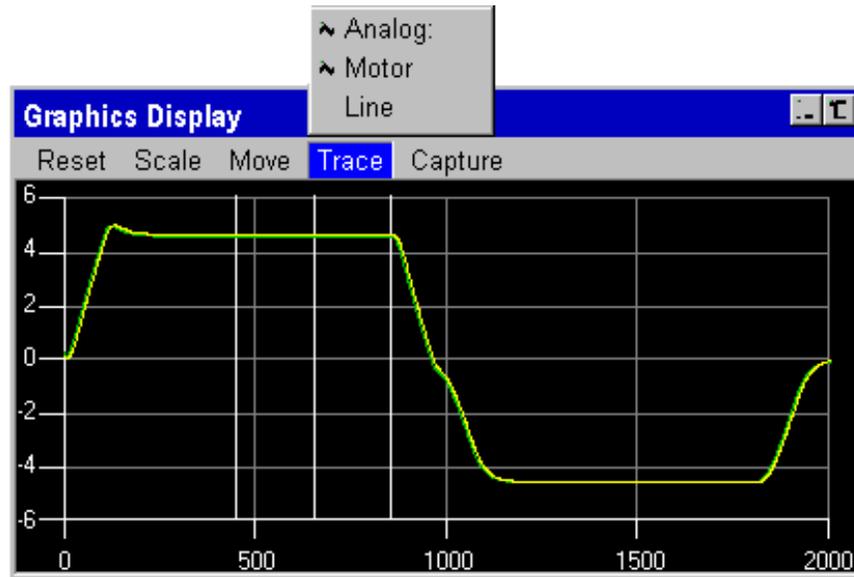


Figure 6-29. Trace Controls

Analog Trace

The “Analog” trace graphs the analog command voltage used to control the velocity and position of the motor. This is the signal from the AMS XL200CL series controller to the Servo controller (motor drive). The “Analog” signal is displayed as a GREEN trace.

Motor Trace

The “Motor” feedback trace reflects the simulated encoder feedback for the velocity. This signal is fed back to the AMS XL200CL series controller from the Servo controller or motor drive. The “Motor” feedback signal is displayed as a YELLOW trace.

Line Trace

The “Line” trace reflects the material velocity. This is displayed as a BLUE trace.

Capture Controls

The graph can be displayed over 4 different time samples. The “Capture” menu selects how long the graphed sample is to be. The default value is four seconds, but the graph can also display samples of 8, 16, and 32 seconds. A larger sample may show several cycles whereas the 4-second sample may show only one cycle or a portion of a cycle.

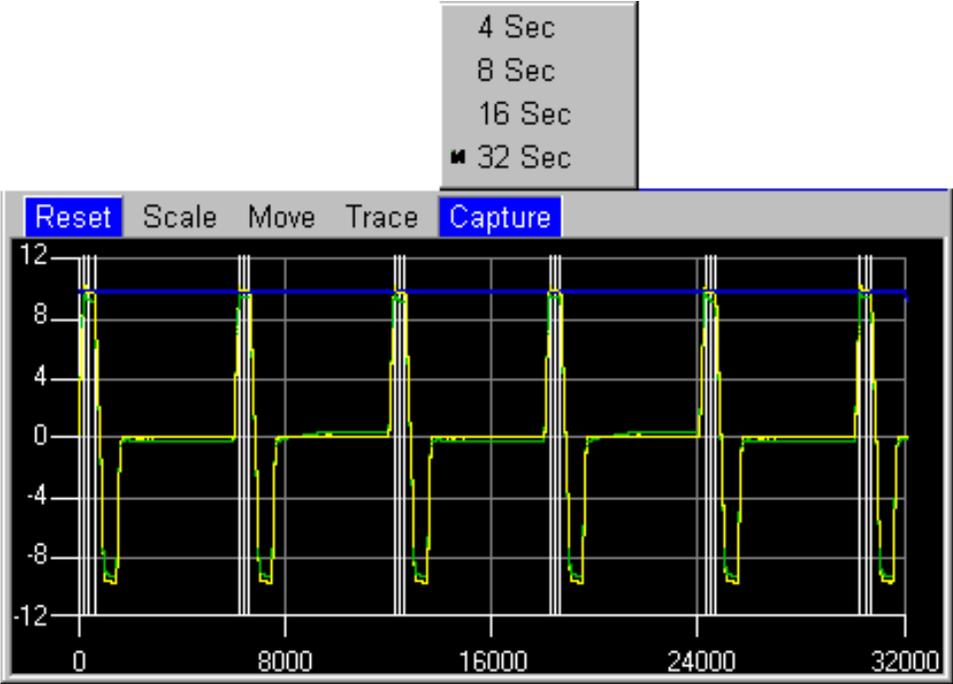


Figure 6-30. Capture Timing Control with a 32 second sample

The Ideal Graphic Signal

All the preceding graph controls are designed to enable the user to view a signal in great detail for both tuning and troubleshooting reasons. As shown in figure 6-31, a signal can be displayed in great detail.

In figure 6-31, a signal that has been adjusted to fill nearly the entire screen, therefore showing the greatest amount of detail while still being able to view the entire signal.

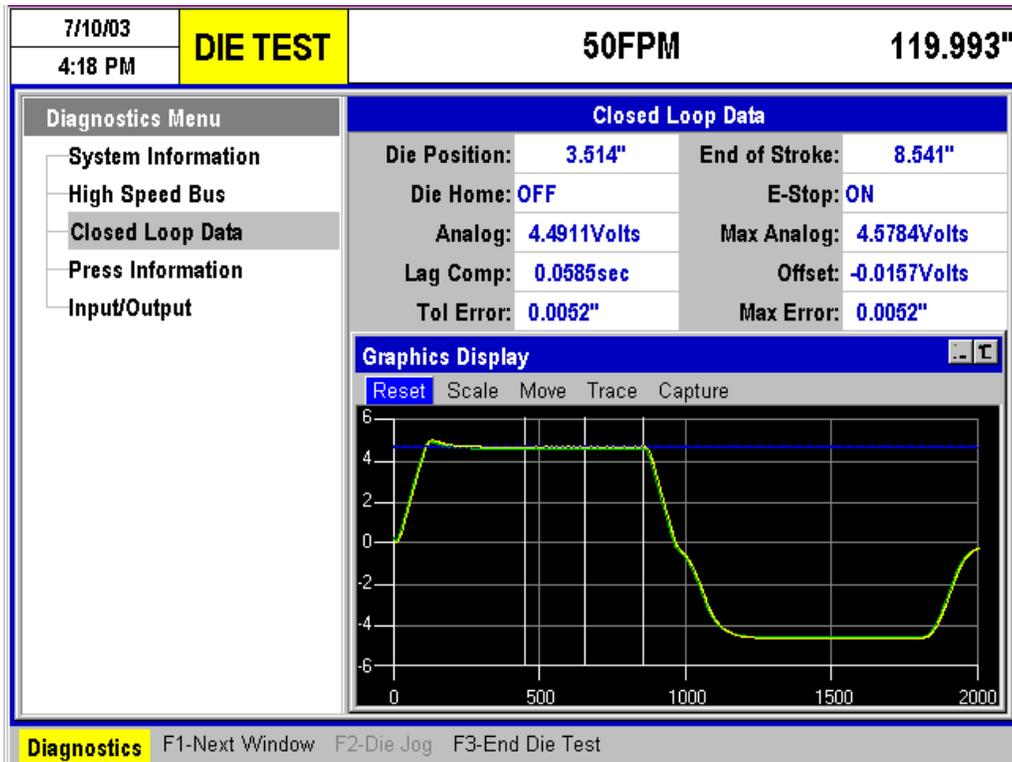


Figure 6-31. An "Ideal" graph adjustment

Feeder Graphics

The graphics display is also useful when tuning and troubleshooting feed-to-stop systems. The “Feed OK” and “E-Stop” statuses are both displayed along with the standard graphic information.

As with a die accelerator, every press operation is shown over the period of time selected for viewing. In the example figure 6-32, two press operations and a cutoff operation are shown on the same graph.

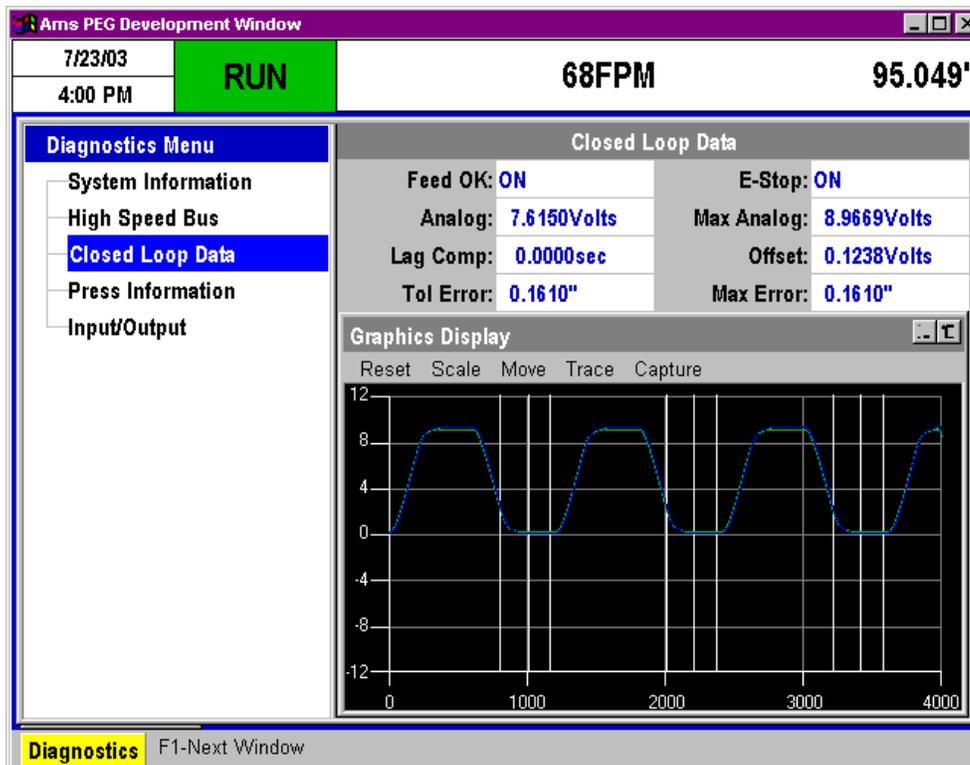


Figure 6-32. Graphic View of a Feed System

Press Information

The “Press Information” window will display the total number of presses and gags that the controller is presently configured for. The number of available outputs are determined by the model of software provided and the type-setting switch configuration.

The model of a controller (XL200CL vs. XL206 vs. XL212) will determine the total number of tooling outputs. For example, the XL206 will have six tooling outputs that can be divided between press and gag outputs.

The type-setting switch configuration will determine how the tooling outputs will be divided. For example, the XL206 with printer (seven tooling outputs) shows that the configuration is set for four presses and three gags. An option would have been to have two presses and five gags or any other combination that added up to seven.

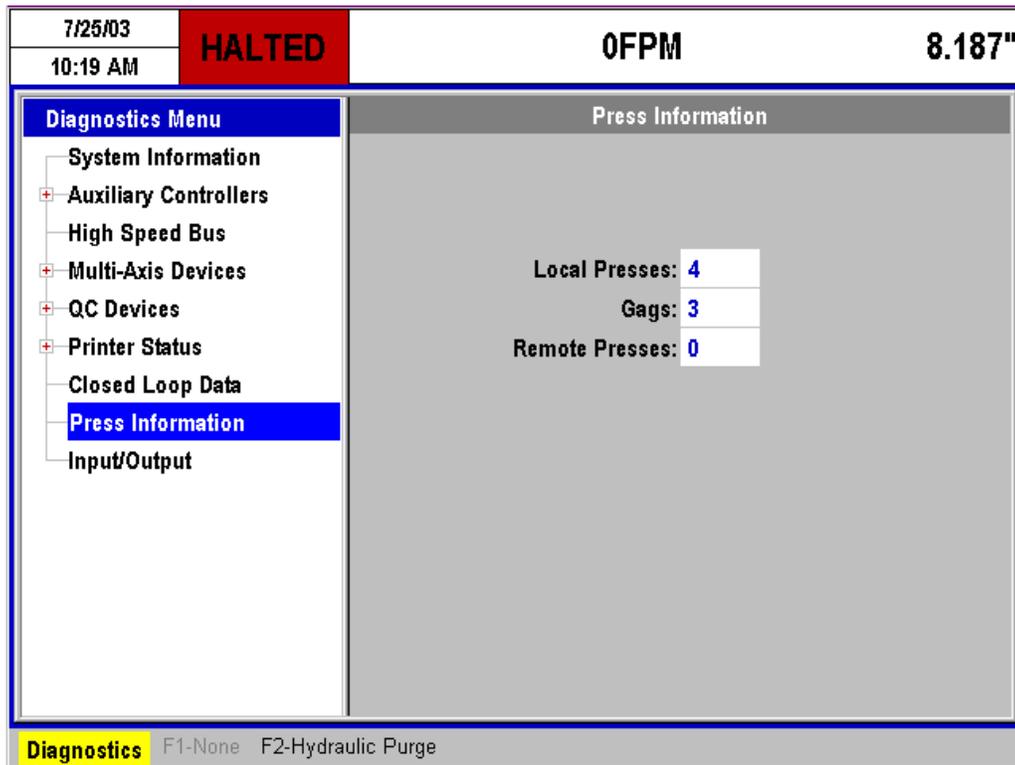


Figure 6-33. Press Information Screen

Number of Presses:

This represents the number of local presses on the system that are directly controlled by the XL200CL series controller.

Gags:

This value displays the number of available gags that can be assigned to presses and programmed in the tool data.

Remote Presses:

Shows the number of presses that are controlled via a communications link.

Hydraulic Purge (F2):

Some hydraulic press systems require to be purged to get the hydraulic system warmed up and working consistently. The XL200CL Series controller has an automatic method for performing this operation in “Hydraulic Purge”. Press the “F2” key to automatically fire the press repeatedly. Press the “Abort” button to halt the firing action.

F2

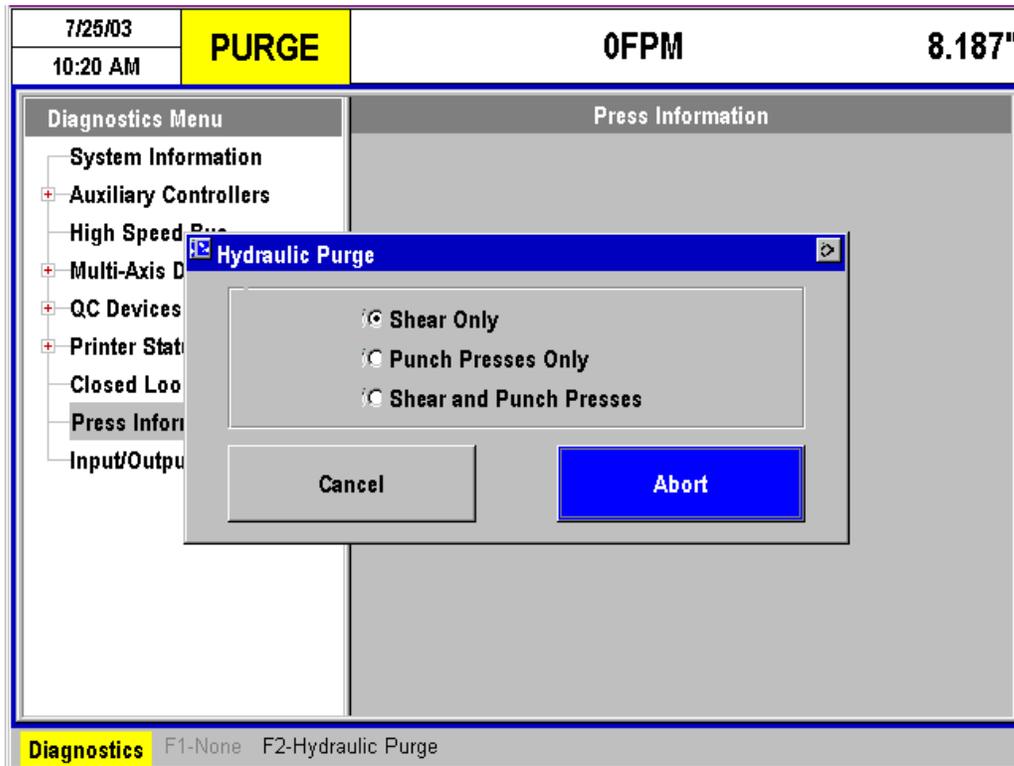


Figure 6-34. The “Hydraulic Purge” feature

The purge feature can be used on the shear individually, on all punch presses, or on the shear and punch presses at the same time. Select the appropriate choice by using the “tab” or “arrow” keys and press the “Enter” key.

Press the “Abort” command button to halt the purging action.

6

Input/Output

This mode allows you to view the current status of all the **XL200CL SERIES** controller’s inputs and outputs. This can be very helpful in troubleshooting the system during and after installation.

7/25/03	RUN	98FPM		27.391"		
10:21 AM						
Diagnostics Menu		Num.	Input Name	ON/OFF	Output Name	ON/OFF
System Information		1	Jog Forward	OFF	Output 1	OFF
+ Auxiliary Controllers		2	Jog Reverse	OFF	Output 2	OFF
High Speed Bus		3	Run	ON	Output 3	OFF
+ Multi-Axis Devices		4	E-Stop	ON	Run	ON
+ QC Devices		5	Setup Lockout	OFF	Item Complete	OFF
+ Printer Status		6	Manual Shear	OFF	Drive Enable	ON
Closed Loop Data		7	Manual Press	OFF	Output 7	OFF
Press Information		8	Coil Tailout	OFF	Print Trigger	OFF
Input/Output		9	Shear Complete	OFF	Shear Down	OFF
		10	Press Complete 1	OFF	Press Down 1	OFF
		11	Press Complete 2	OFF	Press Down 2	OFF
		12	Input 12	OFF	Gag 3	OFF
		13	Input 13	OFF	Gag 4	OFF
		14	Input 14	OFF	Gag 5	OFF
		15	Input 15	OFF	Output 15	OFF
Diagnostics		F1-Next Window				

Figure 6-35. Input/Output Status Screen

Press the “Diagnostics” key to display the Diagnostic menu selections. Use the arrow keys to highlight the Input/Output menu selection. The corresponding screen will be displayed on the window on the right of display.

Diagnostics

Press the “F1” key to toggle between the left window and the right windows on the display. Once in the right window with the input/output information, the user can page down or up to see additional input and output statuses.

F1

Beside each input or output is a status field that signifies whether the I/O is “ON” or “OFF”. These displays will change on screen as the actual input or output is changing on the controller.

Printers

Basic Printer Information

(Printer interface drawings are located in Appendix "B")

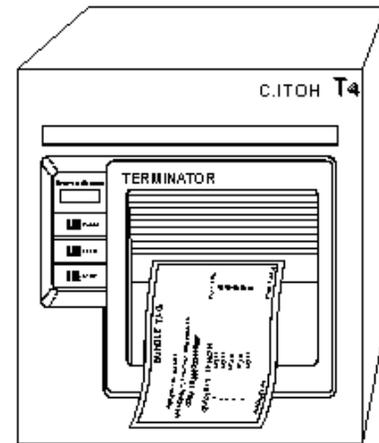
Printer Options

Bundle Ticket Printers

Bundle ticket printers are designed to create identification tags for bundles of product that could include information such as the quantity of parts, part length, and type of part produced in a bundle. The XL200CL Series controller currently has print drivers for four common industrial bundle ticket printers.

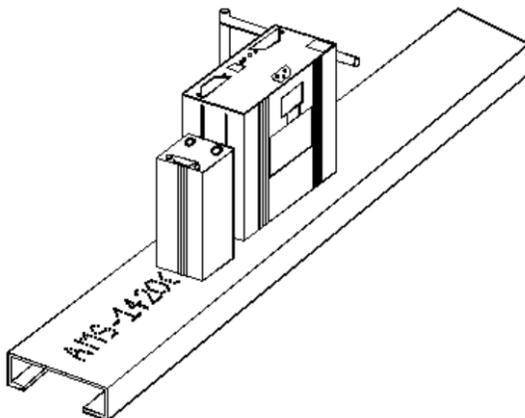
Bundle tag printers are typically located at the end of the machine where the finished (or semi-finished) product is off-loaded and bundled or at the operator control station. Printers that are located at the operator station are considered "Local Printers". Printers located away from the operator console usually have an interface box and are considered "Remote Printers".

Bundle tag printers typically use thermal technology to print the tags with. It is important to keep the printers as clean as possible and free of fluids and material residue.



7

Part Printers



Part printers can be used to mark every part that is produced by the XL200CL Series controller. This can be in the form of an ink jet, a printed tag, or impacted print. The XL200CL currently has print drivers for eight common industrial part printers.

XL200CL Series Outputs for Part Printers

Print Initiate Output

The XL200CL Series controller loads the print message to the printers using communication port “B”. The print message is fired (printed) when the controller turns on an output called the “Print trigger”.

The location of the output signal that is sent from the controller to activate the printer is common between all models of the XL200CL series controller. When using the XL200CL series controller, the Print Initiate output will always be on Output #8 (terminal E9).

Printer Encoder

When using the Print-on-Part Printer, the user may have the option of using the internal timing of the printer or to use an encoder output that is generated by an external encoder or an encoder divider. The internal timing of the printer is set by a parameter and will print at the same speed regardless of variations in the line velocity. This could result in variations in the printed message. The printer encoder will provide velocity feedback to the printer, allowing the printer to adjust the print speed to the line variations.

Printer Flush

If the part printer selected is a PM5100 model, an additional feature is available to automatically flush the head using the XL200CL Series controller. The printer will be sent a command to flush ink or solvent through the system. An output on the XL200CL Series controller will turn on a valve that rotate the print head away from the material and into a waste container.

This output is the “Print Flush” output located on Output #7 (terminal E8).

Printer Selection

Selecting and Configuring a Printer

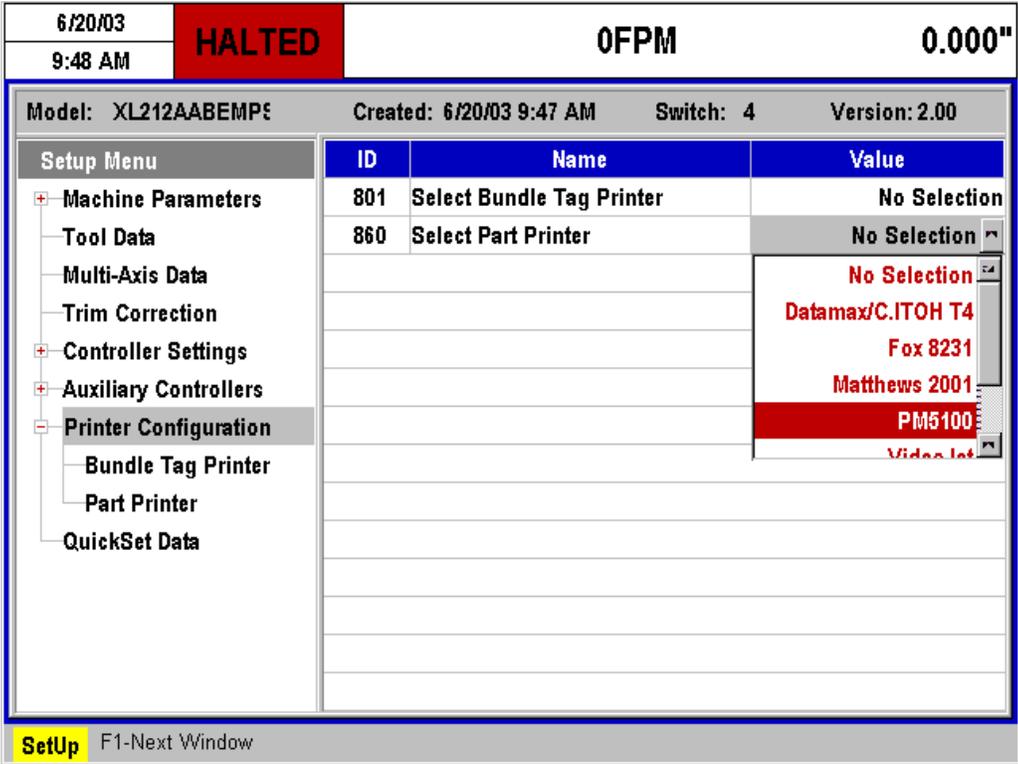


Figure 7-1 Part Printer Selection

Select the "SETUP" key to display the setup menu. Highlight the "Printer Configuration" menu item. This will display printer selection fields for both the bundle ticket printer and the part printer in the parameter window.



Press "F1" to tab over to the parameter window. Select the appropriate printer field and select the desired printer from the drop down list. Once the printer is selected, the chosen printer will be displayed along its custom parameter settings. These parameter settings will vary from printer to printer and will be discussed with each individual printer model in this chapter.



Once the correct printer has been selected, its driver information and status will be accessed through the diagnostics screen.

Displaying Printer Diagnostic Status

Press the “Diagnostics” key to open the diagnostics menu. “Printer Status” will be one of the available selections. If more than one printer driver has been setup, the “Printer Status” menu item will contain a (+) in front of it. This implies that the selection can be further branched out. The example below shows the selection being branched into “Bundle Tag Printer” and “Part Printer”.

Highlight the desired printer to view its status information. The status window on the right will display all available status information. Some printers will have additional operational commands that can be activated by the function keys. The example in figure 7-2 shows 5 available function key options.

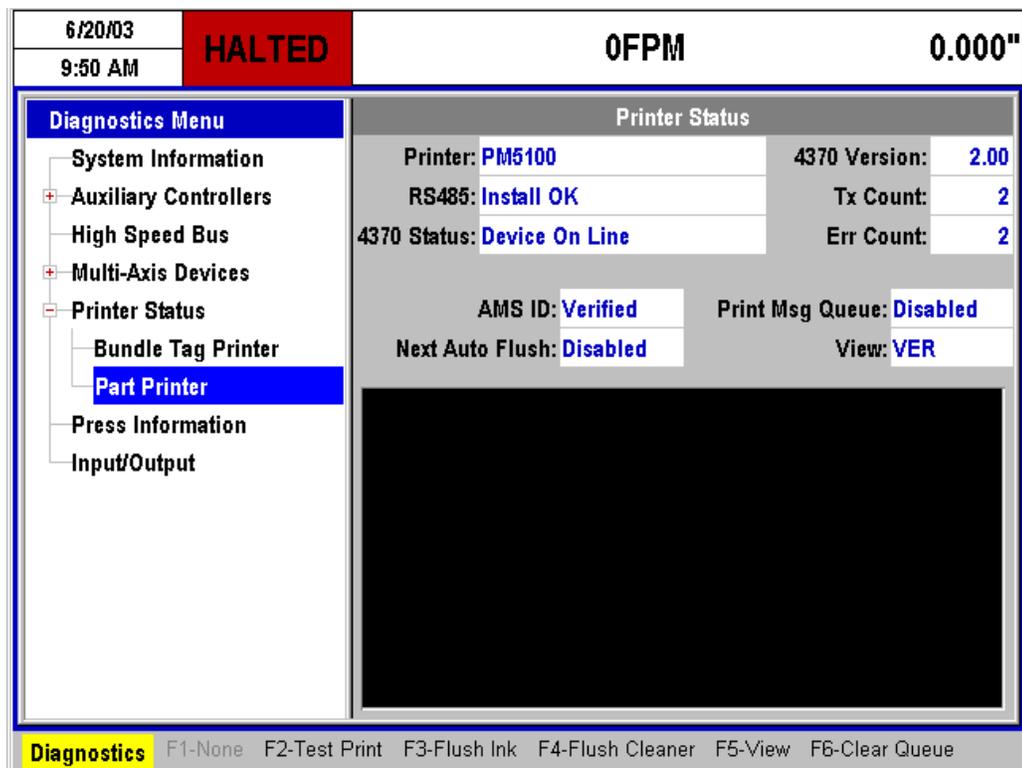


Figure 7-2. Printer Status Screen

The “Setup Window”, “Status Window”, and function key commands available in the status window will vary depending upon the printer that is selected and whether the printer is being used for a part printer or a bundle tag printer.

Bundle Tag Printers

Datamax/Citizen Bundle Tag Printer Setup

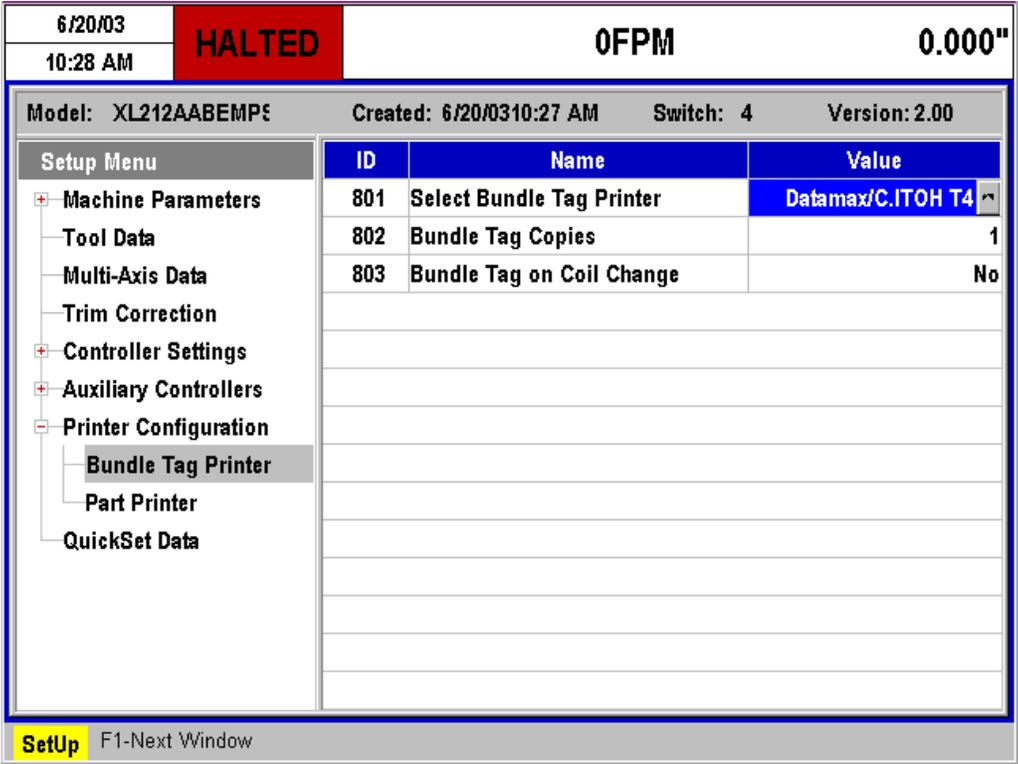


Figure 7-3. Datamax/Citizen/C-itoh Printer Setup Parameters.

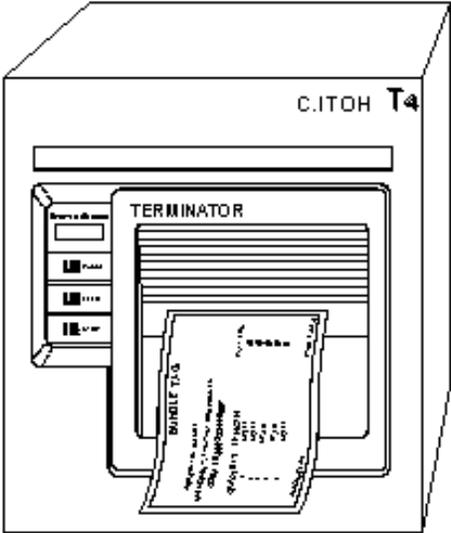
7

Bundle Tag Copies:

This value will determine how many tags are printed during each individual bundle print. 1 to 10 identical tags may be printed for each different print. Printer speed may limit the speed at which the bundles are actually ran in order for all previous tickets to be printed properly. This should be taken into consideration when programming the number of tickets to be printed.

Bundle Tag on Coil Change:

Setting this parameter to “Yes” will cause a bundle tag to be printed anytime the coil is changed throughout a given order. If “No” is selected, no tag will be printed during a coil change.



Datamax/Citizen Bundle Tag Diagnostics

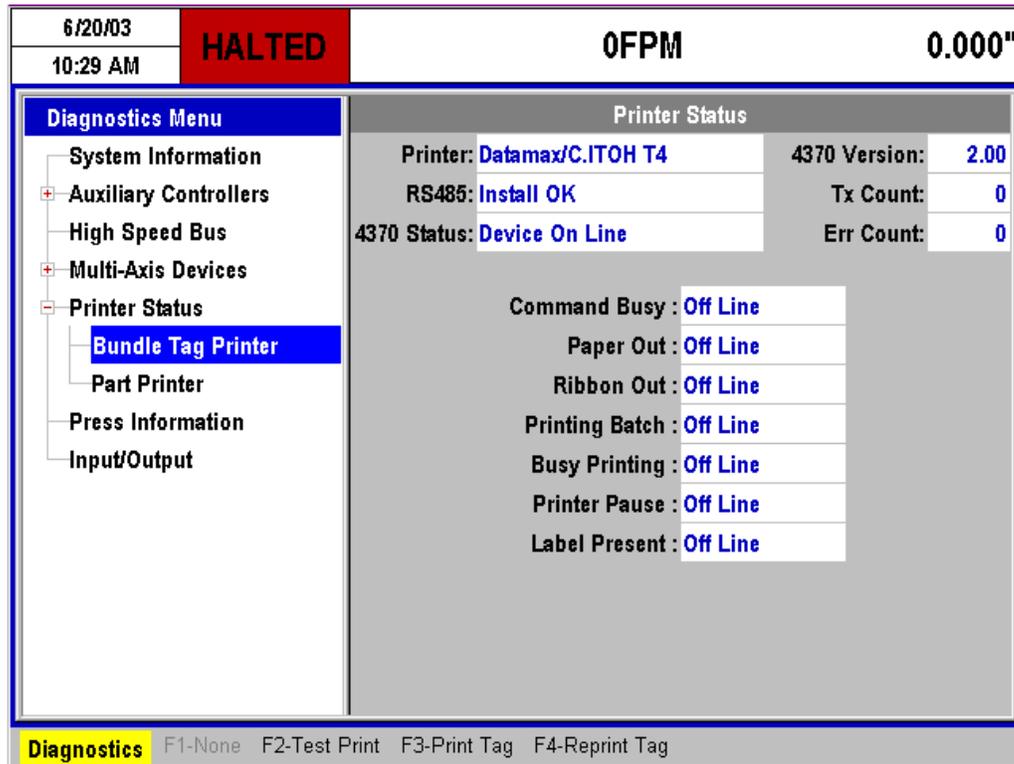


Figure 7-4. Citizen/Datamax/Citoh Diagnostic Window

Printer:

This field displays the make and model of the tag printer driver that has been selected.

RS485:

Displays if controller communications to the 4370 interface board is working properly. If the 4370 is communicating with the controller, the display will read "Install is OK". "Response Timeout" is displayed when the controller cannot communicate with the RS485 board

4370 Status:

This displays the status of the communications between the 4370 interface board and the actual printer it is attached to. If the two are communicating successfully, the field will read "Device On Line".

4370 Version:

Displays the version of software located on the 4370 interface board.

Tx Count:

This displays the total number of "Transmissions" that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Command Busy:

If the printer has received print instructions from the controller and there is an order being produced, this status will be YES. If there is no print order to be run, the status will be NO.

Paper Out:

If the printer runs out of paper, this status will be YES. If paper is present, the status is NO.

Ribbon Out:

If a ribbon is not present in the printer, this status will be YES. If there is a usable ribbon in the printer, the status is NO.

Printing Batch:

If the printer is receiving print instructions from the controller, this status will be YES. This indicates there is information in the printer buffer.

Busy Printing:

This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will return to NO.

Printer Pause:

If the PAUSE button is pressed on the front of the Citoh printer, the controller will display a YES. Press the PAUSE again to reset this parameter to NO.

Label Present:

This requires the use of a separate sensor from the PAPER OUT sensor, and will indicate that the label has been ejected from the printer.

Datamax/Citizen Diagnostic Commands

Test Print (F2)

A test print can be performed to verify proper operation of the printer and printer buffer. Press the “F2” key to initiate the printer to create a test tag. This tag will print out all possible characters and then an assortment of textured lines.

A blue rounded rectangular button with the text "F2" in white.

Print Tag (F3)

A bundle tag can be printed at any time throughout the production process. Highlight the “Bundle Tag Printer” in the menu screen then press the “F3” key to cause the controller to print a current bundle tag. The controller will automatically increment the total number of bundles by 1 after this operation is performed.

A blue rounded rectangular button with the text "F3" in white.

Reprint Tag (F4)

Pressing the “F4” key while in the Bundle Tag Printer window will reprint the previously printed bundle tag.

A blue rounded rectangular button with the text "F4" in white.

Zebra Z400 Bundle Tag Setup

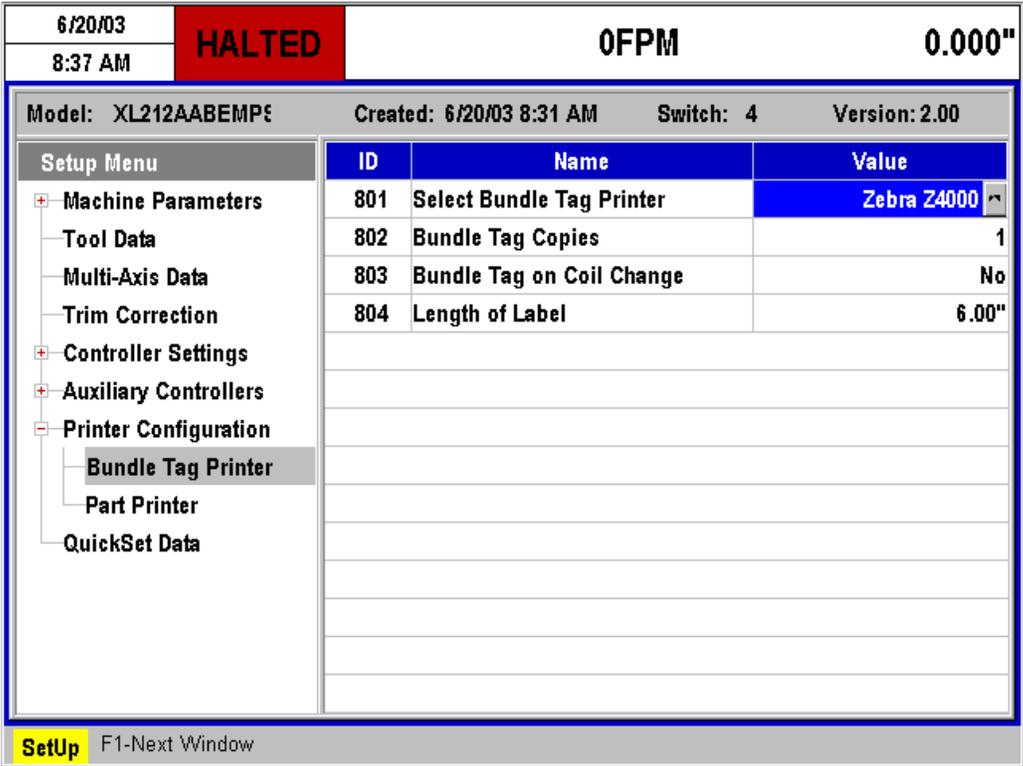


Figure 7-5. Zebra Z4000 Bundle Tag Setup Window

Bundle Tag Copies:

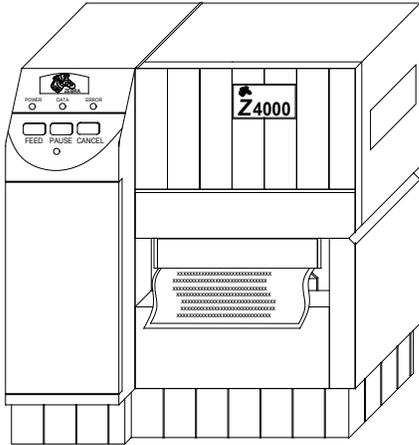
This value will determine how many tags are printed during each individual bundle print. 1 to 10 identical tags may be printed for each different print. Printer speed may limit the speed at which the bundles are actually ran in order for all previous tickets to be printed properly. This should be taken into consideration when programming the number of tickets to be printed.

Bundle Tag on Coil Change:

Setting this parameter to “Yes” will cause a bundle tag to be printed anytime the coil is changed throughout a given order. If “No” is selected, no tag will be printed during a coil change.

Length of Label:

This parameter instructs the printer on how long the actual labels are. The printer will adjust its feed length accordingly.



Zebra Z400 Bundle Ticket Diagnostics

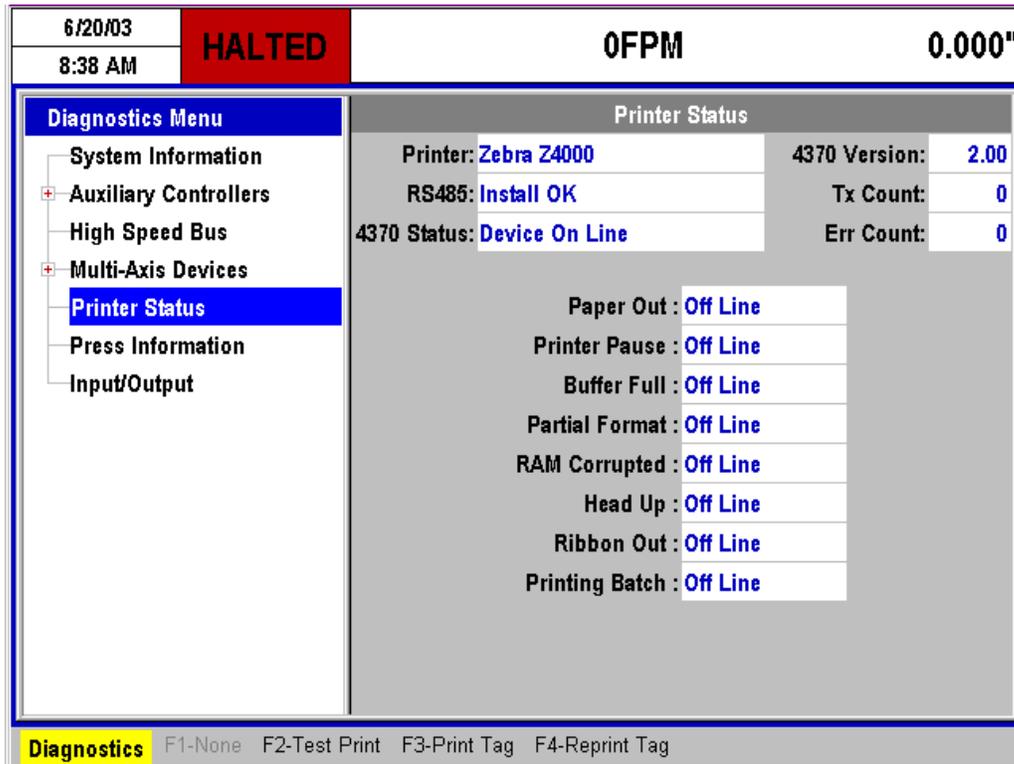


Figure 7-6. Printer Menu Screen

Printer:

This field displays the make and model of the tag printer driver that has been selected.

RS485:

Displays if controller communications to the 4370 interface board is working properly. If the 4370 is communicating with the controller, the display will read "Install is OK". "Response Timeout" is displayed when the controller cannot communicate with the RS485 board

4370 Status:

This displays the status of the communications between the 4370 interface board and the actual printer it is attached to. If the two are communicating successfully, the field will read "Device On Line".

4370 Version:

Displays the version of software located on the 4370 interface board.

Tx Count:

This displays the total number of "Transmissions" that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Paper Out:

If the printer runs out of paper, this status will be YES. If paper is present, the status is NO.

Printer Pause:

Is shown as YES when the printer has paused due to an error or by pressing the "Pause" button on the printer to halt automatic operation.

Buffer Full:

If the printer buffer is full, the status will be shown as YES.

Partial Format:

Format status returned from the Zebra printer.

Ram Corrupt:

Will displayed as YES if the resident memory is detected as incorrect

Head Up:

Is shown as YES if the head had not be locked in the printing position

Ribbon Out:

If a ribbon is not present in the printer, this status will be YES. If there is a usable ribbon in the printer, the status is NO.

Printing Batch:

This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will read NO.

Printer Systems

Additional information is also available on custom bundle tag labels. The XL-Link for Windows package is required to produce custom labels.

If the line is halted in the middle of an order, a printing function can be activated with the PRINT key on the front panel.

F6

This will print a tag for the parts that have been completed so far. When RUN is pressed again, the rest of the order will be completed and a BUNDLE TAG will be printed for the remainder of the order, only.

The Zebra printer works properly with the default parameters listed below:

Baud Rate	9600 bps
Data Length	8 bits
Parity	Parity N
Flow Control	XON/XOFF
Interface	RS232C
Model	NativeOF
Voltage Setting	PE *.*V

Datamax/Citizen Part Printer Diagnostics

The “Diagnostic” window contains the same status information as when setup for the “Bundle Tag Mode”, but has no available function key operations. See figure 7-8.

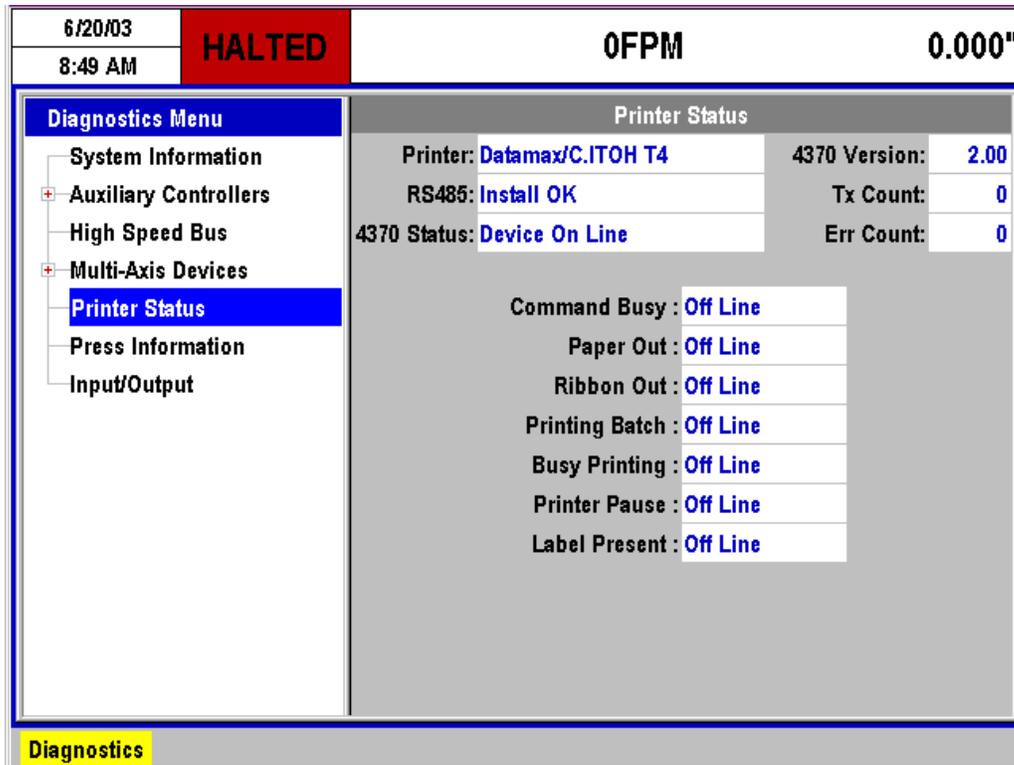


Figure 7-8. Citizen/Datamax/C-Itoh Part Print Status

Printer:

This field displays the make and model of the tag printer driver that has been selected.

RS485:

Displays if controller communications to the 4370 interface board is working properly. If the 4370 is communicating with the controller, the display will read “Install is OK”. “Response Timeout” is displayed when the controller cannot communicate with the RS485 board

4370 Status:

This displays the status of the communications between the 4370 interface board and the actual printer it is attached to. If the two are communicating successfully, the field will read “Device On Line”.

4370 Version:

Displays the version of software located on the 4370 interface board.

Tx Count:

This displays the total number of “Transmissions” that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Command Busy:

If the printer has received print instructions from the controller and there is an order being produced, this status will be YES. If there is no print order to be run, the status will be NO.

Paper Out:

If the printer runs out of paper, this status will be YES. If paper is present, the status is NO.

Ribbon Out:

If a ribbon is not present in the printer, this status will be YES. If there is a usable ribbon in the printer, the status is NO.

Printing Batch:

If the printer is receiving print instructions from the controller, this status will be YES. This indicates there is information in the printer buffer.

Busy Printing:

This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will return to NO.

Printer Pause:

If the PAUSE button is pressed on the front of the Citoh printer, the controller will display a YES. Press the PAUSE again to reset this parameter to NO.

Label Present:

This requires the use of a separate sensor from the PAPER OUT sensor, and will indicate that the label has been ejected from the printer.

Citizen/C-Itoh SETUP MODES

The following setup modes are explained in detail in the CITO H printer manual.

- **NORMAL OPERATING MODE** - Normal operation.
- **PRINTER SETTING MODE** - Print mode selection, end-of-ribbon detection, label-peeling sensor actuation and use of auto-cutter are provided.
Press “PAUSE” and “FEED” key simultaneously to enter the printer setting mode. Press “STOP” to exit.
- **SELF - TEST MODE** - Performs test printing and then is set to data dump mode.
Press “FEED” key while turning power on. Turn power off to exit.
- **SYSTEM MAINTENANCE MODE** - Allows user to set communications and memory switches to a specific value.
Press “PAUSE”, “FEED”, and “STOP” keys while turning power on.
- Press “STOP” key to exit.

Additional information is also available on custom bundle tag labels. The Eclipse Production Software for Windows software package is required to produce custom labels.

F6

If the line is halted in the middle of an order, a printing function can be activated with the PRINT key on the front panel.

The C.ITOH printer works properly with the default parameters listed below:	
Baud Rate	9600 bps
Data Length	8 bits
Parity	Parity N
Flow Control	XON/XOFF
Interface	RS232C
Model	NativeOF
Voltage Setting	PE *.*V

Zebra Z4000 Part Printer Setup

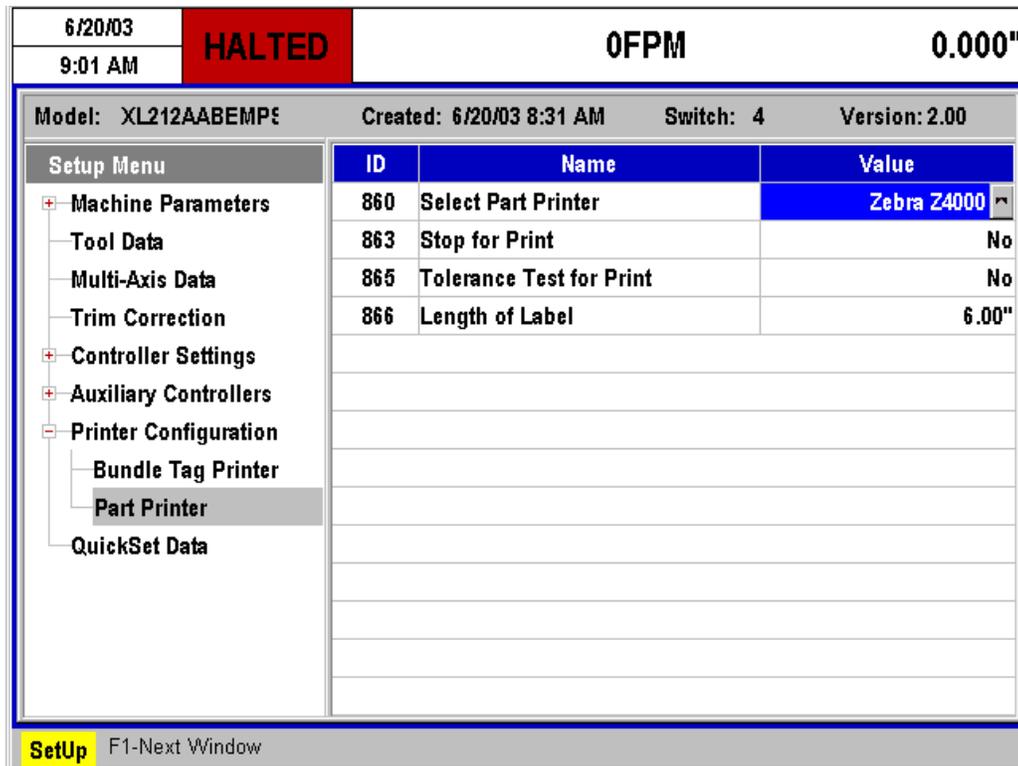


Figure 7-9. Zebra Z4000 Part Printer Setup Window

7

Stop for Print

Selects whether the material will halt while the part tag is printed and applied. “Yes” will instruct the controller to stop for the printing operation. Selecting “No” will allow the line to continue to run while the ticket is printed.

Tolerance Test for Print:

If the line halts for the print operation, the controller can test for the position of the material for tolerance to insure that the tag is placed in the proper location. If set to “Yes”, the test will be performed, if “No” then it will not be performed.

The TOLERANCE value that was entered under the SETUP parameters applies to the printer as well as all other presses. When the line is halted to perform a press or printer operation, the controller will check to see if any other presses (including the printer) are in tolerance. If another press is in tolerance, that operation will be performed along with the original operation.

Length of Label:

This parameter instructs the printer on how long the actual labels are. The printer will adjust its feed length accordingly.

Zebra Z4000 Part Printer Diagnostics

6/20/03	HALTED	0FPM	0.000"																																												
9:02 AM																																															
Diagnostics Menu <ul style="list-style-type: none"> System Information + Auxiliary Controllers High Speed Bus + Multi-Axis Devices Printer Status Press Information Input/Output 		Printer Status <table border="1"> <tr> <td>Printer:</td> <td>Zebra Z4000</td> <td>4370 Version:</td> <td>2.00</td> </tr> <tr> <td>RS485:</td> <td>Install OK</td> <td>Tx Count:</td> <td>0</td> </tr> <tr> <td>4370 Status:</td> <td>Device On Line</td> <td>Err Count:</td> <td>0</td> </tr> <tr> <td>Paper Out :</td> <td>Off Line</td> <td></td> <td></td> </tr> <tr> <td>Printer Pause :</td> <td>Off Line</td> <td></td> <td></td> </tr> <tr> <td>Buffer Full :</td> <td>Off Line</td> <td></td> <td></td> </tr> <tr> <td>Partial Format :</td> <td>Off Line</td> <td></td> <td></td> </tr> <tr> <td>RAM Corrupted :</td> <td>Off Line</td> <td></td> <td></td> </tr> <tr> <td>Head Up :</td> <td>Off Line</td> <td></td> <td></td> </tr> <tr> <td>Ribbon Out :</td> <td>Off Line</td> <td></td> <td></td> </tr> <tr> <td>Printing Batch :</td> <td>Off Line</td> <td></td> <td></td> </tr> </table>		Printer:	Zebra Z4000	4370 Version:	2.00	RS485:	Install OK	Tx Count:	0	4370 Status:	Device On Line	Err Count:	0	Paper Out :	Off Line			Printer Pause :	Off Line			Buffer Full :	Off Line			Partial Format :	Off Line			RAM Corrupted :	Off Line			Head Up :	Off Line			Ribbon Out :	Off Line			Printing Batch :	Off Line		
Printer:	Zebra Z4000	4370 Version:	2.00																																												
RS485:	Install OK	Tx Count:	0																																												
4370 Status:	Device On Line	Err Count:	0																																												
Paper Out :	Off Line																																														
Printer Pause :	Off Line																																														
Buffer Full :	Off Line																																														
Partial Format :	Off Line																																														
RAM Corrupted :	Off Line																																														
Head Up :	Off Line																																														
Ribbon Out :	Off Line																																														
Printing Batch :	Off Line																																														
Diagnostics																																															

Figure 7-10. Zebra Z4000 Part Printer Diagnostic Status

Printer:

This field displays the make and model of the tag printer driver that has been selected.

RS485:

Displays if controller communications to the 4370 interface board is working properly. If the 4370 is communicating with the controller, the display will read "Install is OK". "Response Timeout" is displayed when the controller cannot communicate with the RS485 board

4370 Status:

This displays the status of the communications between the 4370 interface board and the actual printer it is attached to. If the two are communicating successfully, the field will read "Device On Line".

4370 Version:

Displays the version of software located on the 4370 interface board.

Tx Count:

This displays the total number of "Transmissions" that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Paper Out:

If the printer runs out of paper, this status will be YES. If paper is present, the status is NO.

Printer Pause:

Is shown as YES when the printer has paused due to an error or by pressing the "Pause" button on the printer to halt automatic operation.

Buffer Full:

If the printer buffer is full, the status will be shown as YES.

Partial Format:

Format status returned from the Zebra printer.

Ram Corrupt:

Will displayed as YES if the resident memory is detected as incorrect

Head Up:

Is shown as YES if the head had not be locked in the printing position

Ribbon Out:

If a ribbon is not present in the printer, this status will be YES. If there is a usable ribbon in the printer, the status is NO.

Printing Batch:

This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will read NO.

Printer Systems

Additional information is also available on custom bundle tag labels. The XL-Link for Windows package is required to produce custom labels.

If the line is halted in the middle of an order, a printing function can be activated with the PRINT key on the front panel.

F6

This will print a tag for the parts that have been completed so far. When RUN is pressed again, the rest of the order will be completed and a BUNDLE TAG will be printed for the remainder of the order, only.

The Zebra printer works properly with the default parameters listed below:

Baud Rate	9600 bps
Data Length	8 bits
Parity	Parity N
Flow Control	XON/XOFF
Interface	RS232C
Model	NativeOF
Voltage Setting	PE *.*V

Print Direction:

The position of the printer with respect to the direction of the material flow will determine whether to choose a direction of right or left. Selecting "RIGHT" will cause the printer to print characters from left to right. Selecting "LEFT" causes the printer to print from right to left. Press any number key to choose the desired option.

Dot Size:

Expressed as a time (in microseconds), during which a dot is printed. The longer the time programmed; the larger the dot. The range of acceptable values is 100 to 5000 microseconds and the default value is 1000 microseconds.

Print Bold:

To print characters in bold face, this parameter should be set to "Yes". A status of "NO" will print normally.

Matthews 2001 Part Printer Diagnostics

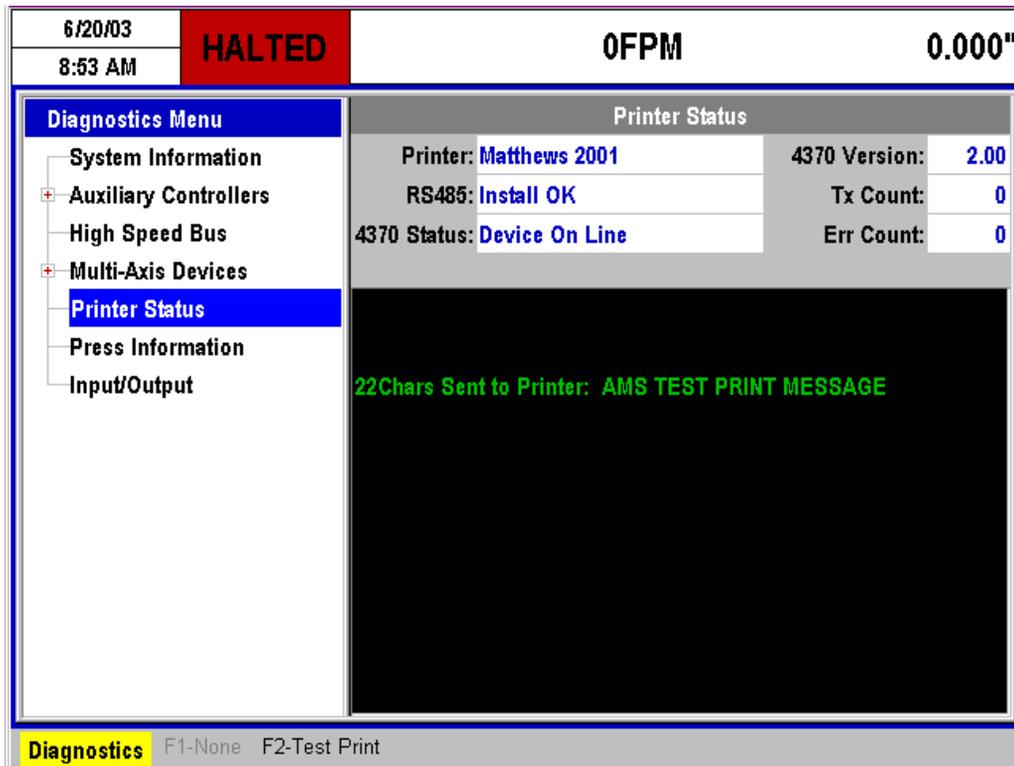


Figure 7-12. Matthews 2001 Printer Status

Printer:

This field displays the make and model of the tag printer driver that has been selected.

RS485:

If the 4370 is communicating with the controller, the display will read "Install is OK". "Response Timeout" is displayed when the controller cannot communicate with the RS485 board

4370 Status:

This displays the status of the communications between the 4370 interface board and the actual printer it is attached to. If the two are communicating successfully, the field will read "Device On Line".

4370 Version:

Displays the version of software located on the 4370 interface board.

Tx Count:

This displays the total number of "Transmissions" that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Fox 8231M Part Printer (Tag-Applicator) Setup

6/20/03	HALTED	0FPM		0.000"
8:50 AM				
Model: XL212AABEMPE Created: 6/20/03 8:31 AM Switch: 4 Version: 2.00				
Setup Menu	ID	Name	Value	
+ Machine Parameters	860	Select Part Printer	Fox 8231	
Tool Data	861	Printer Output Dwell	0.500sec	
Multi-Axis Data	864	Slow Speed for Print	No	
Trim Correction	863	Stop for Print	No	
+ Controller Settings	865	Tolerance Test for Print	No	
+ Auxiliary Controllers	862	Printer Output Reaction	0.0000sec	
- Printer Configuration	890	Edge Offset	0.250"	
Bundle Tag Printer	891	Backfeed	0.000"	
Part Printer	892	Print Speed	4.0In/S2	
QuickSet Data	893	Slew Speed	4.0In/S2	
SetUp F1-Next Window				

Figure 7-13. Fox 8231M Printer Setup

Printer Output Dwell:

The time (in seconds) that the controller will transmit an enable signal to the printer. This parameter can also be adjusted to shorten or lengthen the applicator stroke.

Slow Speed for Print:

Selecting “Yes” will instruct the controller to slow down when it is time to activate the printout message on the printer. Selecting “No” will allow the line to run at full speed while the message is printed.

Stop for Print

Selects whether the material will halt while the part tag is printed and applied. “Yes” will instruct the controller to stop for the printing operation. Selecting “No” will allow the line to continue to run while the ticket is printed.

Tolerance Test for Print:

If the line halts for the print operation, the controller can test for the position of the material for tolerance to insure that the tag is placed in the proper location. If set to “Yes”, the test will be performed, if “No” then it will not be performed.

The TOLERANCE value that was entered under the SETUP parameters applies to the printer as well as all other presses. When the line is halted to perform a press or printer operation, the controller will check to see if any

other presses (including the printer) are in tolerance. If another press is in tolerance, that operation will be performed along with the original operation.

Printer Output Reaction:

This value provides the time that it takes from when the XL200CL controller tells the printer to print to the time that the message is actually printed. This allows the controller to trigger the message earlier in time as line speed increases which keeps the message in the same location on the material. The acceptable range of values is 0 to 9.999 seconds.

Edge Offset:

There is a distance between the point on the label path at which printing occurs and the point at which the label is completely out of the printing mechanism and can be removed. It is sometimes desirable to feed the label out of the print mechanism to the point at which it can be easily removed or applied before printing the next label. This value is the distance that the label will be moved. The acceptable range of values for this parameter is 0 to 512.000" and the default value is 0.250".

BackFeed:

When the EDGE OFFSET parameter is used, it is possible that the next label to be printed may have moved beyond the print head so that part of the label is past the printing area. If this is the case, the label may be "backed up" by using the BACKFEED parameter. This parameter will define the distance that the next label to be printed will be fed backwards, so that the entire label is in the printing area. The acceptable range of values for this parameter is 0 to 1.000" and the default value is 0.000".

Print Speed:

The PRINT SPEED parameter sets the maximum speed at which label stock will be fed through the print head while printing is occurring. Typically higher print speeds will cause some reduction in print quality. It may be desirable to sacrifice some print quality for increased label speed. This feature allows the label to be printed at the highest speed that results in acceptable print quality. The print speed may be reduced to obtain the best quality with acceptable label speed while the label is being fed. The acceptable range of values for this parameter is 1.0 to 8.0 inches per second and the default value is 4.0 inches per second.

Slew Speed:

The SLEW SPEED parameter sets the maximum speed at which label stock will be fed through the print head while printing is not occurring. In other words, the speed while the printer is "slewing" past unprinted areas. This feature allows the printer to use the highest slew speed that results in acceptable print quality. Typically the slew speed will be set equal to or higher than the print speed. If there is a large difference between the speed settings, print quality may be reduced. If the Print Speed parameter is changed, it may be necessary to change the Slew Speed as well, because

Printer Systems

the highest print quality is attained when the difference between the Print Speed and the Slew Speed is kept small. The acceptable range of values for this parameter is 1.0 to 8.0 inches per second and the default value is 4.0 inches per second.

Fox 8231M Part Printer Diagnostics

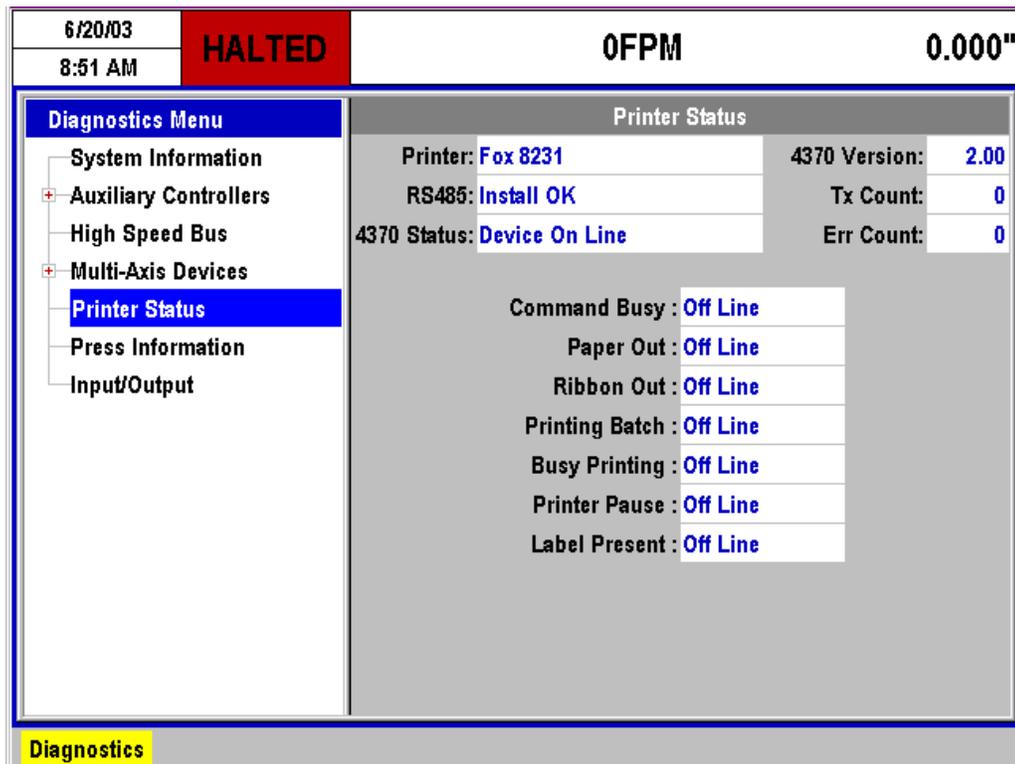


Figure 7-14. Fox 8231M Printer Diagnostic Status

Printer:

This field displays the make and model of the tag printer driver that has been selected.

RS485:

Displays if controller communications to the 4370 interface board is working properly. If the 4370 is communicating with the controller, the display will read "Install is OK". "Response Timeout" is displayed when the controller cannot communicate with the RS485 board

4370 Status:

This displays the status of the communications between the 4370 interface board and the actual printer it is attached to. If the two are communicating successfully, the field will read "Device On Line".

4370 Version:

Displays the version of software located on the 4370 interface board.

Tx Count:

This displays the total number of "Transmissions" that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Command Busy:

If the printer has received print instructions from the controller and there is an order being produced, this status will be YES. If there is no print order to be run, the status will be NO.

Paper Out:

If the printer runs out of paper, this status will be YES. If paper is present, the status is NO.

Ribbon Out:

If a ribbon is not present in the printer, this status will be YES. If there is a usable ribbon in the printer, the status is NO.

Printing Batch:

If the printer is receiving print instructions from the controller, this status will be YES. This indicates there is information in the printer buffer.

Busy Printing:

This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will read NO.

Printer Pause:

If the PAUSE button is pressed on the front of the Citoh printer, the controller will display a YES. Press the PAUSE again to reset this parameter to NO.

Label Present:

This requires the use of a separate sensor from the PAPER OUT sensor, and will indicate that the label has been ejected from the printer.

VideoJet Printer Diagnostics

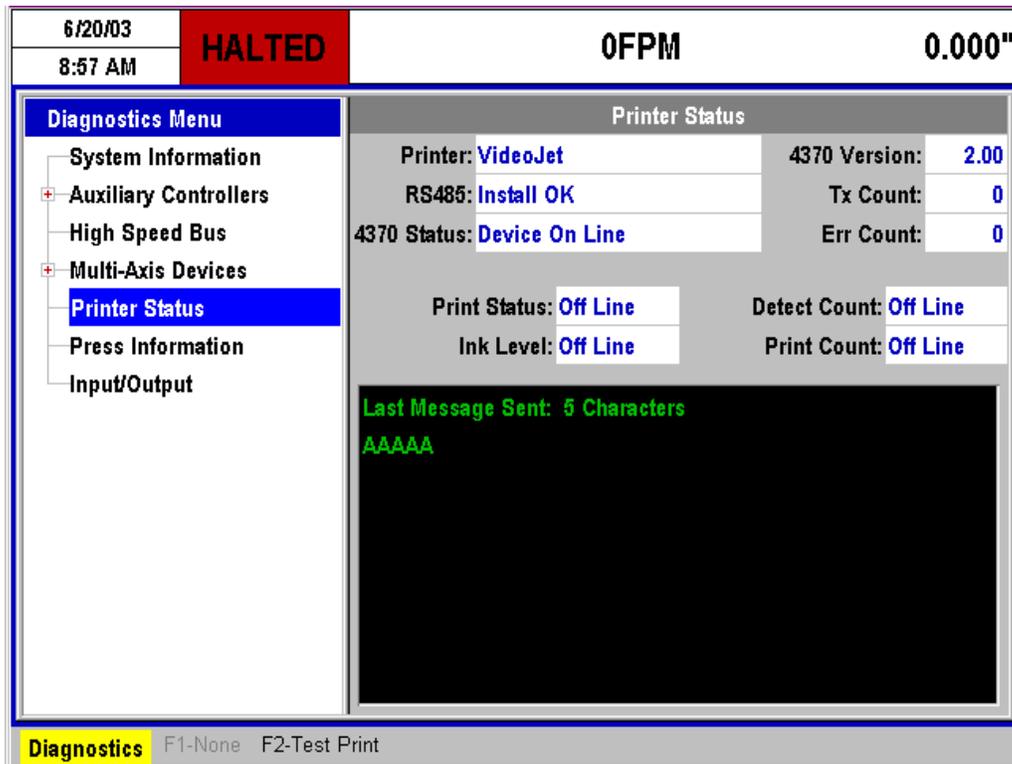


Figure 7-16. VideoJet Printer Diagnostic Window

Printer:

This field displays the make and model of the tag printer driver that has been selected.

RS485:

Displays if controller communications to the 4370 interface board is working properly. If the 4370 is communicating with the controller, the display will read "Install is OK". "Response Timeout" is displayed when the controller cannot communicate with the RS485 board

4370 Status:

This displays the status of the communications between the 4370 interface board and the actual printer it is attached to. If the two are communicating successfully, the field will read "Device On Line".

4370 Version:

Displays the version of software located on the 4370 interface board.

Tx Count:

This displays the total number of "Transmissions" that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Print Status:

See the printer user manual for code identification.

Ink Level:

Displays the current ink level in the printer.

Detect Count:

See the printer user manual for code identification.

Print Count:

See the printer user manual for code identification.

Linx 4800 Part Printer Diagnostics

6/20/03	HALTED	0FPM	0.000"
9:03 AM			
Diagnostics Menu <ul style="list-style-type: none"> System Information ⊕ Auxiliary Controllers High Speed Bus ⊕ Multi-Axis Devices Printer Status Press Information Input/Output 		Printer Status Printer: Linx 4800 4370 Version: 2.00 RS485: Install OK Tx Count: 2 4370 Status: Device On Line Err Count: 2 Print Fault: 0 No Fault Command Status: ** See Printer Manual Command: ** See Printer Manual Jet State: Undefined Print State: Undefined Print Error: Undefined Print Msg Queue: Disabled	
Diagnostics		F1-None F2-None F3-None F4-None F5-None F6-Clear Queue	

Figure 7-18. Linx 4800 Part Printer Diagnostic Status

Printer:

This field displays the make and model of the tag printer driver that has been selected.

RS485:

Displays if controller communications to the 4370 interface board is working properly. If the 4370 is communicating with the controller, the display will read "Install is OK". "Response Timeout" is displayed when the controller cannot communicate with the RS485 board

4370 Status:

This displays the status of the communications between the 4370 interface board and the actual printer it is attached to. If the two are communicating successfully, the field will read "Device On Line".

4370 Version:

Displays the version of software located on the 4370 interface board.

Tx Count:

This displays the total number of "Transmissions" that have been sent to the 4370 board since the window was opened.

Err Count:

Displays the number of faulty or missing responses from the 4370 board. This is very useful in locating problems on the communication line.

Print Fault:

Displays any current faults that the printer has encountered. See the printer user manual for code identification.

Command Status:

Provides an operating code for the current status of the printer. See the printer user manual for code identification.

Command:

Provides the current command code to the printer. See the printer user manual for code identification.

Jet State:

See the printer user manual for code identification.

Print State:

See the printer user manual for code identification.

Print Error:

See the printer user manual for code identification.

Print Msg Queue:

See the printer user manual for code identification.

Auxiliary Devices

AMS Controls produces and supplies additional equipment to complement our XL200CL series length control systems. Among these are valve drivers, encoder drivers, printer interface devices, printer buffers, and detect switches. These devices are individually covered in this chapter.

User Interface

The XL200CL series controller supports standard, off the shelf interfaces in addition to the controller's large 10.5-inch display and industrial keypad.

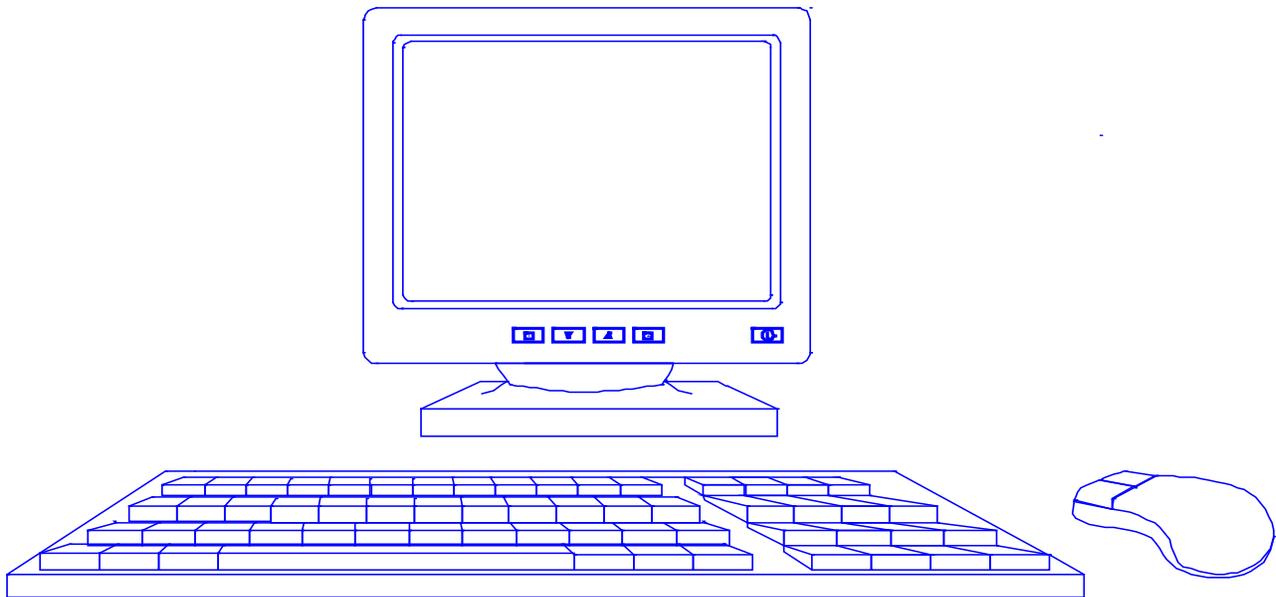
**8**

Figure 8-1. User Interface Enhancements

The individual devices can be used together or independently. For instance, the keyboard can be attached to the controller without having to attach the monitor or the mouse.

SVGA Monitor

The XL200CL series controller supports the standard Super VGA format. Any monitor specified as “SVGA” can be attached.

A SVGA monitor can be attached and used simultaneously with the flat digital screen on the controller.

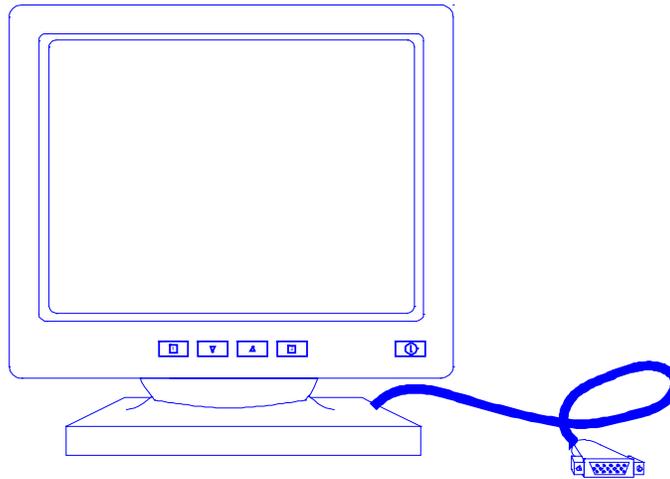


Figure 8-2. SVGA Terminal

The 15-pin svga connection is located at the top of the controller next to the USB mouse and keyboard inputs. The typical interface cable should be less than 10 feet to assure a steady display. Longer lengths can be obtained by using signal-boosting devices.

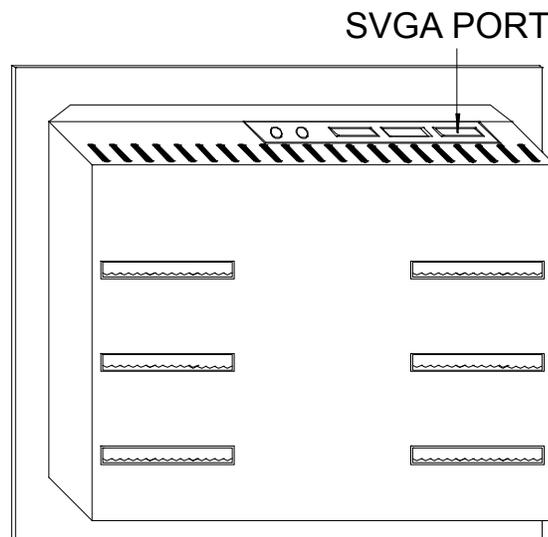


Figure 8-3 Super VGA Connection Location

Keyboard

A standard keyboard can be attached to the XL200CL USB keyboard port. The keyboard can be used in conjunction with the controller's keypad to enter data and answer prompts.

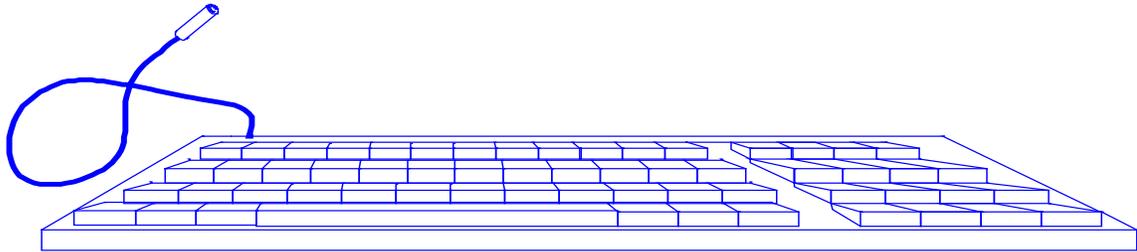


Figure 8-4 Standard Keyboard Interface

The keyboard can be used with or without the SVGA monitor and is ideal for easy entry of alpha-numeric data. The Keyboard's USB port connection is located on the top of the controller, furthest from the other connectors. Do not connect to the USB mouse port, which is the closest to the other connectors.

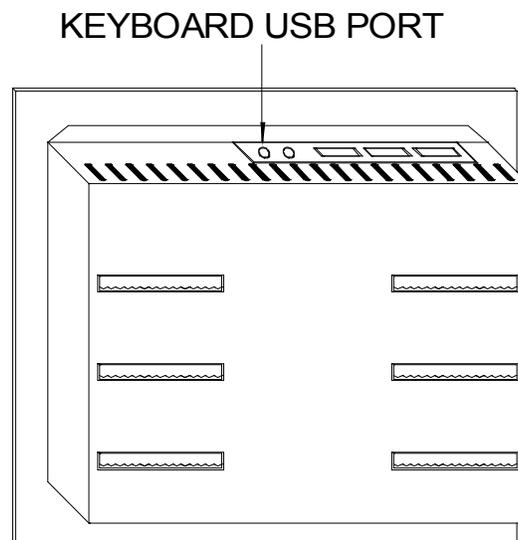


Figure 8-5 Keyboard USB Connection

Mouse

A micro-soft compatible mouse can be connected to the XL200CL Series controller to improve the ease of navigating the windows and controls.

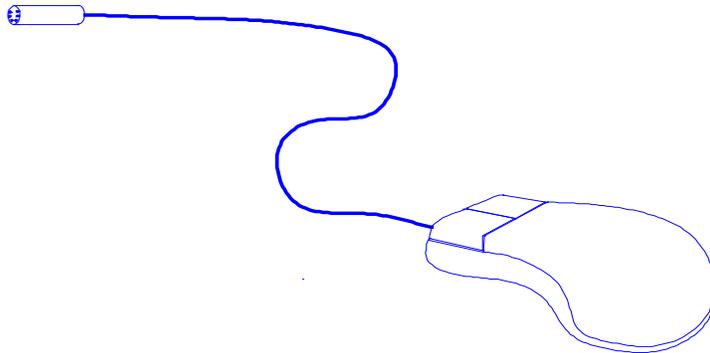


Figure 8-6 Standard Microsoft-Compatible Mouse

The mouse can be used in conjunction with the controller keypad and with the keyboard (if connected). The Mouse's USB port connection is located on the top of the controller, closest to the other connectors. Do not connect to the USB keyboard port, which is the furthest from the other connectors.

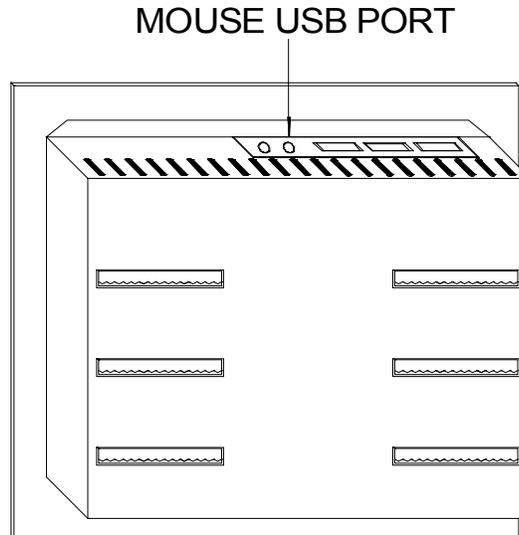


Figure 8-7 Connection point for USB mouse

Bar Code Scanner

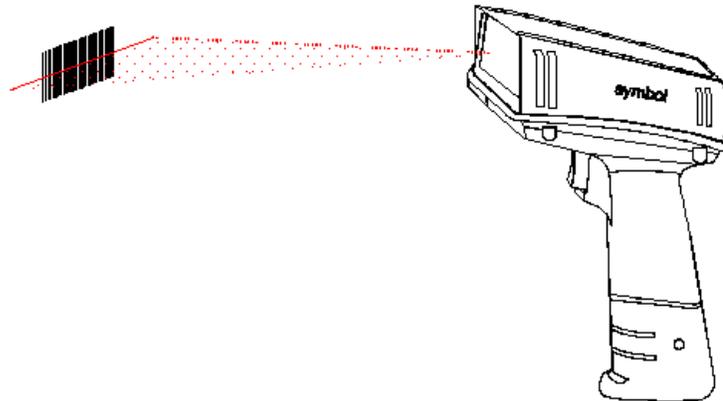


Figure 8-8. Barcode Scanner Gun

The Scanner can be used as an additional input to the controller. The scanner's DB-9 (female) port connection is located on the top of the controller. Scanners that were attached to AMS controllers prior to the XL200CL version 2 were hard-wired into the terminal connectors. Such units will require a DB-9 connector be added if upgrading.

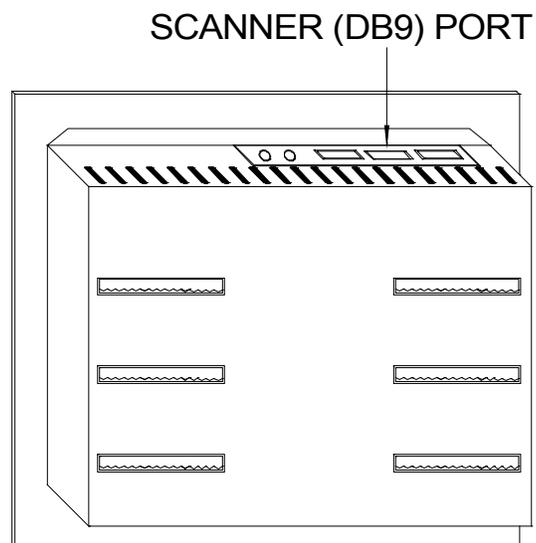


Figure 8-9. Location of Scanner Port Input (Female DB9)

The BARCODE SCANNER system allows a code to be entered with one scan. These codes include:

- Scrap codes
- Delay codes
- Employee numbers
- Coil inventory numbers

Auxiliary Devices

Using the scanner, specific keystrokes for the AMS controller can also be entered. The following is a list of codes that are used by AMS to create bar codes for use by the BARCODE SCANNER. There are many types of software programs that can be used, but the type that works best is one that uses barcode font code 128. Contact your AMS representative for available barcode programs.

REQUIRED AMS CODE	DESIRED KEYSTROKE / HOT KEY
<u>013</u>	Enter
<u>027</u>	Status
<u>001 064 013</u>	Help
<u>001 065 013</u>	Setup
<u>001 066 013</u>	Program
<u>001 067 013</u>	Footage Totalizer
<u>001 068 013</u>	Next Line
<u>001 069 013</u>	Skip Line
<u>001 070 013</u>	Add Line
<u>001 071 013</u>	Delete Line
<u>001 072 013</u>	Increase Quantity
<u>001 073 013</u>	Decrease Quantity
<u>027 084</u>	End
<u>027 087</u>	Delete
<u>012</u>	Right Arrow
<u>008</u>	Left Arrow
<u>011</u>	Up Arrow
<u>010</u>	Down Arrow
<u>027 074</u>	Page Up
<u>027 075</u>	Page Down
<u>030</u>	Home
<u>001 096 013 XX 013</u> XX = 2 digit delay code	Enter Delay Reason Hot Key
<u>001 097 013 XXXXXXXX 013</u> XXXXXXX = 7 digit employee code	Enter Employee # Hot Key
<u>001 099 013 XX 013</u> XX = 2 digit scrap code	Scrap Code w/Inc. Qty Hot Key
<u>001 100 013 XXXXXXXXXXXXXXXXXXXX 013</u> XXXXXXXXXXXXXXXXXXXX= 16 digit coil inventory code	Load_Coil-Coil_Completely_Used_Hot_Key
<u>001 101 013 XXXXXXXXXXXXXXXXXXXX 013</u> XXXXXXXXXXXXXXXXXXXX= 16 digit coil inventory code	Load_Coil-Coil_Not_Completely_Used_Hot_Key

Each 3-digit number listed above (i.e. 013, 027, 001, 084) represents a single ASCII character

!!!

When designing barcodes, use the format as defined! Do NOT take individual keystrokes and link them together to form a barcode. Future software enhancements may alter the keystroke sequence, invalidating such barcodes created by stringing together keystrokes.

Expansion Board

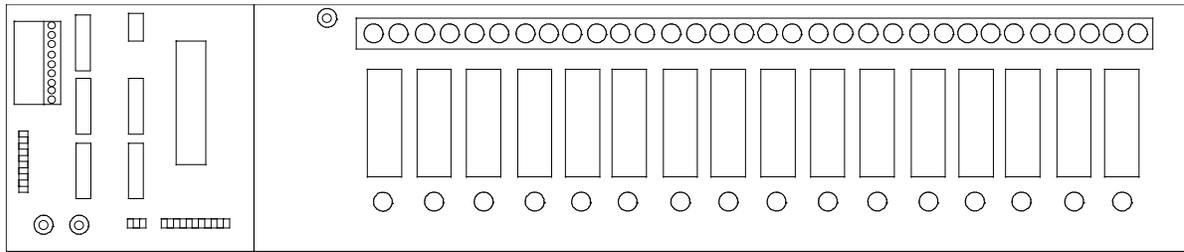


Figure 8-10. Expansion Module and Interface Board

EXP Hardware

To use the expansion option the following equipment is required:

- 5 volt, 6 amp power supply
- Expansion board EXP-1
- Input/output card EXP-IO
- Communication cable (open ended for terminal connections)

Expansion Board Characteristics

The EXP-1 expansion board will be used with up to 16 plug-in modules (typically ODC-5 and/or OAC-5) which are labeled 0-15 on the expansion board. These modules are used for gags 13 through 28. Module 0 would be gag 13 and Module 15 would be gag 28.

Up to four “4” expansion cards can be added to the XL212E controller for a total of 64 additional gags.

The ODC-5 output modules use dry relay-contacts and are rated to withstand up to 3 amps. The OAC-5 modules are solid-state devices and are rated to withstand up to 1 amp.

Gags are immediately set for the next operation after the previous operation is completed. Gags that are manually fired will be energized 0.5 seconds before the press fires, and held “ON” until the completion of the cycle.

Model OAC-5 is a solid-state device and must be installed properly. The polarity of the output must be connected to the output properly.

The expansion board will also include an LED representing each module. When the LED is on, it indicates that the module is receiving a signal to energize. These LEDs can be used to troubleshoot the circuitry if the appropriate gag is not energizing.

The 32 connection terminal strip is connected to the normally open contacts associated with each module. A “power on” indicator light is located next to the terminal strip

Connected to the expansion board is a plug-in input/output (I/O) EXP-IO board. The I/O board will interface the controller to the expansion board. Communication between the EXP-IO board and the AMS controller is via a RS-485 communications. The gag board can be placed up to 4000 feet away from the controller.

Located on the I/O board are two strips labeled “Group A” and “Group B”, which have movable jumpers. The jumpers must be set as specified for the I/O circuitry to work properly (see the enclosed electrical interface diagram for the proper jumper connections).

The I/O board will also have two communication lights labeled “REC” and “XMT” that will flash when there is communication taking place, to and from the XL controller. A connection diagram is shown below.

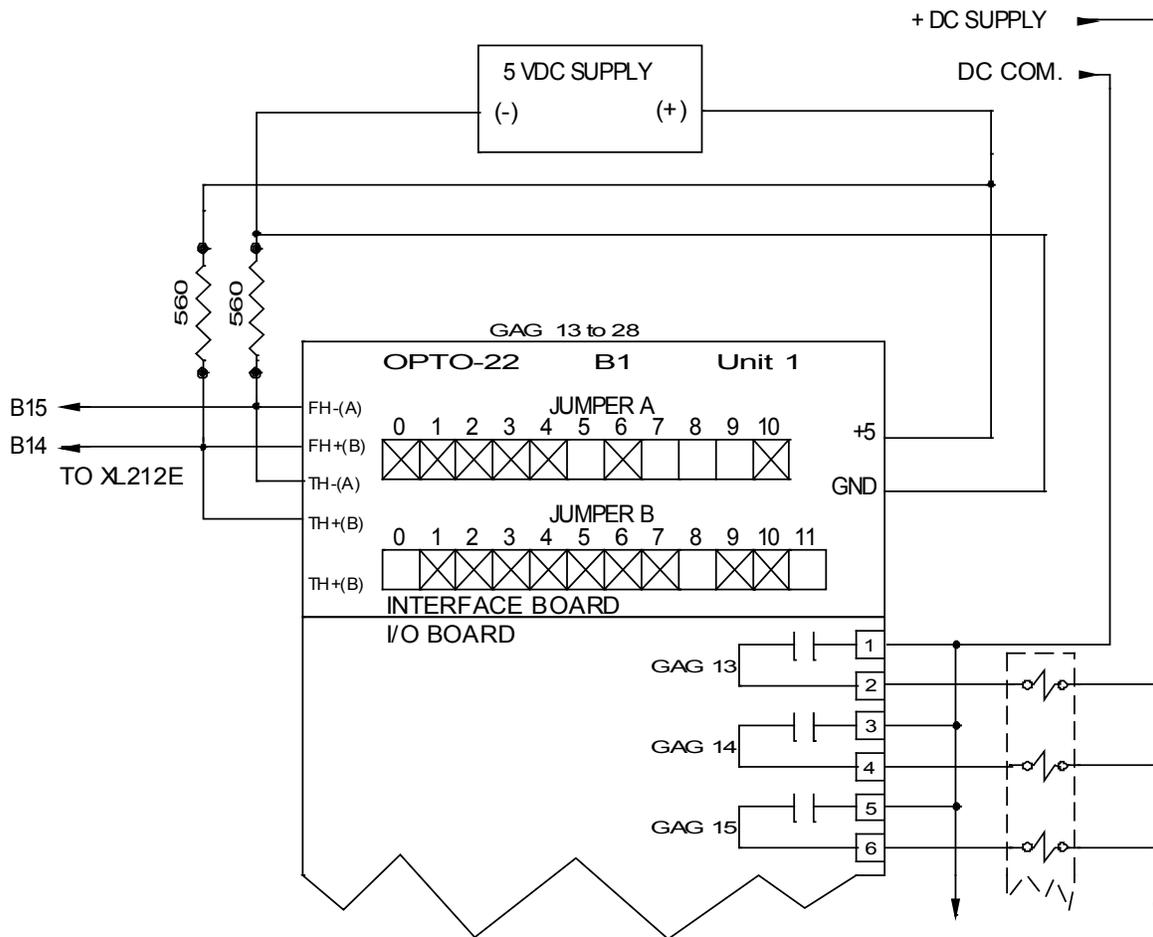


Figure 8-11. Expansion Card Connections

3840 Power Module

Figure 8-12 shows the 3840-2 Power Module. This unit has three 24VDC inputs, two 60VDC valve driver outputs, and one set of relay contacts. The 3840 is used to enhance the consistency and speed of activating valves and solenoids. The “slammer” as it is often referred can fire a valve more repeatedly than what can be achieved from a normal I/O supply. The Power Module drives (slams) the solenoid valve with a short 60VDC pulse, which quickly drops to 24VDC for the duration of the output signal. The high-voltage pulse makes the solenoid react faster and more consistently while the quick drop in voltage saves the solenoid from excessive currents and damage to the valve.

The 3840 power module is especially useful in open loop, flying-die applications, where it is beneficial to reduce the amount of time between the shear output turning on and the shear actually contacting the material. The faster the shear reacts, the more accurate the cut. The second output could be used for a shear up or punch output. The 3840 –1 Power Module is a single valve driver device. Both models include a control relay with a single set of normally open and normally closed contacts.

3840 Specifications

Specifications for the 3840 firing module are below:

- 2 amp DC per output channel (12 ohm max load)
- 4 amp maximum load including power supply
- 200 msec recovery time between ending of output and the start of next output.
- Short circuit shutdown at 4 amps DC, each channel
- Auxiliary control relay contact ratings: 5 amps.
- 4 amp max load on 24vdc power supply, less usage of valve drivers.

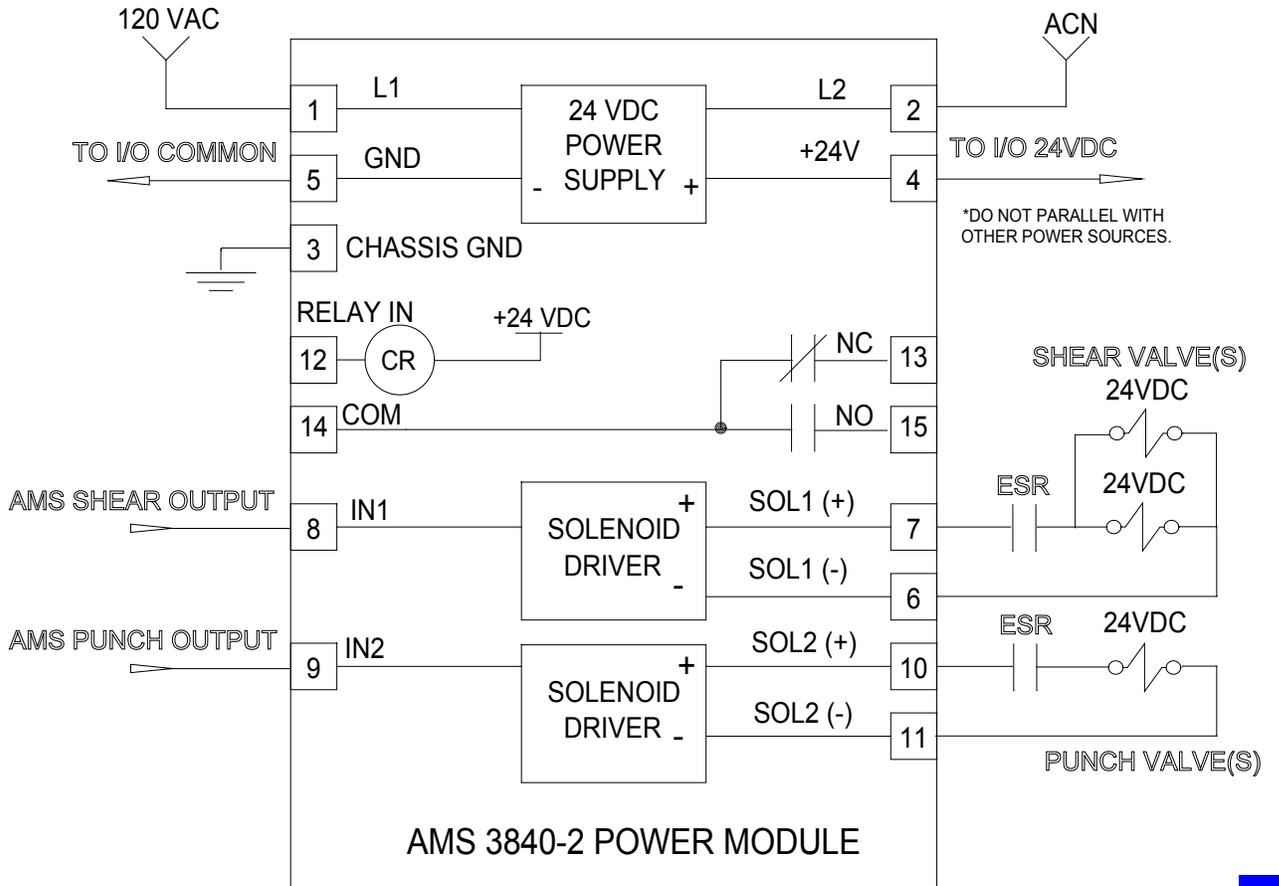


Figure 8-12. 3840-2 Power Module

4390 Series Encoder Drivers

The 4390 series of encoder drivers provides several abilities such as driving multiple controllers from a single encoder, driving printer systems with a common encoder, and using multiple encoders on single-encoder system.

All of the 4390 series of encoder drivers are designed for use with 5-volt TTL logic, quadrature encoders. Differential line driver outputs are used.

4390-1 Encoder Expander/Driver

The 4390-1 is used to divide the line encoder signal of a single encoder between multiple controllers. Four separate controllers can share the same line encoder. A wiring diagram for the 4390-1 is shown in figure 8-13.

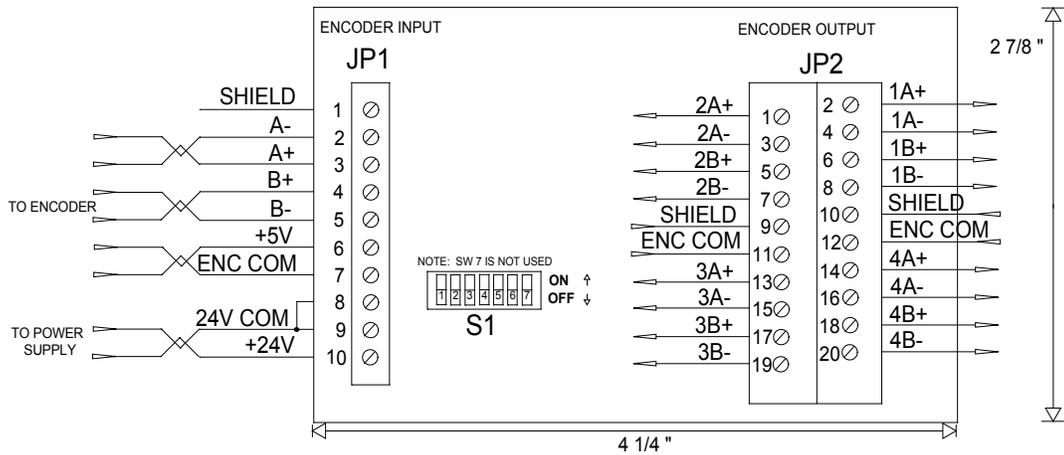


Figure 8-13. 4390-1 Encoder Expander/Driver

The switches on Switch deck S1 are used to divide down counts for specific applications. For example, open-loop controllers cannot accept counts as fast as closed-loop controllers. If a high-resolution encoder is used on a high-speed line, an open loop controller may not be able to accept the encoder counts. The “divide by” switches enable the user to select a lesser number of counts.

The user has the option to pass along the same number of counts as the incoming encoder line had, or to divide that number by half or by a fourth. See the following switch chart for switch setting definitions.

Encoder	Switch Settings	Divide By:
Output #1	No Division Available	1
Output #2	SW1=OFF SW2=OFF	1
	SW1=ON SW2=OFF	2
	SW1=OFF SW2=ON	4
Output #3	SW3=OFF SW4=OFF	1
	SW3=ON SW4=OFF	2
	SW3=OFF SW4=ON	4
Output #4	SW5=OFF SW6=OFF	1
	SW5=ON SW6=OFF	2
	SW5=OFF SW6=ON	4

Example:

A model 1000 encoder (1000 counts per revolution of the encoder) is used.

Switch #1 is set to “ON”, all others set to “OFF”.

- The counts on output #1 would be 1000 by default
- The counts on output #2 would be 500, half of the original 1000.
- The counts on output #3 would be 1000 (divided by one).
- The counts on output #4 would be 1000 (divided by one).

4390-2 Printer Encoder Driver

The 4390-2 board differs from the 4390-1 in that its sole function is to provide an 80-count encoder pulse to a printer. This is primarily for the Matthews 2001 inkjet printer system. It accomplishes this task by receiving the signals from the line encoder and creating two encoder outputs. One signal equal to the incoming signal, and one divided down to an 80-count pulse. See figure 8-14.

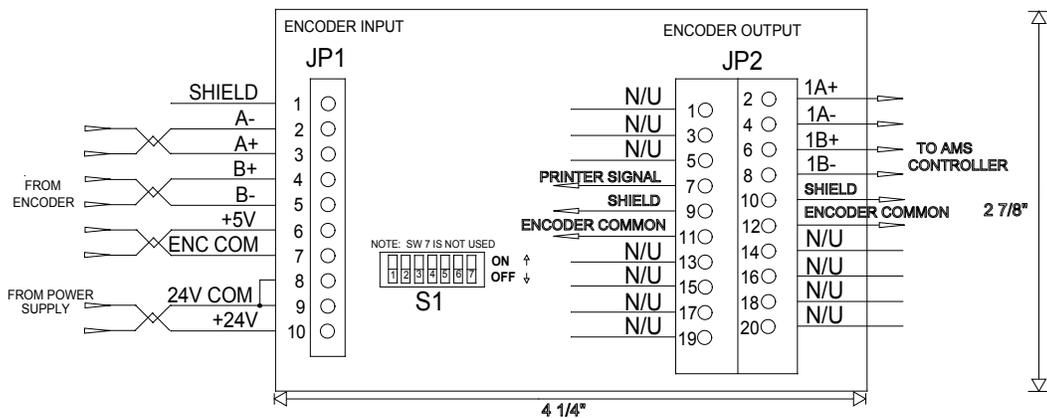


Figure 8-14. 4390-2 Printer Encoder Driver

The switches on S1 are used to tell the 4390-2 driver which model encoder is being used to provide counts. The driver card has switch settings for the four major models produced by AMS controls. See the chart below.

Encoder Model	Switch Settings	Encoder Out
Same In/Out	Not Applicable	Output #1
Model 256	SW1=OFF SW2=OFF	Output #2
Model 500	SW1=OFF SW2=ON	80-Count Printer
Model 1000	SW1=ON SW2=OFF	Output
Model 2000	SW1=ON SW2=ON	

Example:

A Model 1000 encoder is used on a line with an inkjet printer. Using the switch chart, the following settings must be done.

- Switch #1 would be set to “ON”
- Switch #2 would be set to “OFF”.

Encoder output #1 is wired to the controller; encoder output #2 will be wired to the printer.

4390-5 Encoder Demodulator

The 4390-5 Encoder Demodulator is essentially an "encoder signal selector" for a line with two encoders. Two encoder inputs come to the board, but only one of the signals is allowed to pass through the output of the board to the controller.

Some applications require that one encoder be used to measure length and line speed up to a certain point on the line. At a given point, it is necessary for a second encoder to take over the task of sending information to the controller. The 4390 provides the switching for the two encoders based on a signal from an input device. This is usually in the form of a sheet detect switch.

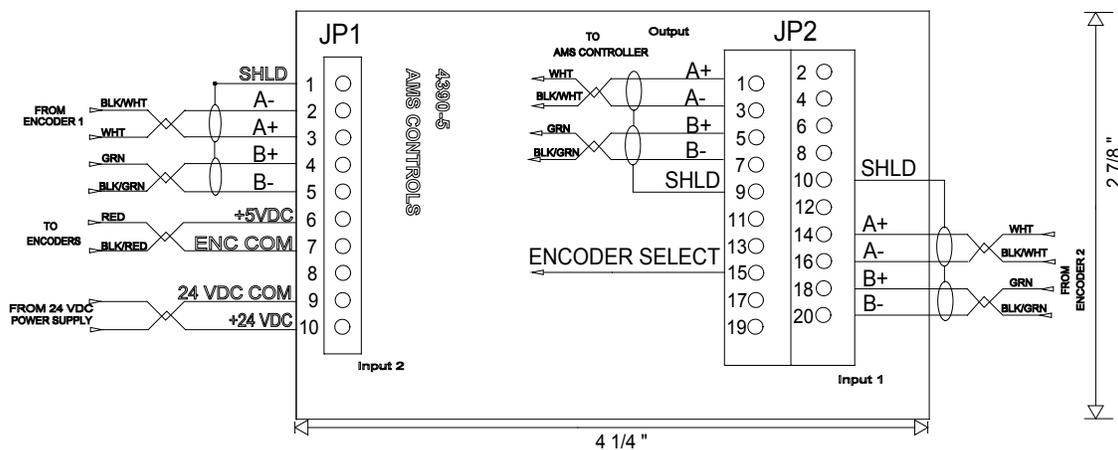


Figure 8-15. 4390-5 Encoder Demodulator

- When the "Encoder Select" input is not turned on (floating high), Encoder #1's signal is passed through to the controller.
- Taking the "Encoder Select" input low (connected to common) will cause the board to pass along the output signal from encoder #2, rather than encoder #1.

4370 Printer Driver

The 4370 Printer Driver is a communications buffer for the print messages sent from the XL200CL Series controller to a printer. There are two versions of printer driver: the 4370-1, which uses a 40-milliamp current loop driver, and the 4370-2 using a RS-232 driver. The model needed will depend on the type of printer used. Most of the printers supplied from AMS will use the 4390-2. The PM5100 and the Mathews 2001 uses the 4390-1. See figure 8-16.

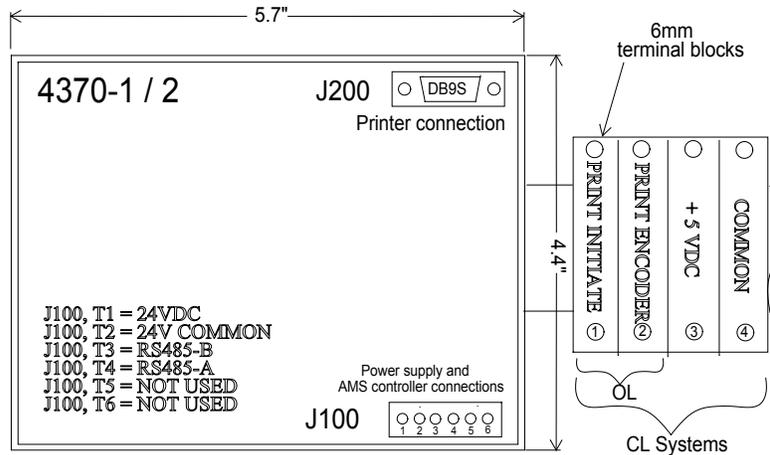


Figure 8-16. 4370-1 / 4370-2 Printer Driver

The 4370 printer-driver is sometimes accompanied by a set of 2 or 4 terminal blocks. When print-on-part printers are used, they need an “initiate” input to tell them when to print and an encoder input to tell it how fast to print the message. Terminals 1 and 2 shown in figure 8.16 provide for easy connection for these inputs.

The initiate output on the XL200CL controller is located on terminal E9 (output 8).

An encoder can be directly attached to the printer or an encoder signal via a 4390-1 driver card can be connected.

A1-A2 Analog Converter Module

AMS Controls, Inc. uses differential output drivers for its analog circuits. This type of driver has many benefits including being a “clean” signal to use in industrial environments. Most systems today are made to work with this technology. Some drive systems still use what is called “single ended analog signals” for speed control. This type of analog input has one leg tied to common on the appropriate input to the drive. The other leg would then be the “command” signal. These two types of signals are incompatible.

AMS Controls provides an analog converter module that changes the “differential analog” output from the controller to a “single-ended” analog signal, allowing the XL200CL Series controller to be compatible with nearly all drives systems. (See figure 8-17).

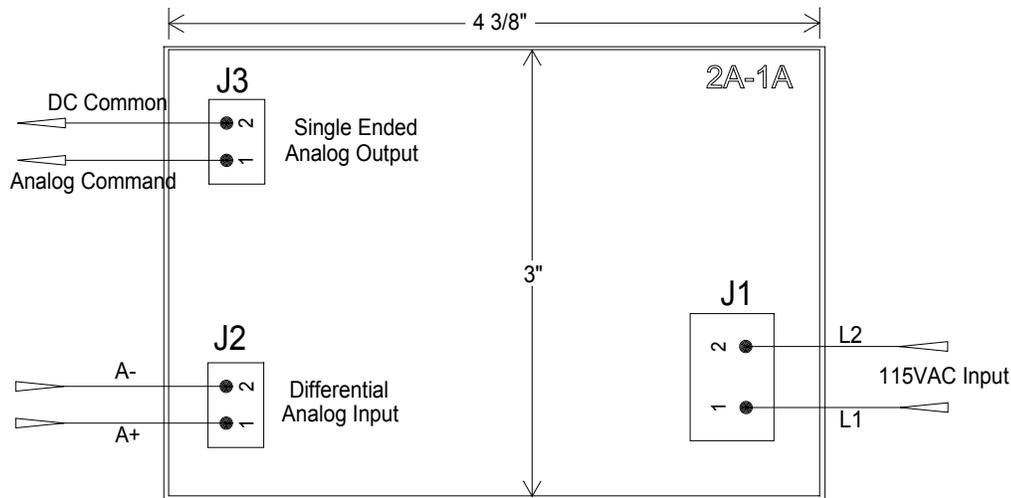


Figure 8-17. Analog Converter Module

The “2A-1A” driver card requires 115VAC supply to operate. The analog output from the AMS controller simply wires into the terminals on J2. The shield for this cable should be tied to the AMS shield connection.

The “single-ended” output is then taken from J3 and wired to the drive. The shield for it should be attached to the drive’s shield connection.

Switch FOPs

Switch FOPs (Fiber Optic Pickups) are optical switches that use fiber-optic lines to provide high-speed accuracy for the detection of material or an opening in the material. Generally, there are two main applications for photo eyes; sheet (edge) detects and hole detects.

Sheet Detect Application

When used to detect a sheet “sheet detect mode”, the FOP searches for the leading edge of the material. This allows the controller to locate a pre-cut sheet of material with very high accuracy. Once the edge is detected, pre-defined operations can then occur on that material. Since the material is usually not present, the detectors will “sense” each other. In these cases the amplifier should be set to “dark operation”, meaning that the amplifier will send a detect signal when the light-beam is broken between the detectors. Figure 8-18 shows the controls on the Omron amplifier. Notice the Setting switch on the lower-left hand side of the drawing.

Hole Detect Application

Hole detect FOP’s will search for the absence of material. Typically, they will pick up a hole or series of holes. In this case, the detectors do not “sense” each other until a hole passes and the light beam goes through the material. The amplifier should then be set for “light operation”. Hole detect switches should be placed as close to the shear as possible, but not so close that they will be subjected to shock and jarring from the press. A distance of around 10 inches is recommended.

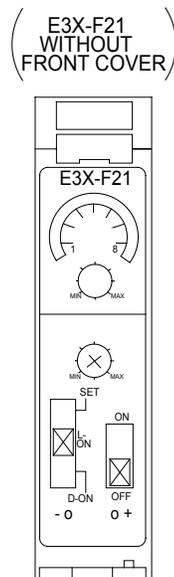


Figure 8-18. E3X-F21 Amplifier Controls

Hole detect switches must be very accurate and provide very fast and repeatable switching. AMS Controls requires the use of specific Omron photo-switches for hole detect applications. These specific parts have been tested and verified for required performance.

- The amplifier part number is “E3X-F21”.
- The fiber optic cable part number is “E32-TC00”.

AMS will not guarantee accuracy if a type of switch other than the Omron E3X-F21 is used.

AMS supplies a 4” x 4” junction box that has the amplifier already mounted in it. The installer will have only three wires to install: 24VDC, Common, and the input wire. See below for typical wiring connections.

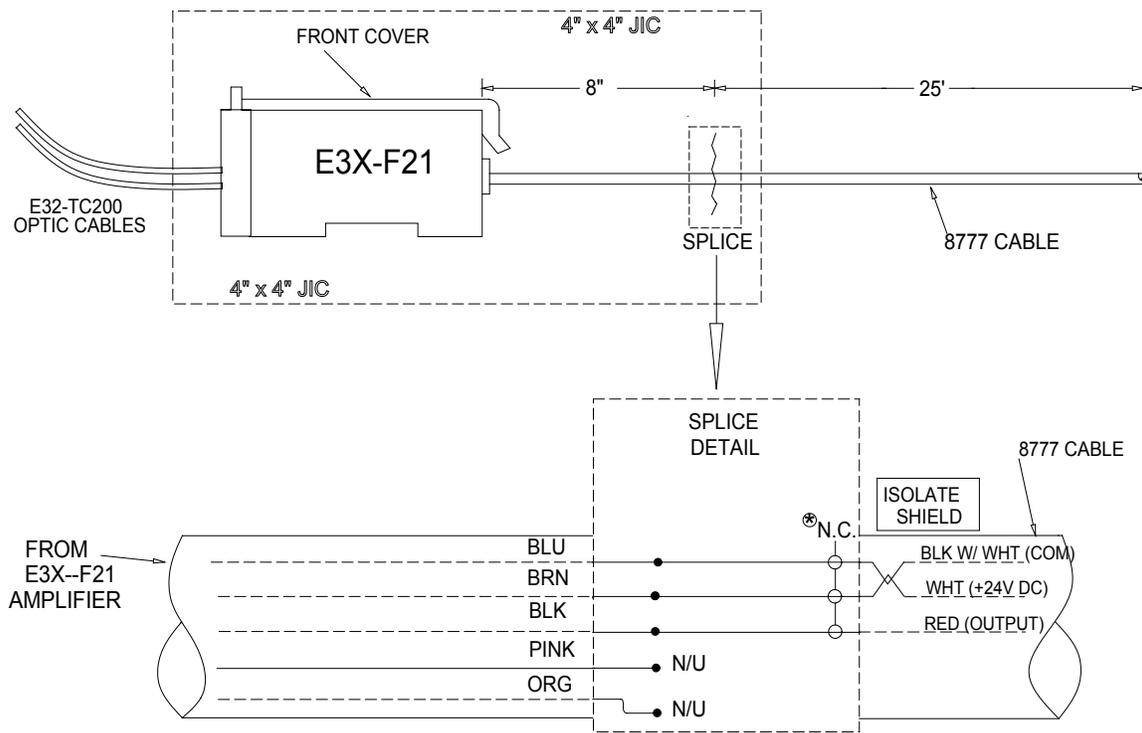


Figure 8-19. FOP (Fiber Optic Pickup) Junction Box Connections

As for all signal wiring, the 8777 cable that returns the detect signal to the controller should be run through conduit by itself or with only other small signal wires (such as encoders, etc.)

Auxiliary Devices

Some special rules apply when using fiber optic switches. For the specified model of Omron switch, a distance of no more than 3½" is acceptable for the distance between the sensors. Also, the optical cables cannot be bent too sharply. (Figure 8-20). Auxiliary items such as 90-degree deflectors and flexible-cable armor can also be supplied. Call AMS for more details.

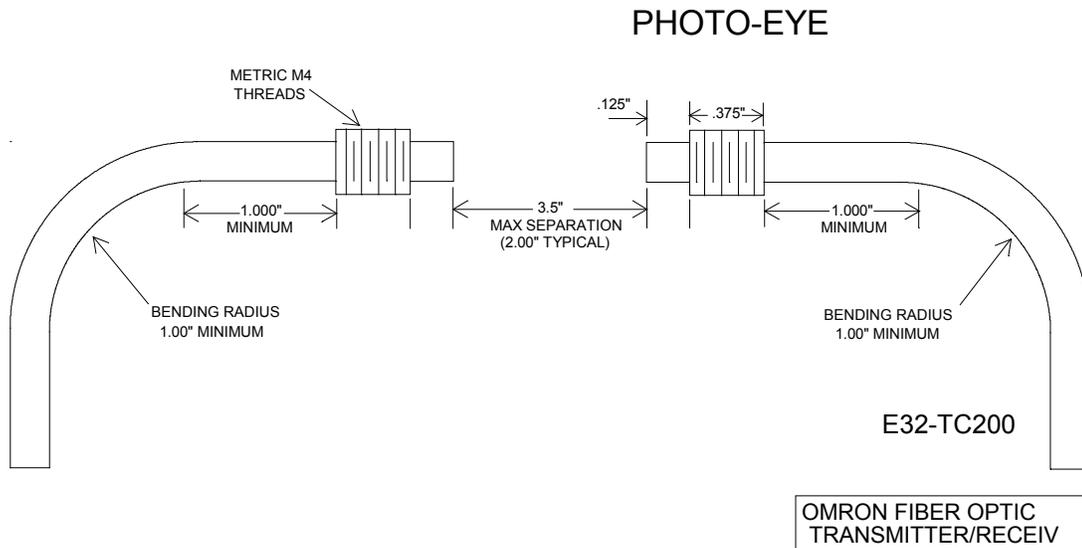


Figure 8-20. Fiber-Optic Photo-Eye Placement

If interested in any of the devices found in this chapter, Call AMS Controls, Inc. at 1 (800) 334-5213 or contact us at sales@amscontrols.com.

Software Options

Extended Macro Patterns (“M” Option)

Chapter three (3) discusses standard patterns and macro patterns in detail. As a reminder, a macro pattern is a group of reoccurring patterns that can be identified as a single tool (or operation). These macro patterns (group of patterns) can then be placed into standardized patterns or used independently.

The standard XL200CL series controller can be programmed with as many as 25 macro patterns. Pattern numbers 975 through 999 are reserved for this purpose. Some customers require many more macro patterns than that. Adding the “M” extended macro pattern software option enables the customer to access as many as 350 macro patterns. With this option, the range of extended macro patterns is 650 through 999.

Programming Patterns

Programming Extended Macro Patterns is very similar to programming standard patterns. Press the PROGRAM key to enter the Program Mode. Select PROGRAM PATTERNS. Any number (1 - 999) can be used to define a pattern, however, patterns 650 - 999 may be inserted into other patterns as MACRO PATTERNS. Refer to Chapter 3 for full details in programming patterns and macro patterns.

Edit Tool Data

Tool data should be entered by the normal procedure in the EDIT TOOL DATA screen. Tool Number zero is reserved for the shear and must always be entered. A Tool Number, Press Number, Gag Number, and Offset Distance is to be defined for each available tool.

Using Macro-Patterns saves programming time for frequently used patterns

In the pattern programming window, tools are referenced on the part where the specific press operations are to occur. When using a macro pattern, the pattern number itself is used in place of the tool number. This is why tools 650 through 999 may not be programmed. This range of tool numbers is reserved for MACRO PATTERNS and will be programmed in the “Program Patterns” screen. When the “M” option is included in the software, defining a “Tool ID Number” greater than 649 will result in an error.

Hole Detect (“H” Option)

The “Hole Detect” option gives the customer the ability to detect the leading edge of a piece of material, detect a single hole, or detect and count a series of holes, referencing the controller to a specific part being produced. When this option is added, the controller has an “H” added to its model number. (XL200CL becomes a XL200CLH).

The “H” series controller can still be used as a standard controller via configurations in the machine parameters.

The hole-detect input is located on input #24 on all models of the XL200CL series controller. Input #24 is on terminal connection “D10”.

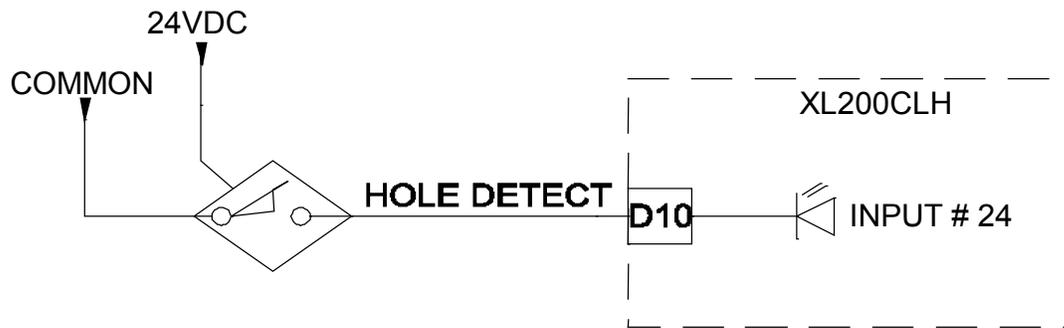


Figure 9-1. Typical Wiring of a Hole Detect Input.

The **XL200CLH SERIES** has the same general parameters as other AMS controllers with the addition of specific parameters that relate directly to the Hole option. These parameters are located in the SETUP menu under “Machine Parameters” and are described on the next page.

Hole Option Parameters

Hole Mode Select

Hole Mode Select describes whether the controller is working as a standard controller or is used to count holes. Select **Count Hole** to run the controller as a hole detector or select **Standard** for normal controller operation. When the controller is in the “Count Hole” mode, the operator will enter the number of holes before a shear instead of an actual part length. In the “Standard” mode, the controller uses a part length for programming the cutoff point.

Shear to Detector Distance

The “Shear to Detector Distance” is the physical distance between the shear press and the hole-detector. The detector should be located as close as possible to the shear press for best accuracy but far enough away (typically 10” or more), to react to sensing the hole and to activate the shear press.

Minimum Hole Spacing

When the Hole Counter detects a hole in the run mode, the material must move the “Minimum Hole Spacing” distance forward before another hole is allowed to be detected. This parameter prevents the controller from accidentally reading the same hole multiple times. Typically, a value smaller than the minimum distance between holes in the material and larger than the hole itself is programmed here.

No Hole Stop Distance

This parameter defines the maximum length of material allowed past the shear press without detecting the programmed number of counts to make the current part. This parameter is used to protect machinery in case of photo-detector failure. If a hole is not detected in the specified distance (Length Past Shear + Shear To Detector Distance is greater than the No-Hole Stop Distance), the line will stop and an error message will be displayed.

Hole Detect Logic

Selects the logic of the Hole Detect input. **Active Low** triggers a hole count when input #24 is switched to circuit common (turns on). **Active High** triggers a hole count when input #24 floats high at 24VDC (turns off). The default value is “Active Low”.

Programming

Programming cut lists is similar to standard programming, with the exception of “Hole count” and “Offset” taking the place of “length” on each bundle item.

Enter the number of holes to be counted in the “Hole Count” field. Enter the distance from the last hole to the desired cutoff point into the “Offset” field.

For example, a part that contains 30 holes is produced. Each hole is 1.00 inch in diameter and is equally distanced at 4 inches from center to center. The desired cut point is directly between the 30th hole of the first piece and the 1st hole of the second piece. See Figure 9-2.

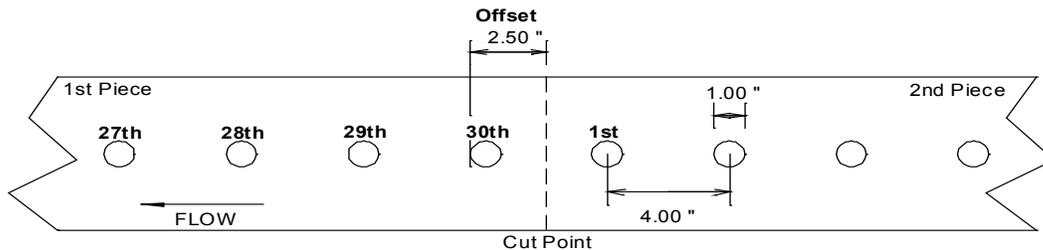


Figure 9-2 Example parts with 30 holes, 4 inch spacing.

The “Hole Count” for this part is (30). The “Offset” distance equals “2.5 inches”. This will produce the desired part. This program will look like the one shown in figure 9-3.

6/23/03	HALTED	0 Holes	0FPM	0.000"			
10:12 AM							
Order-Material-PCode	Bundle	Qty	Done	Holes	Offset	Pattern	Status
05-9786 P9	1	200	0	30	2.500"	0	Next
GLV-5.75-18							
PC007							
05-9723J6							
GLV-5.75-18							
PC007							
06-0923R7							
WHT-5.75-18							
PC007							

Program F1-Next Window F2-Add F3-Delete F4-Copy F5-None F6-Go to Patterns

Figure 9-3. Programming Example as shown on the Program Screen

Programming in Hole Mode

QTY:

Is the number of actual parts required for the bundle. In the above example, 200 parts will be produced for the order.

Hole:

This is the number of holes that are to be counted for each part. Figure 9-3 shows 30 holes are to be detected before targeting the shear.

Offset:

This is the distance from the leading edge of the last hole counted to the location where the shear is to occur. In the above example, the shear will occur 2.5 inches past the leading edge of the last hole.

Auxiliary Controller (“S” Option)

The **Auxiliary Controller** (also known as the “Slave” controller) is available with or without a display. When a display is not used, interfacing and programming is accomplished through the **XL200CLS SERIES Controller**. Chapter 10 of this manual describes the **Auxiliary Controller** operation in detail.

When the auxiliary option is included, the XL200CL series controller will be able to support up to 9 downstream controllers. This includes up to eight SL3XXH(CL) controllers and one SL304 controller. Each Auxiliary Controller is uniquely identified by the respective Auxiliary Controller (DIP) switch settings. Below is an example of the **SL301HCLS** Controller switch settings.

SW1	SW2	SW3	Device #	Unit #	Type
OFF	OFF	OFF	1	30	0
ON	OFF	OFF	2	31	1
OFF	ON	OFF	3	32	2
ON	ON	OFF	4	33	3
OFF	OFF	ON	5	34	4
ON	OFF	ON	6	35	5
OFF	ON	ON	7	36	6
ON	ON	ON	8	37	7

Figure 9-4 Switch settings for setting identities for SL301H (CL)'s.

The auxiliary controllers may use hardware-oriented detectors for detecting holes or edges, or may use a direct output from the XL200CL series controller to target respective operations.

Complete listings of switch setting configurations for the auxiliary controllers are found at the end of Chapter 10.

A common scenario where auxiliaries are used is when multiple flying dies are arranged on a machine in series. The XL200CL series controller tracks the different tool locations, but does not fire the presses directly. Instead, the press outputs queue the auxiliary controllers, which in turn track the target and perform the flying operation with great accuracy. All programming is done on the XL200CL, yet the “Slave” controllers perform the actual operations.

Expanded Gag Outputs (“E” Option)

The XL212 controller has the ability to drive up to a combination of 12 press or gag outputs. These outputs can be configured to fire the press itself or a gag that is designated to a particular press. Certain machines contain only one or two presses but have many gags. When additional gags are required, the “Expansion” option can be added. This requires both a software upgrade and additional hardware. The hardware (Expansion board) is discussed in detail in chapter 9 (Auxiliary Devices). Adding this option includes adding an “E” to the model number (XL212 becomes an XL212E). This option is only available on the XL212 controller model.

The “Expansion” option enables the controller to communicate to and control one to four expansion boards. Each expansion board contains an additional 16 gag outputs. If four boards are attached, the total number of additional gags that can be used 64. This is in addition to gags that are available on the controller itself.

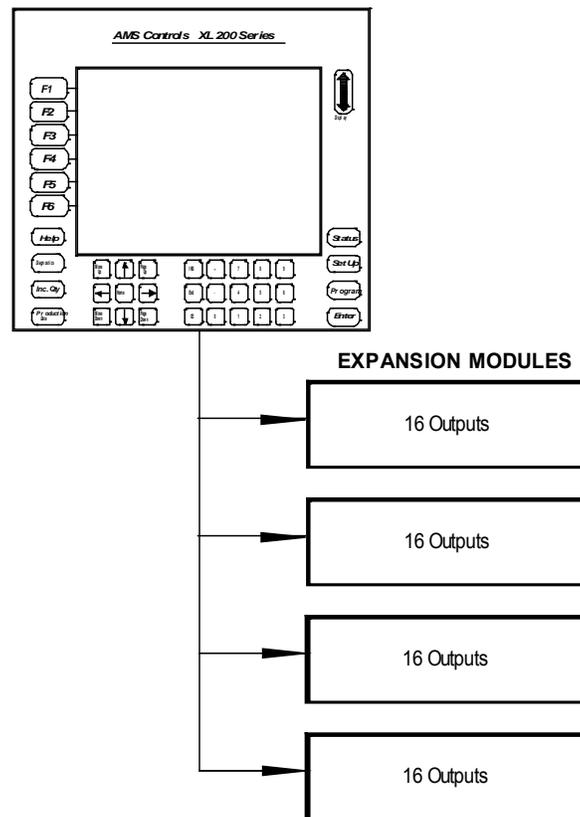


Figure 9-5. XL212E Attached to Four Expansion Modules.

Analog Output (“AA” Option)

The XL200CL has two analog output circuits. The “Proportional Velocity” output is standard on all controllers and provides an analog output that is proportional to the material velocity. The analog output for a given velocity is determined by the parameter “Velocity at Maximum Analog”. The output is located on Analog Output #2 at terminals B4 and B5.

An additional “Analog” option can be added to the software. This requires the hardware to be modified as well. With the additional analog option, the user can vary line speeds automatically depending on the length of part being produced. “AA” being added to the model number indicates this option.

This feature determines and controls how fast the line runs by adjusting the output from Analog Circuit #2 (Terminals B7 and B8). This analog output is to be used as an input to the drive system that controls the roll former, feeder, or other material feeding device. The longer a part is, the faster the line is allowed to run.

This allows the operator to run production without constantly checking the next part length and adjusting the line speeds to keep from overrunning close targets. The line speed will be reduced or increased by a constant ratio that is controlled by the analog parameters.

No acceleration or de-acceleration ramps will be generated for changes in the analog signal & the analog output will be set to 0 (zero) volts when the line is halted. Such ramps should be set in the drive system itself.

Analog Parameters

The analog output option included additional setup parameters located in the “Setup” menu window under “Machine Parameters”.

Minimum Speed Voltage

Sets the minimum voltage output desired between 0 volts and 10 volts. As well as setting the lower velocity limit when running short parts, the Minimum Speed Voltage parameter sets the analog output for jog speed.

Maximum Speed Voltage

Maximum Speed Voltage sets the maximum analog voltage output while the line is running full speed.

Length at Maximum Speed

The “Length at Maximum Speed” parameter is set in units of length and has a range of 0 to 3500 inches. This parameter is used to scale the analog voltage output while in run mode. For any part length equal or greater than the “Length at Maximum Speed” parameter, the analog output will equal the “Maximum Speed Voltage”. For any part lengths that are less than the

“Length at Maximum Speed” parameter, the analog output voltage will be determined by a formula but will not be less than the “Minimum Speed Voltage”.

$$\text{OUTPUT VOLTS} = \frac{(\text{MAXIMUM VOLTAGE} - \text{MINIMUM VOLTAGE})}{\text{LENGTH AT MAXIMUM SPEED}} \times \text{PART LENGTH} + \text{MINIMUM VOLTAGE}$$

For example, Using the following settings and applying them to the formula, the output voltage for a 96 inch piece would be 6.8 volts.

Maximum Voltage	8 Volts
Minimum Voltage	2 Volts
Part Length (Current)	96 inches
Length at Maximum Speed	120 inches
Output Volts Equal	6.8 Volts

Part Printer (“P” Option)

The part printer option allows the XL200CL Series controller to interface and operate several different part printer systems. “P” being added to the model number indicates this option. These include ink jet part marking systems and tag printers. Among the supported printer systems are:

PM5100 & PM3200 Matthews 2001 VideoJet Fox IV 8231 M C-itoH T-4 Citizen	Single and Dual head Inkjet Part Marker w/ automatic head cleaning. Single head inkjet Part Marker Single and Dual Head Part Marker Part Tag Printer with Applicator Part Tag Printer (Peel Off) Part Tag Printer (Peel Off)
--	---

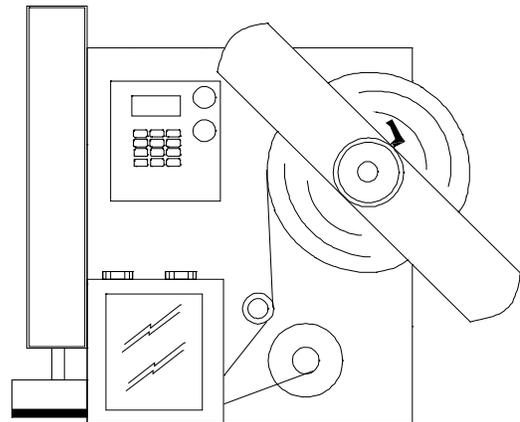
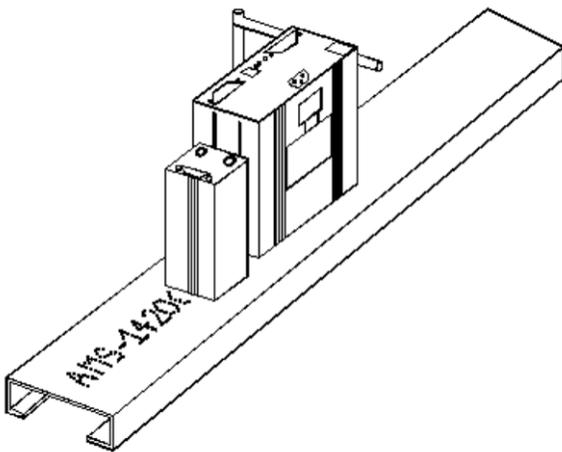


Figure 9-6 Examples of Part Printers: Matthews 2001 and Fox IV

Default print messages include the part length and pattern number (if used). Detailed custom messages can also be printed when orders are downloaded via the Eclipse Production Software.

The “Setup” menu on the XL200CL Series controller contains the “Printer Configuration” menu item that provides a method for selecting the appropriate printer and configuring its operating parameters. This is discussed in detail in Chapter 7 (Printers).

The “Diagnostics” screen menu item for “Printer Status” provides status feedback from the printer and provides the operator some operational commands such as reprint and testing a print. This too is discussed in detail in Chapter 7.

Bundle Printer (“B” Option)

The bundle ticket printer options allow the XL200CL Series controller to interface and operate several different types of bundle tag printers. “B” being added to the model number indicates this option. Among the supported printer systems are:

C-Itch T-4
Zebra 4000
General Dynamics
Citizen

Bundle Ticket Printer
Bundle Ticket Printer
Bundle Ticket Printer
Bundle Ticket Printer

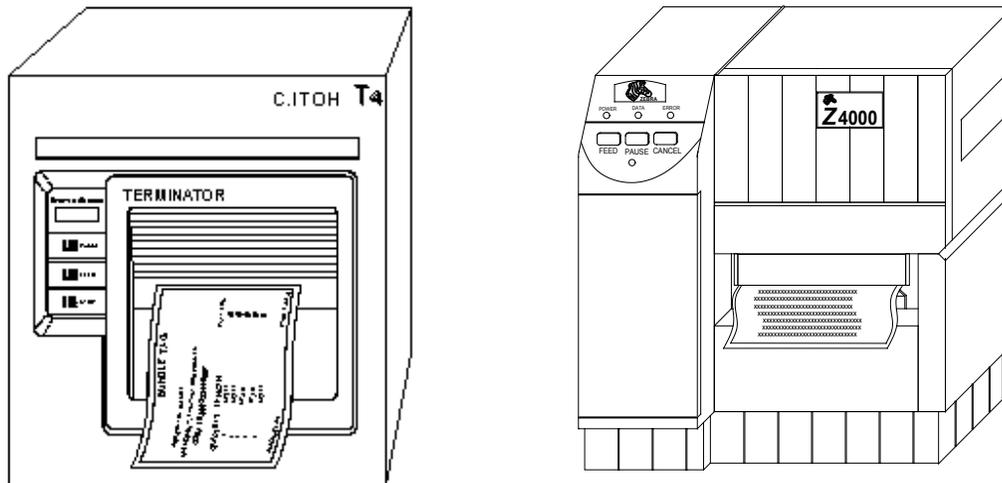


Figure 9-7 Examples of Bundle Tag Printers: C-itch T-4 and Zebra 4000

9

The XL200CL Series controller prints a default tag that includes the Order number, each lift with respective quantity and length, and tag number. Customized information can be added by downloading orders via the Eclipse Production Software.

The “Setup” menu on the XL200CL Series controller contains the “Printer Configuration” menu item that provides a method for selecting the appropriate printer and configuring its operating parameters. This is discussed in detail in Chapter 7 (Printers).

The “Diagnostics” screen menu item for “Printer Status” provides status feedback from the printer and provides the operator some operational commands such as reprint and testing a print. This too is discussed in detail in Chapter 7.

Alternating Press (“L” Option)

The “Alternating Press” option permits the user to program a single tool into part patterns that is then triggered by two separate presses. This allows the easy programming of parts and increased line speeds as the two presses will be able to overlap on close operations. “L” being added to the model number indicates this option.

A common use of this feature is on stud lines that run at high speeds. Due to the close proximity of the required punched holes, the punches would soon overlap. The “Alternating” option allows the same identical punch patterns to be used but does so with two presses, eliminating overlapping operations.

This feature is only available on the XL200CL die accelerator and may be used in conjunction with other options. The typical XL200CL controller can control an accelerator cutoff press and an open loop punch press. When the “Alternating” option is added, The XL200CL can control three presses, although the two punch presses are considered one and are programmed accordingly.

6/23/03	HALTED	0FPM		0.000"
11:17 AM				
Model: XL200L		Created: 6/23/03 11:15 AM	Switch: 17	Version: 2.00
Setup Menu	ID	Name	Value	
+ Machine Parameters	121	Shear Dwell Down	0.200sec	
- Tool Data	123	Shear Boost Dwell	0.140sec	
- Trim Correction	124	Shear Reaction	0.1200sec	
+ Controller Settings	125	Shear Boost Reaction	0.1400sec	
- QuickSet Data	131	Press 1 Dwell Down	0.100sec	
	133	Press 1 Boost Dwell	0.040sec	
	134	Press 1 Reaction	0.0800sec	
	135	Press 1 Boost Reaction	0.0800sec	
	141	Press 2 Dwell Down	0.100sec	
	143	Press 2 Boost Dwell	0.040sec	
	144	Press 2 Reaction	0.0800sec	
	145	Press 2 Boost Reaction	0.0800sec	
	260	Tool Selected for Manual Punch	1	
	300	Bundle Quantity Reload Value	20	
SetUp F1-Next Window				

Figure 9-8. Additional Press Parameters with Alternating Option

The two presses will be considered as a single tool when programming the part pattern. See figure 9-9 and notice that an even-spaced pattern has been programmed.

Software Options

The resulting part is produced with every other operation being performed by the opposite press.

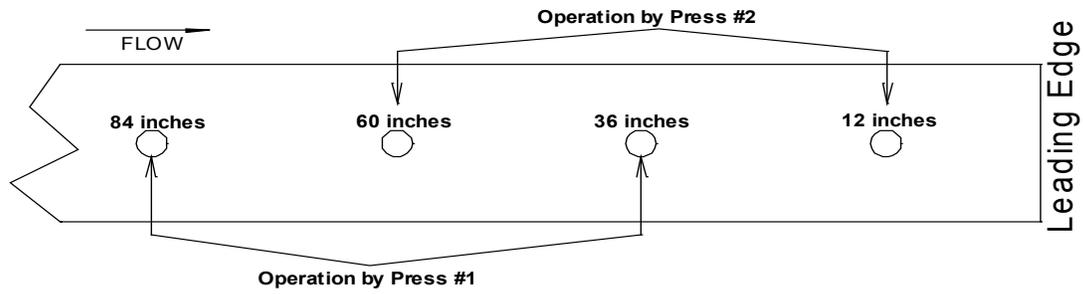


Figure 9-11. Finished Product using example information

Y-Axis Control (“Y” Option)

The “Y-Axis” option gives the user the ability to control devices that actually position “across” the material rather than with the material feed. This enables a machine to control the “Y” position of devices such as tooling, guides, rolling dies, and printers.

Figure 9-12 shows a basic y-axis punch working with a cutoff press. Note that the punch press has moved across the material in the y-axis, creating punches in different locations across the part. The holes in this example are referenced from the center of the part. Locations closer to the axis motor are considered negative in respect to the centerline of the material. Locations away from the axis motor are considered positive.

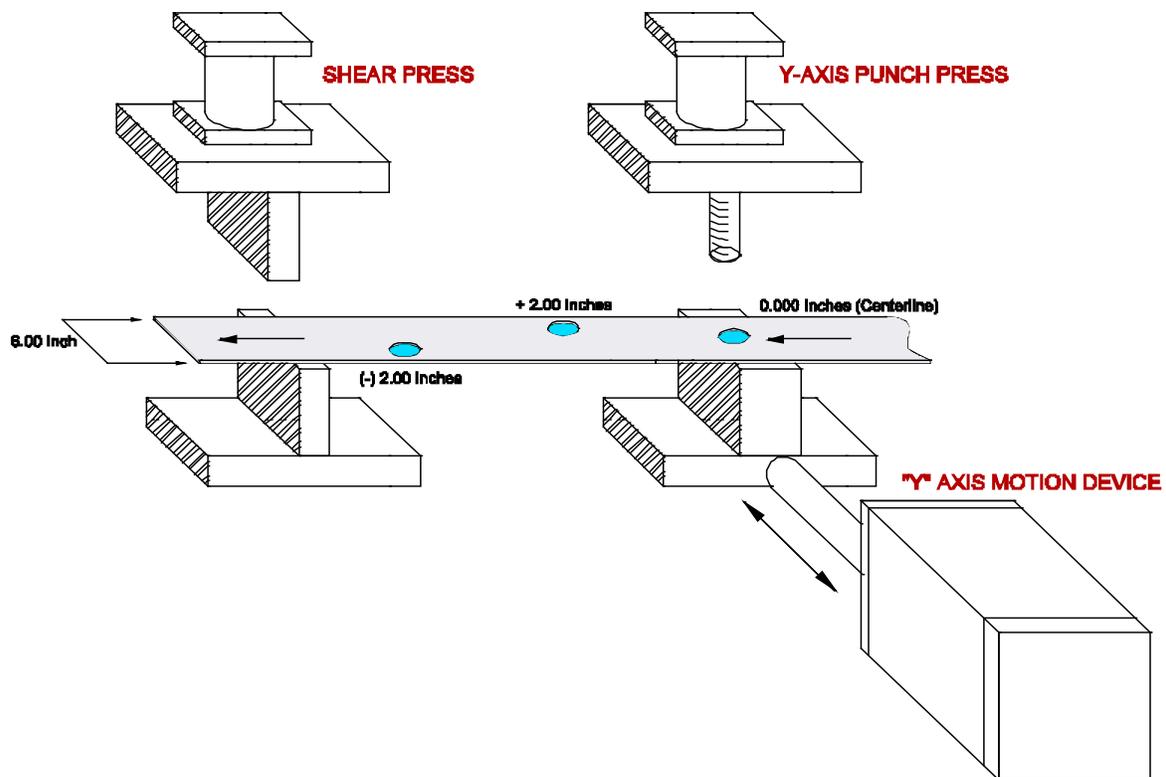


Figure 9-12. Simple Cutoff with a Single Y-Axis Press

“Y-Axis” devices have the advantage of simplicity within the press die. Instead of complicated tooling schemes with dozens of gags, the press tool is simple and is positioned where it is needed.

Tool Setup

The “Y-Axis” feature simply requires the y-axis tools to be created and programmed into standard part patterns. A y-axis tool can be referenced from the top, bottom, or center of the part within the part pattern. Before a pattern can be created, the y-axis tools must first be identified.

Note Figure 9-13 for our example. Four tools are available in this press configuration. The Shear is press #0, a set of end-notches is press #1, and then there are two y-axis systems for presses #2 (Hole) and #3 (Slot).

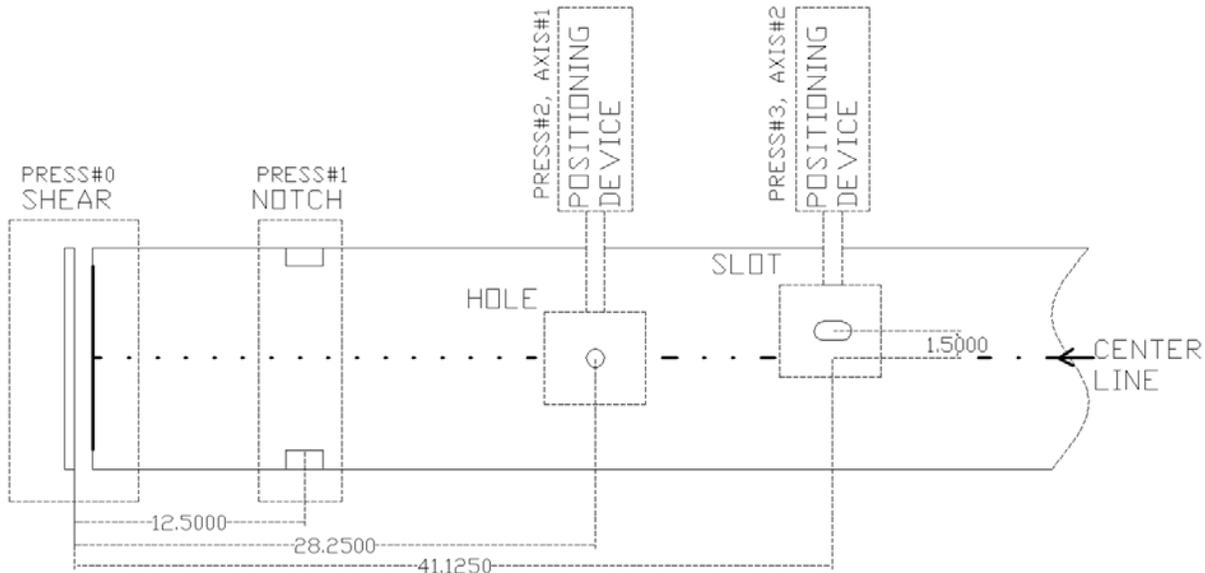


Figure 9-13. Tooling Layout for Y-Axis Example

Each tool in the example is located at a specific distance away from the shear blade and from the centerline of the part. As with standard machines without the y-axis option, the X coordinate of each tool is loaded into the “Edit Tool Data” window. This enables the controller to “know” the location of all tools in the “X” plane (the distance “upstream” from the cutoff blade).

Y-axis machines have two additional fields available in the tool edit data window (these fields are grayed out on standard systems). This is for the “Y-Offset” measurement and the “Axis” selection. Our example will label press #2 as axis #1, and press #3 as axis #2.

The tool reference point will be located a specific distance from the reference point on the material. The example references to the center of the material. In the example, press #2 is already located at the center of this reference; therefore the offset distance is 0.000 inches. Press #3 is offset toward the top of the part, therefore the offset distance is positive 1.500 inches. The cutoff press and notching press cannot move in the Y-axis, so they are set to 0.000 inches. See Figure 9-14 for a detailed Tool Data list for the y-axis example.

Pattern Programming

The following part specification is a product of the machine tooling from the y-axis example on pages 9-15 and 9-16. Note that the both tools 10 and 11 are used in multiple locations across the part.

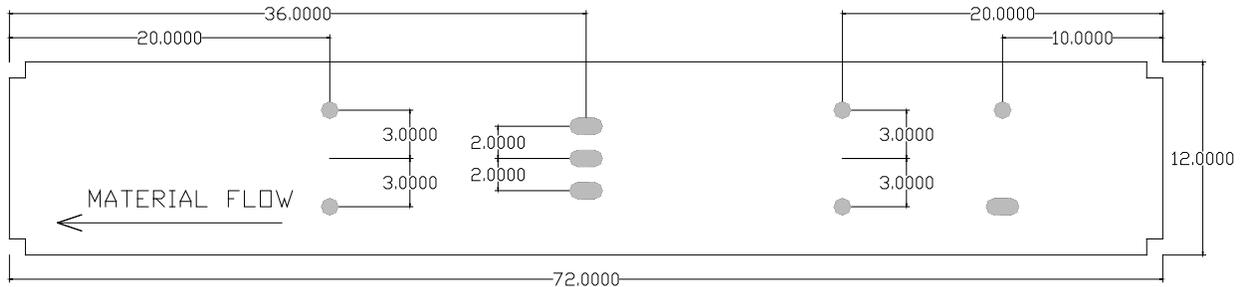


Figure 9-15. Required Part Pattern for Example

The pattern for this part will be programmed like a standard punch pattern with the addition of a “Y-Reference” and a “Y-Offset” for y-axis tools. Standard tools will not require a y-axis and should be left at zero.

Y-Reference

Provides the reference point from which the operation is to occur. Our example is referenced to the “Center” of the part. Operations can also be referenced to the “Bottom Edge” and the “Top Edge” of the part as well. When referencing the bottom or top, keep in mind that the LEFT HAND side of the part is considered the leading edge (as drawn above).

Y-Offset

The “Y-Offset” distance describes the actual distance away from the previously selected “Y-Reference” location that an operation is to occur.

The pattern example shows that the first operation for tool #10 is located at 20.000 inches from the leading edge, and positive 3.000 inches from the center of the part.

Software Options

As the machine runs, the y-axis position control will move the respective presses in between material feeds. For multiple operations of the same press in different locations across the part, the press will fire at the closest available location, then move to the next location and fire the press again, and so on until all operations that are available to that axis is complete. The material will then be fed for the next operation or set of operations.

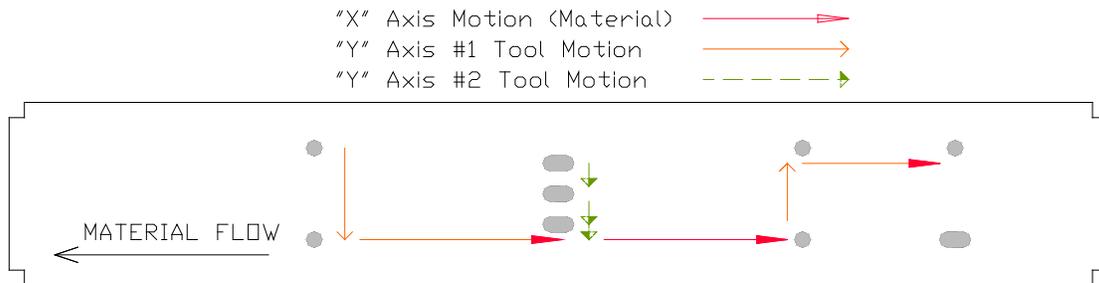


Figure 9-18. Tooling and Material Motion

If a tool is not used during other press operations, it will be allowed to move to its next programmed location, even if other press operations are occurring. The XL200CL Series controller will always attempt to make the least amount of moves for a given axis to increase production time and reduce wear and tear on the positioning devices.

Tube Mill Operation (“T” Option)

The tube mill controller option is intended for continuous operation and extrusion machines where the material rarely stops. This option is only available on closed-loop die accelerators and is only available with the analog (AA) and hydraulic (Y) options.

Tube Mill Option Features

Scrap Sensor Input

Input #19 (terminal D-5) can be connected to any sensor that can indicate when scrap material starts and ends. This input allows the controller to consider this section of material as scrap. Parts produced with bad sections of material will be considered scrap and handled accordingly.

Dump Table Control

IO has been added to support the direction of parts into a good or scrap bin.

Oil Mister Control

IO has been added to support misting oil on the shear blade. Parameters for timing and dwell relative to the shear cycle have been provided. Additionally, a counter has been added so that the mister will cycle only after the desired number of shear cycles.

Test Part Feature

The test part feature will allow a single scrap part to be produced for testing. The part length is determined by the setup parameter “Test Part Length”. The test part can be triggered by the appropriate function key while in the “Production Data” Window.

Immediate Set Next

The function of the F2 Key (Set to Next) was modified while in the run mode when the tube mill option is enabled. If the set next key is pressed while running, the selected item will be set to next and the controller will begin filling this item into the queue immediately.

The function of the key acts normally when in “Idle” mode.

Tube Mill Option Operation

Manual Shear Operation

If the “Continuous Material Flow” parameter is set to “Yes” the controller will always perform an “Auto-Crop” after being put into run mode in order to reference the leading edge of the first part. While in idle mode, a manual cycle will reference the die to the home switch without making an actual cut. In run mode it is ignored.

If the “Continuous Material Flow” parameter is set to “No” the controller will not auto-crop the part. Manual shear functions will work normally.

Entering the Run Mode

The Queue is always empty when entering the run mode. If the material is assumed to be moving, a short reference cut is inserted into the queue and then parts are filled in normally. If the Scrap input is on when entering the run mode then all parts filled between the shear and the scrap sensor are assumed to be scrap. If the scrap input is off when entering the run mode then all parts between the shear and the scrap sensor are assumed to be good. The parts are filled until one part, at least, rests under the sensor.

Scrap Sensor Input While in Run Mode

The parts are always filled into the queue until one part, at least, rests under the sensor. When a scrap input is detected, the part residing under the sensor is marked as scrap. The sensor is not monitored again until the line halts or the end of the marked part passes the sensor. At that time the sensor is checked again to see if the scrap input is still on and the process begins again.

Dump Table Operation

There are two Dump Table outputs. One is the “Dump Trigger” output and the other will be a “Scrap Dump” selector output. The “Scrap” input will only be valid while the “Dump Trigger” Output is on.

While the Dump Trigger output is not on, the good or scrap status of the current part is monitored. The Scrap input will change state when it detects that the current part has a different good or scrap status. When the output is on, the current part is scrap. A light may be attached to this output to inform the operator of the status of the current part.

After the Shear Dwell has expired the Dump Table Delay is monitored until it expires. At this point the Dump Trigger output will turn on for the programmed dwell.

Mister Operation

The Mist Counter will be set on every power up so that the first shear cycle will result in a mist application. After that the Mister will fire for every number of shear cycles as set by the “Mist Counter” parameter. The Mist Delay time will start when the shear output turns on. After the Mist Delay time has expired the mister will fire for the Mist Dwell time.

Test Part Feature

This feature will be triggered with a function key in the Production Footage Totals screen. It will simulate the scrap input being triggered and should cause a scrap part equal to the Detected Scrap Length.

Tube Mill Setup Parameters

Shear to Scrap Detect Distance

This is the actual measured distance between the cutoff blade (or punch reference point) to the scrap detect device if one is used. Set this parameter to 0.000" if a scrap detector is not used.

Dump Table Delay.

This is the amount of time after the shear dwell has expired that the dump output is turned on and the dump dwell starts.

Dump Table Dwell.

The programmed amount of time the dump output stays on.

Mist Counter

The mist output will turn on after the number of shear cycles set by the value in the "Mist Counter" parameter. Setting this value to "0" turns the feature off.

Mist Delay

The amount of time after a shear dwell occurs that the mist output turns on.

Mist Dwell

The amount of time that the mist output stays on for once triggered.

Test Part Length.

This parameter sets the length of sample parts that are produced when a "test part" is requested.

Continuous Material Flow.

This parameters informs the controller as to how the line operates.

If set to "Yes", the controller assumes that external devices are controller the material motion and that the material is always moving. Upon entering the run mode, the controller will always perform an "Auto-Crop" to reference the leading edge of the first part.

When set to "No", it is assumed the line is controlled by the XL200CL. The controller will not auto-crop the part. Manual shear functions will work normally.

Removed Setup Parameters for Tube Mill

The following parameters have been removed from the Tube Mill controller model.

- Bundle Quantity Reload Value.
- Bundle Quantity Count.
- Delay After Shear.
- Halt Mode.
- Coil End Point.
- Coil End Offset.

Auxiliary Controllers

Auxiliary Controller

This section describes the **Auxiliary Controller** operation and the different windows for interfacing to the controller. The typical Auxiliary Controller is built into an “chassis mount” package and does not include a display.

Interfacing and programming is accomplished through the **XL200CLS SERIES Controller** display and keyboard. Auxiliary controllers are also referred to as “slave controllers” or “upstream controllers”.

Auxiliary Controllers can also include displays and are available in the panel mount style package when requested.

From a memory cleared condition, the XL200CL Series controller searches for all auxiliary controllers during initial power up, listing them by model and unit number as they are found. If a controller is not found, it is no longer searched for during subsequent power-ups. Look at the example screen in Figure 10-1.

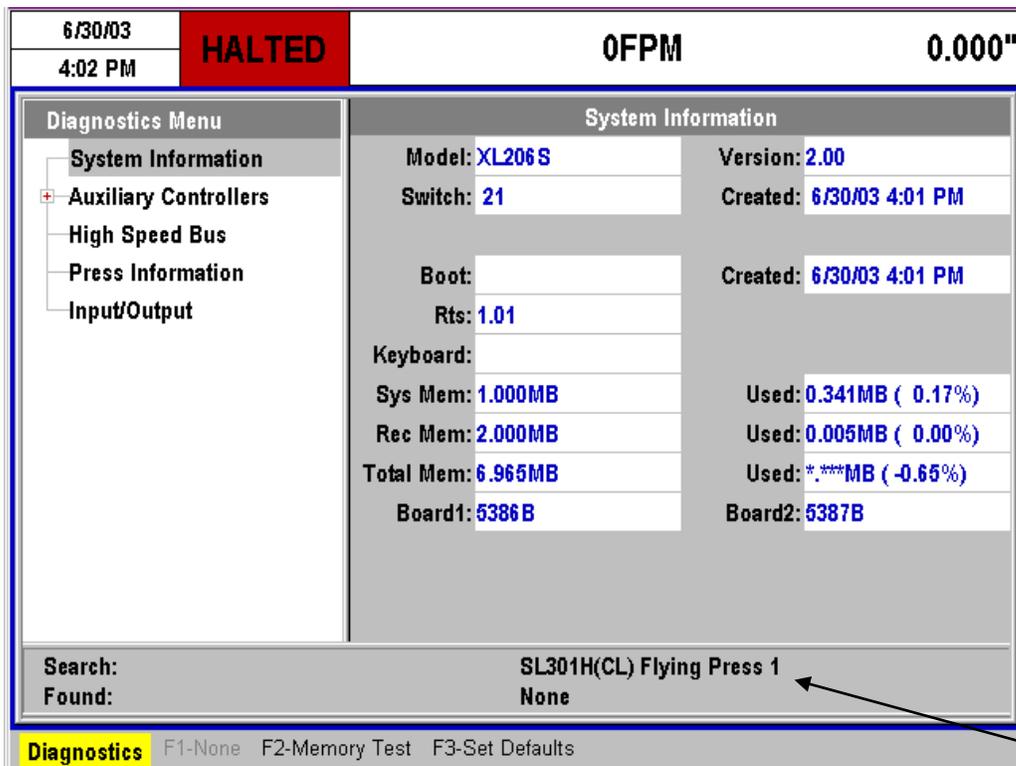


Figure 10-1 “Power Up” window searches for Auxiliary Controllers

Auxiliary controllers can be manually searched for while in the “Diagnostics” screen. This will be discussed in detail later in the chapter.

Up to eight auxiliary controllers may be used with each XL200CL Series Controller. Each auxiliary controller is given a unique identity by setting the respective (DIP) switch settings. Multiple auxiliary controllers that communicate to the same master must have different identities.

SW1	SW2	SW3	Device #	Unit #	Type
OFF	OFF	OFF	1	30	0
ON	OFF	OFF	2	31	1
OFF	ON	OFF	3	32	2
ON	ON	OFF	4	33	3
OFF	OFF	ON	5	34	4
ON	OFF	ON	6	35	5
OFF	ON	ON	7	36	6
ON	ON	ON	8	37	7

Figure 7.22. Switch settings for the SL301HCLS.

Type-setting switches #4 through #7 set up individual characteristics for each controllers machine functions.

See switch settings in the Appendix of this manual for the controller being used.

In addition, an SL304 controller can be added as an auxiliary controller. Only a single SL304 can be included in the auxiliary configuration, therefore no special switch settings are necessary.

Installation

Installing the **Auxiliary Controller** on a machine involves the following steps:

- Mechanical and Electrical Installation
- Setting the customizing switches (DIP Switches)
- Programming the Setup Parameters
- Testing
- Calibration

Mechanical Installation

The typical installation of the **Auxiliary Controller** is inside a console or rack. No display or keypad is used on the controller itself. Figure 10-2 provides the mounting dimensions of the auxiliary body.

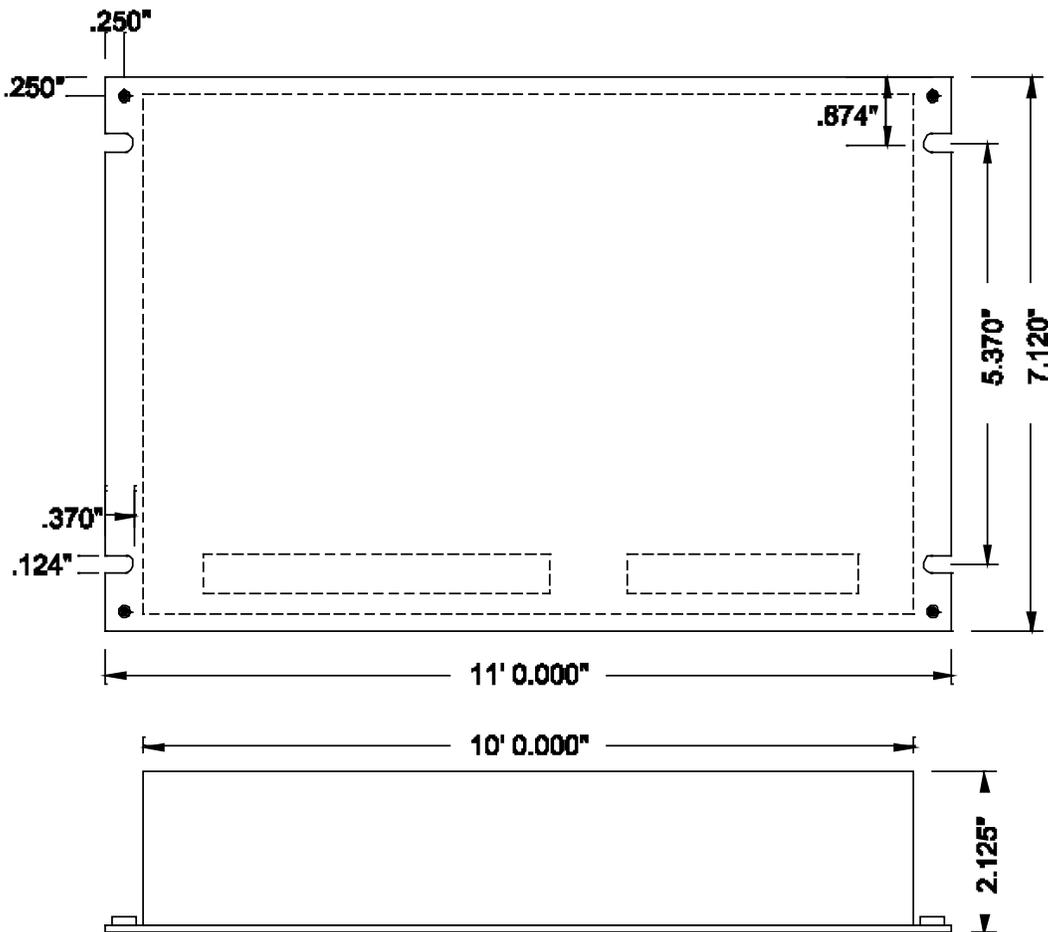


Figure 10-2 Mounting Dimensions of SL Series Auxiliary Controller

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Electrical Installation

Installing the **Auxiliary Controller** requires knowledge of electric control circuits and of the machine that the controller is connected to. An accurate wiring diagram is essential for trouble-free installation. If a wiring diagram is not available, it is valuable to trace wiring in the machine and reconstruct the wiring diagram. The time spent shall be saved when troubleshooting, installing and solving machine problems.

Wiring in the auxiliary controller is identical to installing the master controller. Please review chapter 1 (Installation) for guidelines in installing an AMS length controller.

Controller Power

The **Auxiliary Controller** is powered by 24 VDC. Power should be within plus or minus 5% and not interrupted by the emergency stop circuit, see figure 2. The controller can continue to monitor the material position after an emergency stop with power still applied and will continue production after an emergency stop, without loss of accuracy.

Drive Control Circuit (Closed Loop Models)

The **Auxiliary Controller** has two ways of controlling the servo drive device. The *Analog Output* is connected to the speed reference input of the servo drive. This is a Bipolar, 0 - 10 VDC analog signal. The “Drive Enable” output of the controller controls the enable circuit of the servo drive. When the output is turned off, the drive should shut down its power output completely. When the enable output is turned on, the drive should enable its power output and close the feedback loop around the motor. In a hydraulic servo system, the hydraulic system should be turned completely off if the “Drive Enable” output is not turned on.

Run Mode Control Circuit

The machine is placed in the RUN mode by closing the RUN input. If a valid job is programmed, the **Auxiliary Controller** will turn its RUN output on. This output should latch in the run circuit electrically, thus the machine will remain in a Run state (automatic) until a batch halt occurs or when the line is manually halted by pressing the “Halt” switch.

With an Auxiliary controller, there are at least two controllers that may share control of the system. Contacts from the “run” output of all controllers may be run in series to form a series-type latch. In this way, if one controller drops out of run mode, then all controllers drop out of run mode.

Setting the Customizing Switches

When installing the **Auxiliary Controller**, the customizing switches must be set before initial power is applied. These switches are found on the back of the controller via a square cutout. The switches are located near the center of the printed circuit board in a single (DIP) switch package.

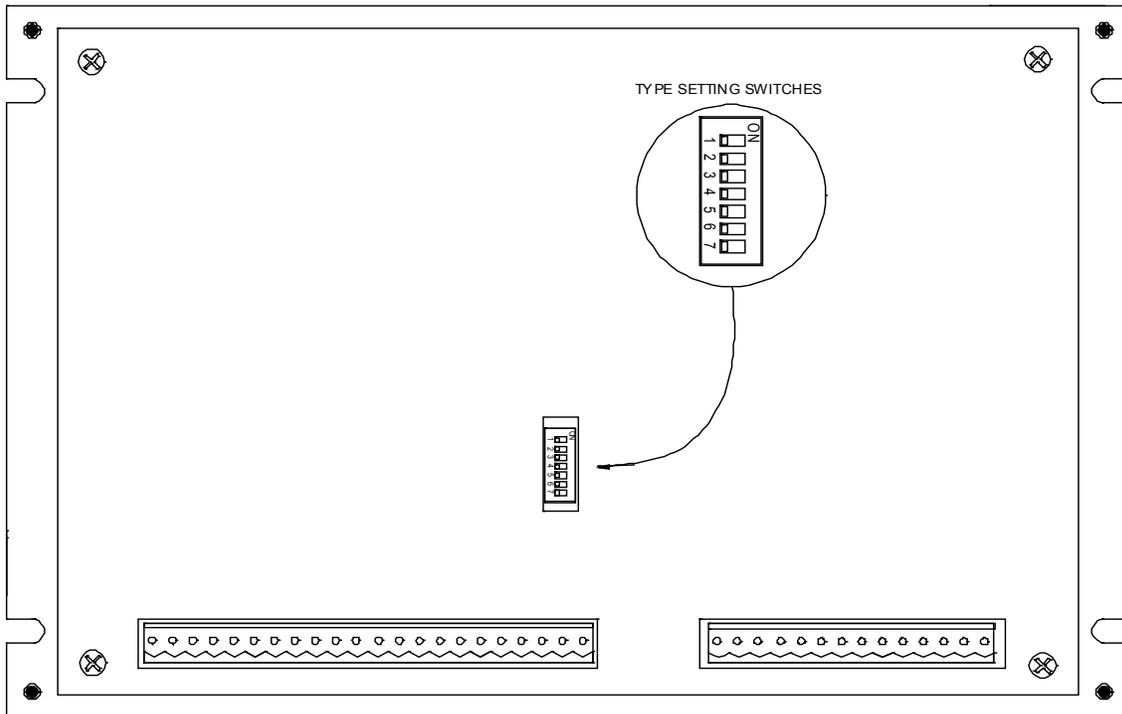


Figure 10-3 Type Setting Switches on back of Auxiliary Controller
There are seven switch segments in the package numbered 1 through 7. The switches are changed to either ON or OFF to match machine requirements.

Charts are provided at the end of this chapter identifying proper switch settings for each specific model of auxiliary controller.

Initial Power Test

Before plugging external connectors into the controller, check for proper voltage and voltage polarity. This is accomplished by monitoring the DC supply voltage with a digital voltmeter. Check the connector that supplies the positive 24 VDC and common.

Review the auxiliary example drawings included in Chapter 13.

Auxiliary Machine Parameters

In addition to setting customizing switches, the user can further customize the **Auxiliary Controller** to the machine by programming parameters in the “Setup” Screen. Press the “Setup” key. The setup screen includes menu window on the left and a parameter window on the right. If the blue highlighted cursor is in the parameter window, press the “F1” key to tab it to the menu window.



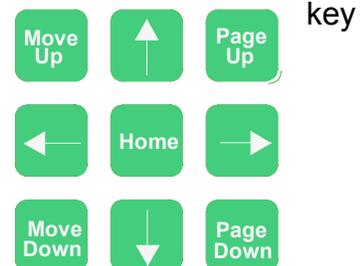
The menu window contains a selection named “Auxiliary Controllers”. Use the arrow keys to highlight “Auxiliary Controllers”. Notice that the small square file box just to the left of the “Auxiliary Controllers” label has a “+” in it. This means that it can contain multiple menus or lists in it. In this case, 1 to 8 different auxiliary controllers may be listed. To show the available auxiliary controllers, press the right-arrow key to open the menu selection.



Notice that the small, square file box now displays a “-“ to signify that it is now open. With the selection now open, highlight the auxiliary controller to be adjusted. As each auxiliary controller is highlighted, the parameter window on the right will display the parameter and program list for the respective controller.

If the controller’s switch settings had been changed to configure the controller for a specific application, the parameters will all be set to default values. Anytime the type-setting switches are changed and the controller is re-powered, the controller will set all parameters and programs back to default values (cleared memory).

In order to edit the parameters, press the “F1” to tab to the parameter window and used the navigation keys to select desired parameters.



Auxiliary Controller

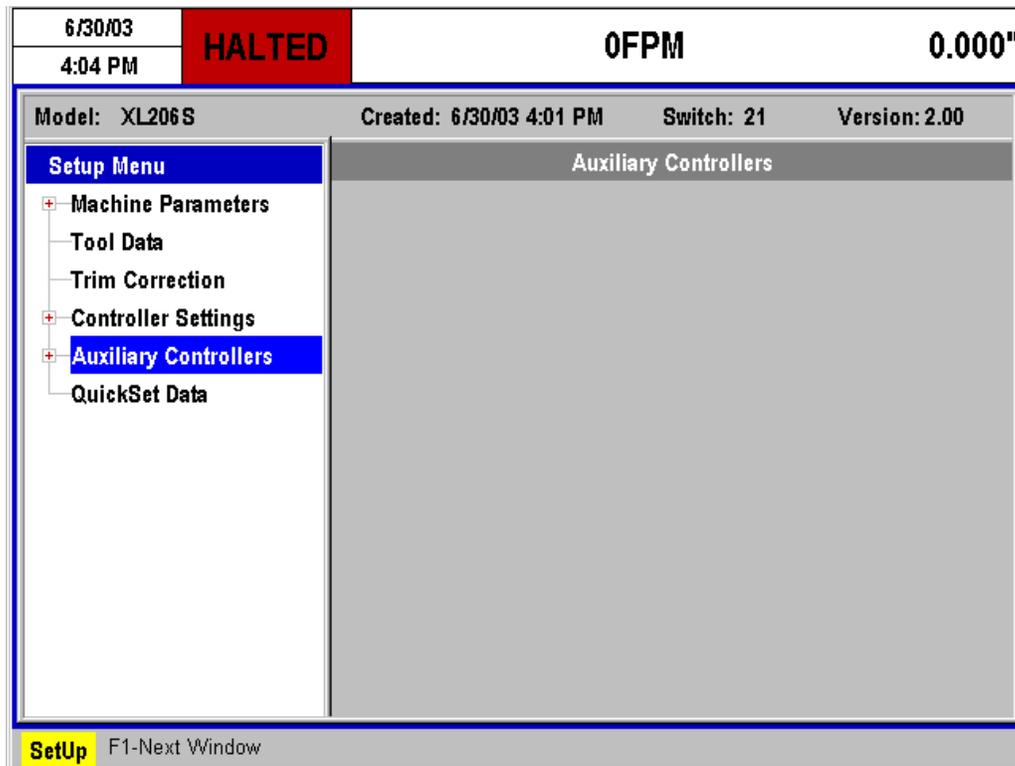


Figure 10-X Setup Screen showing "Auxiliary Parameters"

Some of these parameters are general and apply to all switch settings and **Auxiliary Controllers**; others apply only to certain controller models or specific switch settings. This chapter will discuss and define all parameters.

Note that the top four parameters in the parameter list contains a "U" and a two-digit number behind them. These are actually the program for the respective auxiliary controller. The two-digit number signifies which controller's ID number. For example, the auxiliary controller setup up as Unit #30 would contain a "U30" behind its program listings.

The four program parameters are:

- Auto Hole Queue Clear
- Quantity
- Hole Count
- Length from Hole

These will be discussed in more detail under "Programming" the auxiliary controller.

General Parameters

Press (SHEAR) Dwell Down

PRESS (SHEAR) DWELL DOWN is the time it takes for the shear to move from the top of the stroke to the bottom of the stroke. The allowable range is 0.000 to 9.999 seconds and can be set to the nearest millisecond. If a COMPLETE switch is used, the PRESS (SHEAR) DWELL is set to a time somewhat longer than the expected time for the COMPLETE switch to turn on. When the SHEAR COMPLETE switch closes, the PRESS (SHEAR) DWELL time is overridden and the output turns off immediately.

Press (Shear) Dwell Up

PRESS (SHEAR) DWELL UP is the time necessary for the shear to return from the bottom to the top of its stroke.

Note: To ensure that a feed-to stop line is not restarted until the press complete switch has closed, it is now possible to enter a PRESS DWELL time of zero. With zero entered, the controller will interpret this as “do not restart the line until the complete switch closes.” If the complete input is not made within 10 seconds, then the line is halted. A non-stop line with a PRESS DWELL of zero will run normally as long as the press complete is activated after a press cycle. If the press complete is not activated, the machine will continue to run for ten seconds, halt automatically and display an error.

A programmed time greater than zero is treated as it has been in the past, it will give a timed output according to the PRESS DWELL TIME or turn on until a PRESS COMPLETE is seen, whichever comes first. If any value other than zero is entered, this feature is disabled.

Press Reaction Time

The PRESS (SHEAR) REACTION time is used in high-speed flying die applications to reduce the overall stroke length of the cut cycle. Without a reaction time, the Auxiliary Controller waits until the die has moved to the MINIMUM DIE DISTANCE before the Shear Output is turned on.

The PRESS (SHEAR) REACTION time causes the controller to turn the Shear Output on early. This allows time for relays to activate and solenoid valves to energize. The tolerance test is performed at the end of the Shear Dwell Down signal (after the part has been cut). A SHEAR REACTION of 0.0 to 0.5 seconds is allowed, but the user should note that the Shear Output is not turned on before the die has started its acceleration ramp.

Also note that the PRESS (SHEAR) REACTION time is only in effect when the parameter ON TOLERANCE ERROR is set to “Cut & Stop”.

Refresh Done Job (SL301H & SL301HCLR)

This Parameter can be ignored and is only applicable in non-auxiliary applications.

Batching (SL301H & SL350HCLR)

Batching determines if the job will run non-stop “No”, or if it will prompt for a specific quantity to produce “Yes”. This Parameter may be set to “Yes” only when the “Mode” parameter is set to “Standard”. If the “Mode” parameter is set to “Count Hole” this parameter should always be set to “No”.

Mode

This parameter is used to select between operating modes of the controller. The two options are “Count Hole” and “Standard”. This parameter must be set to Count Hole to operate normally as an auxiliary controller. If the controller is used as a stand alone device or to run in no-hole-detect manner, then “Standard” may be selected.

Press-Detect (Shear-Detect on SL350HCLR)

The press to detect distance is the physical distance between the shear press and the hole detector. The hole detector should be located as close to the shear press as possible for accuracy. However, the detector must have enough distance (typically 10" or more) to allow the controller time to see the hole and activate the shear press. Units for PRESS-DETECT are in inches or millimeters.

Detect Punch 1 (SL304 Only)

This parameter is the physical distance between the first sheet detect limit switch and punch press 1. The distance should be measured accurately and may be entered in inches, centimeters, or millimeters.

Detect Punch 2 (SL304 Only)

The physical distance between the first sheet detect limit switch and punch press 2. . The distance should be measured accurately and may be entered in inches, centimeters, or millimeters.

Speed Logic (SL304, Two Speed Only)

The **MP304** has four outputs which control the speed and direction of the machine. To accommodate more than one wiring possibility, the **MP304** may be run with one of two different SPEED LOGIC settings: FORWARD-SLOW or FAST-SLOW. The controller outputs are defined differently for each logic setting.

The outputs, their definitions, and their states in various conditions are shown in tables 3-1 and 3-2. Any number key toggles between FORWARD/SLOW and FAST/SLOW. Select the appropriate SPEED LOGIC to match your machine wiring configuration.

Machine State					
	Run Fast	Run Slow	Jog Fwd	Halt	Jog Rev
Output 1 (For)	ON	ON	ON	OFF	OFF
Output 2 (Slow)	OFF	ON	ON	ON	ON
Output 3 (Rev)	OFF	OFF	OFF	OFF	ON
Output 4 (Run)	ON	ON	OFF	OFF	OFF

Table 3-1. Status of Outputs in Forward-Slow

Machine State					
	Run Fast	Run Slow	Jog Fwd	Halt	Jog Rev
Output 1 (For)	ON	OFF	OFF	OFF	OFF
Output 2 (Slow)	OFF	ON	ON	OFF	ON
Output 3 (Rev)	OFF	OFF	OFF	OFF	ON
Output 4 (Run)	ON	ON	OFF	OFF	OFF

Table 3-2. Status of Outputs in Fast-Slow

Minimum Slow Distance (SL304, Two Speed Only)

On two-speed machines, the AMS controller calculates the distance before the punch that the machine should shift into slow speed (if the Decel Factor Mode is set to Auto). This is based upon the speed of the material and the deceleration characteristics of the machine. A minimum amount of slow distance can be manually set by this parameter. It is added to the calculated slow distance to extend the time spent in slow speed. It is best to set this parameter to a few inches initially until the system has been calibrated and the controller has had a chance to get accustomed to the behavior of the machine. When the machine is running good parts repeatedly, reduce the MINIMUM SLOW DISTANCE as much as possible to increase the production rate.

The prompt used is MIN SLOW DIST and is programmed in inches, centimeters, or millimeters. The largest allowable value of MINIMUM SLOW DISTANCE is 50 inches.

Tolerance (SL304, Feed-to-Stop Only)

This is the maximum allowable error in the positioning of an operation. You must be careful to set this value within the limits of the machine.

TOLERANCE should be set small enough to get acceptable parts but wide enough to avoid production interruptions.

On feed-to-stop machines, the **MP304** controller can check for the material to be within a specified tolerance before activating the press. If the material has not stopped within this tolerance, the controller will halt and an error will be displayed. If the tolerance is set at 0.03 inches, the length past the shear must be equal to the programmed length plus or minus 0.03" before the shear will be cycled. The controller allows values from 0.0005 inches to 10.0000 inches. The default value for TOLERANCE is 0.1 inches.

Minimum Hole Spacing

For Minimum Hole Spacing, enter a value slightly smaller than the minimum distance between holes in the material and larger than the actual hole diameter. When the Auxiliary Controller detects a hole in the run mode, the material must move the MINIMUM HOLE SPACING distance forward before another hole can be detected. This prevents the controller from detecting multiple holes when actually reading the same hole. Units for MINIMUM HOLE SPACING are in inches or millimeters depending on how the “Units” parameter is set.

No-Hole Stop

This parameter defines the maximum length of material that will allowed to be fed out before counting enough holes to produce the current part. Operators may use this parameter to protect machinery in the case of a photo-detector failure. The Auxiliary Controller will halt the line and display an error message if the “Length Past Shear” + “Shear To Detector Distance” is greater than “No-Hole Stop Distance”.

This function is disabled if No-Hole Stop equals zero inches or the operator chooses the standard operating mode.

Minimum Part (SL301H & SL350HCLR)

This parameter can be ignored and is only applicable in non-auxiliary applications.

Loop Gain (Closed-Loops)

Loop Gain sets the sensitivity of the servo loop (electronic drive). Lowering this number will make the drive less responsive. If it is too low, the system will become sluggish. Raising this number makes the system more sensitive and responsive. If the LOOP GAIN is too high, the system may become unstable and oscillate. Caution should be used in changing this number. Make gradual changes.

10

Jog Velocity (Closed-Loops)

The Jog Die Velocity sets the speed of the die during die-jog operations and referencing.

Min Velocity

Minimum Die Velocity sets the minimum return speed of the die once a cycle has been made.

Max Velocity (Closed-Loops)

Maximum Die Velocity sets the maximum **return speed** of the die once a cycle has been made.

Acceleration (Closed-Loops)

Acceleration sets the rate of velocity change for die travel. This parameter controls both the acceleration and deceleration of the **forward** travel for Die Accelerators.

Return Accel (Closed-Loops)

Return Acceleration sets the acceleration for the flying die to **return** home after the cut is made. This parameter may be set higher than the forward Acceleration since the die return is not a critical movement. This decreases the overall cycle time of each cut. If cycle times are not tight, then it may be desirable to adjust to a value lower than the “Acceleration” parameter. This results in less wear and tear on the actuating system. Units are expressed in inches per second, per second (Inches/second²).

Min Die Dist (Closed-Loops)

The MINIMUM DIE DISTANCE defines the shortest distance from the home position where a cut can be made. With most presses, improper cutting will occur if the die is not near the center of the press, or if it is not up to the full line speed. The MINIMUM DIE DISTANCE defines the “near” side of this acceptable window. As the die accelerates for a cut, the die must be past this MINIMUM DIE DISTANCE and in tolerance (if a “no cut” mode is selected), before a cut can be made. This is also the place that all manual referencing occur.

The minimum Die Distance must meet the following criteria.

Minimum Die Distance = Velocity squared divided by 2 times acceleration, this value plus 11 percent.

$(\text{Velocity} * \text{Velocity}) / (2 * \text{Acceleration}) + 11\%$

The formula will produce a MINIMUM DIE DISTANCE that will allow the die to achieve a stable speed prior to cutting.

In the formula, Velocity is the expected speed of the line expressed in inches per second (**not feet per second**), and Acceleration is the programmed parameter in the controller expressed in inches / second². Inches per second can be derived from dividing Line speed (in Feet per minute) by 5.

Inches Per Second = Feet per minute / 5

Max Die Dist (Closed-Loops)

The MAXIMUM DIE DISTANCE defines the furthest distance from the home position that a shear can occur. This defines the “far” side of the acceptable window for the press operation to occur. If the die reaches the MAXIMUM DIE DISTANCE and is not within tolerance, an error will occur. When the machine is operated in a “no cut” mode and the tolerance is not obtained, no cut will be made. If the tolerance is obtained at or before the MAXIMUM DIE DISTANCE, the cut will be made. Because of this, the MAXIMUM DIE DISTANCE needs adjusted so that enough travel is left over to complete the cycle and decelerate to a stop without hitting the end limits or over-travel switches.

Advance After Cut

Used only on die-accelerators, Advance After Cut is the distance on a non-stop line that the die will advance after the shear dwell down has expired or the shear complete input had been received. The die then accelerates during the shear up dwell for a distance set by the parameter. The purpose of this parameter is to prevent the shear blade from scraping against the leading edge of the metal as the shear blade (or die) moves upward. This is particularly handy on very light gauge and fine finish products.

On Tolerance Error

When a tolerance error occurs, some roll form manufacturers would prefer that the controller cut an incorrect part, instead of producing a large amount of material past the shear. This is especially true if the material past the shear is not easily reversed. In some cases it is preferred that the line is stopped, with the operator inspecting the part to determine if it is usable. On the other hand, other users may be concerned with a possible speed mismatch if a cut is made on the error.

When the controller detects that a part is about to be made outside of the specified tolerance range, the operator has two options:

If **STOP NO CUT** is selected, the controller will display an error message and stop the line without making the cut.

If **CUT & STOP** is selected, the controller will make the cut, then stop the line and display an error message.

Auto Crop - After the Manual Shear button is pressed the controller is in the Auto Crop mode. The display will flash “Auto-Crop”. When the RUN mode is entered, the machine will then make a flying crop at the MINIMUM DIE DISTANCE.

Tolerance

TOLERANCE defines the acceptable band of length variation that a user will accept and defines both the upper and lower limits. For a TOLERANCE of 0.010 inch the allowable range of variation would be ± 0.010 inch. If the controller is unable to achieve a length within this band, an error message is displayed and the machine is halted.

Offset Auto

The Offset is the voltage required to hold the feed rolls at stop, with no drift in either direction. This parameter is **automatically** adjusted by the AMS controller, and can not be adjusted by the customer. The customer can manually change value, but should only be done for maintenance reasons.

The more common usage of this parameter is for monitoring the amount of offset, and making external balance adjustments to the drive. This parameter should be as close to zero as possible giving the controller the maximum control range.

Offset Integral

The Offset Integral defines the integral time constant that the “Offset Auto” feature uses for the removal of position error (or “Drift”). A time constant of 100 seconds is recommended and is the default value.

Lag Auto

Lag Compensation is an integrated calculation used to correct for conditions where the speed is matched, but the position lags behind the target. This parameter is automatically adjusted and is not normally changed by the user. If this value becomes unstable, there may be a problem in the system such as binding or friction.

The lag compensation is only calculated while the die is between the “Minimum and Maximum Die Distances”.

Lag Integral

The LAG INTEGRAL defines the integral time constant that is used by the “Lag Auto” parameter for the removal of velocity error (LAG) while tracking a moving target.

Derivative

This parameter is used in special application loop control systems. Systems that use hydraulics or have a lot of inertia may have a slow response time. If this is the case, entering a DERIVATIVE value can increase the response. The sluggish response of the machine will result in an error, and the purpose of the DERIVATIVE is to anticipate the rate of change in the error, and amplify the rate of change to improve performance.

Auxiliary Controller

If it is determined that this parameter is to be used, start with a value of 10 seconds (or less), and then decrease the value until a change in pitch or “hum” is heard in the motor. This indicates that the controller is overcorrecting the error. When this occurs, increase the value until the system stops oscillating.

CAUTION:

Changing this value will amplify any noise in the system, as well as the error. This can cause problems in the system. The parameter may also increase the tolerance of the system, which could cause variation errors. Entering zero for the DERIVATIVE will disable the parameter.

Line Resolution

The RESOLUTION parameter defines the length of material movement for each increment of the encoder. It is a function of the circumference of the measuring wheel and the number of counts per revolution of the encoder. The formula for calculating RESOLUTION is as follows:

$$\text{Resolution} = \frac{\text{Circumference}}{4 \times \text{Encoder Count}}$$

Note: Above circumference is in inches.

For the AMS encoder, the encoder count is the model number on the encoder. A Model 256 is a 256-count encoder. A Model 1000 is a 1000-count encoder.

The most common wheel used has a circumference of 12 inches. For this size wheel, the RESOLUTION follows:

It is not necessary to precisely measure the circumference or calculate the formula to any great precision. Nominal values can be used with precise results achieved during calibration. Values between 0.00004000 inches and 0.04000000 inches are acceptable.

<u>Model</u>	<u>Resolution</u>
256	0.01171875
500	0.006
1000	0.003
2000	0.0015

(Using a 12” Wheel)

10

Circumference (SL350HCLR ONLY!)

This is the physical circumference of the rotary rolls in inches. Typical circumference is 24" and is the parameter default.

Rotary Count (SL350HCLR ONLY!)

This is the total number of encoder pulses received by the controller per one revolution of the rolls. For example, a servo drive is setup to output 1250 counts per revolution. Since the counts are a quadrature output, 4 pulses are received for every count. We are using a 7:1 gearbox. The following formula would apply.**Error! Bookmark not defined.****Error! Bookmark not defined.**

$$\text{Rotary Counts} = \text{Servo Counts} \times 4 \times \text{Gear Ratio}$$

In this particular case the rotary count parameter should be set to 35,000.

Rotary Start (SL350HCLR ONLY!)

This parameter is used to inform the controller at what position or angle the Rotary die must be at line speed to enter the material. This parameter is expressed in Degrees and defaults to 135. If this number is too small the controller will error with a Drive Not Responding message, indicating that not enough time was allowed to accelerate to line speed. If this number is too large the die will enter the material before line speed was matched and cause material jam ups. It is recommended that the default number be used.

Rotary Stop (SL350HCLR ONLY!)

This parameter is used to inform the controller at what position or angle the die is no longer in the material. This parameter is expressed in degrees and defaults to 225. The default parameter is recommended.

Die Resolution

Die Resolution defines the value of one count from the die encoder as reflected in the movement of the die.

Correction Factor

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

The best way to calibrate the system is to run 10 parts, carefully measure them, and calculate an average length. The new CORRECTION FACTOR is calculated as follows:

$$\text{New Correction} = \frac{\text{Old Correction} \times \text{Programmed length}}{\text{Average Measured Length}}$$

Filter Constant

The FILTER CONSTANT can be adjusted to improve accuracy. A low value is used on machines with very stable line speeds. A high value (greater than 50 Hz) is used when rapid fluctuations in line speeds occur. Some trial may be necessary to achieve an accurate value.

The default value is 32 Hz, which is considered to be an optimum setting for typical applications. The controller will allow values from 1.0 Hz to 200.0 Hz.

Units

Length measurements can be programmed and displayed as either inches or millimeters. The parameter selects between “ENGLISH” (inches) or “METRIC” (millimeters or centimeters). The ENGLISH parameter will also measure in feet and feet/minute while the METRIC parameters will also measure in meters and meters/second. Press any number key to toggle through the choices, and then press ENTER to record your selection

Jog Select (Closed Loop)

The Jog Select parameter selects whether the material feeding device is jogged or if the die is jogged when “Jog Forward” for “Jog Revers” input is received by the controller. “LINE” enables a line (material) jog to occur. “DIE” mode will enables the die to be jogged at all times. This parameter is displayed only in the die-accelerator switch configuration.

Minimum Velocity (Closed Loop)

This is the minimum die return speed. The default is 10.0 FPM with a range of 10 to 500 FPM. This parameter is only displayed in the non-stopping mode.

Shear Dead Band

Shear Dead Band provides a programmable delay between turning off the Shear Down output and turning on the Shear Up output. Delay occurs anytime the shear is fired, including run, test and normal modes. Default is 0.000, which disables the feature. The adjust range is 0.000 to 9.999 seconds. Delay will occur during both stopping and flying-cut modes of operation.

10

Manual Shear Die Distance

Defines the location that all manual shear operations will occur. The default is 0.000 “ with the adjust range between 0.000 “ to 350.000 “. The Setup Lockout on the Control locks out this parameter.

Hole Detect

The two selections are ACTIVE LOW and ACTIVE HIGH. LOW is the default. In LOW, the encoder interrupts look to see if the input from the Omron hole detect switches are on (LOW) to recognize the leading edge of a hole. For ACTIVE HIGH, the encoder interrupts look to see if the input is off (HIGH) to initiate the hole count.

Line movement

Used to select either “FWD/FST” or “RUN”. In the Default mode “FWD/FST”, the Run Output will initiate before any tasks are started and will stay on until all press tasks have stopped. “RUN” will initiate the Run output when the Fast or Forward output is on for the first time and will stay on until the Fast or Forward output is turned off for the last time. This mode is only active for single speed, open loop, and non-stopping lines. In this mode the delay after shear will not work.

Auxiliary Programming

The first four parameters of the Auxiliary Parameter window is actually the controller's job program. Four program fields are included:

Auto Hole Queue Clear

This enables the auxiliary controller to clear its hole count any time the master controller clears it queue. Setting to "Yes" will cause this to occur. Setting this to "No" forces the hole count to be cleared manually when needed.

Quantity

Simply key in the desired quantity, and press ENTER to confirm. The quantity can be set from 1 to 9998 pieces. The Auxiliary Controller treats the quantity 9999 as a special case. When an order with a quantity of 9999 pieces is run, the quantity does not decrement when a piece is made. This is done so that the master **XL SERIES** controller can regulate the number of parts being made. "9999" is the default value.

Hole Count

Key in the number of holes per each part and press ENTER to confirm. The **Auxiliary Controller** detects holes in the material and cycles the shear press when this number is reached. To cut on every hole detected, program a count of one. The maximum number of holes per part is 500.

Length From Hole

The next item to be programmed for a job is the Length From Hole. Key in the number of inches or millimeters and press ENTER to confirm. **THIS IS NOT THE OVERALL LENGTH OF THE PART.** The Offset Length is the distance from the leading edge of the last hole counted to the point where the shear occurs. See figure below.

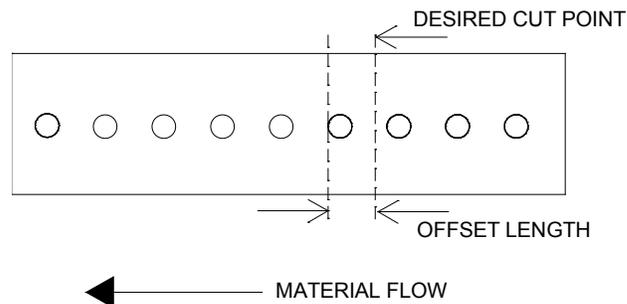


Figure 10-4 Offset Distance for a slave controller

Auxiliary Status and Command Screen

The information on the “Diagnostic” screen includes the Auxiliary Controller’s Software Version, Unit ID Number, Type Number, Current Length Past the Shear, Line Speed, Number of Detected Holes, Input and Output Status, Tolerance error, Lag Compensation, Offset Voltage, Stroke Length, and Programmed Part Information.

Press the “Diagnostics” key to view auxiliary status information.

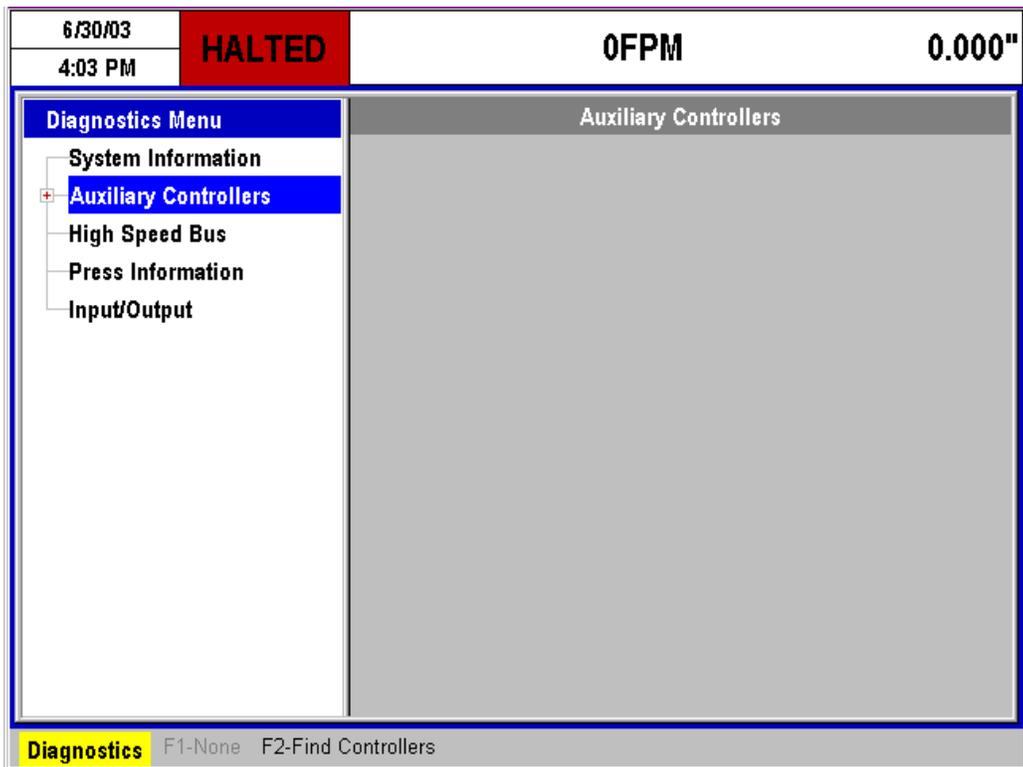


Figure 10-3 Diagnostics Display showing Auxiliary selection

Use the navigation keys to highlight the “Auxiliary Controllers” selection in the menu window (left side). Note that this selection has a square file box with a “+” in it meaning that more information can be displayed within the selection. Press the right-arrow key to open the selection.



Auxiliary Controller

Once open, all attached auxiliary controllers should be displayed. As many as eight controllers can be attached to the master controller at one time. As different auxiliary controller are highlighted, there corresponding status screens are shown in the “Status” window on the right. Select the controller to be viewed using the navigation buttons.

If the XL100 SERIES controller can not communicate with the auxiliary controller, an Error popup window will be displayed. Press the “CE” key to clear the window.

Search For All Devices

While the “Auxiliary Controllers” menu selection is highlighted, an option is available to search for any attached auxiliary controllers. This option is used to search the communications system for all on-line auxiliary controllers. Press the “F2” function key to initiate the XL200CL series controller to search for auxiliary controllers. The status of the search is listed at the bottom of the controller screen.

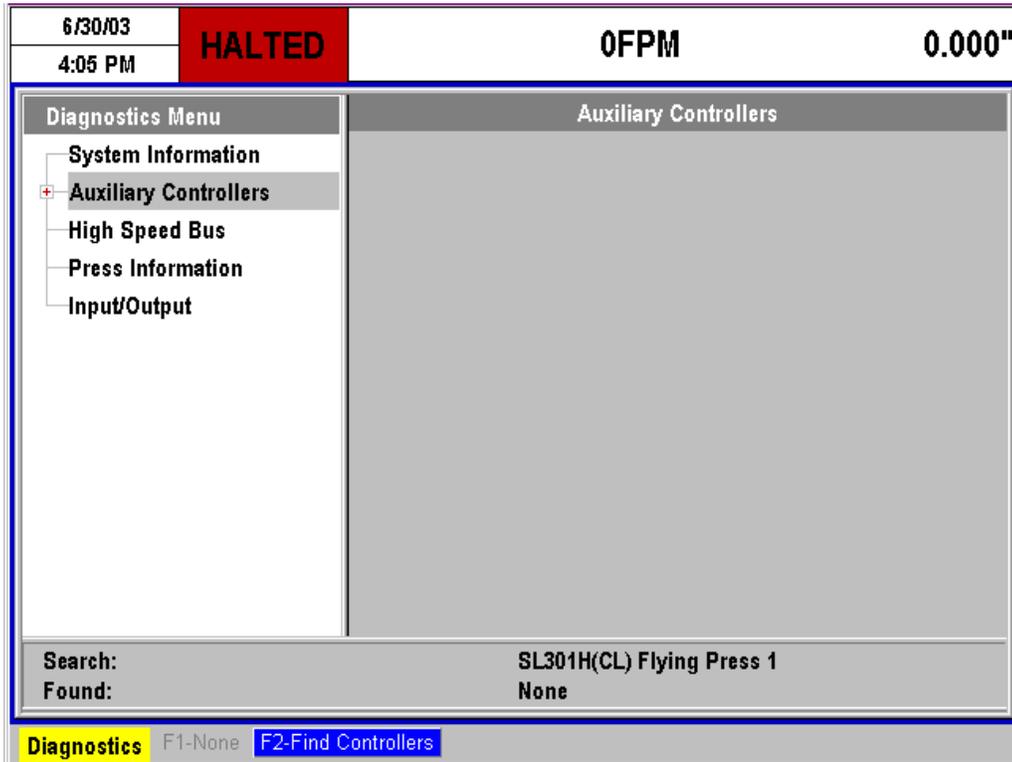


Figure 10-4 Search For All Devices Command

Viewing Auxiliary Controller Status

The “auxiliary” status screens are used to view the current **Auxiliary Controller** status, model, software version and other items. Highlight the auxiliary controller that is to be viewed. The status information will be displayed in the right-hand window.

Status Information

All of the following information pertains to the specific auxiliary controller that is being viewed while in the diagnostics window. Some auxiliary controllers may not have all of the following information displayed due to model variations.

Position

Present position of the material past the press since the last target was queue.

Speed

This is the material velocity as it passes through the press.

Status

States the current operation status of the controller. Displays “Run” when the controller is in automatic mode, “Jog” when the motion outputs are being jogged, and “Cycle” when the shear is firing.

Holes

This is the number of holes that have been counted. All or part of these holes may be past the press, with the remainder between the press and the detector.

Inputs

Displays active and inactive inputs. Active inputs will be displayed by the number that relates to the specific input. For example, the “Shear Complete” input is “Input #4”, therefore a “4” will be displayed in the number 4 position.

Outputs

Displays active and inactive outputs. Active outputs will be displayed by the number that relates to the specific output. For example, the “Shear Up “ output is “Output #7”, therefore a “7” will be displayed in the number 7 position.

TolError (Closed Loop)

Displays the amount of error sensed by the controller by comparing the material encoder counts to the motor feedback counts.

Offset (Closed Loop)

Displays the offset volts required to hold the motor still.

LagComp (Closed Loop Accelerator)

The lag compensation is automatically calculated by the controller and displayed here for troubleshooting purposes.

StrokeEnd (Closed Loop Accelerator)

This is the length of travel used on the last cycle.

Auxiliary Controller

PrgData

This is the actual program that is currently running in the auxiliary controller. Press the “Setup” key and highlight the respective controller to change the program.

- Qty Quantity of parts ordered. A programmed quantity of “9999” will cause the controller to run continuously.
- Left Number of parts left to make in the batch.
- HoleCnt Number of holes to be counted before queue the next set of targets
- Length The “length” past the last hole to be counted that the press is to target.

TX Count

Displays the number of transmissions to the auxiliary controller since the last power up.

Err Count

Displays the number of faulty transmissions detected. This should always stay zero or very close to zero. If this number gets very large, troubleshooting procedures should be followed to locate cause of problem.

Auxiliary Commands

Certain commands can be sent to each auxiliary controller via the “Auxiliary” Controller Status” screen. Three commands are presently available.

Clear Hole Queue (F2)

Clears the hole queue for the selected controller.

Run Die Test (F3) – (Closed Loop Accelerator)

This command will cause a popup window to be displayed that will ask for the “Length” of a simulated part and the for the simulated “Velocity”. Pressing “OK” will initiate the test, pressing “Cancel” will halt the test.

Clear Memory (F4)

This command will clear ALL memory in the selected auxiliary controller. Before clearing memory on any controller, make sure that a current copy of all setup and calibration parameters have been recorded so that they may be re-entered.

Initial Machine Tests

Manual Shear

The shear can be manually activated using the CYCLE input. This causes the SHEAR output to turn on for the SHEAR DWELL time or until the SHEAR COMPLETE input switch closes. Make adjustments to the SHEAR DWELL time or the position of the SHEAR COMPLETE switch until the shear cycles properly.

Jogging

The die or the material should be jogged forward and in reverse to verify proper wiring and operation.

Referencing Controller to the Material

The **Auxiliary Controller** measures relative movement of the material through the machine and has no way of measuring the absolute amount of material that is past the shear. In order to cut accurate lengths, the controller must know how much material is past the shear at some point in time and then it can make relative measurements there after. This is a process called referencing.

Referencing is simply loading material into the machine past the shear and activating the CYCLE input. The Die must locate the reference switch, move to the minimum die distance, fire the press, and then return to the reference switch (home location).

Note: The Manual Cycle switch must be held closed until the referencing process is complete or an error will be displayed.

At the bottom of the shear stroke, the length counter is set to zero and the **Auxiliary Controller** is referenced. The controller will remain referenced as long as the encoder stays in contact with the material and the material does not move while the controller is turned off.

10

Die Accelerator Test

There are two ways that the DIE ACCELERATOR TEST can be performed. The purpose of the test is to simulate an actual run operation without creating scrap material.

The first method is to use the COMMAND function in the Auxiliary Controller Program screen. This command will cause a popup window to be displayed that will ask for the "Length" of a simulated part and the for the simulated "Velocity". Pressing "OK" will initiate the test, pressing "Cancel" will halt the test.

Ensure that the material is referenced by activating the Manual Shear Input and that the E-Stop input is closed before performing the test. During the test the controller will generate line encoder pulses in proportion to the programmed speed and move the die to simulate a shearing operation.

Running the Machine

After an order has been entered, the machine is placed in the RUN mode by activating the RUN input to the auxiliary controller. The **Auxiliary Controller** will begin counting holes and shearing (or punching) parts to the programmed hole count. It will decrement the quantity remaining after each piece is cut and halt the line automatically when the quantity remaining reaches zero.

Note: If the target is beyond the die when the RUN mode is entered, a "Missed Shear: error message will be generated.

Switch Settings for Slave Controllers

SL301H	Switch Settings and I/O	10-30
SL301HCLR	Switch Settings and I/O	10-31
SL301HCL	Switch Settings and I/O	10-32
SL301HCLS	Switch Settings and I/O	10-33
SL304	Switch Settings and I/O	10-34

SL 301 H Plus Switch Settings and I/O

SW1	OFF	Feed-to-Stop Shear
	ON	Non-Stop Shear
SW2	OFF	Shear Die Boost Active
	ON	No Shear Die Boost
SW3	OFF	Single Speed Shear
	ON	Two Speed Shear
SW4	Not Used – Must be OFF	

SW5	SW6	SW7	
OFF	OFF	OFF	Unit ID 30
ON	OFF	OFF	Unit ID 31
OFF	ON	OFF	Unit ID 32
ON	ON	OFF	Unit ID 33
OFF	OFF	ON	Unit ID 34
ON	OFF	ON	Unit ID 35
OFF	ON	ON	Unit ID 36
ON	ON	ON	Unit ID 37

NO.	INPUTS	OUTPUTS
1	Jog Forward	Forward/Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Shear Complete	Shear
5	Setup Lockout	N/A
6	N/A	Run
7	Hole DetectorShear	Die Boost/Shear Up
8	Manual Shear	N/A

Shear Up is available when Die Boost is not used.

SL 301 HCLR Switch Settings and I/O

SW1 Line Encoder (1) Direction

SW2 Die Encoder (2) Direction

SW3 Sets the Analog output voltage polarity (+ or -)

SW4	SW5	SW6	
OFF	OFF	OFF	Unit ID 30
ON	OFF	OFF	Unit ID 31
OFF	ON	OFF	Unit ID 32
ON	ON	OFF	Unit ID 33
OFF	OFF	ON	Unit ID 34
ON	OFF	ON	Unit ID 35
OFF	ON	ON	Unit ID 36
ON	ON	ON	Unit ID 37

SW7 Must be off.

NO.	INPUTS	OUTPUTS
1	Jog Forward	Forward
2	Jog Reverse	Not Used
3	Remote Run	Reverse
4	Manual Shear	Run Disable
5	Setup/Lockout	Drive Enable
6	Home	Not Used
7	Hole Interrupt on SL	Not Used
8	E-Stop	Run

SL 301 HCL Switch Settings and I/O

Closed Loop Flying Press Slave Controller

SW1	SW2	SW3	
OFF	OFF	OFF	Unit ID 30
ON	OFF	OFF	Unit ID 31
OFF	ON	OFF	Unit ID 32
ON	ON	OFF	Unit ID 33
OFF	OFF	ON	Unit ID 34
ON	OFF	ON	Unit ID 35
OFF	ON	ON	Unit ID 36
ON	ON	ON	Unit ID 37

SW4 Sets the direction of Encoder 1 (Line Encoder)

SW5 Sets the direction of Encoder 2 (Die Encoder)

SW6 Sets the Analog output voltage polarity + -

SW7 Not Used - Must be OFF

NO.	INPUTS	OUTPUTS
1	Die Jog Forward	Not Used
2	Die Jog Reverse	Not Used
3	Run	Not Used
4	Press Complete	Press Down
5	Manual Cycle	Drive Enable
6	Die Retract	Not Used
8	E-Stop (Drive Ready)	Run

SL 301 HCLS Switch Settings and I/O

Closed Loop Flying Press Slave Controller

SW1	SW2	SW3	
OFF	OFF	OFF	Unit ID 30
ON	OFF	OFF	Unit ID 31
OFF	ON	OFF	Unit ID 32
ON	ON	OFF	Unit ID 33
OFF	OFF	ON	Unit ID 34
ON	OFF	ON	Unit ID 35
OFF	ON	ON	Unit ID 36
ON	ON	ON	Unit ID 37

SW4 Sets the direction of Encoder 1 (Line Encoder)

SW5 Sets the direction of Encoder 2 (Die Encoder)

SW6 Sets the Analog output voltage polarity + -

SW7 Not Used - Must be OFF

NO.	INPUTS	OUTPUTS
1	Die Jog Forward	Not Used
2	Die Jog Reverse	Not Used
3	Run	Not Used
4	Press Complete	Press down
5	Manual Cycle	Drive Enable
6	Die Retract	Press Up
7	Hole Detector	Not Used
8	E-Stop	Run

MP 304 Switch Settings and I/O

SW1	OFF	Feed-to-Stop Press 1
	ON	Non-Stop Press 1
SW2	OFF	Die Boost Active Press 1
	ON	No Die Boost Press 1
SW3	OFF	Single Speed Press 1
	ON	Dual Speed Press 1
SW4	OFF	Front Panel Run
	ON	Remote Run (Input 3)
SW5	OFF	Feed-to-Stop Press 2
	ON	Non-Stop Press 2
SW6	OFF	Die Boost Active Press 2
	ON	No Die Boost Press 2
SW7	OFF	Single Speed Press 2
	ON	Dual Speed Press 2

NO.	INPUTS	OUTPUTS
1	Jog Forward	Forward
2	Jog Reverse	Slow
3	Safety Interlock/Rem. Run	Reverse
4	Sheet Detect 1	Run
5	Setup Lockout	Press 1
6	Sheet Detect 2	Press 2
7	Manual Press 1	Press 1 Up/Press 1 Die Boost
8	Manual Press 2	Press 2 Up/Press 2 Die Boost

Press Up outputs are available on outputs 7 and 8 when no press die boosts are used.

Model Customization

Controller Model Types

There are several different controller models available from AMS Controls. Each individual model may be setup to operate in different modes depending on how the customization switches are set. The factors that will influence the model selected will include whether the machine feeds to a stop for a press operation or continues in motion with a die accelerator, whether the line runs a single speed or shifts into a “creep” speed before the operation, and the number of presses that are to be controlled.

The following section lists the proper position for the configuration switches to be set to customize the operation for a specific machine. A map of the inputs and outputs is provided as well as recording lists for machine parameters, tools, and other critical information.

A generic setup data sheet that includes all possible setup parameters is also included. Fill in the appropriate data for your individual controller on this sheet, as it will help the AMS Customer Service Department troubleshoot your machine in the event it is not performing at the required standards. It is also a written back-up should the controller data be lost for any reason.

The basic controller model number displays the base model of the controller without options. The Remote Terminal and Bar Code Scanner input are standard features and do not change the controller number. Additional optional features will change the controller model number with the appropriate letter or letters added to the end of the number (M = Extended Macros, B = Bundle Tag Printer, P = Print-on-Part Printer, E = Expansion Board).

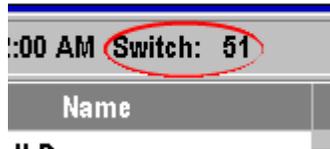
See chapter 10 for details. For Example:

- XL200CLB = Has **B**undle Tag Printer option
- XL212CLE = Has **E**xpansion Board option
- XL206CLM = Has **E**xtended Macros
- XL202CLP = Has Print-on-**P**art Printer
- XL212CLMBEP = Has Extended **M**acros, **B**undle Tag Printer, **E**xpansion Board, and Print-on-**P**art Printer
- XL202CLBP= Has **B**undle Tag Printer and Print-on-**P**art Printer

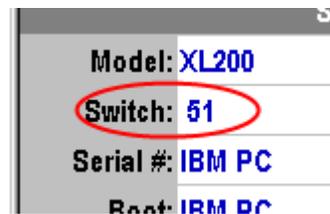
Model Customization

Setting the DIP switches of the XL200 determines the basic machine type for which the controller is configured. The "Switch" number is displayed in the **Setup** menu:

OFPM



and in the **Diagnostics\System Information** menu:



The number listed as "Switch" indicates the DIP settings. Number each DIP switch in binary beginning with the first switch. For example:

Switch Number	1	2	3	4	5	6	7	8	9	10
Binary Value	1	2	4	8	16	32	64	128	256	512

Thus Switch: 51 would indicate that DIP switches 6, 5, and 1 were in their ON position. Based on the specific software model of controller, the machine type could be determined.

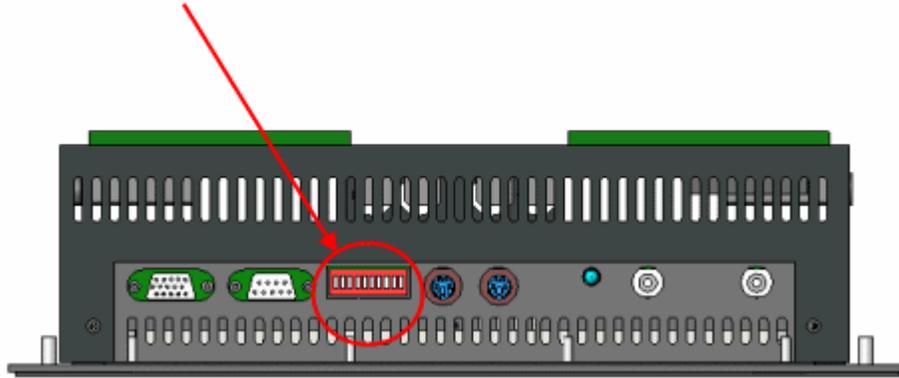
The DIP switch settings are defined in the back of the XL controller manuals. They are also listed, along with the controller I/O designations by configuration, at the following links:

Open Loop Models - [XL2XX Switch Settings and I/O](#)

Closed Loop Models - [XL2XXCL Switch Settings and I/O](#)

Version 1 - Version 3 Hardware Models

Physical DIP Switches are found on the top of the XL200 Series controller:

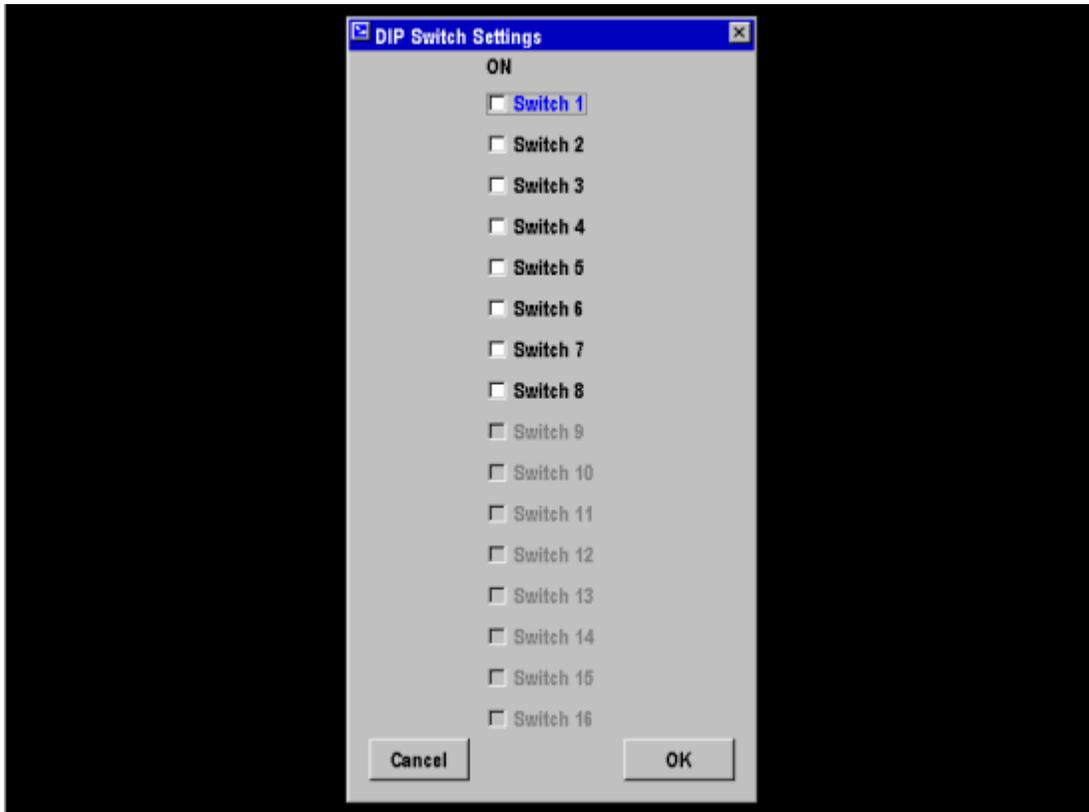


XL200 Series v1 - v3 Hardware Models

Version 4 Hardware Models

Version 4 controllers use "soft switches" accessed by pressing and holding the Setup key on the XL200 keypad during power up:

Model Customization



XL200 Series v4 Hardware Models

XL200CL Switch Settings

ALL MODELS Except XL270CL and XL208CL

IO#	Inputs	Outputs
1	Jog Forward Jog Die 1 Fwd	Fast Uncut Length
2	Jog Reverse Jog Die 1 Rev	Slow Stopping
3	Run	Reverse
4	Emergency Stop (E-Stop)	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Drive Enable
7	Manual Punch	Print Flush/Encoder
8	Tail Out (Inverted Sheet Detect)	Print Trigger
9	Press 0 Complete (Shear)	Press 0 Down (Shear)
10	Press 1 Complete Press X Up Comp	Press 1 Down Gag 1
11	Press 2 Complete Press X Up Comp	Press 2 Down Gag 2 Press X Up/Boost
12	Press 3 Complete Press X Up Comp	Press 3 Down Gag 3 Press X Up/Boost
13	Press 4 Complete Press X Up Comp	Press 4 Down Gag 4 Press X Up/Boost
14	Press 5 Complete Press X Up Comp	Press 5 Down Gag 5 Press X Up/Boost
15	Press 6 Complete Press X Up Comp	Press 6 Down Gag 6 Press X Up/Boost
16	Press 7 Complete Press X Up Comp	Press 7 Down Gag 7 Press X Up/Boost
17	Press 8 Complete Press X Up Comp	Press 8 Down Gag 8 Press X Up/Boost
18	Press 9 Complete Press X Up Comp Test Part Jog Die 2 Fwd	Press 9 Down Gag 9 Press X Up/Boost Mister
19	Press 10 Complete Scrap Material Loop Full Jog Die 2 Rev	Press 10 Down Gag 10 Press X Up/Boost Dump Trigger
20	Press 11 Complete Manual Stacker	Press 11 Down Gag 11 Press X Up/Boost Scrap Dump
21	Press 13 Complete Asynchronous Print Detect	Shear Up (CLF Models Only) Continuous Stroke Mode
22	Feed Ready Die Home	Stacker
23	Slow Run Die Home 2	Short Part Scanner Verify
24	Hole Detect	Very Short Part Horn Drive Enable 2

Model Customization

Notes:

1. The maximum number of presses and/or gags allowed for each model is as follows (this includes the shear press):

Models	Max Presses (including shear)
XL200HCL	2
XL200CL, XL202CLF, XL202HCLF	2
XL244CL	5
XL244HCL	5
XL206CL, XL206CLF, XL206HCLF	6
XL212CL, XL212CLF, XL212HCLF	12

2. Gag outputs are only available on models **XL202CL, XL206CL, XL212CL**, all “**CLF**” models, and all “**HCLF**” models. The number of available gag outputs is equal to the maximum number of presses allowed for that model **minus** the number of active presses configured by the dip-switch. The Exp. Gag Board option is only available on model **XL212CL**.
3. Each model (except those noted below) will provide Press Down and Press Up outputs for the number of presses configured by the dip-switch. For models **XL200CL** and **XL200HCL**, Press Up outputs begin at output #11. For models **XL202CL, XL202CLF, XL202HCLF, XL206CL, XL206CLF, and XL206HCLF**, the first Press Up output follows the last Gag output. If no gags are configured, the first Press Up output follows the last Press Down output. No Press Up outputs are provided for models **XL244CL, XL244HCL, XL212CL, XL212CLF, and XL212HCLF**.
4. The Hole Detect input is only available on models with an “H” suffix in their name.
5. The “Feed Ready” and “Slow Run” inputs are available only in Feed-to-Stop mode. The “Die Home” input is available only in Die Accelerator mode.
6. The “Short Part” and “Very Short Part” outputs are only available on models with “Brake & Hump (U)” option.
7. The Scanner Verify, and Horn outputs are only available when the “Dietrich IO (D)” option is set. The “Dietrich IO” option cannot be used at the same time as the “Brake & Hump” option.

8. The following inputs and outputs are available only when the “Tube Mill (T)” is set:
 - Scrap Input
 - Test Part Input
 - Mister Output
 - Dump Trigger Output
 - Scrap Dump Output
9. The Manual Stacker input is not available when the base model is an **XL212CL** and the controller is configured for twelve presses since this input is already defined as the Press 11 Complete input. The Stacker output is still available in this configuration.
10. Material Loop Full Input is available only when the “C” continuous press option is enabled.
11. Continuous Stroke Mode output is available only when the “C” continuous press option is enabled.
12. The Uncut Length output is available only when the “U”, Brake and Hump, option is enabled and the controller is configured for Feed-to-Stop operation.
13. Die Home 2, Drive Enable 2, Jog Die 2 Fwd and Jog Die 2 Rev inputs are only available on models that support two Die Accelerators and only when both Die Accelerators are configured.
14. Jog Forward and Jog Reverse inputs become Jog Die 1 Fwd and Jog Die 2 Rev when two Die Accelerators are enabled.

XL200 Series Standard Closed Loop Switch Settings Version 2.00

Models: XL200CL, XL200HCL

Switch #	OFF	ON
1	CW Encoder 1 Direction	CCW Encoder 1 Direction
2	CW Encoder 2 Direction	CCW Encoder 2 Direction
3	Normal Analog Voltage Polarity	Inverted Analog Voltage Polarity
4	Disable Punch	Enable Punch ¹
5	See Below	See Below
6	See Below	See Below
7	Punch Material Motion (See Note 5)	Punch Material Motion (See Note 5)
8	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
9	CRT Disabled	CRT Enabled
10	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
11	Front Shear Blanking Mode Disabled	Front Shear Blanking Mode Enabled ⁶
Switch 5	Switch 6	Description
OFF	OFF	Feed-to-Stop, One Encoder ²
ON	OFF	Feed-to-Stop, Two Encoders ²
OFF	ON	Single-Speed Die Accelerator ³
ON	ON	Two-Speed Die Accelerator

Notes for Models **XL200CL** and **XL200HCL**:

- For model **XL200CL**, Version 2.02 or earlier, the punch press can only be enabled in the Feed-to-Stop mode. Later versions allow the punch press to be enabled in the Die-Accelerator mode also.
- Feed-to-Stop mode is NOT allowed on the **XL200HCL** model.
- When the Tube Mill (T) option is active, the controller must be configured as a Single-Speed Die-Accelerator.
- Encoder 1 and Encoder 2 are defined as follows:

Model	Encoder 1	Encoder 2
XL200CL Feed to Stop	Motor Encoder (Feeder)	Line Encoder (when 2-encoder option is used)
XL200CL, XL200HCL Die Accelerator	Line Encoder	Motor Encoder (Die Accelerator)

- Starting with versions 3.44.00 and 4.07.00, when configured as a Die Accelerator, if switch 4 is on and switch 7 on, the press will be enabled as a two-speed Feed-to-Stop press. If switch 4 and 6 are NOT ON switch 7 should be OFF. If the alternating punch option is Enabled, both alternating presses will be configured for Feed-to-Stop.
- Front Shear Blanking Mode is only possible when the Punch is enabled. For obvious reasons this option is only available on versions 4 and higher.

Models XL202CL, XL206CL, XL212CL, XL202CLF, XL206CLF, XL212CLF, XL202HCLF, XL206HCLF, XL212HCLF, XL202CLF-MHA, XL206CLF-MHA, XL212CLF-MHA Switch Settings

Switch #	OFF		ON	
1	CW Encoder 1 Direction		CCW Encoder 1 Direction	
2	CW Encoder 2 Direction		CCW Encoder 2 Direction	
3	Normal Analog Voltage Polarity		Inverted Analog Voltage Polarity	
4	Single Speed One Encoder ¹		Two Speed Two Encoders ¹	
5	See Below		See Below	
6	See Below		See Below	
7	See Below		See Below	
8	See Below		See Below	
9	CRT Disabled		CRT Enabled	
10	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
Switch 5 ²	Switch 6 ²	Switch 7 ²	Switch 8 ²	Number of Presses
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 for Models **XL202CL, XL206CL, XL212CL, XL202CLF, XL206CLF, XL212CLF, XL202HCLF, XL206HCLF, XL212HCLF, XL202CLF-MHA, XL206CLF-MHA, XL212CLF-MHA**:

- Switch 4 configures Single/Two Speed on all “CLF”, “HCLF” and “CLF-MHA” models. Switch 4 configures One/Two Encoders on all “CL” models.
- “CLF” and “CLF-MHA” models can be configured for a maximum of 6 presses.
- Encoder 1 and Encoder 2 are defined as follows:

Model	Encoder 1	Encoder 2
All “CLF”, “HCLF” and “CLF-MHA”	Line Encoder	Motor Encoder (Die Accelerator)
XL202CL, XL206CL, XL112CL	Motor Encoder (Feeder)	Line Encoder (when 2-encoder option is used)

Model XL212CLF-MHA2 Switch Settings

Switch #	OFF		ON	
1	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
2	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
3	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
4	Single Speed		Two Speed	
5	See Below		See Below	
6	See Below		See Below	
7	See Below		See Below	
8	See Below		See Below	
9	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
10	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
11	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
12	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
13	See Below		See Below	
14	See Below		See Below	
15	See Below		See Below	
16	See Below		See Below	
Switch 5 ²	Switch 6 ²	Switch 7 ²	Switch 8 ²	Number of Presses
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
Switch 13 ⁴	Switch 14 ⁴	Switch 15 ⁴	Switch 16 ⁴	Number of Presses on Second Die
OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	2
ON	ON	OFF	OFF	3
OFF	OFF	ON	OFF	4
ON	OFF	ON	OFF	5

Notes for Models XL212CLF-MHA2:

1. Switch 4 configures Single/Two Speed.
2. “CLF-MHA2” models can be configured for a maximum of 6 presses.
3. Encoder 1 and Encoder 2 are defined as follows:

Encoder 1	Encoder 2	Encoder 4
Motor Encoder (Die 1)	Motor Encoder (Die 2)	Line Encoder

4. If any of these switches are on, a second DA is enabled. The number of presses must be defined larger than the number of presses on the second die. The presses for the first die start with the shear press and end at the first press on the second die. The first press for the second die is (Number of Presses – Number of Presses on Second Die + 1)

Models XL244CL, XL244HCL Switch Settings

Switch #	OFF	ON
1	CW Encoder 1 Direction	CCW Encoder 1 Direction
2	CW Encoder 2 Direction	CCW Encoder 2 Direction
3	Normal Analog Voltage Polarity	Inverted Analog Voltage Polarity
4	Disable All Punches	Enable Punches
5	See Below	See Below
6	See Below	See Below
7	No 2d Die Accelerator	2d Die Accelerator enabled ⁴
8	No Gags	Gag Outputs Enabled ⁵
9	CRT Disabled	CRT Enabled
10	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
Switch 5	Switch 6	Number of Open Loop Punches ¹
OFF	OFF	1
ON	OFF	2
OFF	ON	3
ON	ON	4

Notes for Models **XL244CL**, **XL244HCL**:

- Each Open Loop Punch will have a corresponding boost output.
- Models **XL244CL** and **XL244HCL** are defined to function only as a single-speed die-accelerator.
- Encoder 1, 2 and 3 are defined as follows:

Model	Encoder 1	Encoder 2	Encoder 4 (Ver. 4)
XL244CL, XL244HCL (Single) Die Accelerator	Line Encoder	Motor Encoder (Die Accelerator)	Not Used
XL244CL, XL244HCL (Dual) Die Accelerator	Motor Encoder (Die 1)	Motor Encoder (Die 2)	Line Encoder

- Version 4 only. Punches must be enabled. Disables DIP switches 1,2 and 3. Changes Encoder definitions.
- Punches must be enabled. A minimum of two gags will be available. Unused press outputs convert to gag outputs.

Model XL270CL (Tile Machine Controller)

I/O Definitions

IO#	Inputs	Outputs
1	Jog Forward	Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	E-Stop	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Drive Enable
7	Manual Punch 1	<i>(Future Print Flush)</i>
8	Tail Out	<i>(Future Print Trigger)</i>
9	Press 0 Complete, Shear	Press 0 Down (Shear)
10	Press 1 Complete	Forming Press 1 Down
11	Press 2 Complete ¹	Forming Press 2 Down ¹
12	Press 3 Complete, Entry Shear	Press 3 Down (Entry Shear)
13	Press 1 Forming Tool Complete ² Press 4 Complete (KMF) ³	Press 4 Down (KMF) ³
14	Manual Punch 2 ¹	Press 5 Down (KMF) ³
15	Press 0 Up Complete	Press 0 Up (Shear)
16	Press 1 Up Complete	Forming Press 1 Up
17	Press 2 Up Complete ¹	Forming Press 2 Up ¹
18	Press 3 Up Complete	Press 3 Up (Entry Shear)
19	Stacker Complete	Not Used
20	Manual Stacker	Press 1 Forming Tool
21	<i>(Future Asynchronous Print Detect)</i>	Press 2 Forming Tool ¹
22	Feed OK	Stacker
23	Slow Run	Not Used
24	Press 5 Complete (KMF) ³	Not Used

Model XL270CL (Tile Machine Controller)

Switch Settings

Switch #	OFF	ON
1	CW Encoder 1	CCW Encoder 1
2	CW Encoder 2	CCW Encoder 2
3	Normal Analog Polarity	Inverted Analog Polarity
4	Disable Twin Press Option	Enable Twin Press Option
5	See Below	See Below
6	See Below	See Below
7	See Below	See Below
8	See Below	See Below
9	CRT Disabled	CRT Enabled
10	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
12	KMF presses FTS ⁴	KMF Presses NS ⁴
Switch 5	Switch 6	Motor Type
OFF	OFF	Feed-to-Stop, One Encoder
ON	OFF	Feed-to-Stop, Two Encoder
OFF	ON	Reserved
ON	ON	Reserved
Switch 7	Switch 8	Machine Type
OFF	OFF	Formia
ON	OFF	Sen Fung
OFF	ON	Reserved
ON	ON	Reserved

Notes for Model XL270CL (Tile Machine Controller):

1. Inputs/Outputs only available when Twin Press Option is selected via dipswitch configuration.
2. Press 1 Forming Tool Only available when configured as a Sen Fung Machine.
3. The Press 4 and 5 inputs and outputs were added to support the KMF Felt applicator module. They are only added when the Machine is configured for a Formia tile machine. The KMF module only requires Down outputs so, to preserve the remaining outputs for other unforeseen uses, no down outputs are provided.
4. DIP switch 12 is only available for the Formia model and configures the KMF press outputs to NON-Stop operation.

Model XL208CL I/O Definitions (Version 3 and Higher)

IO#	Inputs	Outputs
1	Jog Forward	Fast Forward
2	Jog Reverse	Slow
3	Run	Reverse
4	Emergency Stop (E-Stop)	Run
5	Setup Lockout	Item Complete
6	Manual Shear	Drive Enable
7	Manual Punch	Print Flush/Encoder
8	Tail Out (Inverted Sheet Detect)	Print Trigger
9	Not Used	Not Used
10	Not Used	Not Used
11	Not Used	Not Used
12	Not Used	Not Used
13	Not Used	Not Used
14	Not Used	Not Used
15	Not Used	Not Used
16	Not Used	Not Used
17	Not Used	Not Used
18	Not Used	Not Used
19	Not Used	Not Used
20	Manual Stacker	Not Used
21	Asynchronous Print Detect	Not Used
22	Die Home	Stacker
23	Not Used	Not Used
24	Not Used	Not Used

Model XL208CL Switch Settings (Version 3 and Higher)

Switch #	OFF	ON
1	CW Encoder 1 Direction	CCW Encoder 1 Direction
2	CW Encoder 2 Direction	CCW Encoder 2 Direction
3	Normal Analog Voltage Polarity	Inverted Analog Voltage Polarity
4	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
5	See Below	See Below
6	See Below	See Below
7	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
8	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
9	CRT Disabled	CRT Enabled
10	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
Switch 5	Switch 6	Description
OFF	OFF	Invalid
ON	OFF	Invalid
OFF	ON	Single-Speed BOSS
ON	ON	Two-Speed BOSS

Notes for Models **XL208CL**:

- Encoder 1 and Encoder 2 are defined as follows:

Model	Encoder 1	Encoder 2
XL208CL	Line Encoder	Motor Encoder (Die)

XL212CL-SGF Switch Settings

Switch #	OFF		ON	
1	Feeder		End Gripper Functionality	
2	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
3	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
4	One Encoder ¹		Two Encoders ¹	
5	See Below		See Below	
6	See Below		See Below	
7	See Below		See Below	
8	See Below		See Below	
9	CRT Disabled		CRT Enabled	
10	NOT USED – MUST BE OFF		NOT USED – MUST BE OFF	
Switch 5	Switch 6	Switch 7	Switch 8	Number of Presses
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:

- Encoder 1 and Encoder 2 are defined in the Table below:

Model	Encoder 1	Encoder 2
XL212CL-SGF Feeder	Motor Encoder (Feeder)	Line Encoder (when 2-encoder option is used)
XL212CL-SGF End Gripper	Motor Encoder (Gripper)	Invalid. Single Encoder must be used.

XL212CL-SGF IO

IO#	Inputs	Outputs
1	Feed Ready	Output 1
2	Slow Run	Stopping
3	Run	Output 3
4	Emergency Stop (E-Stop)	Run
5	Setup Lockout	Item Complete
6	Input 6	Drive Enable
7	Buggy Home	Print Flush
8	Input 8 Tail Out ¹	Print Trigger
9	Press 0 Complete (Shear)	Press 0 Down (Shear)
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	Gripper Clamp ²
22	Future Hole Detect Functionality	Output 22
23	Weld Detect ¹ Gripper Material Sensor ²	Output 23
24	Part Detect	Output 24
33	Jog Forward	Output 33
34	Fog Reverse	Output 34
35	Manual Part Reference	Part Referencing
36	Manual Shear	Output 36
37	Manual Punch	Output 37
38	Manual Buggy Reference ²	Buggy Referencing ²
39	Manual Part Grip ²	Part Grip Function ²
40	Manual Part Drop ²	Dropping Part ²
41	Stationary Part Grip ²	Part Drop Completed ²
42	Punch Verify Mode	Part Flip ²
43	Punch Skip	Stopped
44	Punch Allow	Uncut Length
45	Input 45	Entry Guides Closed ²
46	Input 46	Exit Guides Closed ²
47	Input 47	Punch Verify Mode
48	Input 48	Output 48

Models: XL200CL-MRE2

Switch #	OFF	ON
1	See Below	See Below
2	See Below	See Below
3	See Below	See Below
4	See Below	See Below
5	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
6	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
7	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
8	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
9	CRT Disabled	CRT Enabled
10	NOT USED – MUST BE OFF	NOT USED – MUST BE OFF
Die 1 Type	Switch 2	Switch 1
Crank	OFF	OFF
Rotary	OFF	ON
Linear	ON	OFF
Die 2 Type	Switch 4	Switch 3
Crank	OFF	OFF
Rotary	OFF	ON
Linear	ON	OFF

Notes for Model **XL200CL-MRE2**:

- Encoder 1, 2 and 3 are defined as follows:

Encoder 1	Encoder 2	Encoder 4 (Ver. 4)
Motor Encoder (Die 1)	Motor Encoder (Die 2)	Line Encoder

Machine Parameter Sheet

Machine Parameters

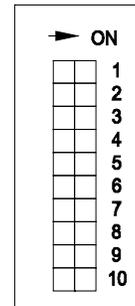
Shear Dwell Down	_____
Shear Dwell Up	_____
Press 1 Dwell Down	_____
Press 1 Dwell Up	_____
Press 1 Reaction	_____
Tool Selected for Manual Punch	_____
Bundle Quantity Reload Value	_____
Bundle Quantity Count	_____
Item Complete	_____
Delay After Shear	_____
Scrap Part Length	_____
Halt Mode	_____
Halt No More Items to Run	_____
Tolerance	_____
Tolerance Mode	_____
Crash Detect Velocity Change	_____
Crash Detect Time	_____
Dump Table Delay	_____
Dump Table Dwell	_____
Mist Counter	_____
Mist Delay	_____
Mist Dwell	_____
Test Part Length	_____
Continuous Material Flow	_____
Stitch Gag	_____
Alternating Press Mode	_____
Coil End Point	_____
Coil End Offset	_____
Shear Kerf	_____
Minimum Part Length	_____
Shear to Encoder Distance	_____
Shear to Scrap Detect Distance	_____
Short Part Length	_____
Very Short Part Length	_____
Minimum Die Distance	_____
Maximum Die Distance	_____
Shear Die Distance	_____
Line Resolution	_____
Die Resolution	_____
Loop Gain	_____
Offset Integral	_____
Offset Voltage (Auto)	_____

Serial Number: _____

Version Number: _____

Type Number: _____

(Type Setting Switch)



(Machine Parameters Continued)

Lag Integral	_____
Lag Compensation	_____
Derivative	_____
Jog Select Mode	_____
Jog Velocity	_____
Filter Constant	_____
Slow Run Velocity	_____
Maximum Velocity	_____
Minimum Die Return Velocity	_____
Maximum Die Return Velocity	_____
Acceleration	_____
Return Acceleration	_____
Die Reference	_____
Settling Time	_____
Shear Reaction	_____
Advance After Cut	_____
Velocity at Max Analog Voltage	_____
Maximum Speed Voltage	_____
Minimum Speed Voltage	_____
Length at Maximum Speed	_____
Auxiliary Shear Compensation	_____
Filter Constant	_____
Velocity at Max Analog Voltage	_____
Maximum Speed Voltage	_____
Minimum Speed Voltage	_____
Length at Maximum Speed	_____
Auxiliary Shear Compensation	_____

Note: Use these sheets 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.

Press Dwell Sheet

Press Dwell Data

Shear 0 Dwell Dn	_____	Press 5 Dwell Dn	_____
Shear 0 Dwell Up	_____	Press 5 Dwell Up	_____
Shear Reaction	_____	Press 6 Dwell Dn	_____
	_____	Press 6 Dwell Up	_____
Press 1 Dwell Dn	_____	Press 7 Dwell Dn	_____
Press 1 Dwell Up	_____	Press 7 Dwell Up	_____
Press 1 Reaction	_____	Press 8 Dwell Dn	_____
Press 1 Boost	_____	Press 8 Dwell Up	_____
Press 1 Boost Reaction	_____	Press 9 Dwell Dn	_____
Press 1 Boost Enable Velocity	_____	Press 9 Dwell Up	_____
Press 2 Dwell Dn	_____	Press 10 Dwell Dn	_____
Press 2 Dwell Up	_____	Press 10 Dwell Up	_____
Press 2 Reaction	_____	Press 11 Dwell Dn	_____
Press 2 Boost	_____	Press 11 Dwell Up	_____
Press 2 Boost Reaction	_____		_____
Press 2 Boost Enable Velocity	_____		_____
Press 3 Dwell Dn	_____		_____
Press 3 Dwell Up	_____		_____
Press 4 Dwell Dn	_____		_____
Press 4 Dwell Up	_____		_____

Controller Settings

Controller Settings

Time Format	_____
Date Format	_____
Date Separator	_____
Set Hours	_____
Set Minutes	_____
Set Seconds	_____
Set AM or PM	_____
Set Days	_____
Set Months	_____
Set Year	_____
Network Unit ID	_____
Network Baud Rate	_____
Halt Delay Minimum	_____
Auto-Request Order Footage	_____
Use Scrap Codes	_____
Manual Shear Scrap Length	_____
Language Selection	_____
Numeric Display Format	_____
Auto-Delete Done Orders After	_____
Set Done Items to Ready	_____
Enable Virtual Keyboard	_____

Specifications

Mechanical Specifications

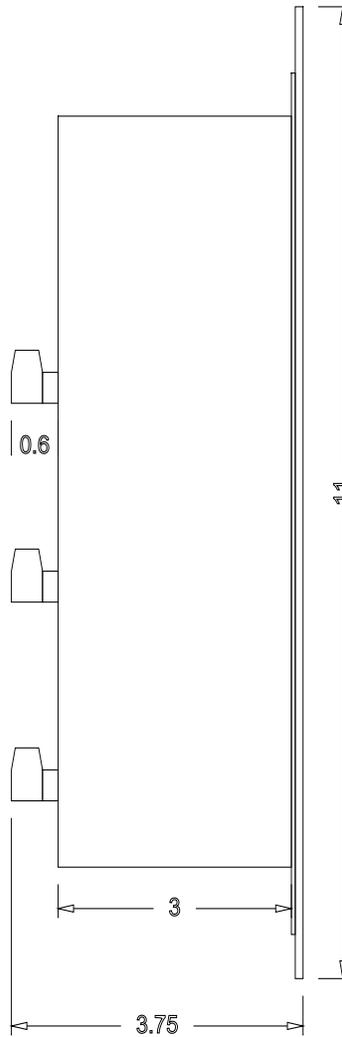
Mounting

Size

11" high x 12.375 wide x 4" deep
including cable

Weight

7lbs



A

Figure 12-1 Side Dimensions of the XL200

Specifications

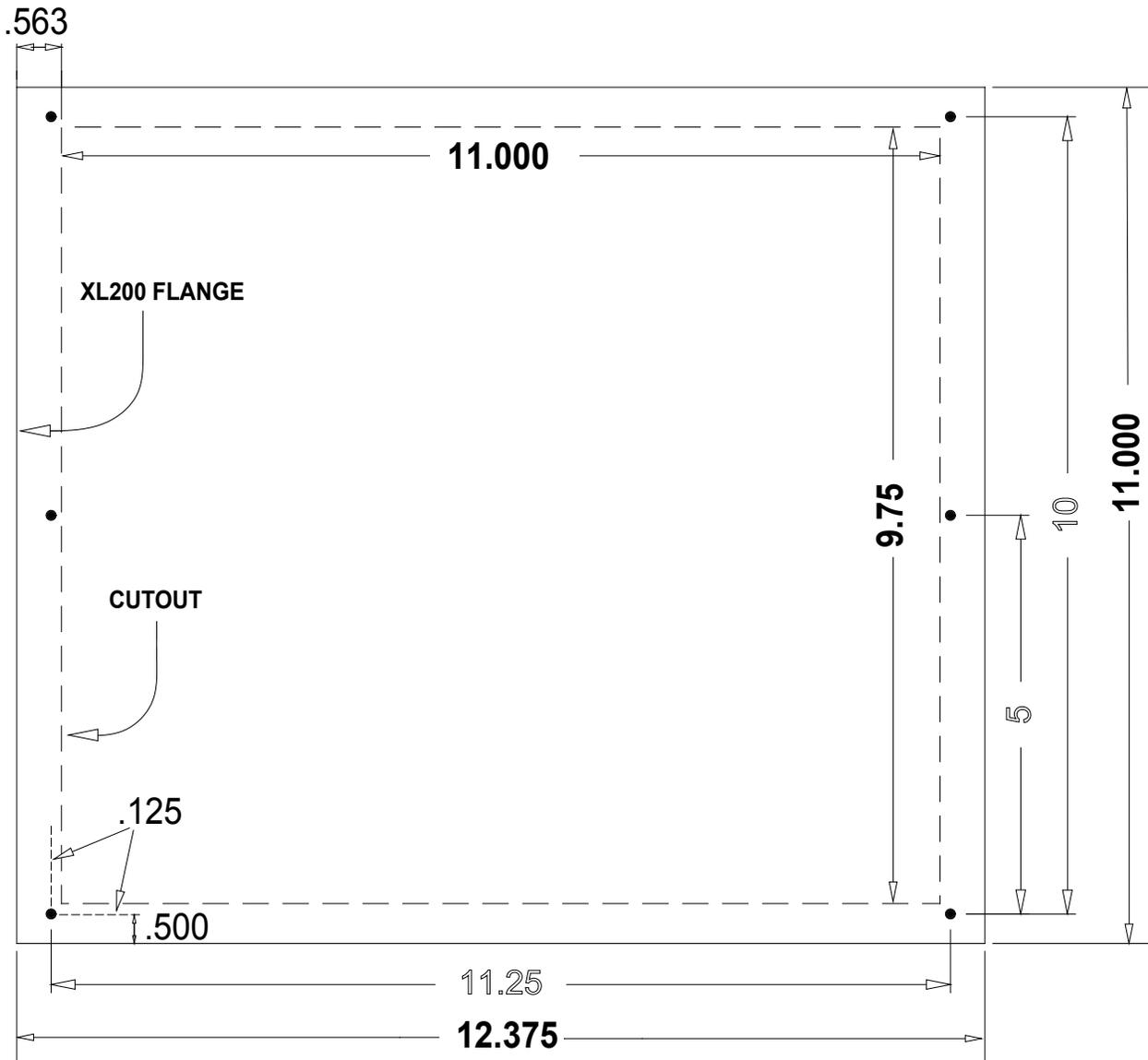
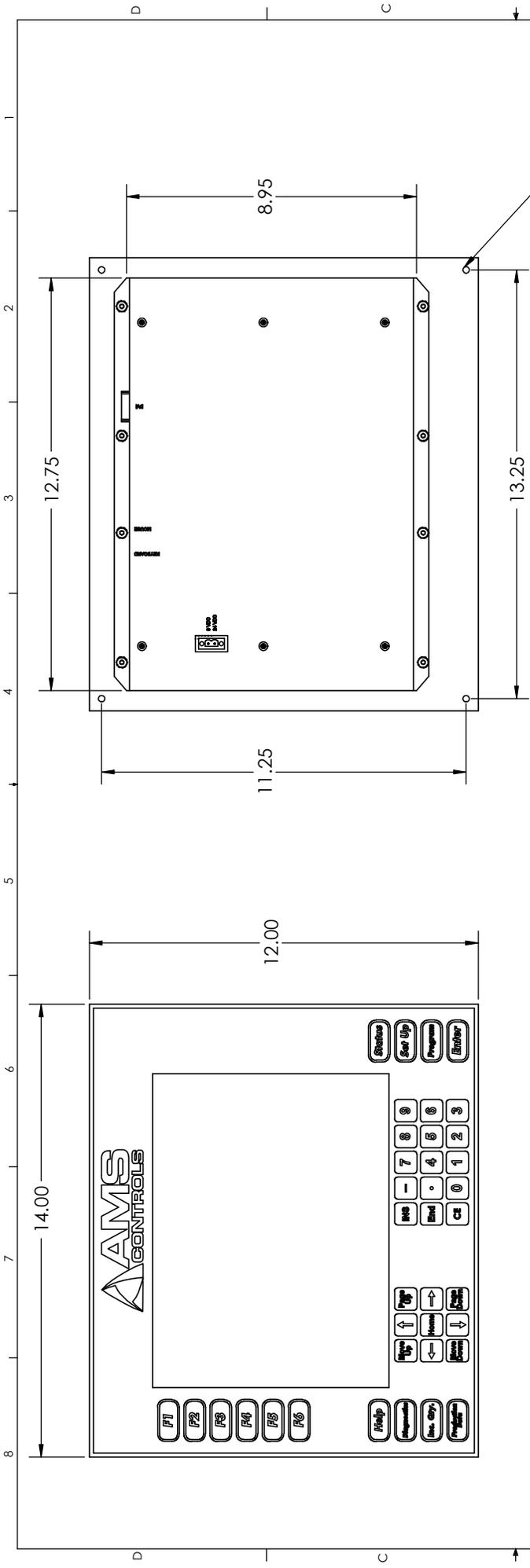


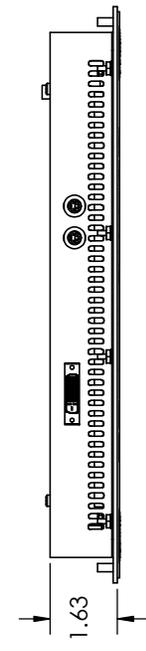
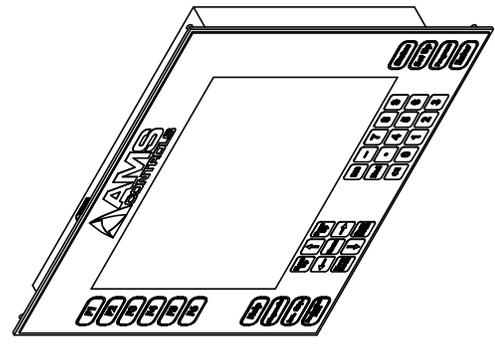
Figure 12-2 XL200 Cutout Dimensions

Only the dotted line in Figure 12-2 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.



Mounting Pems (x4): 10-24 x 3/8"



ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION	QUANTITY	DATE	BY
PARTS LIST					
UNLESS OTHERWISE SPECIFIED, CAD GENERATED DRAWING. DIMENSIONS ARE IN INCHES. DO NOT MANUALLY UPDATE.					
DIMENSIONS ARE:					
DECIMALS		FRACTIONS		DATE	
X ± 0.00		± 0/10		RDH 11.29.11	
XX ± 0.05		ANGLES		DRAWN	
XXX ± 0.50		CHECKED		DATE	
XXXX ± 0.01		MATERIAL		REV.	
MATERIAL					
FINISH					
DO NOT SCALE DRAWING					
SCALE					
CAD FILE					
SHEET OF					

DATE	BY	REV.	OF
AMS CONTROLS, INC.			
XL200 Remote Display			
DATE: 11.29.11			
DRAWN: RDH			
CHECKED:			
MATERIAL:			
FINISH:			
DO NOT SCALE DRAWING			
SCALE:			
CAD FILE:			
SHEET OF:			

Electrical

CPU Input Power

Input Voltage	24VDC \pm 5%
Continuous Power Consumption	20 Watts
Inrush Current	5 Amp
Recommended Supply	2.4 Amps (57 Watts)

Input Characteristics

Type NPN	Current Sinking
----------	-----------------

Output Characteristics

Type	Open Collector Transistor
Maximum Current	4 Amperes DC

Encoder Input

Type	Quadrature with Complements
Voltage	5VDC
Maximum Encoder Load	200 milliamperes
Maximum Pulse Rate	20,000 pulses/second

Analog Output Characteristics

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

Operation

Number of Order Items	999
Maximum number of Patterns	999
Maximum Operations per part per press	Limited only by Available Memory
Maximum Part Length	3500.000 inches (88900.00 millimeters)
Maximum Quantity / Item	9999
Units of Measurement	4 English, 3 Metric modes
Coil Footage Totalizers	Limited only by Available Memory
Maximum Footage/Totalizer	1,000,000 feet (1,000,000 meters)

Features

Display	10.25 inch diagonal, color.
Keys (Defined)	34
Keys (Soft – multipurpose)	6

Eclipse

Communication Settings

Protocol	RS-485
Baud Rate	300 to 38,400
Data Bits	7 or 8
Parity	Even, Odd, & None
Stop Bits	1 or 2

Computer Requirements

Operating System	Windows 98, NT 4.0 or better
Processor	Pentium –200 MHZ minimum
Memory	128 MB of RAM minimum
Hard Drive	1.2 GB or more
Serial Ports	1 “available” serial port
Printer	Windows Compatible (ink-jet or laser)
CD-ROM drive	Required
Mouse	Required

Printer Specs

Bundle Tag Printer

Refer to the manufacturer's manual that was included with your printer or refer to the manufacturer's website for additional information.

<http://www.matthewsmarking.com/>

<http://www.datamaxcorp.com/>

<http://www.zebra.com/>

<http://www.foxiv.com/>

Inkjet Print on Part Printer

Refer to the manufacturer's manual that was included with your printer or refer to the manufacturer's website for additional information.

<http://www.videojet.com/>

<http://www.westmarkind.com/diagraph/linx.htm>

<http://www.matthewsmarking.com/>

Bar Code Scanner

Refer to the manufacturer's manual that was included with your printer or refer to the manufacturer's website for additional information.

http://www.symbol.com/products/barcode_scanners/barcode_scanners.html

*Diagrams***About 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.

XL Series Wiring Diagrams

XL200CL Die-Accelerator	Pg. B-3
XL200CL Feeder Control	Pg. B-4
XL206CLF Die-Accelerator w/ Flying Gags	Pg. B-5
XL206CL Feeder Control, 6 Press/Gags	Pg. B-6
XL212CLF Die-Accelerator w/ Flying Gags	Pg. B-7
XL212CL Feeder Control, 12 Press/Gags	Pg. B-8

SL (Auxiliary) Series Wiring Diagrams

SL301H	Pg. B-9
SL301HCL	Pg. B-10
SL301HCLR	Pg. B-11
SL304	Pg. B-12

Expansion Board Diagrams

Single Expansion Board	Pg. B-13
Multiple Expansion Boards	Pg. B-14

Printer Diagrams

Communications Block Diagram	Pg. B-15
PM5100 Wiring Diagram	Pg. B-16
5120 Cable for the PM5100	Pg. B-17
Typical Inkjet Connection Diagram	Pg. B-18
4450 Matthews 2001 interface cable	Pg. B-19
Matthews Local Installation Diagram	Pg. B-20
Matthews Remote Installation Diagram	Pg. B-21
Typical Bundle Tag Connection Diagram	Pg. B-22

Diagrams

Refer to warnings on Page B-2

Simplified Bundle Tag Connection Diagram	Pg. B-23
4467 CitoH interface cable	Pg. B-24
CitoH (typical BTP) Local Installation Diagram	Pg. B-25

For detailed drawings of auxiliary hardware devices (such as the 3840 power module) see chapter 9.

!! Warning !!

AMS 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.

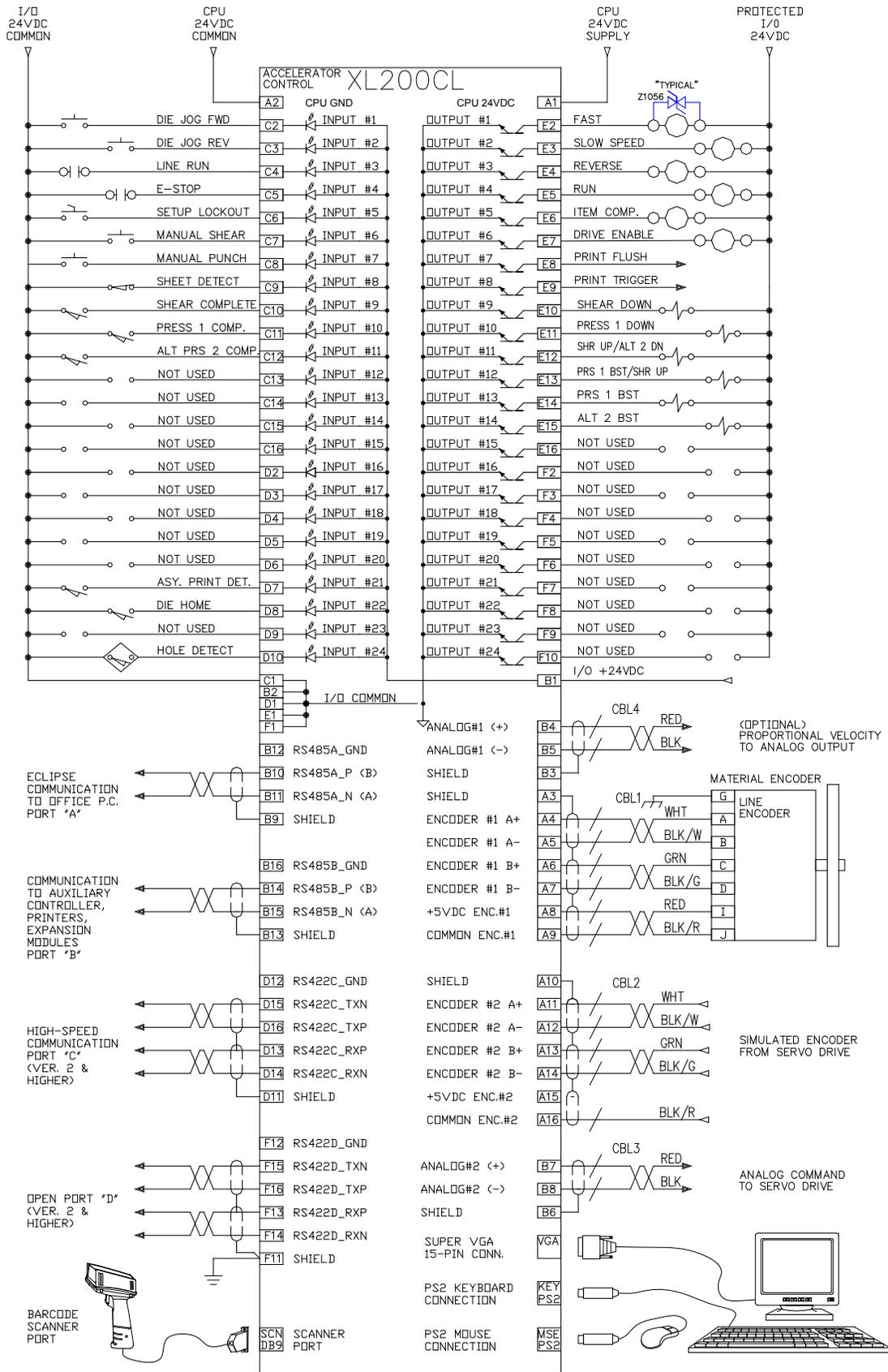


Figure B-1. XL200CL Die Accelerator Wiring Diagram



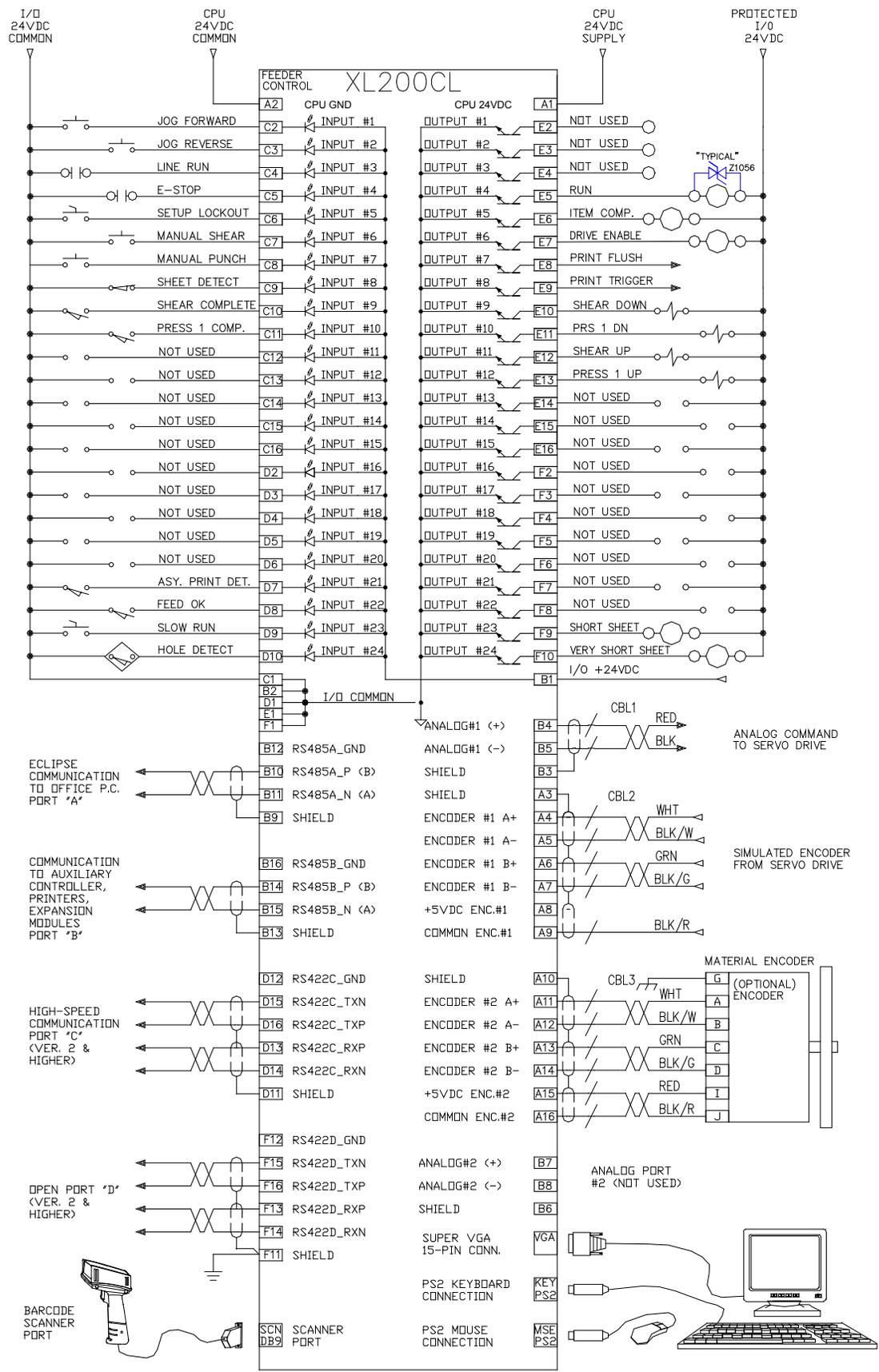


Figure B-2. XL200CL Feeder Control Wiring Diagram

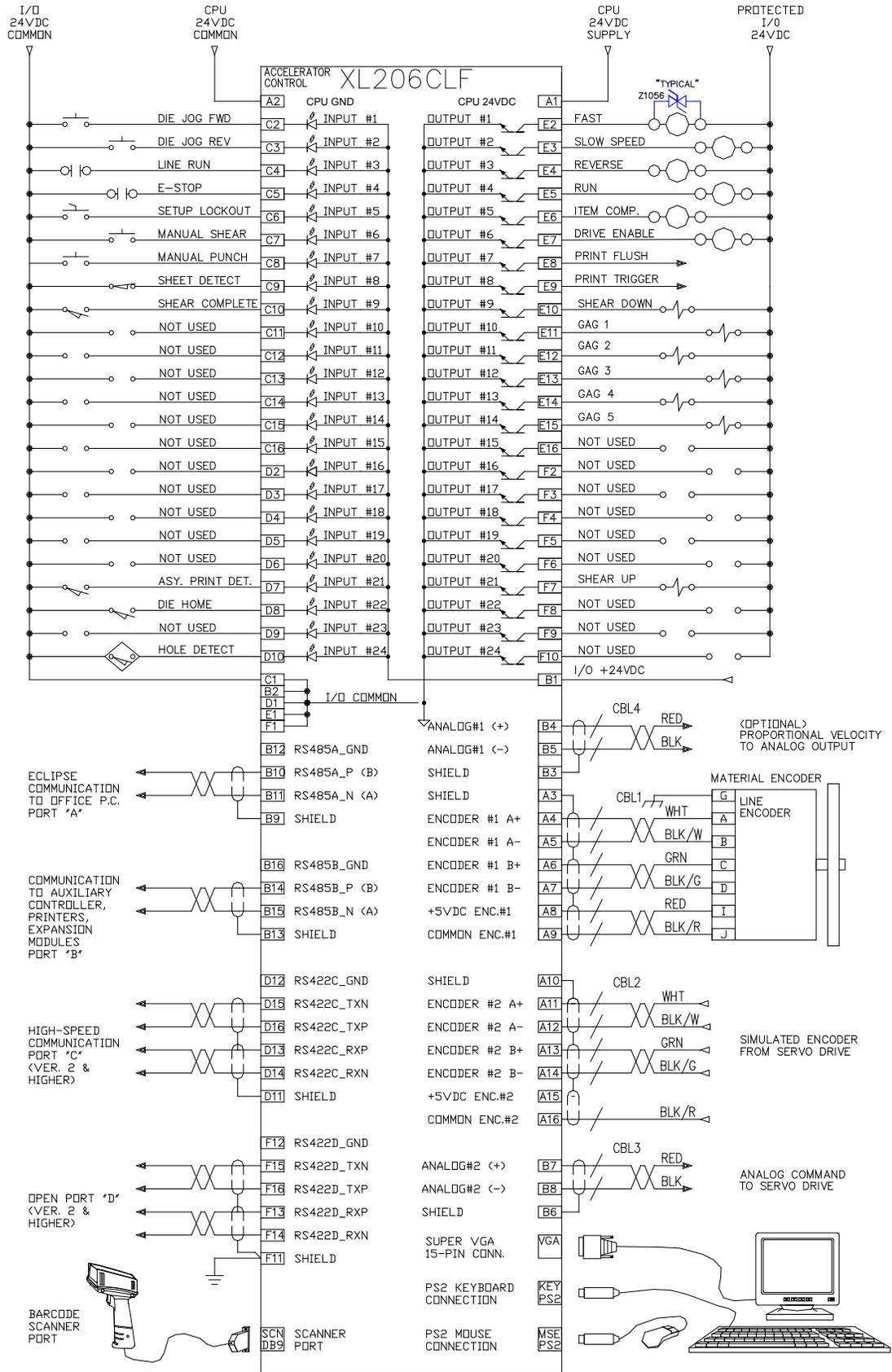


Figure B-3. XL206CLF Accelerator w/ 5 Flying-Gags Wiring Diagram

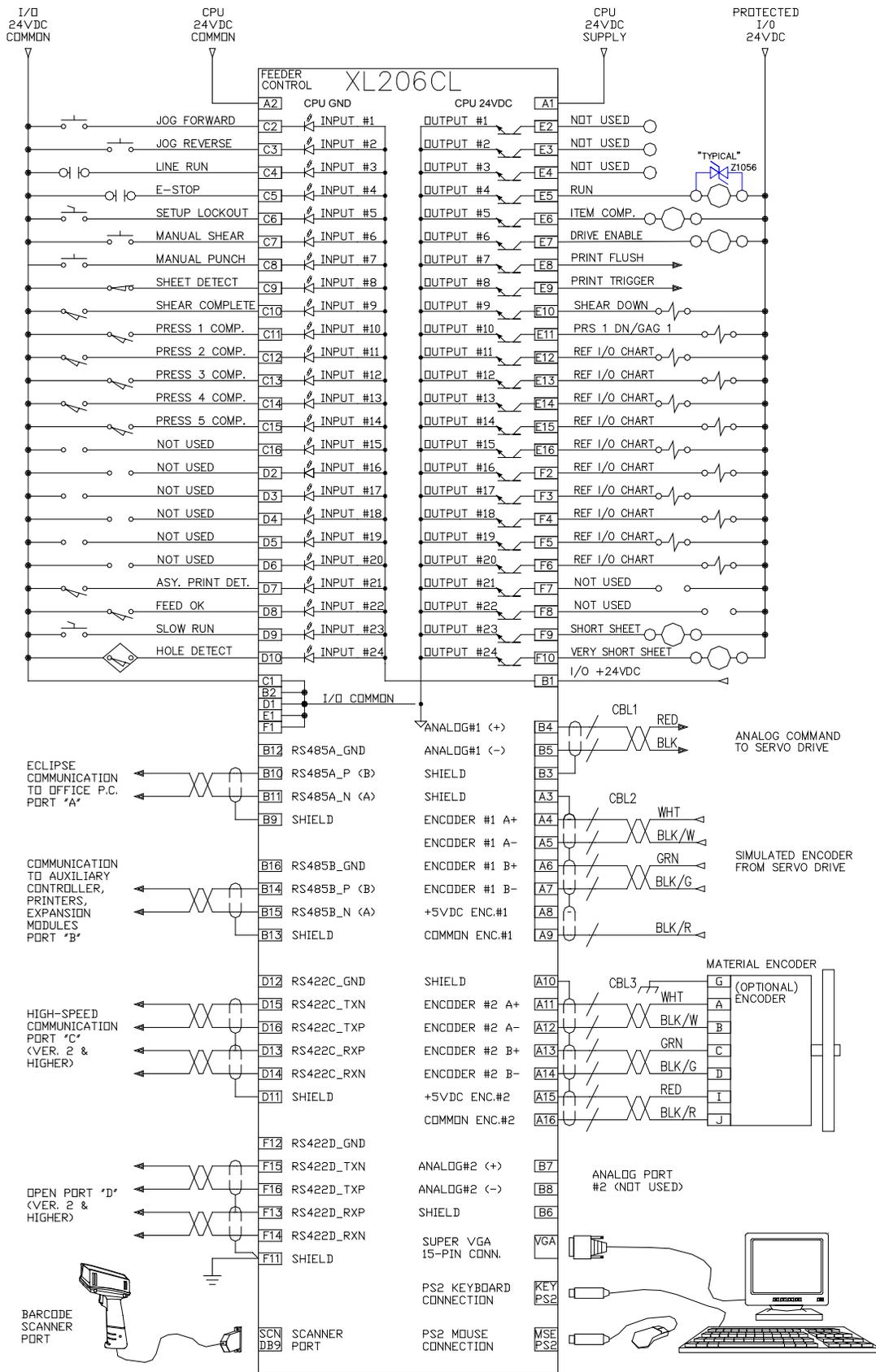


Figure B-4. XL206CL Feeder w/ 6 Press/Gags Wiring Diagram

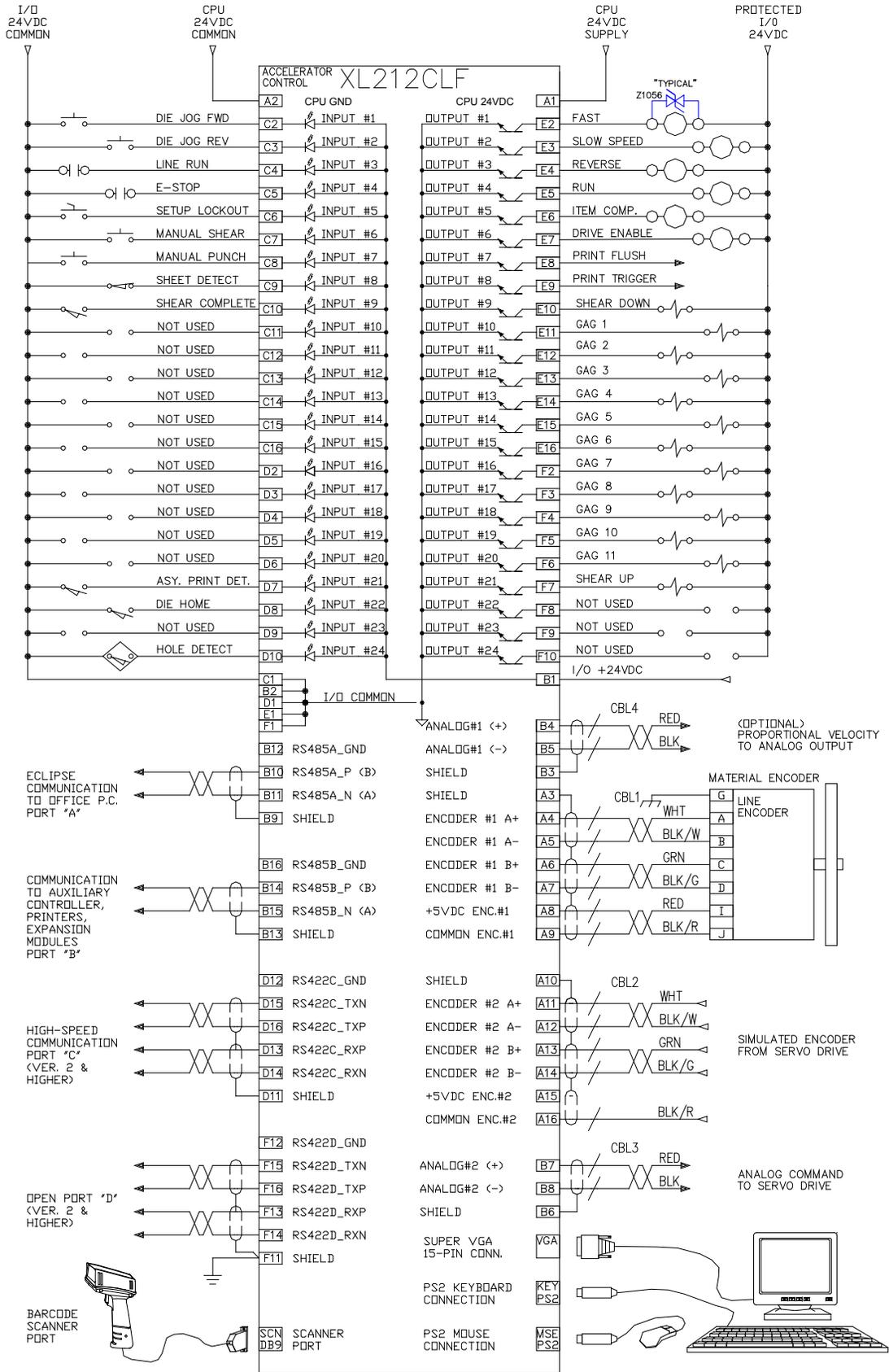


Figure B-5. XL212CLF Accelerator w/ 11 Gags Wiring Diagram



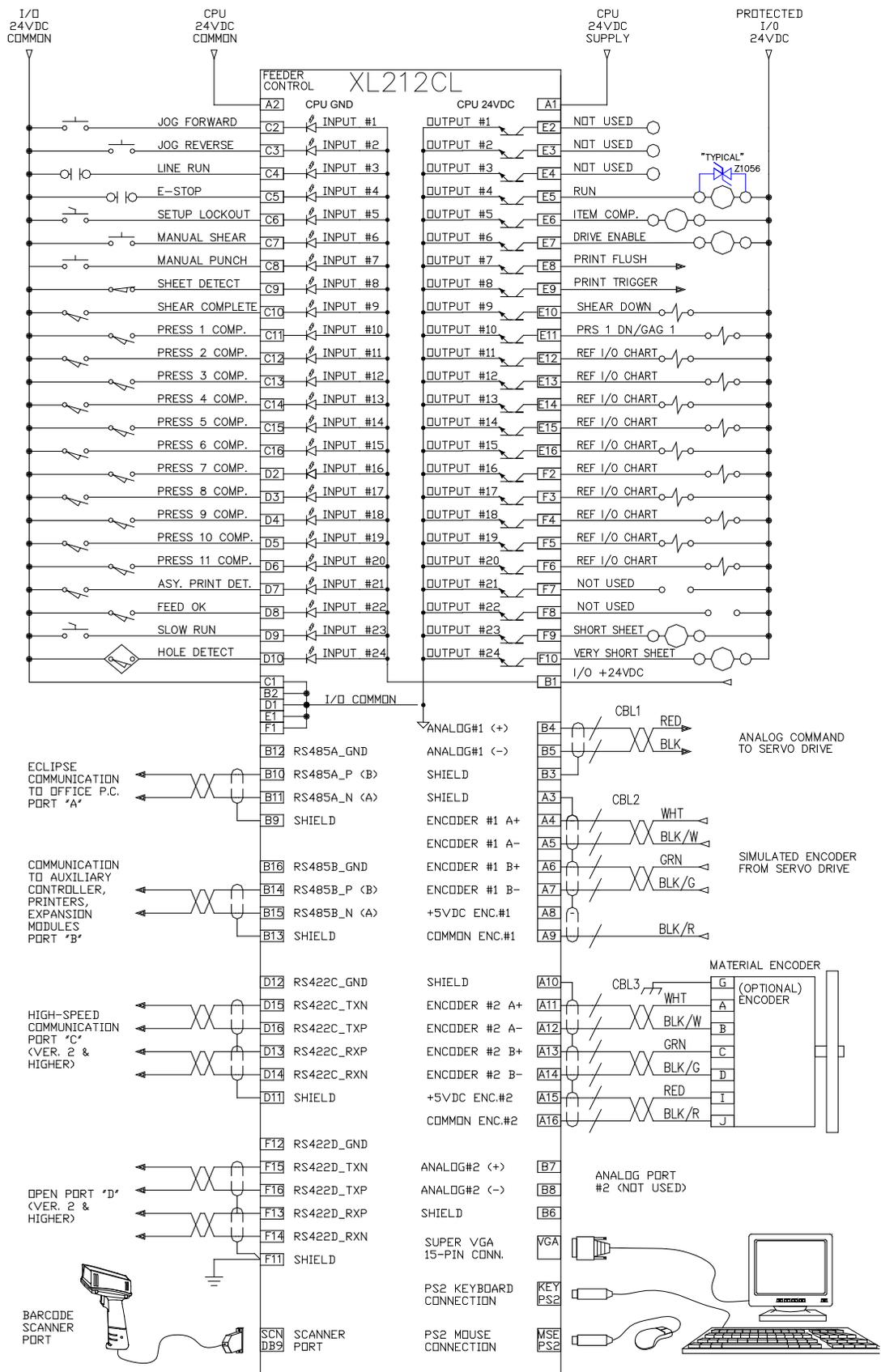


Figure B-6. XL212CL Feeder Control with 12 Press/Gags Wiring Diagram

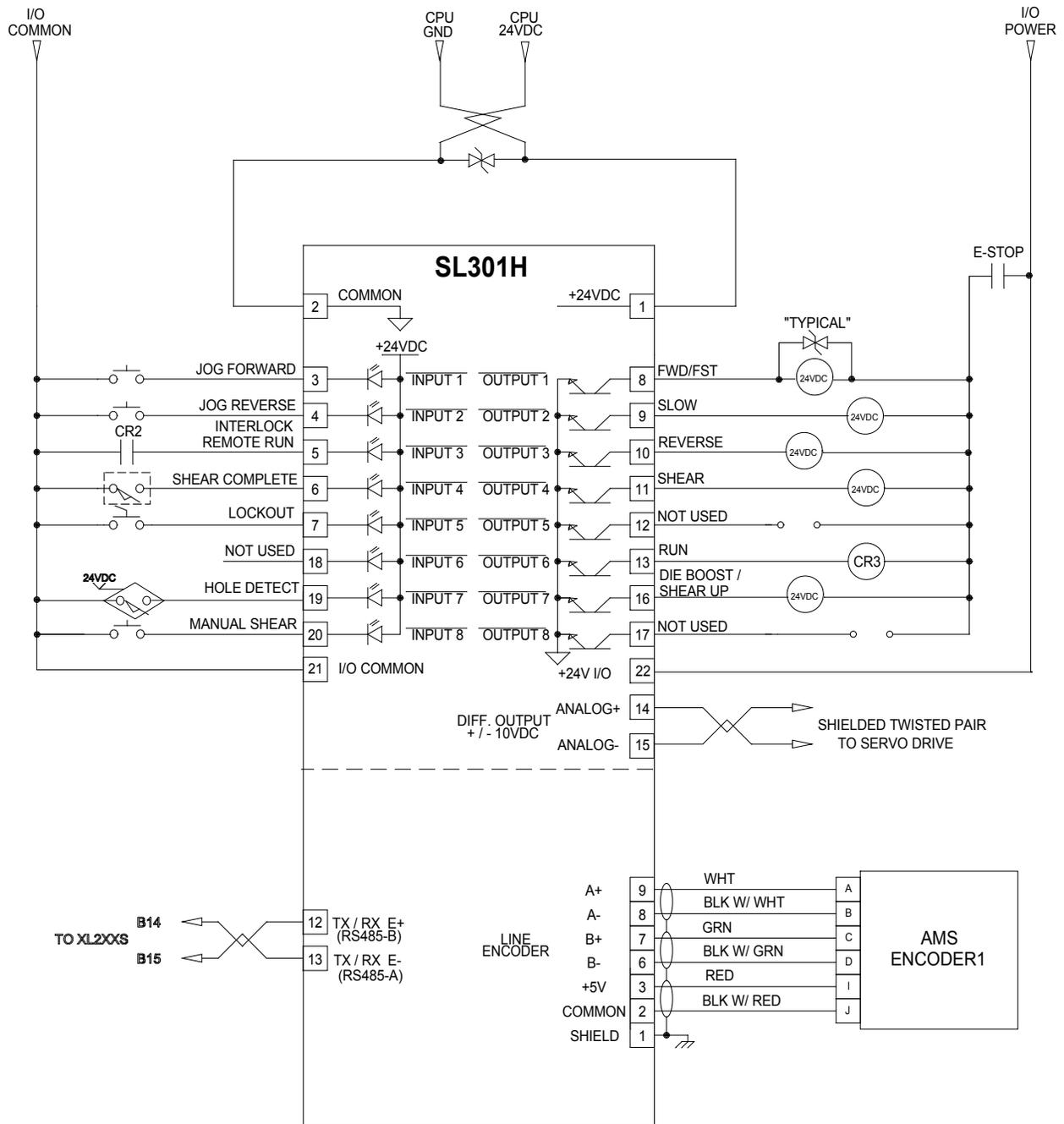


Figure B-7. SL301H Wiring Diagram

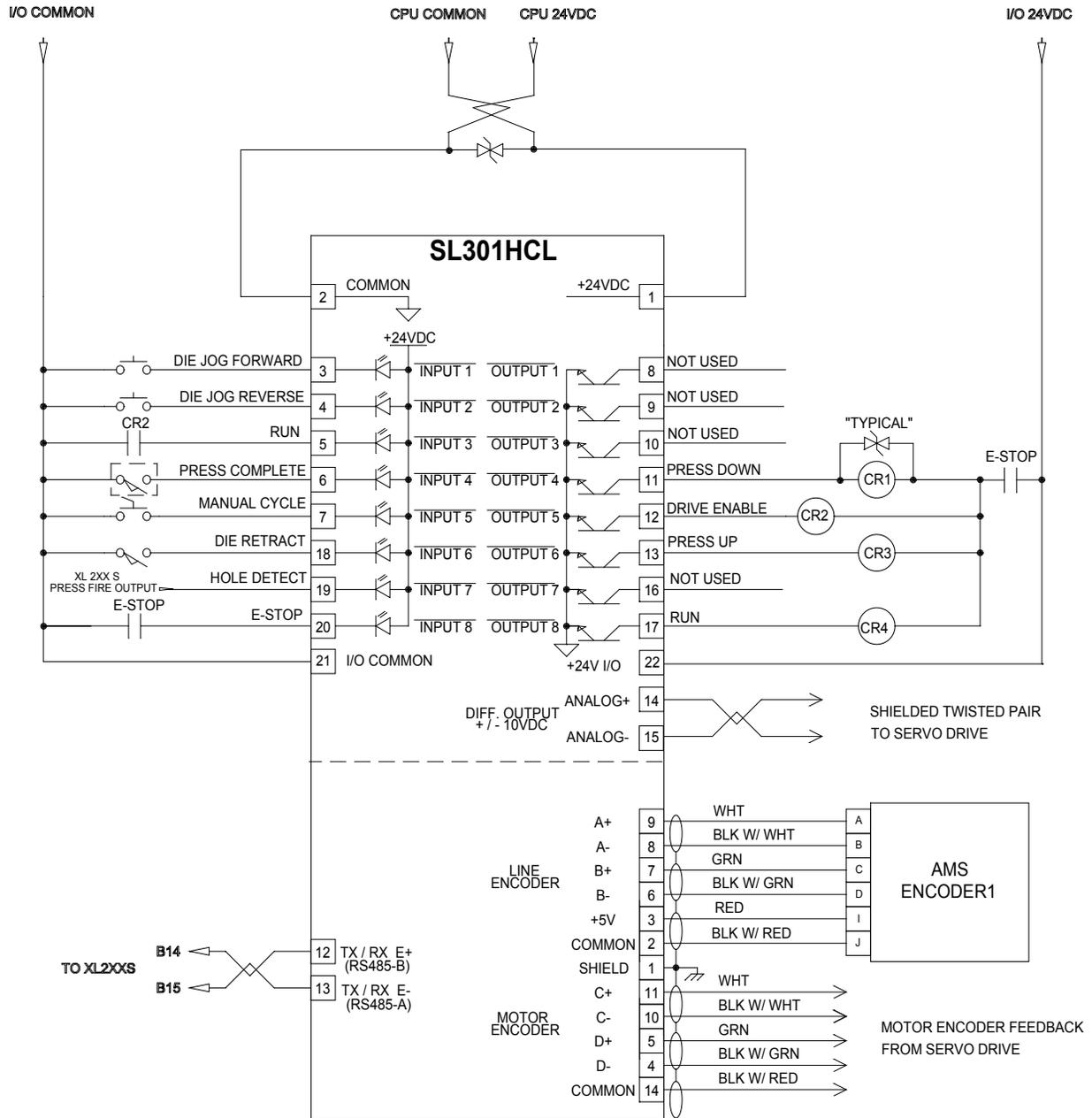


Figure B-8. SL301HCL Auxiliary Controller Wiring Diagram

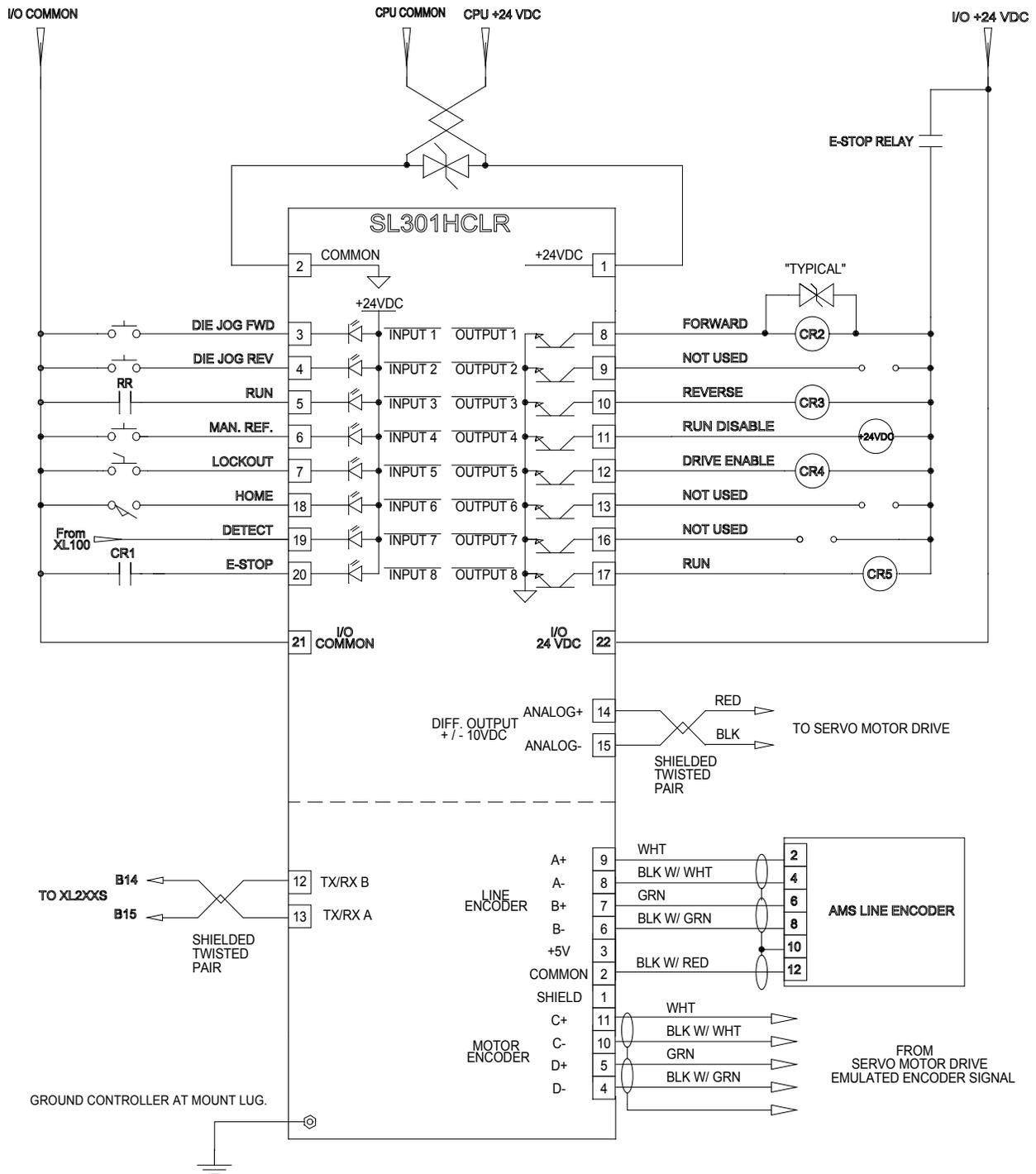


Figure B-9. SL301HCLR Wiring Diagram (Rotary Controller)



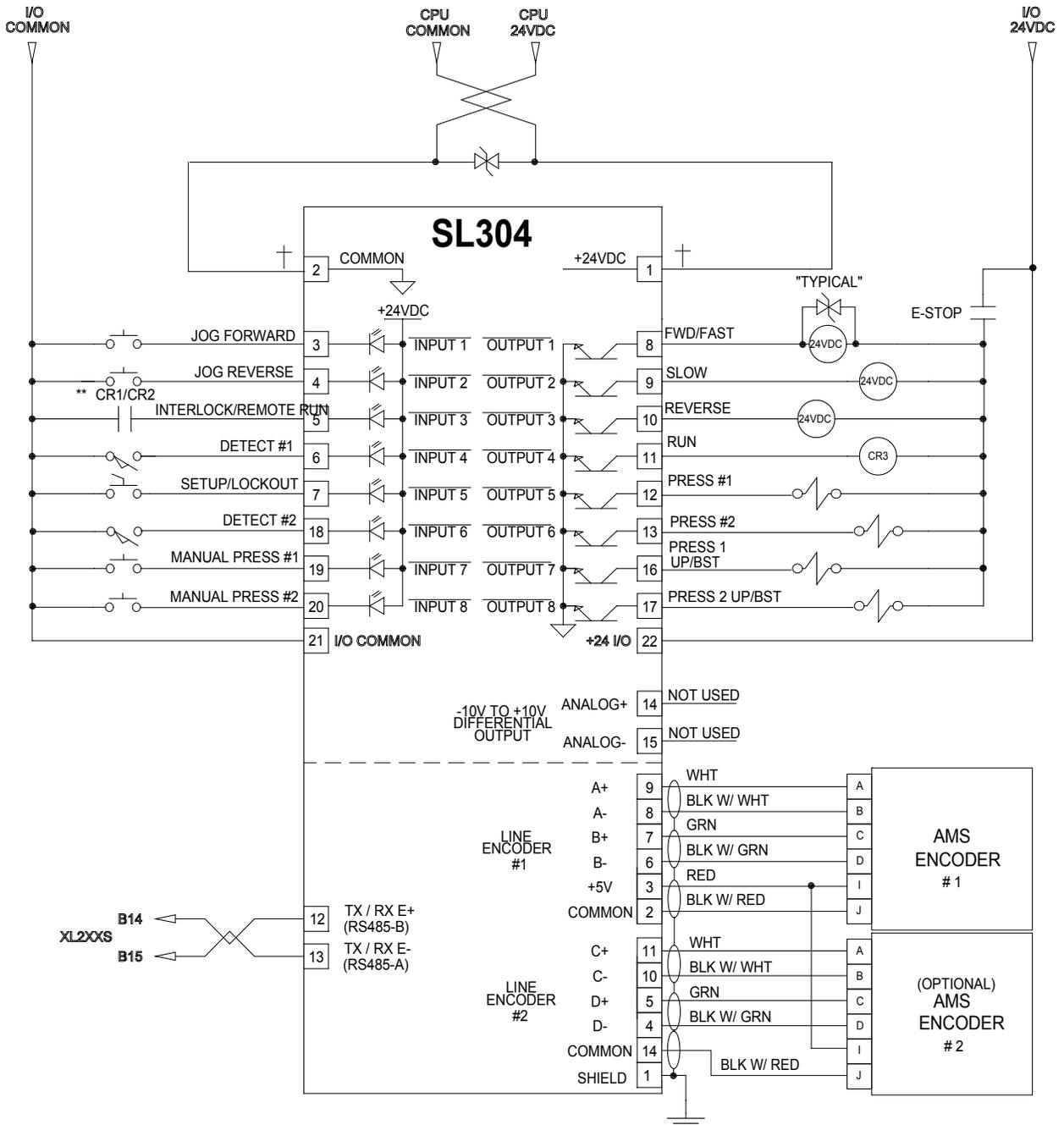


Figure B-10. SL304 Wiring Diagram (Downstream Dual Punch)

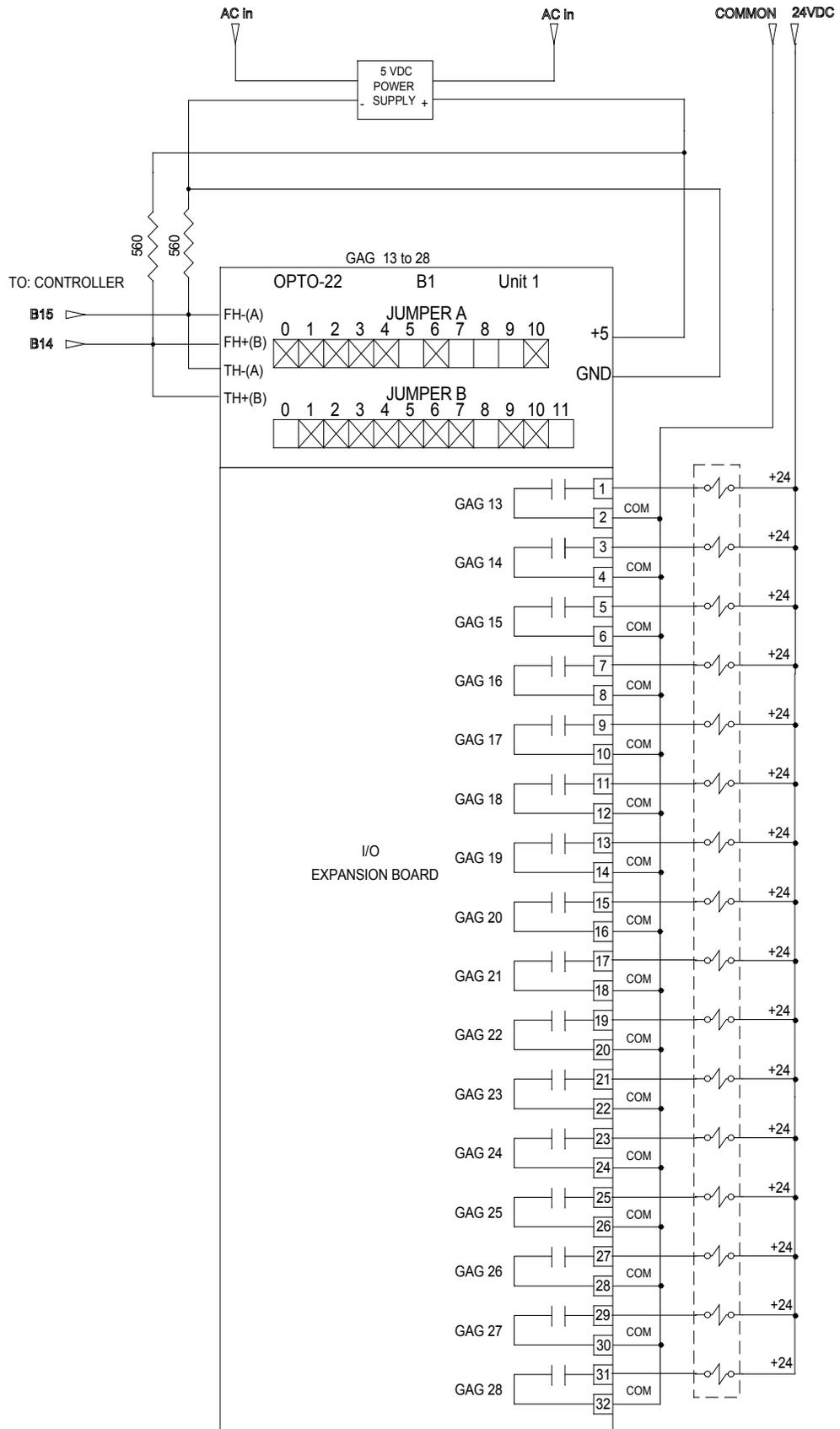


Figure B-11. Single Expansion board Connections

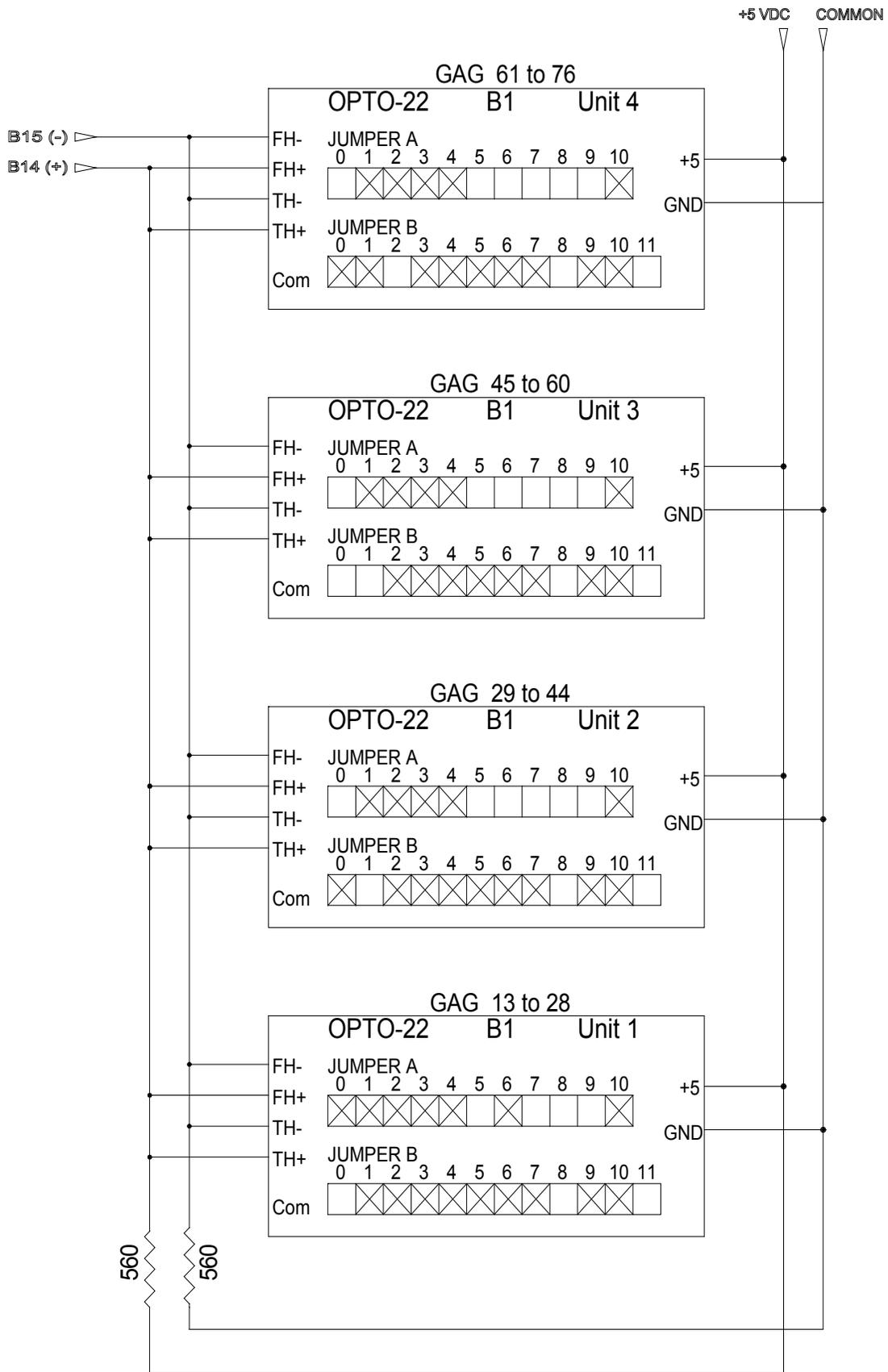


Figure B-12. Multiple Expansion Board Wiring Connections

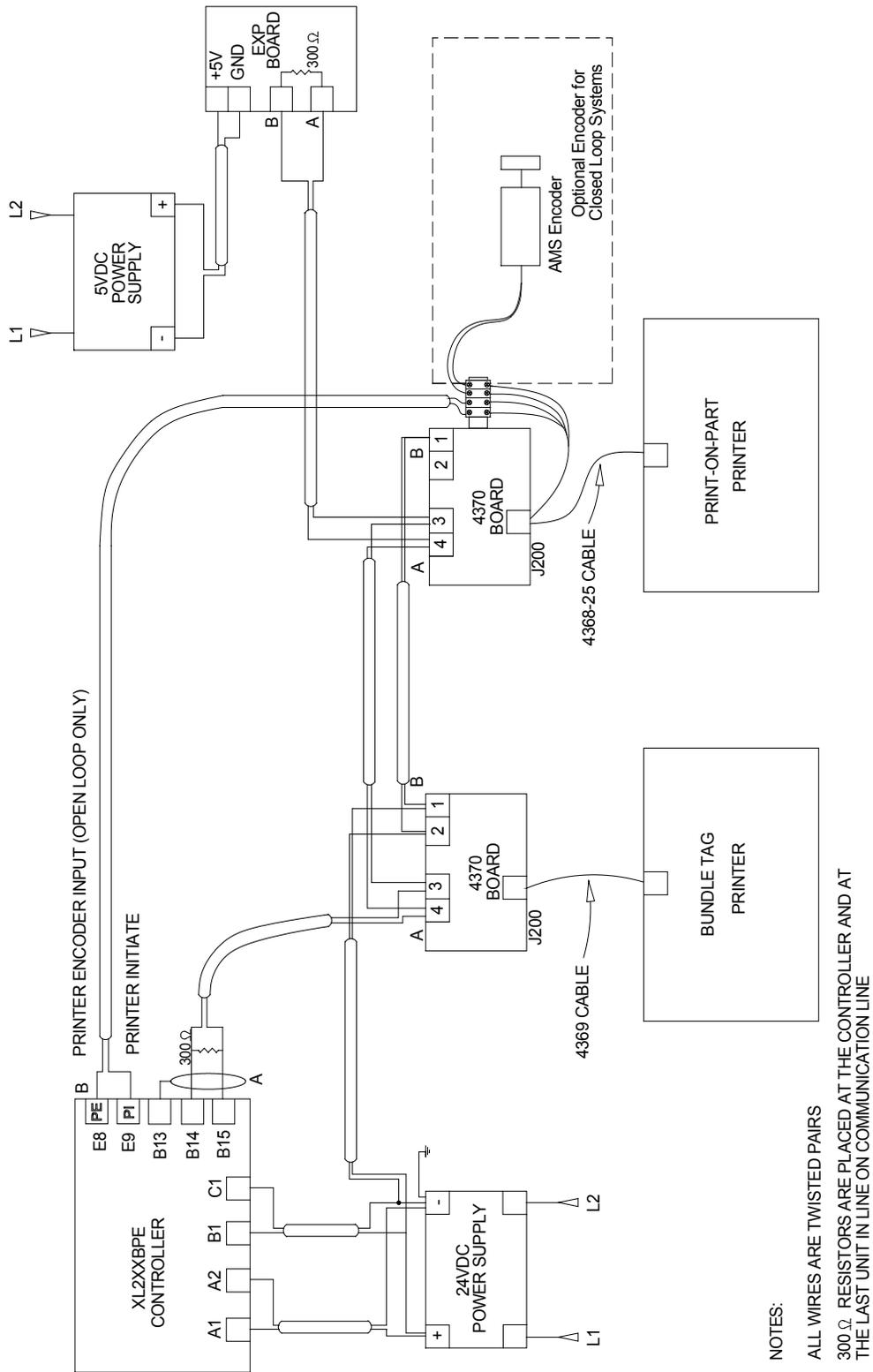
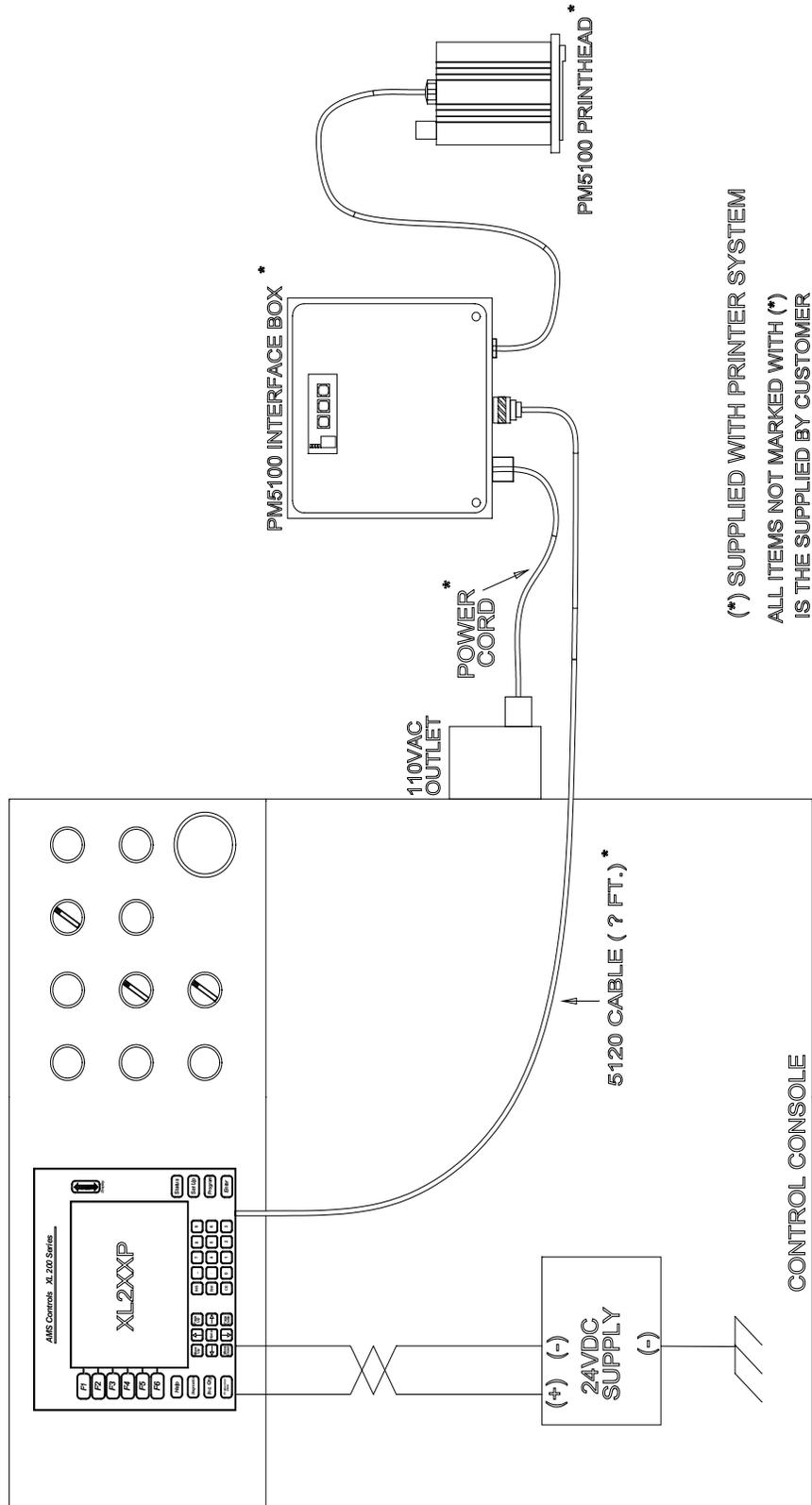


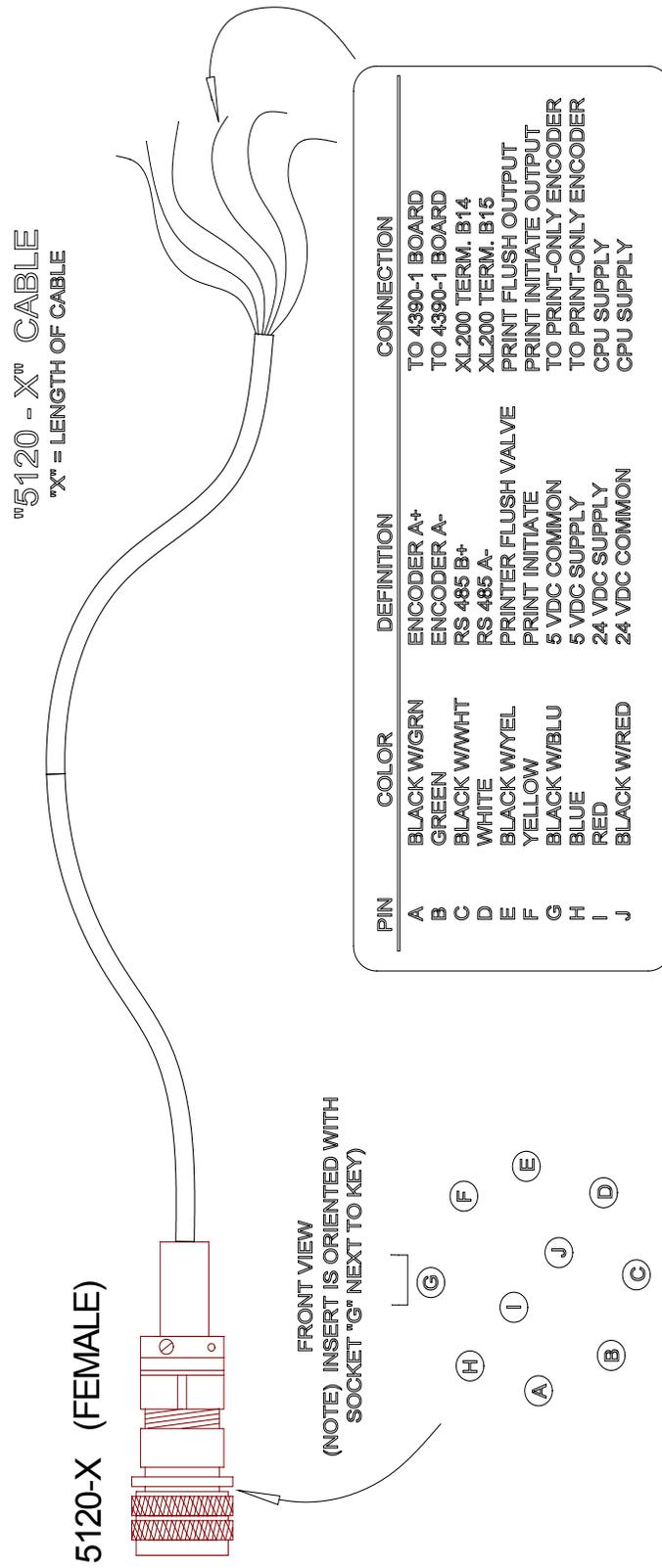
Figure B-13. Communications Block Diagram





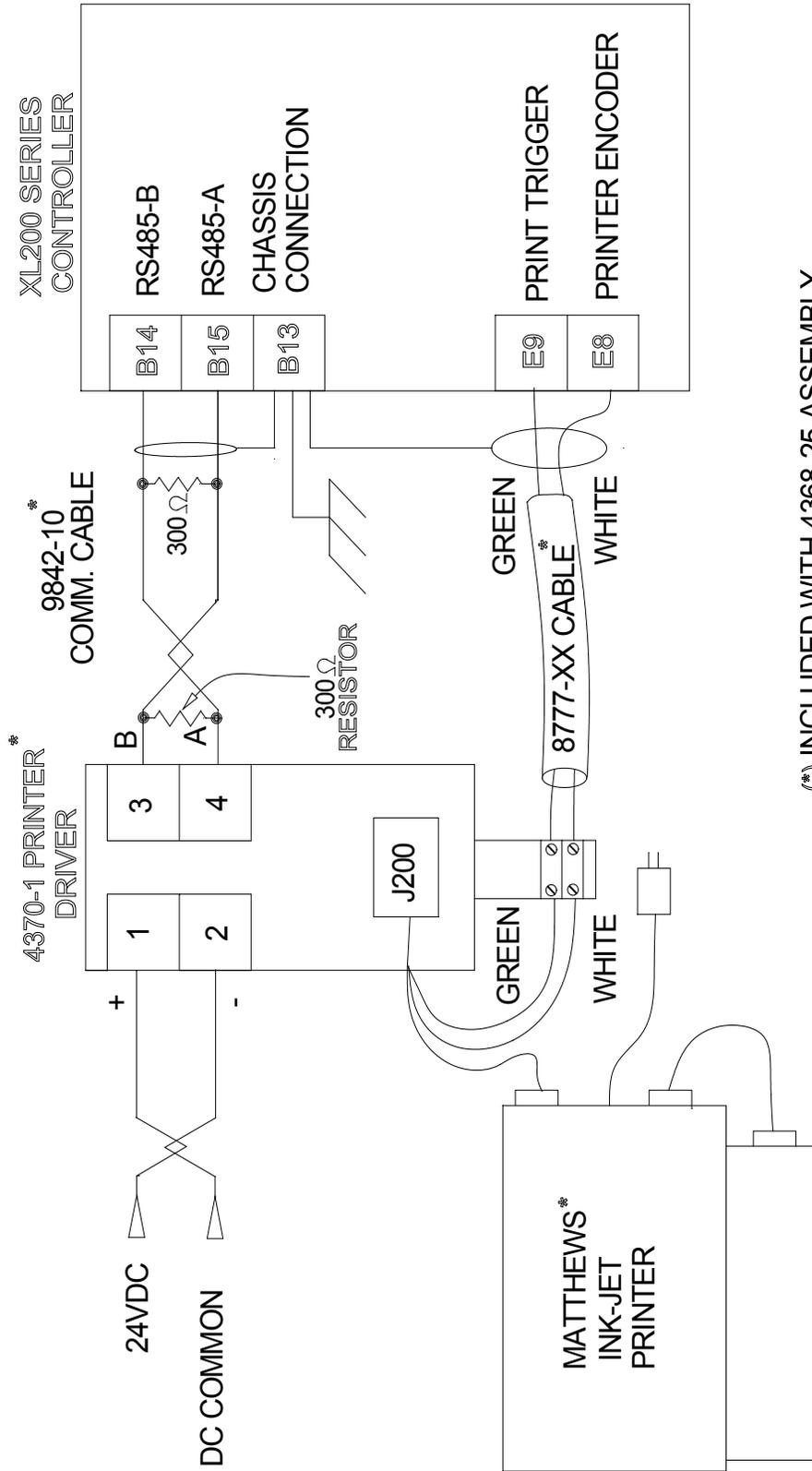
(*) SUPPLIED WITH PRINTER SYSTEM
 ALL ITEMS NOT MARKED WITH (*)
 IS THE SUPPLIED BY CUSTOMER

Figure B-14. PM5100 Printer System Connection Diagram



B

Figure B-15. 5120-"X" Cable for the PM5100 Printer



(*) INCLUDED WITH 4368-25 ASSEMBLY

Figure B-16. Mathew Inkjet Printer Connection Diagram

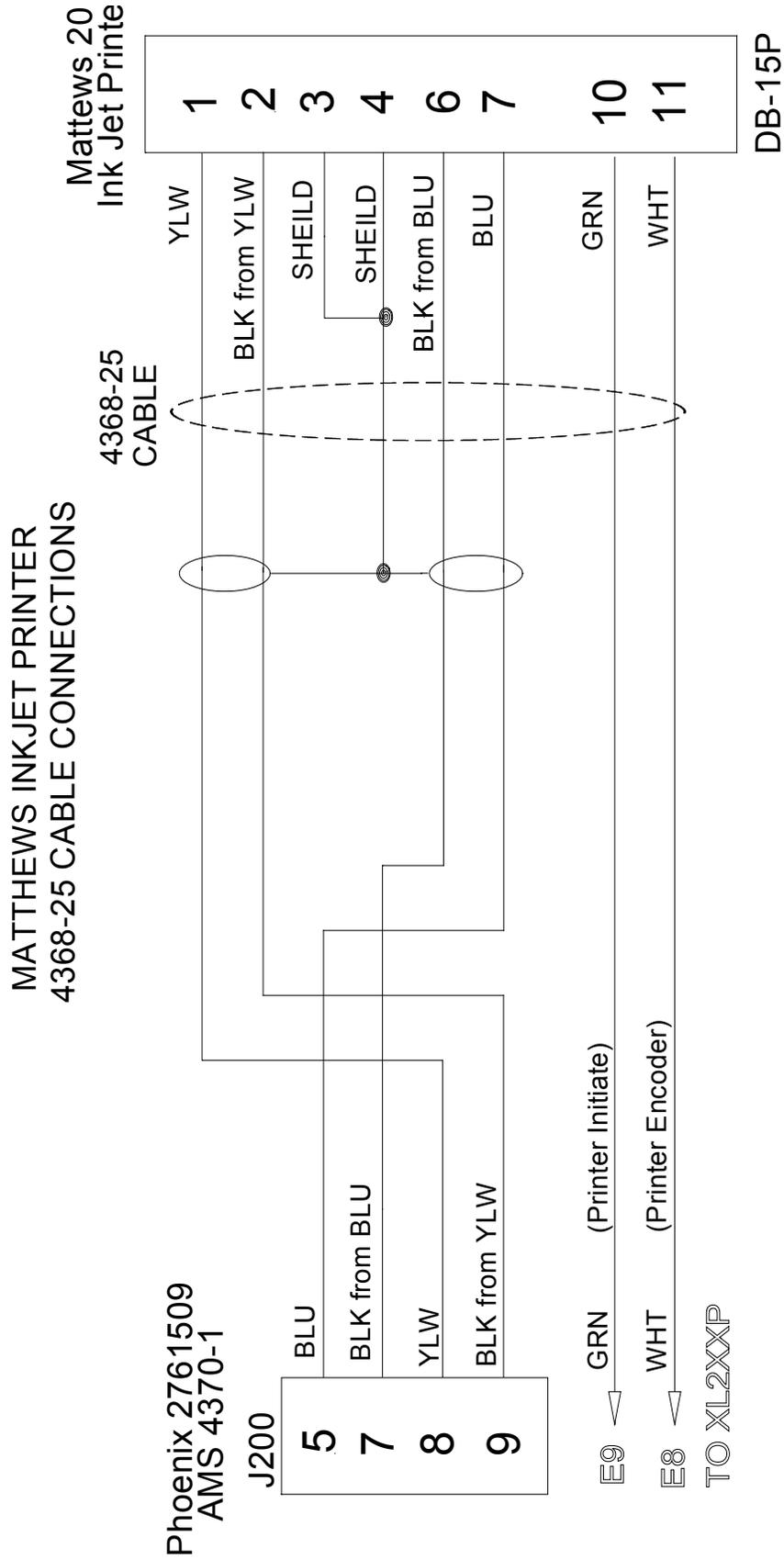


Figure B-17. The 4450 interface cable diagram for the Matthews IJP

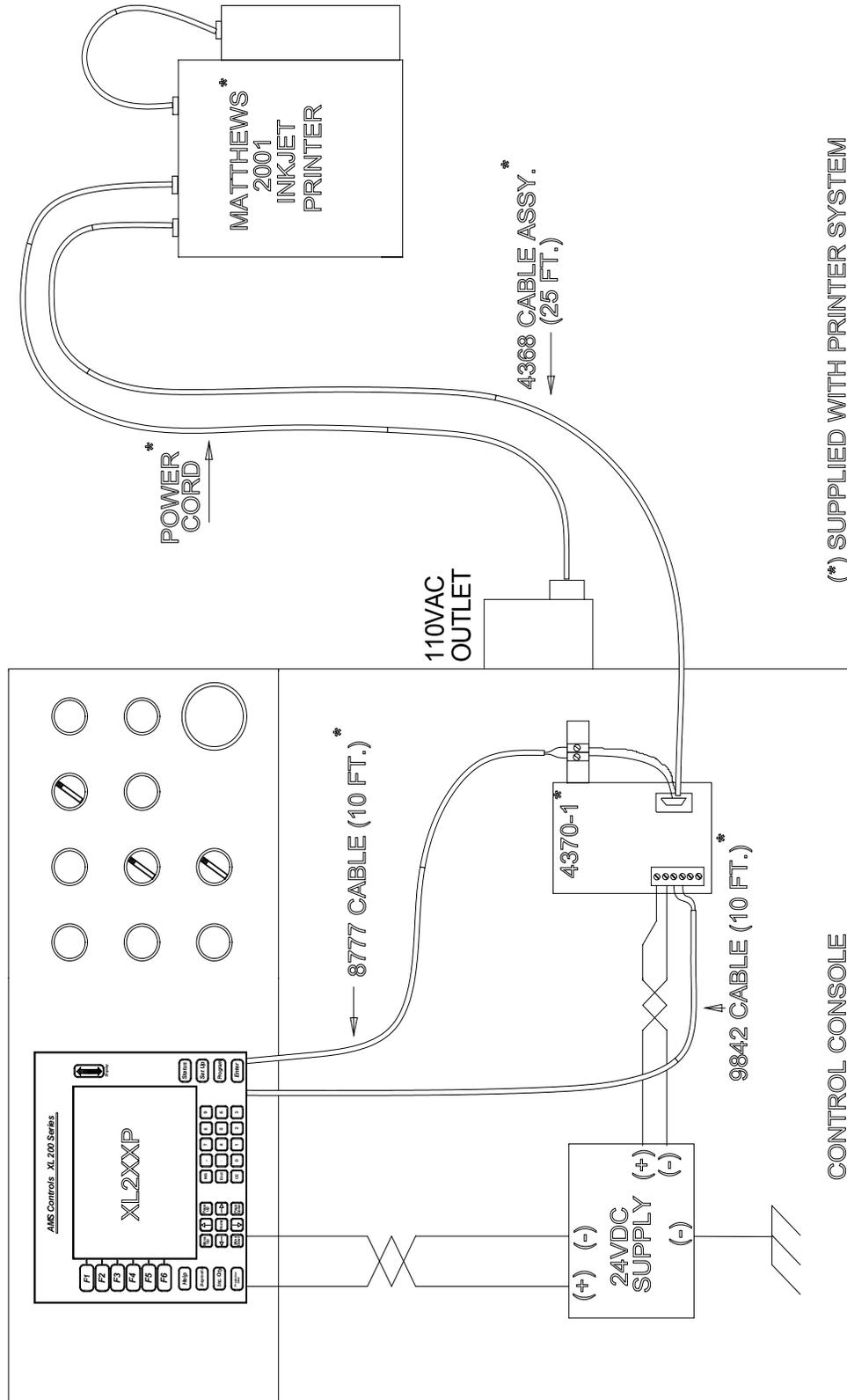


Figure B-18. Matthews Local Installation Diagram (within 10ft)

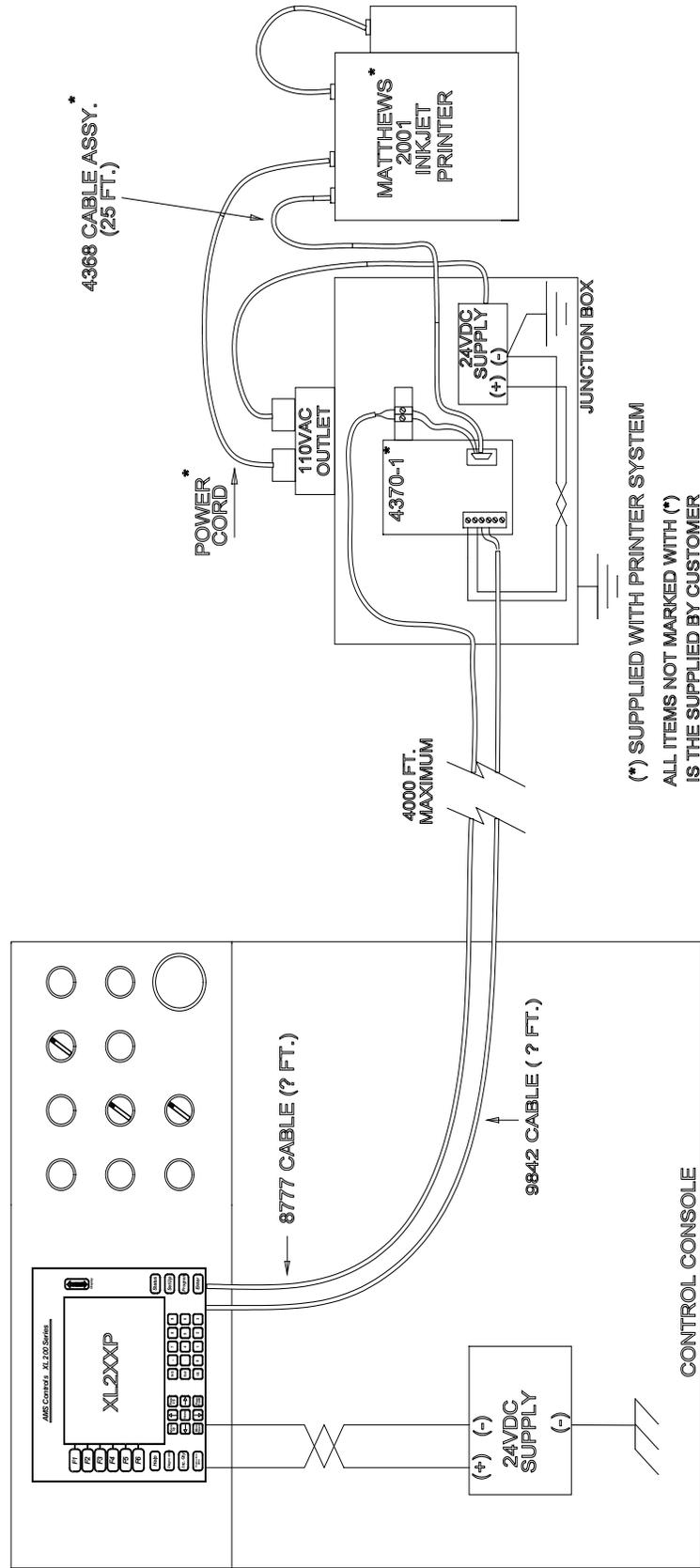
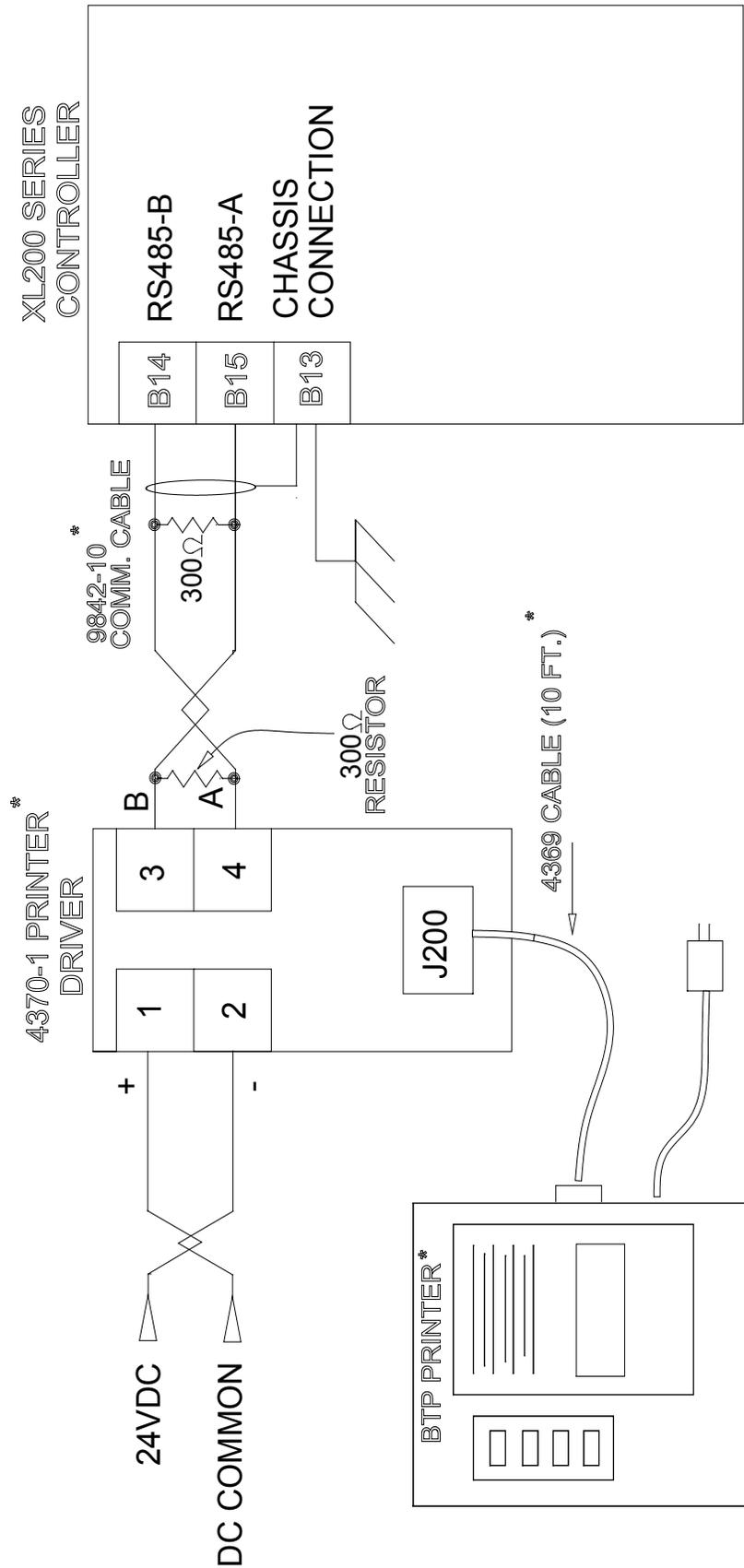


Figure B-19. Matthews Remote Installation Diagram



(*) INCLUDED WITH 4369-25 ASSEMBLY

Figure B-20. Bundle Ticket Connection Diagram (Citch shown)

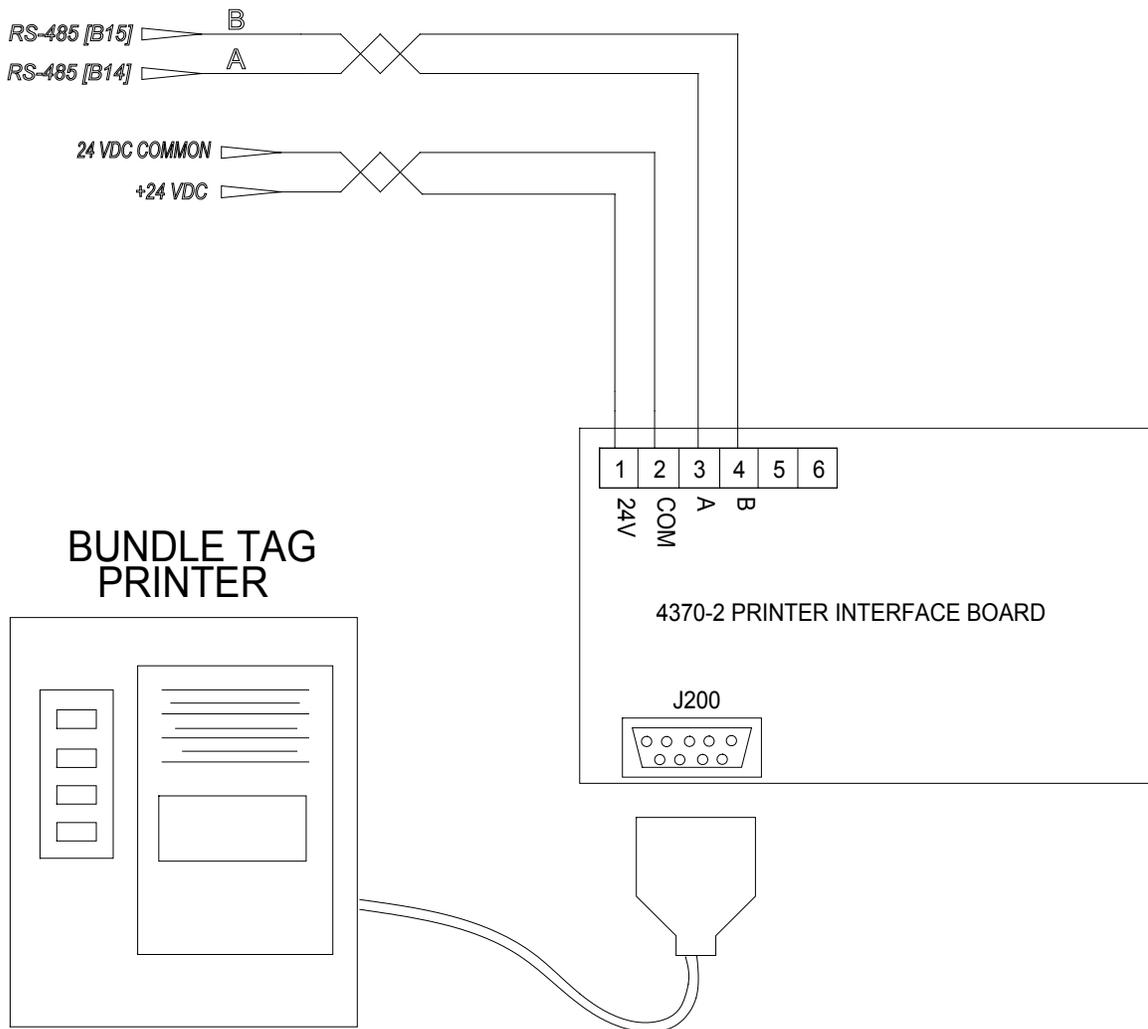


Figure B-21. Simplified Wiring Diagram for a Bundle Tag Printer

B

4369-25 CABLE CONNECTIONS
SHIELD ONLY AT THE DB25P END

To AMS
4370-2 J200

To C.I.TOH PRINTI

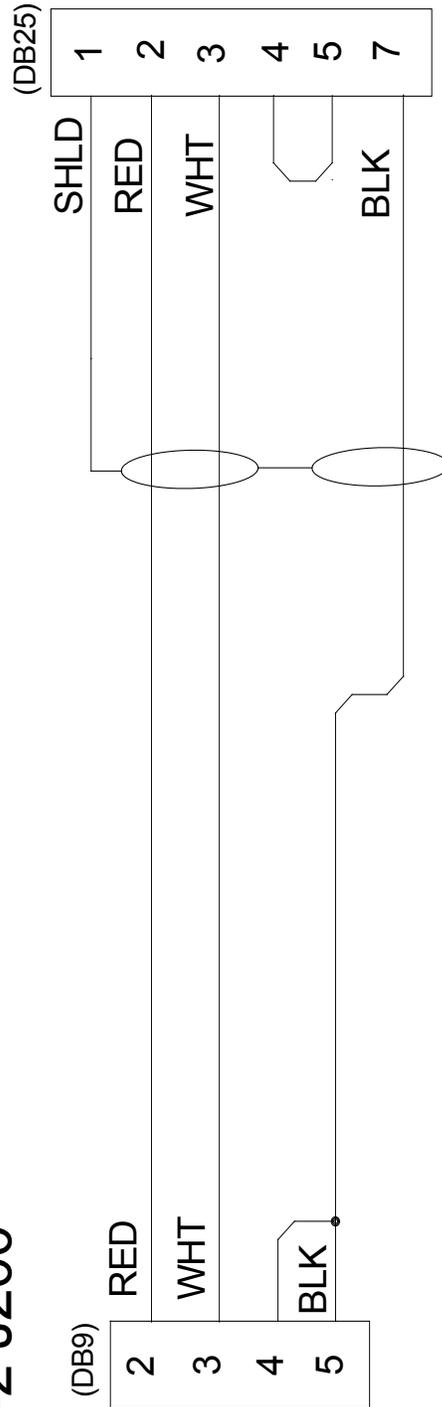


Figure B-22. 4467 Cable Diagram for the CitoH Printer

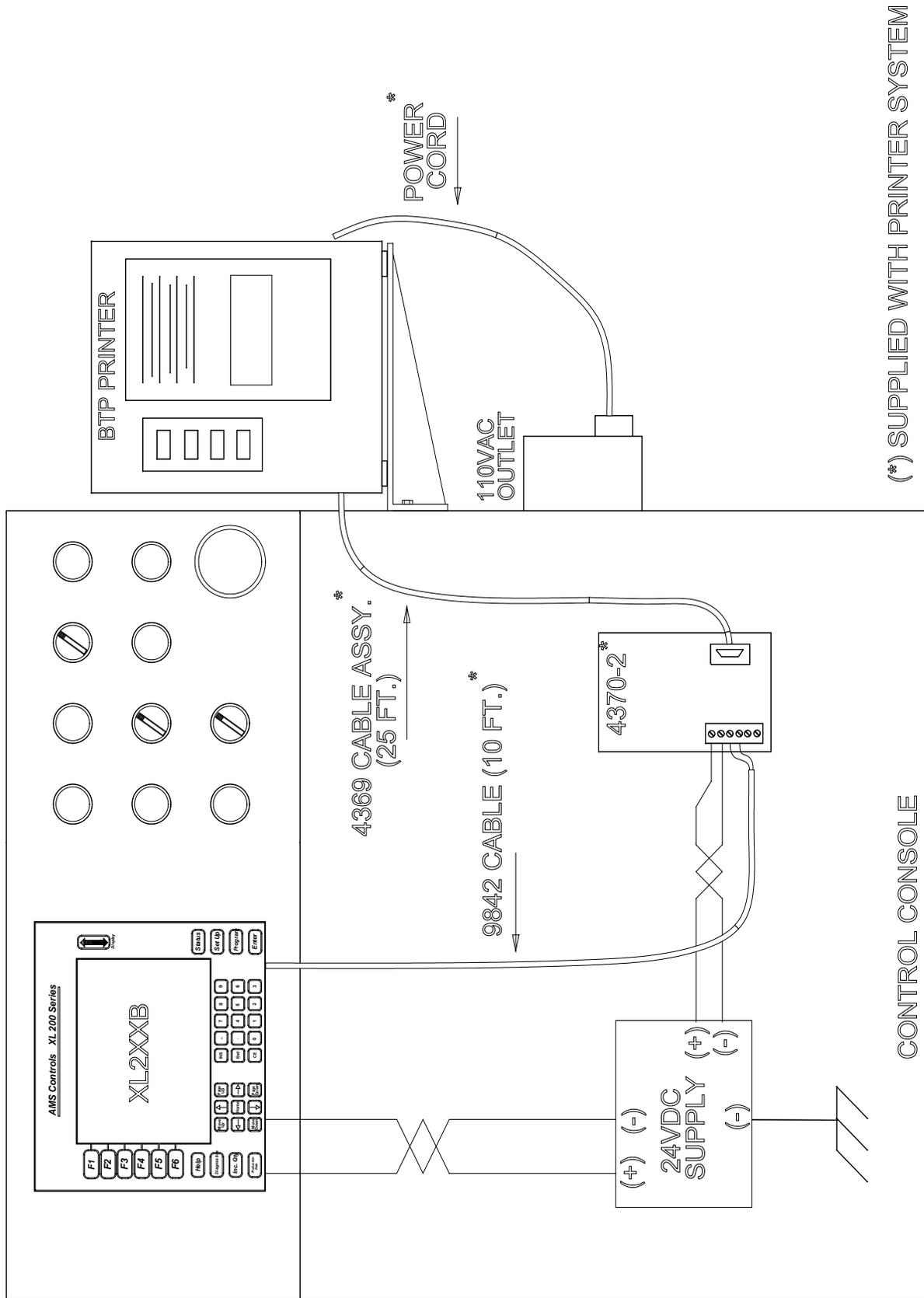


Figure B-23. Wiring Block Diagram for Local BTP Installation

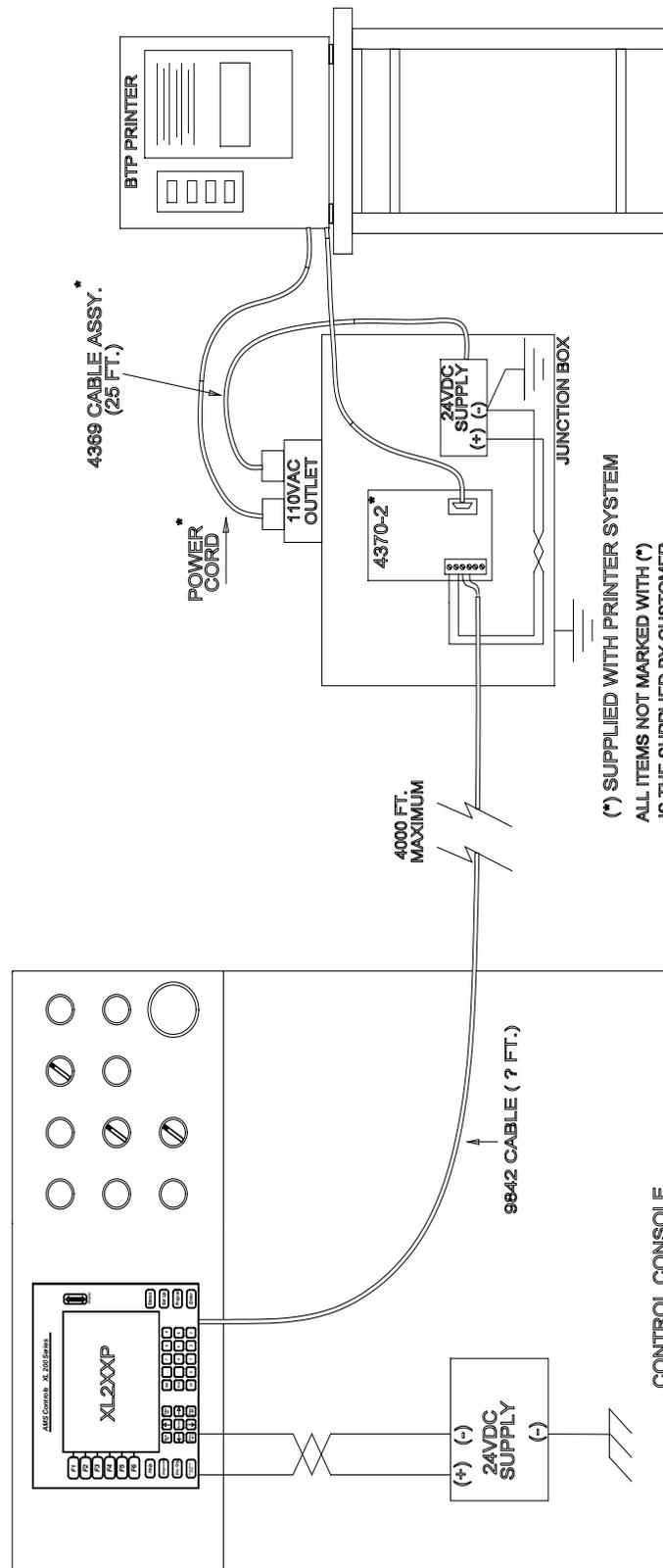


Figure B-24. Wiring Block Diagram for Remote BTP Installation

Updates

Version 1.10 and Prior

No SCN's (**S**oftware **C**hange **N**otices) for version prior to 1.10. All such changes are

already included within manual.

Version 1.11 (9-4-03)

SCN 865: New Material Table

A material table has been included in order to create the ability to use the edge-reference options for the multi-axis machines. Patterns will now be able to reference a y-axis tool by the "+ Edge" or the "- Edge" rather than using strictly the "Center" of the part.

The table includes "Material Code", "Width", "Gauge", "Color", "DateTime" and "Description" fields. Only the Material Code, Width, and Datetime will be initially used for Multi-Axis applications.

When material table will be searched the matching material code to the order being ran after entering the run mode. If a matching material is not found the controller will exit the run mode and prompt the operator for material information.

The "+ Edge" and "- Edge" Y-references are now available when programming patterns. Commands were also added to the diagnostic screen to download and upload material tables.

SCN 874: Error Message while uploading Slave Setups

If attempting to view setups while the XL2XXCL Master was uploading setups from an auxiliary controller, the error message "Setup Locked out by Eclipse...Please Wait" was displayed. The error actually had nothing to do with Eclipse.

The error message was changed to "Setups Temporarily Locked...Please Wait". This message will be displayed when either an auxiliary controller or Eclipse sharing the masters database.

SCN 875: Hydraulic Purge Screen

The hydraulic purge screen for a model XL200CLP included options for "Punch Presses Only" and "Shear and Punch Presses". These options were removed since there was no punch activated.

C

Version 1.12 (9-22-03)

SCN 890: Shear Tool Axis definition

Previously, all press tools other than the shear tool could have a “Y-axis” reference assigned to it for positioning control. The shear tool has now been included as a positionable axis and will also have the ability to have an Axis ID and Y-axis offset.

SCN 892: Controller reset after double-cycle

If a controller’s memory was nearly full and a double-cycle was initiated, the controller could possibly reset. This error was located in the software and corrected.

Version 1.13 (10-21-03)

SCN 913: Unload Queue causing reset

Under certain conditions, the controller could reset if the queue was cleared. This was typically associated to controllers that had large numbers of items and messages in memory. This issue was corrected.

Version 1.14 (11-05-03)

SCN 916: Corrected Barcode Scanner Problem

Corrected a problem when scanning "Text Only" barcodes longer than 6 characters. This caused the controller to appear to lock up.

Version 1.15 (11-26-03)

SCN 861: Increased Viewable limit of production records

The maximum number of production records that could be stored in the controller was 999. This has been expanded to 99999 records. The controller will stop generating production records if 5% or less of record memory is available.

SCN 880: Added barcode capability to the Video Jet Printer

Barcode capability was added to the Video Jet Printer. Barcodes can only be printed in font 16X10 or font 16X24 single line text. See printer documentation for further specifications

SCN 882: New Order Edit Feature

In order to eliminate keystrokes for entering an order, the following changes were made:

The Order tree node will then be expanded and the material code will be selected after an order number is edited. The Order tree node is collapsed after the edit window is closed once the order number is edited.

If the material code is edited; the product code will be selected after the edit window is closed. String may be empty.

If the product code is edited, the items grid will be selected. If there are no items in the order then one empty item will be created automatically.

SCN 887: Material Table Added

In order to allow programming of Y-axis punch locations with “+ Edge” and “- Edge” references, a material table was added. This feature will be used to create an automatic adjustment for roll clearance for the currently loaded material and to allow for material overrides. All multi-axis controller must have a coil loaded in order to be enabled to run.

SCN 888: MP325 added to Multi-Axis drivers

A driver to communicate to a Y-axis positioning MP325 controller was added for multi axis operations. These are connected via an RS485 bus and must have unit ID numbers of 50 or 51. The Unit ID will be programmed into each controller (via dipswitches) and in the axis record as defined in the XL200's axis table found under the “Setup” menu.

SCN 899: Multi-Angle Shear Setup Option

A new setup parameter called “Enable Multi-Axis Shear” was added. This parameter is only available when the controller is configured for multi-axis operation, stopping mode, and the machines material “Y Reference” parameter is configured for “+Edge” or “-Edge”.

Operators will be forced to use coils and the material table. The width of the material entered in the material table must be accurate or the controller will not be able make the calculations required to cut at an angle.

The cutoff is assumed to pivot on the Machine Material Y Reference edge of the part. To program the angle of the cutoff, tool 0 is programmed in the pattern. The x reference should be leading or trailing edge with an x offset of zero. The y reference should be Center+ or Center- with the y offset equaling the angle of the desired cutoff. It is assumed that the shear Axis device will be configured so that 1 inch equals 1 degree of angle. Programming 0 inches will result in a square cut. Programming Center+ 45 inches will result in a positive 45 degree cut. Positive angle cuts results in the opposite side of the cutoff from the pivot point moving in the direction of material flow. The programmed part length is defined to be the distance of the feed on the Machine Material Y Reference edge of the material. The controller will automatically insert scrap feeds in order to prevent the leading edge of one part from overlapping the trailing edge of the previous part.

The operator is free to manually position the cutoff before manually cycling the shear. Referencing the material should be done with the cutoff positioned at 0 degrees. The XL assumes this to be the case. Not following this procedure may result in the first part having a leading edge not cut at the correct angle or having an odd shape.

SCN 900: New Setup Parameter “Clear Queue”

The new parameter labeled “Clear Queue” will determine if the controller will require either a “single shear” or a “double shear” to clear the queue (or target memory). Previously, the controller always required two shears on punching lines and a single shear on cut-only lines.

SCN 901: New Setup Parameter “Velocity Display Unit ID”

The “Velocity Display Unit ID” parameter will appear in the “Operator Preferences” submenu whenever the controller is configured for “Auxiliary Controller Support (slave controller). This parameter will determine if the controller displays the line speed of the XL unit (Unit 0) or displays the line velocity of one of the auxiliary controllers by programming its unit ID number in this parameter. The velocity display will only be correct if a proper ID number is selected (controller with ID 0 to 99). If the auxiliary controllers’ software does not support the display output, a “0” will be displayed in the line speed field.

SCN 903: Length Printing Corrected

A bug was detected if the length printing macro with format, width, and fraction characters were included in the macro. This was noticed when using a Video Jet driver.

SCN 904: Asynchronous Printing Expanded

Asynchronous printing has been added to all print drivers.

SCN 911: Dual Print Drivers for model PM5100 and Video Jet

The PM5100 and Video Jet print drivers had the ability to output to dual drivers added or modified.

SCN 912: QC100L Integration

The QX100 Quality Feedback feature was expanded in its capability. Amongst the improvements are:

- New setup parameters in the “Quality Control” group pertaining to control charts

- New Control Chart menu/window on the production screen

- New setup parameters pertaining to the uploading of SPC data to Eclipse

- Full data upload capability to Eclipse as described in the legacy document

SCN 919: Multi-Axis Enhancements

New features were added for “Multi-Axis” configurations:

Provided a means to specify "Linked Axes." These are tool axes that have the same y-offset and whose ranges of travel overlap. When configuring each axis, the operator can specify an "Opposing Axis ID" and a "Crashable Surface" dimension to indicate that this axis is linked with another. The crashable surface (just like the y-tool offset) should be measured from the designated machine y-reference point.

Provided a means to process multiple y-targets on different axes at the same x-location simultaneously. If two or more axes are on the same press, and each axis has a y-target at the same x-location, an algorithm waits for each axis to be in position before firing the press. This same algorithm prevents crashes between linked axes.

A sorting algorithm was added to sort all y-axis targets in order of increasing value at each given x-location.

SCN 920: Manual Resynchronization of QC100L

The ability was added to manually resynchronize the QC100L data to all XL200 Version 2 software.

In the Production Data screen, when viewing the Capability Study raw data, the operator can now individually select one data sample from the Programmed Length or the Measured Length columns, and press a function key (F5) to delete the selected data value, and shift all other values in that column up by one.

This is intended to be used to resynchronize the Programmed Length values with the Measured Length values reported by the QC100L if for any reason they get out of sync. This function is not allowed while the line is running.

SCN 921: XL200CLT Tube Mill Option

New features were added to configure the controller specifically for use on Tube Mill operations.

SCN 922: Tolerance Mode Edits

The “Warn Only” and “Warn No Cut” modes were removed from the “Tolerance Mode” parameter list of the standard XL200CL controller. These selections will only subsist in the XL200CLT (Tube Mill) models.

Updates

Version 1.14 --- To be Announced.

Troubleshooting

Troubleshooting Experience

The reliability of the **XL200CL VERSION 2 SERIES** controller is superb. Though problems are very few, AMS technical specialists are always ready to help if needed. Combining cutting edge technology and 25 years of experience with all types of length controls and coil processing equipment has enabled us to support our customers with speed and excellence.

Our experience shows that problems are caused by 5 major groups:

- Machine problems (most common)
- Operator mistakes
- Incorrect Setup data
- Cable damage
- Controller fault (least common)

Troubleshooting is just a logical series of steps that lead to the likely cause of a problem. The only tools you need are an accurate scale or steel tape, and perhaps a multi-meter.

This chapter is a “self help guide” for users to assist them in troubleshooting their system. Follow these suggestions in the order listed.

Things to think about,

When did the Problem Start?

Did the machine work properly at one time? If not, have you done the **Calibration** procedure?

If the machine **did** work properly at one time, what has changed since then?

Did the problem start after routine maintenance, electrical panel work, or a material change or after an operator change? Trace back in time to find what is different.

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D

Testing For Input

Warning: “Live Power” testing should only be performed by qualified personnel. Testing voltages can be harmful to the equipment and personnel if not performed properly.

The XL200CL Series controller uses switches, relay contacts, and NPN solid-state devices (such as a proximity switch) to close its inputs to I/O common. See figure D-1. If control common is fed back into the control (input closed), it is seen as an active state and the control will display “ON” for that input on the I/O Screen. As an example, if the RUN input is closed, the control will display “ON” for the RUN input (the controller is given a run command). If the input is open, the display will show the non-active state of “OFF” (no run input is given).

The Sheet Detect Input uses reverse logic. An open condition of the input device is seen as active 1, (material is present) and a closed condition is seen as non-active 0. (There is no material detected by the monitoring device). The limit-switch is to be normally closed.

An ohmmeter can be used to check the operation of an input switch or contact. Determine the input for testing by verifying the proper terminal through the interconnect drawing for the controller in question and verify this input by matching it to the I/O display. With the input device closed, the voltmeter should show nearly zero (0.00) volts between the I/O common and the device input into the control, see figure D-1.

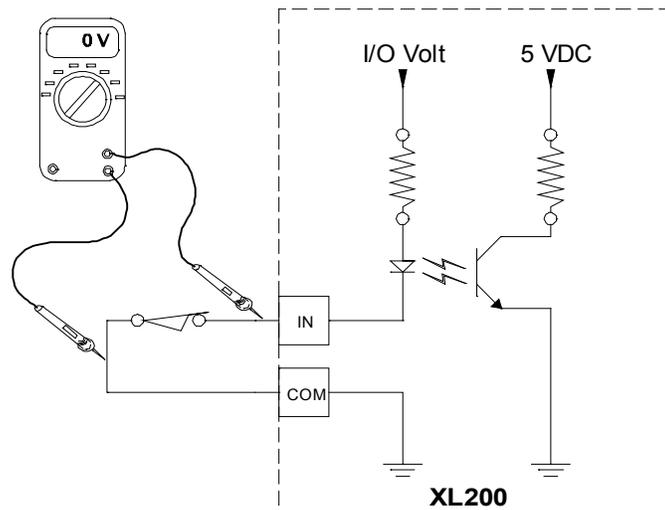


Figure D-1. Closed input shows zero volts on voltmeter

If the voltmeter shows 24VDC (or other allowable I/O voltage level), the input device is either open, defective or a wiring problem exists.

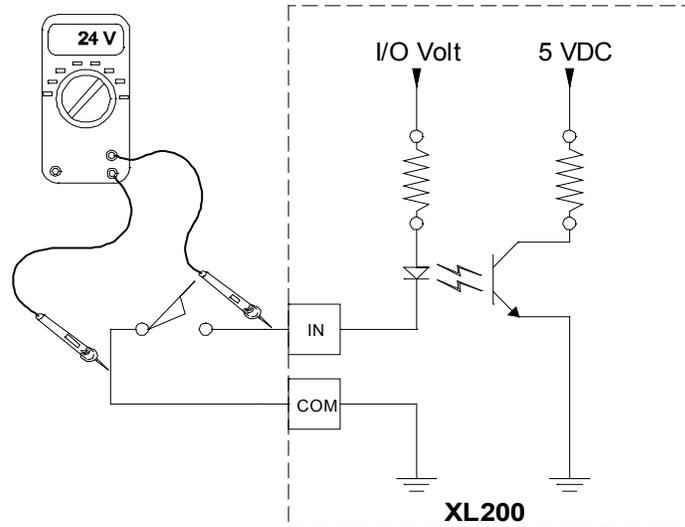


Figure D-2. Input in an “Open” state Displays 24VDC from common

On the I/O display, an input that is turned on shows to be “ON”. An input that is not turned on is shown as “OFF”.

Testing For output

The Input/Output Status Screen also gives indication on what outputs will energize. When the respective output on the display shows “ON”, the control is trying to energize that device to perform a function.

For example, The “Shear Dwell Down” parameter is set to 1 second. The “Shear Down” output display will turn on for a one second period of time at the same time the Shear Down solenoid itself will become energized.

The AMS Control switches common for it’s output (Sinking Output). The simple output circuit is shown in figure D-3. Every output device, such as a coil or relay, has a constant 24 VDC applied to one side of it (if the E-stop circuit hasn’t interrupted it). The XL200CL Series Controller will supply the common (0-vdc) to the opposite lead of the coil to energize the valve or relay.

If the output is turned “ON”, the output lead should read zero volts at the controller output as referenced from the common connection. See Figure D-3.

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Troubleshooting

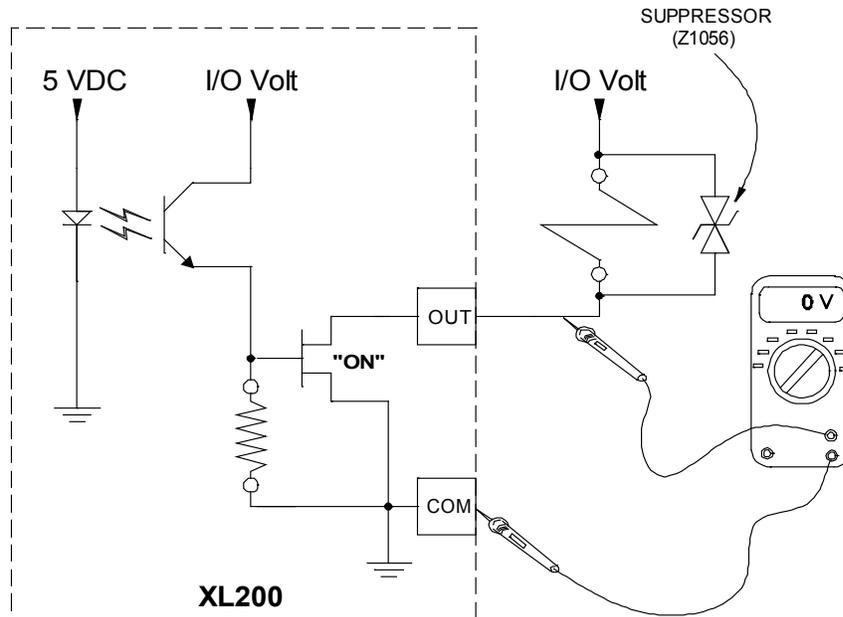


Figure D-3. Output is turned "ON", measures 0v from common

If the output is not turned on, the voltage should "float" at 24VDC when measuring between common and the output (Figure D-4).

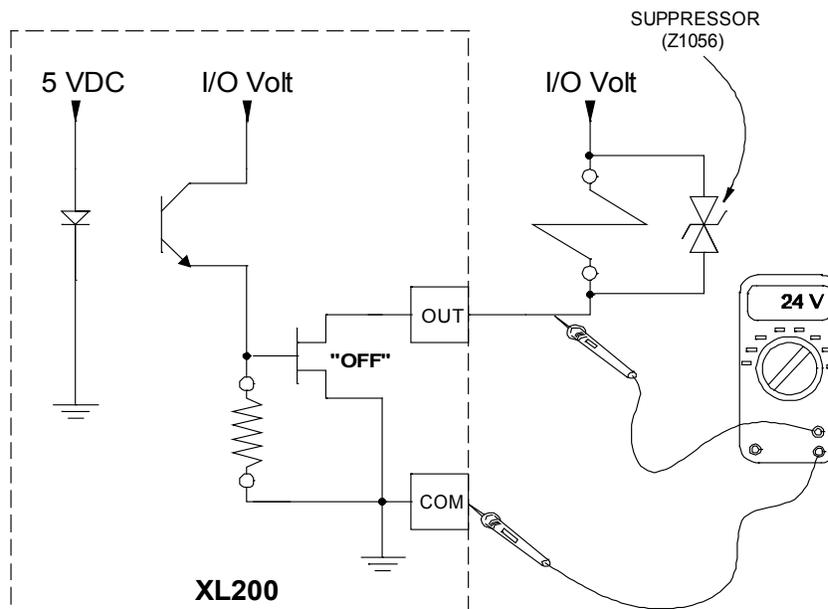


Figure D-4. Output is turned "OFF", measures 24V from common

TROUBLESHOOTING DIE-ACCELERATORS

Closed-Loop die-accelerators share many problems with open-loop systems. The following charts are designed to assist the operator or installer in locating and correcting possible problems. The AMS XL-Series controllers have the added feature of a HELP key; make sure to use this when applicable.

Index of Problems:

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If the problem cannot be solved using the above Troubleshooting charts, Contact AMS Controls Inc. using the information found on the last page of this chapter.

Length Variations (Long and Short Parts)

Faulty Encoder Mounting:

- Is encoder tracking perfectly parallel to the material? Correct as needed.
- Is pressure on the encoder between 7 and 10 lbs. psi? If tension is too tight, shaft will bind and cause incorrect counts. If tension is too light, slippage between the wheel and material may occur.
- Check for a bent encoder shaft or wobble in the wheel. This may not be noticeable when on the material. Free the encoder and wheel and spin it so that a true spin can be verified. Feel for tight spots or binding at the wheel rotates.
- Is a coupler used between the encoder and wheel? Check coupler for good connection. Is wheel in-line with encoder, therefore keeping the coupler straight? Is the coupler tight?
- Is encoder wheel riding on a flat surface of the material? Riding on curved or punched surfaces is not recommended. If riding on curved material is necessary, it may require special hardware or brackets.
- Poor connections or cables going to controller. Repair bad connections or replace bad cables. Isolate cables from high voltage AC wires.

Parameter Settings:

- Minimum die distance may not be large enough. The die may not have had the time to stabilize after accelerating to the line speed. Increase parameter value gradually.
- Shear Reaction may be too large. A large reaction time may cause the press to fire early, even if the die is still accelerating up to line speed. This may cause the die to engage the material before the die reaches line speed or before the die is stable after achieving line speed. Reduce shear reaction gradually.
- Loop Gain is not properly set. Gain should cause the die to “snap” to position. Too small a gain will make the die sluggish. Too large of a gain will cause the die to oscillate or become unstable. Adjust accordingly.
- Lag integral is too small. Too small of a lag integral can cause the die to become unstable as it tracks the target to line speed. Change the lag integral only in small amounts.
- Die Resolution may be incorrect. If the die resolution is incorrect, the die will be traveling at a different velocity than the material.
- The “Settling Time” parameter may not be long enough to allow the die to stabilize at line velocity before firing the press. Increase this parameter to allow more time. This will lengthen the stroke as well.

Backlash in Mechanical System:

- Motor Coupler is slipping or contains backlash. Verify and replace or retighten the coupler.
- Actuator coupler is slipping or contains backlash. Verify proper operation and tighten or replace coupler as needed.
- Gearbox has backlash. Move the input shaft back and forth; output shaft should see little or no delay in motion. Keep in mind that backlash may not be seen when moving by hand, whereas when accelerated by a motor, the backlash may become noticeable. Mark the input and output shafts to verify that no slippage or backlash occurs.
- Actuator device not “tight”. i.e.: Rack separates from pinion due to worn slides on a rack & pinion system, belt vibration or belt slippage on pulleys on a belt-driven actuator, ball-nut or ballscrew wear on a ballscrew actuator system, etc. Correct respective item.\

Electrical Noise:

- Is the analog signal from the controller to the motor drive picking up electrical noise? This can be verified by using an oscilloscope. Make sure the cable is properly shielded and is connected properly.
- Electrical noise may be present on the encoder feedback from the servo drive to the controller.
- The line encoder or the drive signal may have electrical noise on them. This can also be checked with an oscilloscope. Make sure the proper cable is used and that it is properly connected.

Power Supplies:

- I/O power supplies must be connected to a common ground. For instance, a problem may occur if the I/O supply for the AMS controller is floating (not chassis grounded) while the drive system may be grounded. Make sure grounding is properly done.
- Switching supply on a drive can cause electrical interference.
- Power Supply or transformer for the drive is undersized for proper operation. Check voltage levels. Verify with drive manufacturer.

Mechanical Binding:

- Does die stay straight during acceleration and cutoff? Adjust die guides if die is not stable during motion.
- Material misalignment in die can cause binding. Binding or buckling of the material may occur causing die instability and/or causing material vibration which may cause the encoder to skip counts.

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Troubleshooting

- Guide rollers may be faulty. Check rollers for bad bearings or out-of-roundness.
- Gibs may be causing friction due to lack of lubrication, burrs or improper fit to the die. Properly lubricate the gibs and remove foreign substances. Make sure the die flows smoothly throughout its range of motion.
- Bearing tracks may be damaged or are not set straight. Moving the die through its motion range by hand may be the best way to check this. Realign or replace tracks as needed.

Drive System:

- Drive parameters such as gain may not be set properly. The drive has a gain adjustment separate from the controller. There may be several gain adjustments, integrals and other parameters that need to be adjusted in a specific servo drive system. Check your drive manual or call the drive manufacturer or AMS for assistance
- The speed setting (Command Setting) for the drive may not be set high enough for the drive to be controllable at higher line speeds. Slow the line down or increase the speed settings in the drive. This can be verified by placing an oscilloscope on the analog signal from the AMS controller.
- Poor connections or cables going to the drive. Repair connections or replace the cables. Repair bad connections or replace bad cables. Isolate cables from high voltage AC wires.
- Drive system may not be properly sized for the job. Verify with manufacturer.

Cannot Attain Full Speed due to stroke length

Controller Parameters:

- Acceleration may not be high enough to get die up to speed fast enough. Acceleration may be increased at the risk of premature wear and tear on the accelerator. Acceleration should not be set higher than is physically possible by a particular drive system.
- Minimum Die Distance may be too long. The die will waste travel if this parameter is set too large. Be careful, setting this parameter too small could also cause the press to cycle before the die is up-to-speed, therefore causing material damage.
- The Shear Reaction parameter may need to be increased. The larger the Shear Reaction is set to, the earlier in the travel the die will cycle the press, thereby shortening the overall stroke. Caution is required as making the Shear Reaction too large may cause the press to fire too early, thereby causing the die to engage the material before the die reaches target speed and causing damage to the material.
- The “Settling Time” parameter may be too long. This is typically used to allow for the die to stabilize at line velocity. If the time allowed is too long the overall stroke may increase enough to not allow the line to run at full potential speed.

Drive Settings:

- Speed Setting on drive system may not be set to run at full-expected speed range. Verify by attaching an oscilloscope to the analog output of the controller. The output should never go over +/- 10 volts. If so, adjust the Speed Setting on the drive.
- Internal drive settings may limit the RPM (Revolutions per minute) of the motor. Check your drive manual for proper settings.
- The Current settings on the drive may be set too low to allow proper operation. Check the present settings and increase if needed.

Mechanical Limitations:

- The cycle time for the press may be too long to allow for the full cycle to be completed before the die travel limit is exhausted. Speed up the actuation of the press by: increasing air or hydraulic pressure; speeding up the mechanical cam; improving performance of the brake/clutch; firing the trigger device with a power drive module.
- **(Hydraulic systems)** Hydraulic pressure may be depleted at the higher speeds. Different cylinders or hydraulic pumps may be required.

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Troubleshooting

- The mechanical gearing may not be adjusted to run at the higher speed. Check with supplier of actuator to verify limits. If system will not achieve full speed, different gearing or a higher speed motor may be needed.
- Motor RPM may not be high enough to attain full speed. Check with supplier to verify top RPM and calculate highest speed possible. If RPM is not enough, a different motor or gearing may be needed.

Drive Errors/Instability (Still or Jogging)

Controller Parameters:

- Have the directional settings of feedback been set properly on the AMS controller. This is set through the “Type Setting” switches. Check in Chapter 4 of the controller manual for particular switch setting descriptions.
- Is the “Die Resolution” correct? The Die Resolution must be set properly. The “Resolution” parameter should equal the distance the die moves per feedback count from the encoder.
- Loop Gain is not properly set. Gain should cause the die to “snap” to position. Too small a gain will make the die sluggish. Too large of a gain will cause the die to oscillate or become unstable. Adjust accordingly. If this parameter is too high, the die may oscillate or become unstable.
- Is the “Derivative” too small? This is a parameter typically used for slow-to-respond hydraulic systems. As this parameter gets smaller, the controller will give the analog output a larger “kick” to get the die into motion. On systems other than hydraulic, this parameter should be set to 0.0 (off).
- Is the “Offset volts” unstable? This should be a small number less than .10 volt. If this number fluctuates, check the offset Integral. The Integral controls how quickly the controller corrects for die position. The Offset Integral is typically set to 100 seconds.
- Check the drive tuning parameters for proper settings. **Internal “Acceleration” ramps must be turned off on the drive system.** The AMS controller handles this. Other parameters should also be checked.
- On the motor drive system; “Analog Input Type Selection” should be set to bipolar +/- 10-volt analog (differential analog input).
- Simulated encoder output should be set to the corresponding number of counts as set in the AMS controller.
- Other parameters such as speed gain, speed command voltage, current gain and others should be tuned to work as desired. See the manufacturers manual for details.

Electrical Noise:

- Is the analog signal from the controller to the motor drive picking up electrical noise? This can be verified by using an oscilloscope. Make sure the cable is properly shielded and is connected properly.
- Electrical noise may be present on the encoder feedback from the servo drive to the controller.

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Troubleshooting

- The line encoder or the drive signal may have electrical noise on them. This can also be checked with an oscilloscope. Make sure the proper cable is used and that it is properly connected.
- Is signal wiring routed close to the motor drive or other sources of EMI? Reroute cables as needed.
- Is the AMS controller and the drive unit properly grounded? Correct for any grounding errors.

Mechanical Binding:

- If the die is bound in its location, any attempt to control it may result in drive errors or instability in the die itself. Verify that the die free to move as designed.

Drive Errors/Instability (Running or Die Testing)

Controller Parameters:

- Have the directional settings of feedback been set properly on the AMS controller. This is set through the “Type Setting” switches. Check in Chapter 4 of the controller manual for particular switch setting descriptions.
- Is the “Die Resolution” correct? The Die Resolution must be set properly. The “Resolution” parameter should equal the distance the die moves per count from the encoder.
- Loop Gain is not properly set. Gain should cause the die to “snap” to position. Too small a gain will make the die sluggish. Too large of a gain will cause the die to oscillate or become unstable. Adjust accordingly. If this parameter is too high, the die may oscillate or become unstable.
- Is the “Derivative” too small? This is a parameter typically used for slow-to-respond hydraulic systems. As this parameter gets smaller, the controller will give the analog output a larger “kick” to get the die into motion. On systems other than hydraulic, this parameter should be set to 0.0 (off).
- Is the “Lag Integral” parameter too large or not stable? If not stable, check the “Lag Integral”. This should not be smaller than .10 seconds and will typically be between .2 and 2.0seconds. If the “Lag Offset” parameter is too large (.2 seconds or more), then there may be friction causing the lag to occur.

Drive Parameters:

- Check the drive tuning parameters for proper settings. **Internal “Acceleration” ramps must be turned off on the drive system.** The AMS controller handles this. Other parameters should also be checked.
- “Analog Input Type Selection” should be set to bipolar +/- 10-volt analog (differential analog input).
- Simulated encoder output should be set to the corresponding number of counts as set in the AMS controller.
- Other parameters such as speed gain, speed command voltage, current gain and others should be tuned to work as desired. See the manufacturers manual for details.
- Faulty Motor Drive. Check with manufacturer for verification.

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Mechanical Binding:

- Does die stay straight during acceleration and cutoff? Adjust die guides if die is not stable during motion.
- Material misalignment in die can cause binding. Binding or buckling of the material may occur causing die instability and/or causing material vibration which may cause the encoder to skip counts.
- Guide rollers may be faulty. Check rollers for bad bearings or out-of-roundness.
- Gibs may be causing friction due to lack of lubrication, burrs or improper fit to the die. Properly lubricate the gibs and remove foreign substances. Make sure the die flows smoothly throughout its range of motion.
- Bearing tracks may be damaged or are not set straight. Moving the die through its motion range by hand may be the best way to check this. Realign or replace tracks as needed.
- Die may oscillate due to the actuating device being connected away from the center of the die mass (i.e.: top loaded). Use low accelerations.

Connections and Cables:

- Is feedback cable (resolver or encoder) from the motor to the drive in good condition? Check connections and cable continuity. Is shield wire properly connected?
- Is simulated encoder feedback cable from drive to the AMS controller in good shape? Check all connections and cable continuity. Is shield wire properly connected?
- Is analog signal cable properly connected and in good condition? Is shield wire properly connected?
- Check all connections to the drive and to the AMS controller

Electrical Noise:

- Is all signal wiring properly shielded? Correct any shielding errors.
- Is signal wiring routed close to the motor drive or other sources of EMI? Reroute cables as needed.
- Is the AMS controller and the drive unit properly grounded? Correct for any grounding errors.

Material Buckling or Other Deformity

Controller Parameters:

- Is the “Shear Dwell Up” parameter long enough? This parameter forces the die to continue at full line speed after making the cut in order for the cutoff blade to retract back out of the material. After the “Up” time expires, the die begins to slow down to make its return to the home position.
- Is the “Die Resolution” correct? The Die Resolution must be set properly. The “Die Resolution” parameter should equal the distance the die moves per feedback count from the motor encoder.
- Is the “Line Resolution” correct? The Line Resolution must be set properly in order for the die to track the target correctly. The “Line Resolution” parameter should equal the distance the material moves per count from the encoder.
- Is the “Loop Gain” parameter too high or too low? If this parameter is too high, the die may oscillate or become unstable, therefore damaging the material. If it is too low, it may not respond quickly enough to changes in the line speed, also damaging the material.
- The “Minimum Die Distance” parameter may be too short. The die may be cutting in the acceleration ramp or at the knee of the ramp.
- Shear Reaction may be too large. A large reaction time may cause the press to fire early, even if the die is still accelerating up to line speed. This may cause the die to engage the material before the die reaches line speed or before the die is stable after achieving line speed. Reduce shear reaction gradually.

Faulty Feedback from Die Encoder or Line Encoder

- Is *line encoder* tracking perfectly parallel to the material? Correct as needed.
- Is pressure on the *line encoder* between 7 and 10 lbs. Psi? If tension is too tight, shaft will bind and cause incorrect counts. If tension is too light, slippage between the wheel and material may occur. This could cause jumping in the die itself as the die attempts to mirror what the material is doing.
- Check for a bent shaft on the *line encoder* or wobble in the encoder wheel. Fluctuations could make tracking the material with the die very difficult. The wobble may not be noticeable when on the material. Free the encoder wheel and spin it so that a true spin can be verified.
- Is a coupler used between the encoder and wheel? Check coupler for good connection. Is wheel in-line with encoder, therefore keeping the coupler straight? Is the coupler tight?

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Troubleshooting

- Is encoder wheel riding on a flat surface of the material? Riding on curved or punched surfaces is not recommended. If riding on curved material is necessary, it may require special hardware or brackets.
- Check for poor connections or cables from either feedback device going to controller or to the drive. Repair bad connections or replace bad cables.
- Check the coupling mechanism for the *die encoder*. This may be an encoder or resolver attached to the motor.

Drive System:

- Is drive current fluctuating? Adjustments to the drive may be needed to stabilize the actuator motor.
- Check the drive “Gain” parameters. If this parameter is too high, the die may oscillate or become unstable, therefore damaging the material. If it is too low, it may not respond quickly enough to changes in the line speed, also causing damage.
- The speed setting for the drive may not be set high enough for the drive to be controllable at higher line speeds.
- The speed setting (Command Setting) for the drive may not be set high enough for the drive to be controllable at higher line speeds. Slow the line down or increase the speed settings in the drive. This can be verified by placing an oscilloscope on the analog signal from the AMS controller.
- Poor connections or cables going to the drive. Repair connections or replace the cables. Repair bad connections or replace bad cables. Isolate cables from high voltage AC wires.
- Drive system may not be properly sized for the job. Verify with manufacturer

Electrical Noise:

- Controller or drive is not properly grounded. Check against recommended grounding.
- Analog signal is picking up electrical noise. This can be verified by using an oscilloscope. Make sure the cable is properly shielded and is connected right.
- Electrical noise may be present on the encoder feedback from the servo drive to the controller.
- The line encoder or the drive signal may have electrical noise on them. This can also be checked with an oscilloscope. Make sure the proper cable is used and that it is properly connected.

Mechanical Fault in Press or Material Feeding Device:

- The cutoff die or shearing blade may be dull or not aligned properly in order for it to make a clean cut. Correct for any die or blade problems.
- Can the die “twist” within its guides? If the die can change angles while being pushed forward, the cut on the material can be affected. Tighten the guide device(s) to hold the position.
- Backlash in the actuating device can result in poor die performance. Backlash can come from separation or damage within gearboxes, rack & pinions, couplers and loose belts.
- Excessive friction can cause instability in the die. Verify that the die has a consistent travel throughout the cycle. Excessive friction can be caused lack of lubrication, burrs, misalignment or foreign objects. Correct any drag that may be present.
- The material feeding device (often a roll mill or roll feeder) may excessively fluctuate in speed, thereby causing fluctuations in the material that the die cannot keep up with. Check the speed indicator on the AMS controller. If speed fluctuation exists, make the appropriate corrections to insure a consistent feed.

Inconsistent Shearing Action

Shear Complete Circuit:

- If using a mechanical press, a “Shear Complete” switch will need to be used. The complete switch insures that a full cycle is performed and that the die is returned to top-dead-center (TDC). The complete switch is also useful on pneumatic and hydraulic presses in order to keep them cutting completely as the size and gauge of the material changes.
- Is the shear complete switch at the proper location and properly mounted? It may need to be placed differently in order to the press to be consistent and complete.

Press Inconsistencies:

- Is the driving force of the press stable and consistent? For instance, the Air pressure on the air press must stay constant from one cycle to the next. Moisture in the airline could adversely affect the stroke.
- Hydraulic pressure will likewise need to be consistent on hydraulic-type presses. Is the hydraulics for the press being shared with other devices that may drain off varying amounts of pressure? Sharing the same supply may cause fluctuations in available pressure, therefore causing inconsistent operation.
- If using a mechanical press, does the cam lose speed from one hit to the next? The line may need to be slowed down in order for the press to hit consistently.
- If using a clutch/brake device to trigger the press cycle, are both of the devices working properly. A slow acting clutch or brake has greater potential for inconsistency. Repair or replace any faulty hardware.
- Is there any type of binding within the press as it is cycled? Perhaps the press is undersized for the cut or press operation that is required.

Consistently Long or Short lengths

Controller Parameters:

- Are the "Shear Dwell Down" and the "Shear Dwell Up" parameters long enough? If the Shear Dwell parameters are not set properly, the press may not fire fully.
- Is a Shear Kerf programmed? If a kerf (slug of metal) is removed during the cutoff, the same amount must be programmed into the Shear Kerf parameter. Check parameter and program shear kerf as needed.
- Is the Line Resolution parameter properly set? If the resolution is not right, the lengths will reflect that in a consistently long or short manner. The correction factor may compensate for errors in the resolution up to a degree.

Calibration:

- Has the "Correction Factor" been properly adjusted? Changes in the encoder wheel diameter or in how the wheel rides on the material can affect the length, but usually in a consistently short or long manner. Set the correction factor manually, or use the Calibrate Trim feature found in the AMS controller setup menu.

Operational Error:

- Check measuring device for accuracy. Steel tapes may vary from one tape to another. Temperature also affects linear measuring systems. Check all measuring devices against a standard.
- Make sure that a measuring tape is aligned true to the material. Angling the tape even a small degree across the material may show a sizable error.

Controller Lockup, Memory Loss or Task Errors

Any processor-based system has a potential to get corrupted memory. Memory can cause the controller to display a Task Error or even cause the controller to “lock up”. In these cases, clearing memory can help solve the problem. Make sure that all parameters, tool data, and calibration information has been written down previously. Turn off power to the controller, then press and hold the “5” key down and turn on the power while holding the 5 key. Maintain this state for a few seconds, then release the key and allow the controller to power up normally. All parameters will have to be re-entered as well as any job information.

Power Supplies and Grounding:

- Are power supplies at the proper levels? Check with a voltage meter or oscilloscope. Each should be within its specified tolerance of operation.
- Are the power supplies properly grounded? The I/O voltage for the controller should be connected to earth ground.
- Is the AC supply properly filtered or isolated?
- Is the AMS controller properly grounded to earth ground? The “shield” terminal or the mounting bolts on the controller can be directly connected to the grounding block or ground rod connection for this purpose.
- Is the drive system properly grounded? Most drives have a ground terminal for both the incoming power ground and the earth ground.

Noise Suppression:

- Is noise suppression used on all output devices? If not, install appropriate suppression on all unprotected devices, especially higher wattage devices such as contactors and solenoids (valves).
- Is a UPS system or other device being used to isolate and protect this system? Install one if necessary.

Wiring and Wiring Methods:

- Is the appropriate wiring and cabling being used? Many signal inputs and outputs require properly shielded cabling.
- Are the shields on the shielded cabling properly attached? Unattached or improperly attached shields offer little or no noise protection. Unattached or incorrectly attached shields may actually worsen noise problems.
- Is small voltage and signal wiring ran alongside with higher voltage wiring through conduit, wire troughs, or cabinets? Doing so may induce electrical noise from the high voltage carriers to the more

sensitive signal wires. Separate and bundle these wires from each other.

- Check for damaged or cut cables and wiring. These can short or arc to ground. Also, Check for poor connections, especially from the power supplies and signal wiring.
- Is the AMS controller powered up separately from the rest of the machine? The controller should have its own power switch. This enables the control to be powered up after the machine is powered up, and to be powered down before the machine is powered down.

Drops out of Run Mode

Controller Parameters:

- Check the parameter “Halt Mode” in the controller setup list. Is this set in the manner that is desired?
- Is the “Delay after Shear” output being used? If so, the “Forward” output of the controller will turn off for the programmed amount of delay after every shear cycle. The “Run” output may need to be used instead to latch in the run circuit.

Faulty Run Circuit:

- Is there an over travel switch or E-stop pushbutton on the press? If so, these items often have normally-closed contacts. These contacts may open up during vibration that could be caused by the press cycling. Replace “loose” switches with new ones or protect them from excessive shock and vibration.
- Are there conditional contacts or overloads in the run circuit that require certain items to be operating before the run mode can be entered? These items may be opening the circuit during operation.

Operational Error:

- No jobs were set to “Next”. Select a job and set it to “Next”.
- No more parts are left to run. Items remaining on screen show status of “Done”. More parts will need to be programmed before the machine will run again.

TROUBLESHOOTING FEEDERS

Closed-Loop Feed to stop machines share many problems with open-loop systems. The following charts are designed to assist the operator or installer in locating and correcting possible problems. The AMS XL-Series controllers have the added feature of a HELP key; make sure to use this when possible.

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If the problem cannot be solved using the above Troubleshooting charts, call AMS controls using the number on the last page of this manual.

D

Length Variations (Long and Short Parts)

Faulty Encoder Mounting:

- Is encoder tracking perfectly parallel to the material? Correct as needed.
- Is pressure on the encoder between 7 and 10 lbs. psi? If tension is too tight, shaft will bind and cause incorrect counts. If tension is too light, slippage between the wheel and material may occur.
- Check for a bent encoder shaft or wobble in the wheel. This may not be noticeable when on the material. Free the encoder and wheel and spin it so that a true spin can be verified. Feel for tight spots or binding at the wheel rotates.
- Is a coupler used between the encoder and wheel? Check coupler for good connection. Is wheel in-line with encoder, therefore keeping the coupler straight? Is the coupler tight?
- Is encoder wheel riding on a flat surface of the material? Riding on curved or punched surfaces is not recommended. If riding on curved material is necessary, it may require special hardware or brackets.
- Poor connections or cables going to controller. Repair bad connections or replace bad cables. Isolate cables from high voltage AC wires.

Parameter Settings:

- Loop Gain is not properly set. Gain should cause the die to “snap” to position. Too small a gain will make the die sluggish. Too large of a gain will cause the die to oscillate or become unstable. Adjust accordingly.
- Tolerance may be set too high. Set the tolerance to the required specifications for the part being produced.

Backlash in Mechanical System:

- Motor Coupler is slipping or contains backlash. Verify and replace or retighten the coupler.
- Gearbox has backlash. Move the input shaft back and forth; output shaft should see little or no delay in motion. Keep in mind that backlash may not be seen when moving by hand, whereas when accelerated by a motor, the backlash may become noticeable. Mark the input and output shafts to verify that no slippage or backlash occurs.
- Feed rolls are slipping or contains backlash. Tighten rolls so that slippage is eliminated or reduced.

Electrical Noise:

- Is the analog signal from the controller to the motor drive picking up electrical noise? This can be verified by using an oscilloscope. Make sure the cable is properly shielded and is connected properly. Electrical noise may be present on the encoder feedback from the servo drive to the controller.
- The line encoder or the drive signal may have electrical noise on them. This can also be checked with an oscilloscope. Make sure the proper cable is used and that it is properly connected.

Power Supplies:

- I/O power supplies must be connected to a common ground. For instance, a problem may occur if the I/O supply for the AMS controller is floating (not chassis grounded) while the drive system may be grounded. Make sure grounding is properly done.
- Switching supply on a drive can cause electrical interference.
- Power Supply or transformer for the drive is undersized for proper operation. Check voltage levels. Verify with drive manufacturer.

Mechanical Binding:

- Does material stay straight during motion? If the material does not feed straight, it is likely to drag on guides or hang-up on the machinery. Guide rollers may be out of alignment. Check rollers for bad bearings or out-of-roundness.
- Material misalignment in die can cause binding. Binding or buckling of the material may occur causing die instability and/or causing material vibration, which may cause the line encoder to skip counts or the feed rolls to slip.

Drive System:

- Drive parameters such as gain may not be set properly. The drive has a gain adjustment separate from the controller. There may be several gain adjustments, integrals and other parameters that need to be adjusted in a specific servo drive system. Check your drive manual or call the drive manufacturer or AMS for assistance
- The speed setting (Command Setting) for the drive may not be set high enough for the drive to be controllable at higher line speeds. Slow the line down or increase the speed settings in the drive. This can be verified by placing an oscilloscope on the analog signal from the AMS controller.

D

Troubleshooting

- Poor connections or cables going to the drive. Repair connections or replace the cables. Repair bad connections or replace bad cables. Isolate cables from high voltage AC wires.
- Drive system may not be properly sized for the job. Verify with manufacturer.

Drive Errors or Instability (Still or Jogging)

Controller Parameters:

- Have the directional settings of feedback been set properly on the AMS controller. This is set through the “Type Setting” switches. Check in Chapter 4 of the controller manual for particular switch setting descriptions.
- Is the “Motor Resolution” correct? The Motor Resolution must be set properly. The “Resolution” parameter should equal the distance the material moves per count from the motor encoder.
- Loop Gain is not properly set. Gain should cause the die to “snap” to position. Too small a gain will make the die sluggish. Too large of a gain will cause the die to oscillate or become unstable. Adjust accordingly. If this parameter is too high, the die may oscillate or become unstable.
- Is the “Derivative” too small? This is a parameter typically used for slow-to-respond hydraulic systems. As this parameter gets smaller, the controller will give the analog output a larger “kick” to get the motor into motion. On systems other than hydraulic, this parameter should be set to 0.0 (off).
- Is the “Offset volts” unstable? This should be a small number less than .10 volt. If this number fluctuates, check the offset Integral. The Integral controls how quickly the controller corrects for die position. The Offset Integral is typically set to 100 seconds.
- Check the drive tuning parameters for proper settings. **Internal “Acceleration” ramps must be turned off on the drive system.** The AMS controller handles this. Other parameters should also be checked.
- On the motor drive system; “Analog Input Type Selection” should be set to bipolar +/- 10-volt analog (differential analog input).
- Simulated encoder output should be set to the corresponding number of counts as set in the AMS controller.
- Other parameters such as speed gain, speed command voltage, current gain and others should be tuned to work as desired. See the manufacturers manual for details.

Electrical Noise:

- Is the analog signal from the controller to the motor drive picking up electrical noise? This can be verified by using an oscilloscope. Make sure the cable is properly shielded and is connected properly.
- Electrical noise may be present on the encoder feedback from the servo drive to the controller.

D

Troubleshooting

- The line encoder or the drive signal may have electrical noise on them. This can also be checked with an oscilloscope. Make sure the proper cable is used and that it is properly connected.
- Is signal wiring routed close to the motor drive or other sources of EMI? Reroute cables as needed.
- Is the AMS controller and the drive unit properly grounded? Correct for any grounding errors.

Mechanical Binding:

- If the material bound in its location, any attempt to control it may result in drive errors or instability in the die itself. Verify that the material is free to move as designed.

Drive Errors/Instability (Running)

Controller Parameters:

- Have the directional settings of feedback been set properly on the AMS controller. This is set through the “Type Setting” switches. Check in Chapter 4 of the controller manual for particular switch setting descriptions.
- Is the “Motor Resolution” correct? The Motor Resolution must be set properly. The “Resolution” parameter should equal the distance the material moves per count from the encoder.
- Loop Gain is not properly set. Gain should cause the die to “snap” to position. Too small a gain will make the die sluggish. Too large of a gain will cause the die to oscillate or become unstable. Adjust accordingly. If this parameter is too high, the die may oscillate or become unstable.
- Is the “Derivative” too small? This is a parameter typically used for slow-to-respond hydraulic systems. As this parameter gets smaller, the controller will give the analog output a larger “kick” to get the motor into motion. On systems other than hydraulic, this parameter should be set to 0.0 (off).
- Is the “Offset Volts” parameter too small or not stable? If not stable, check the “Offset Integral”. This should not be smaller than 10 seconds and will typically be between 50 and 100 seconds. If the “Offset Volts” parameter is too large (.2 seconds or more), the motor drive may not be stable due to its internal parameters or mis-wiring.

Drive Parameters:

- Check the drive tuning parameters for proper settings. **Internal “Acceleration” ramps must be turned off on the drive system.** The AMS controller handles this. Other parameters should also be checked.
- “Analog Input Type Selection” should be set to bipolar +/- 10-volt analog (differential analog input).
- Simulated encoder output should be set to the corresponding number of counts as set in the AMS controller.
- Other parameters such as speed gain, speed command voltage, current gain and others should be tuned to work as desired. See the manufacturer's manual for details.
- Faulty Motor Drive. Check with manufacturer for verification.

D

Mechanical Binding:

- If the material bound in its location, any attempt to control it may result in drive errors or instability in the die itself. Verify that the material is free to move as designed.
- Material misalignment in die can cause binding. Binding or buckling of the material may occur causing die instability and/or causing material vibration which may cause the encoder to skip counts.
- Guide rollers may be faulty. Check rollers for bad bearings or out-of-roundness.
- Are the feedrolls too tight or unbalanced? If pressure is not set properly, the material may not feed as directed.

Connections and Cables:

- Is feedback cable (resolver or encoder) from the motor to the drive in good condition? Check connections and cable continuity. Is shield wire properly connected?
- Is simulated encoder feedback cable from drive to the AMS controller in good shape? Check all connections and cable continuity. Is shield wire properly connected?
- Is analog signal cable properly connected and in good condition? Is shield wire properly connected?
- Check all connections to the drive and to the AMS controller.

Electrical Noise:

- Is all signal wiring properly shielded? Correct any shielding errors.
- Is signal wiring routed close to the motor drive or other sources of EMI? Reroute cables as needed.
- Is the AMS controller and the drive unit properly grounded? Correct for any grounding errors.

Material Buckling or Other Deformity

Controller Parameters:

- Is the “Shear Dwell Up” parameter long enough? This parameter forces the die to continue at full line speed after making the cut in order for the cutoff blade to retract back out of the material. After the “Up” time expires, the die begins to slow down to make its return to the home position.
- Is the “Motor Resolution” correct? The Motor Resolution must be set properly. The “Resolution” parameter should equal the distance the material moves per count from the encoder.
- Is the “Line Resolution” correct (If a two-encoder system is used)? The Line Resolution must be set properly in order for the die to track the target correctly. The “Line Resolution” parameter should equal the distance the material moves per count from the encoder.
- Is the “Loop Gain” parameter too high? If this parameter is too high, the die may oscillate or become unstable, therefore damaging the material.

Faulty Feedback from Die Encoder or Line Encoder

- Is *line encoder* tracking perfectly parallel to the material? Correct as needed.
- Is pressure on the *line encoder* between 7 and 10 lbs. Psi? If tension is too tight, shaft will bind and cause incorrect counts. If tension is too light, slippage between the wheel and material may occur. This could cause jumping in the die itself as the die attempts to mirror what the material is doing.
- Check for a bent shaft on the *line encoder* or wobble in the encoder wheel. Fluctuations could make tracking the material with the die very difficult. The wobble may not be noticeable when on the material. Free the encoder wheel and spin it so that a true spin can be verified.
- (Two-encoder) Is a coupler used between the encoder and wheel? Check coupler for good connection. Is wheel in-line with encoder, therefore keeping the coupler straight? Is the coupler tight?
- (Two-encoder) Is encoder wheel riding on a flat surface of the material? Riding on curved or punched surfaces is not recommended. If riding on curved material is necessary, it may require special hardware or brackets.
- Check for poor connections or cables from either feedback device going to controller or to the drive. Repair bad connections or replace bad cables.
- Check the coupling mechanism for the *motor encoder*. This may be an encoder or resolver attached to the motor.

D

Drive System:

- Is drive current fluctuating? Adjustments to the drive may be needed to stabilize the actuator motor.
- Check the drive “Gain” parameters. If this parameter is too high, the die may oscillate or become unstable, therefore damaging the material. If it is too low, it may not respond quickly enough to changes in the line speed, also causing damage.
- The speed setting for the drive may not be set high enough for the drive to be controllable at higher line speeds.
- The speed setting (Command Setting) for the drive may not be set high enough for the drive to be controllable at higher line speeds. Slow the line down or increase the speed settings in the drive. This can be verified by placing an oscilloscope on the analog signal from the AMS controller.
- Poor connections or cables going to the drive. Repair connections or replace the cables. Repair bad connections or replace bad cables. Isolate cables from high voltage AC wires.
- Drive system may not be properly sized for the job. Verify with manufacturer

Electrical Noise:

- Controller or drive is not properly grounded. Check against recommended grounding.
- Analog signal is picking up electrical noise. This can be verified by using an oscilloscope. Make sure the cable is properly shielded and is connected right.
- Electrical noise may be present on the encoder feedback from the servo drive to the controller.
- The line encoder or the drive signal may have electrical noise on them. This can also be checked with an oscilloscope. Make sure the proper cable is used and that it is properly connected.

Mechanical Fault in Press or Material Feeding Device:

- The cutoff die or shearing blade may be dull or not aligned properly in order for it to make a clean cut. Correct for any die or blade problems.
- Can the die “twist” within its guides? If the die can change angles while being pushed forward, the cut on the material can be affected. Tighten the guide device(s) to hold the position.
- Excessive friction can cause instability in the feeding of the material. Verify that the material has a consistent travel as it passes through. Excessive friction can be caused lack of lubrication, burrs, misalignment or foreign objects. Correct any drag that may be present.

Inconsistent Shearing Action

Shear Complete Circuit:

- If using a mechanical press, a “Shear Complete” switch will need to be used. The complete switch insures that a full cycle is performed and that the die is returned to top-dead-center (TDC). The complete switch is also useful on pneumatic and hydraulic presses in order to keep them cutting completely as the size and gauge of the material changes.
- Is the shear complete switch at the proper location and properly mounted? It may need to be placed differently in order to the press to be consistent and complete.

Press Inconsistencies:

- Is the driving force of the press stable and consistent? For instance, the Air pressure on the air press must stay constant from one cycle to the next. Moisture in the airline could adversely affect the stroke.
- Hydraulic pressure will likewise need to be consistent on hydraulic-type presses. Is the hydraulics for the press being shared with other devices that may drain off varying amounts of pressure? Sharing the same supply may cause fluctuations in available pressure, therefore causing inconsistent operation.
- If using a mechanical press, does the cam lose speed from one hit to the next? The line may need to be slowed down in order for the press to hit consistently.
- If using a clutch/brake device to trigger the press cycle, are both of the devices working properly. A slow acting clutch or brake has greater potential for inconsistency. Repair or replace any faulty hardware.
- Is there any type of binding within the press as it is cycled? Perhaps the press is undersized for the cut or press operation that is required.

Consistently Long or Short lengths

Controller Parameters:

- Are the "Shear Dwell Down" and the "Shear Dwell Up" parameters long enough? If the Shear Dwell parameters are not set properly, the press may not fire fully.
- Is a Shear Kerf programmed? If a kerf (slug of metal) is removed during the cutoff, the same amount must be programmed into the Shear Kerf parameter. Check parameter and program shear kerf as needed.
- Is the "Motor Resolution" correct? The Motor Resolution must be set properly. The "Resolution" parameter should equal the distance the material moves per count from the encoder.
- Is the Line Resolution parameter properly set? If the resolution is not right, the lengths will reflect that in a consistently long or short manner. The correction factor may compensate for errors in the resolution up to a degree.

Calibration:

- Has the "Correction Factor" been properly adjusted? Changes in the encoder wheel diameter or in how the wheel rides on the material can affect the length, but usually in a consistently short or long manner. Set the correction factor manually, or use the Calibrate Trim feature found in the AMS controller setup menu.

Operational Error:

- Check measuring device for accuracy. Steel tapes may vary from one tape to another. Temperature also affects linear measuring systems. Check all measuring devices against a standard.
- Make sure that a measuring tape is aligned true to the material. Angling the tape even a small degree across the material may show a sizable error.

Controller Lockup, Memory Loss or Task Errors

Any processor-based system has a potential to get corrupted memory. Memory can cause the controller to display a Task Error or even cause the controller to “lock up”. In these cases, clearing memory can help solve the problem. Make sure that all parameters, tool data, and calibration information has been written down previously. Turn off power to the controller, then press and hold the “5” key down and turn on the power while holding the 5 key. Maintain this state for a few seconds, then release the key and allow the controller to power up normally. All parameters will have to be re-entered as well as any job information.

Power Supplies and Grounding:

- Are power supplies at the proper levels? Check with a voltage meter or oscilloscope. Each should be within its specified tolerance of operation.
- Are the power supplies properly grounded? The common of the I/O voltage for the controller should be connected to earth ground.
- Is the AC supply properly filtered or isolated?
- Is the AMS controller properly grounded to earth ground? The “shield” terminal or the mounting bolts on the controller can be directly connected to the grounding block or ground rod connection for this purpose.
- Is the drive system properly grounded? Most drives have a ground terminal for both the incoming power ground and the earth ground.

Noise Suppression:

- Is noise suppression used on all output devices? If not, install appropriate suppression on all unprotected devices, especially higher wattage devices such as contactors and solenoids (valves).
- Is a UPS system or other device being used to isolate and protect this system? Install one if necessary.

Wiring and Wiring Methods:

- Is the appropriate wiring and cabling being used? Many signal inputs and outputs require properly shielded cabling.
- Are the shields on the shielded cabling properly attached? Unattached or improperly attached shields offer little or no noise protection. Unattached or incorrectly attached shields may actually worsen noise problems.
- Is small voltage and signal wiring ran alongside with higher voltage wiring through conduit, wire troughs, or cabinets? Doing so may induce electrical noise from the high voltage carriers to the more

Troubleshooting

sensitive signal wires. Separate and bundle these wires from each other.

- Check for damaged or cut cables and wiring. These can short or arc to ground. Also, Check for poor connections, especially from the power supplies and signal wiring.
- Is the AMS controller powered up separately from the rest of the machine? The controller should have its own power switch. This enables the control to be powered up after the machine is powered up, and to be powered down before the machine is powered down.

Drops out of Run Mode

Controller Parameters:

- Check the parameter “Halt Mode” in the controller setup list. Is this set in the manner that is desired?
- Is the “Delay after Shear” output being used? If so, the “Forward” output of the controller will turn off for the programmed amount of delay after every shear cycle. The “Run” output may need to be used instead to latch in the run circuit.

Faulty Run Circuit:

- Is there an over travel switch or E-stop pushbutton on the press? If so, these items often have normally-closed contacts. These contacts may open up during vibration that could be caused by the press cycling. Replace “loose” switches with new ones or protect them from excessive shock and vibration.
- Are there conditional contacts or overloads in the run circuit that require certain items to be operating before the run mode can be entered? These items may be opening the circuit during operation.

Operational Error:

- No jobs were set to “Next”. Select a job and set it to “Next”.
- No more parts are left to run. Items remaining on screen show status of “Done”. More parts will need to be programmed before the machine will run again.

Contact AMS

If assistance is needed, AMS expert technicians will be glad to help. Please have the controller Model Number, Serial Number, and software version ready when calling. It will be asked for.

To expedite technical support calls, fax the “Setup Parameters”, “Tool Data”, and “Order Information (Program)” to AMS in advance. Label it to “Technical Support”. Please include your name, location, and phone number including area code.

Telephone: 1-800-334-5213
Fax: 1-314-344-9996

AMS can also be contacted through our web site at www.amscontrols.com or email us at Support@amscontrols.com.

AMS Controls, Inc.
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Maryland Heights, MO 63043

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