AMS CONTROLS INC.

Model
XL120
Ductwork Machine Controller
Reference Manual

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Introduction and Product Description

AMS Controls has years of experience with controls for roll formers. Much of this has been with multiple press machines that punch and notch prior to cutoff. The **XL100 SERIES** controller is the ultimate in machine controllers for roll forming and cut-to-length machines, and the **XL120** controller is specifically used for making ductwork for the HVAC industry. Unlike general purpose controllers, AMS controllers were designed specifically for the needs of the roll forming industry. When an AMS controller is installed on a roll forming line, many customers report a 20-30% increase in productivity due to the elimination of costly delays. Production can also be monitored with a PC from the office. The AMS controller will also stay in constant communications with other downstream controllers such as the Backgauge, Pinspotter, Dual Backgauge and Notcher. The **XL120** controller is the latest and best of a long line of controllers.

With the AMS **XL120** controller, parts are produced with a minimum amount of scrap. The powerful microprocessor can sequence from one size to another with no waste. This unique feature makes in line punching practical for JIT production systems.

Of equal importance to roll formers is the operator interface of the control system. Many machines have not been 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 losing any capability.

When designing the controller, AMS sought the following objectives:

- Describe a part in finished part dimensions.

- Prompt for data with plain English prompts using standard industry terminology.

- Allow the user the flexibility to use the same controller on several machine configurations.

- Minimize the amount of data that must be entered.

Note: This manual applies to version 6.56

Accuracy

On most cut-to-length machines without servo drives, accuracy depends on the repeatability of the machine to run at a constant speed and to delay the same amount of time for each operation. With electronic length controllers, however, accuracy is lost when machine fluctuations occur. The **XL120** Controller constantly monitors the performance of the machine and compensates for these variations resulting in improved accuracy. For flying cutoff machines, the exclusive Speed Compensation feature allows accurate punches and cuts at any line speed. For feed-to-stop machines, the Adaptive Slowdown feature and the Overshoot Compensation feature greatly improve machine accuracy.

Productivity

Productivity can be improved with the AMS controller in three ways. First, the improved accuracy with the **XL120** controller allows machines to be run at higher line speeds. Secondly, for feed-to-stop machines, the Adaptive Slowdown feature insures a minimum feed time for any length run and any hole spacing. Thirdly, for all types of machines, 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.

The AMS Controller eliminates a large amount of material waste by only requiring 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 **XL120** Controller includes an RS-485 communications port for connection to your office computer. With the optional **XL-LINK** software, you can schedule orders and send them to the controller, as well as monitor machine performance so your productivity can be greatly increased.

Easy to Use

The **XL120** Controller is a sophisticated computer running a very complex program. This does not, however, mean that a computer expert is required to operate it. The controller has a large liquid crystal display (LCD) that prompts the operator for information in plain English and with words that are familiar. On one display, the operator can see the order that is being run, his progress through the order, and the speed of the line.

Easy to Install

The **XL120** Controller has logic built into it to handle most machine control functions. The user does not need to add Programmable Logic Controllers (PLCs) or relay logic circuits to get the correct machine sequence and safety features.

The AMS controller can control a variety of different machines. For each type of machine, a different set of machine parameters must be programmed into the controller. To simplify this procedure, the type of machine is programmed via a set of switches. The controller reads these switches to determine the type of machine it is connected to. It can then limit the list of parameters that must be programmed to only those that apply to this type of machine.

About this Manual

This manual gives detailed information on the installation, operation, and maintenance of the **XL** Controller. Instructions for installing the AMS Controller on most machine types are included. AMS engineers can help on installation conditions not covered by this manual. Instructions on how to operate the controller are included. This covers how to program orders and run them. It also covers the best way to handle a variety of special circumstances that can come up with most machines of this type. The last section of the manual includes a guide to follow if problems should arise.

Note: AMS Controls reserves the right to change the operation and/or directions within the manual without notice or approval.

The SETUP SHEETS at the end of the manual provide a place to record information about your particular installation. Be sure to record this information and keep this manual in a safe place for later referral. If calling AMS for technical assistance, be sure to have this manual in front of you as well as the model number and serial number of the controller and software version number (displayed in the Setup Menu).

System Description

An Electronic Length Control System is the controlling mechanism for machines that produce individual parts from a coil of stock material. A block diagram of one such a system is shown in Figure 1-1. Many other configurations are also possible.
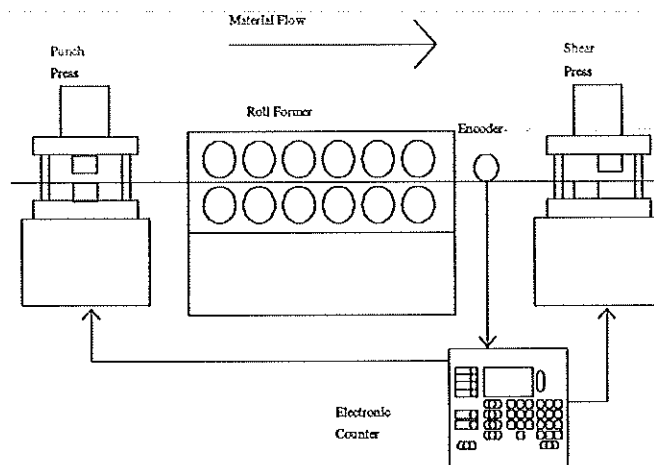

Figure 1-1. Electronic Length Control System Block Diagram

The controller performs the following functions:

- Controls the material movement through the machine.

- Measures the amount of material moving past the cutoff press.

- Cycles the punch presses at programmed points.

- Cycles the cutoff press at the programmed length.

- Stops the machine when the correct number of parts is produced.

The measuring device 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 reaches a point where a punch is needed, the controller cycles the punch press. When the material past the cutoff press is equal to the length of the part programmed, the controller cycles the shear press and increments the quantity that is DONE. When the quantity DONE is equal to the programmed quantity, the controller stops the machine.

There are two basic categories of automatic cutoff machines: flying cutoff machines and feed-to-stop machines. With flying cutoff machines, the material does not stop for each cut and the cutoff die moves along with the material during the shearing cycle. With a feed-to-stop machine, the controller stops the material for each cut and the cutoff die remains at a fixed location. The common practice for this type of machine is to shift into a creep speed just before the cutoff point to increase the precision of the cut and reduce the jolt that can occur if the material is abruptly stopped. The controller controls both the speed shift and the stopping action.

XL120 Controller Hardware Description

Microcomputer

The **XL120** 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 EPROM (Erasable Programmable Read Only Memory) instead of disk. These programs were written by AMS to perform the specific task of length control. The EPROM is factory programmed.
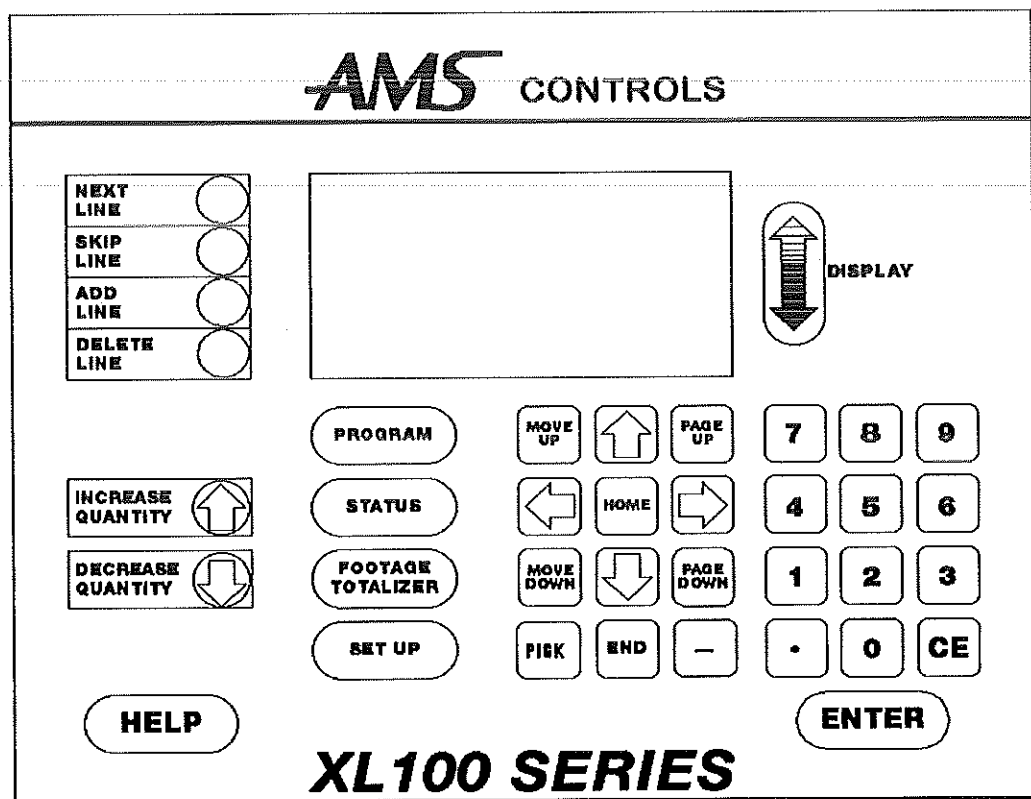

Figure 1-2. The **XL120** Front Panel

The user does not have 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 AMS controller, a battery maintains this memory when off and user data does not have to be re-entered each time power is removed. RAM is used to store machine setup data and job information data.

Operator Interface

Replacing the monitor and keyboard of a PC, the **XL120** controller has an 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 1-2, has 39 keys for command and data entry. Most non-numeric data required is achieved by scrolling through available options on the display and selecting the correct one. Use the *blue* up ↑ and down ↓ arrow keys to move the highlight bar to the desired response, and press the ENTER key to select the highlighted response. This method keeps the data entry simple and avoids spelling mistakes. There is also a way to enter user-defined words to describe orders, coils, and material.

Controller Keys and Functions

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

NEXT LINE	◯
SKIP LINE	◯
ADD LINE	◯
DELETE LINE	◯

Next Line

Located to the left of the display screen, used to select the next order (item) of parts to be processed.

Skip Line

Located to the left of the display screen, used to prevent an order (item) from running. This order (item) can be recalled and run at a later time by pressing "Skip Line" again, setting it back to ready.

Add Line

Located to the left of the display screen, used to insert an order (item) without stopping the machine.

Delete Line

Located to the left of the display screen, used to eliminate an order (item). It is possible to undelete an item as long as it still appears on the display screen. Simply press the "Delete Line" key a second time and the item will return to ready. If the memory has been cleared or a memory test has been performed, the item is deleted, and after it is deleted, it can not be run at a later time.
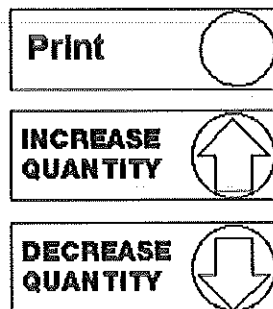
Print

Located below and to the left of the display screen, used only with the bundle tag printer option, will print the part of a bundle that is completed to that point (this function is not available on some older XL controllers).

Increase Quantity

Located below and to the left of the display screen, used to create a part without counting against the completed part count (commonly used to replace a defective part).

Decrease Quantity

Located below and to the left of the display screen, used to decrease the number of parts remaining to be processed in an order (commonly used to decrease the scrap in the footage totalizer when parts that were defective are modified to be counted as good parts).

Help

Located below and to the left of the display screen, used at any time to help explain the messages or prompts on the display.

PROGRAM

STATUS

FOOTAGE
TOTALIZER

SET UP

Program

Located below the display screen and to the left, used to define the dimensions of the parts to be produced.

Status

Located below the display screen and to the left, used to inform 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.

Footage Totalizer

Located below the display screen and to the left, used to account for the total footage of good parts and scrap parts that are produced. Also used to change coils and to enter employee information.

Setup

Located below the display screen and to the left, used to access the machine setup parameters, define tool data, calibrate the machine, set the time clock, view the input/output screen, perform a memory test, enter printer information, perform die accelerator tests, access custom menus, and to setup the XL-Link program.
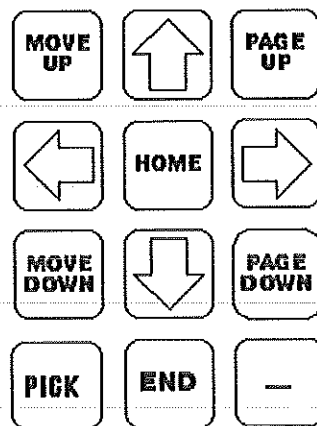
Arrow Keys ↑,↓,←,→

Located below the display screen and to the right, used to move the cursor or highlighted item in the direction of the arrow pressed. Also used to scroll though the letters when entering alphanumeric data.

Move Up, Move Down

Located below the display screen and to the right, used only in the Program mode when editing orders or patterns. Pressing the Move Up or Move Down key will move the highlighted order or pattern in the indicated direction, in order to change the sequence of operations.

Page Up, Page Down

Located below the display screen and to the right, 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 can not 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, End

Located below the display screen and to the right, the Home key will move the highlighted line to the first line of the current item being displayed, even if the display is currently showing a different page. The End key will move the highlighted line to the last line of the current item being displayed, even if the display is currently showing a different page.

Pick

Located below the display screen and to the right, the Pick key will allow the user to toggle through the displayed items whenever there is more than one possible option for a parameter.

Note: If using a remote terminal, there is no Pick key provided. Any number key will also provide the "Pick" function and allows the user to toggle through the displayed options.

Dash (-)

Located below the display screen and to the right, the Dash is used to put a dash in Order Numbers, Material Codes, etc. Example: Order Number 123-456-78. The Decimal Point on the number keypad will also provide the same function as the Dash.
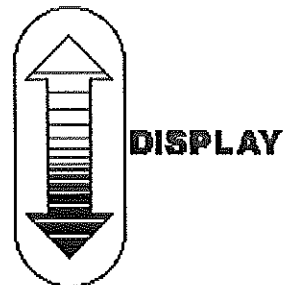
DISPLAY

Display

Located to the right of the display screen, used to lighten or darken the display screen.
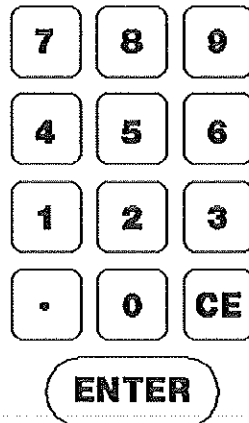
Number Keys, 0-9

Located below and to the right of the display screen, used to enter numerical data.

Decimal Point, ⊕

Located below and to the right of the display screen, this key is used to place a decimal point when entering a number, and it will also display a dash when entering alphanumeric data (for order and material numbers). A third use of this key is to produce the dividing line of a fraction when in the fractional mode, and entering fractions.

CE Key

Located below and to the right of the display screen, this is a "Clear Entry" key. the main use of this key is to correct the entered data when a mistake is made. Pressing this button will clear out the previously entered data so that the data can be entered again from the beginning. This key is also used when entering alphanumeric data to change from numbers to letters, and to clear controller errors.

Enter

Located below and to the right of the display screen, this key can be defined as a "take it" key, as the data that was entered into the display is not accepted by the controller until the Enter key is pressed.

Inputs

The main input into the controller is the group of signals from the encoder. A simplified diagram of this circuit is shown in Figure 1-3. The encoder outputs are differential line drivers which work well in electrically noisy environments. With the twisted pair cable, electrical noise is induced equally on both the normal and the complement signals. The differential line receiver in the AMS 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.
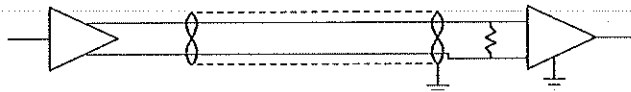
Figure 1-3. Simplified Encoder Channel Circuit

There are sixteen total discrete inputs into the controller. They sense continuity between an input and a common connection. A typical diagram of an input circuit is shown in Figure 1-4. This circuit requires a 24 VDC biasing circuit that is provided either by the user or by the AMS controller, depending on the controller configuration. **Note that no voltage source should be connected to any input.** Doing so can severely damage the controller. Relay contacts, limit switches, or control switches are most common types of inputs. The input may also be the collector of an open collector NPN transistor which has its emitter connected to the common terminal. Current in each input circuit is limited to 15 milliamperes.
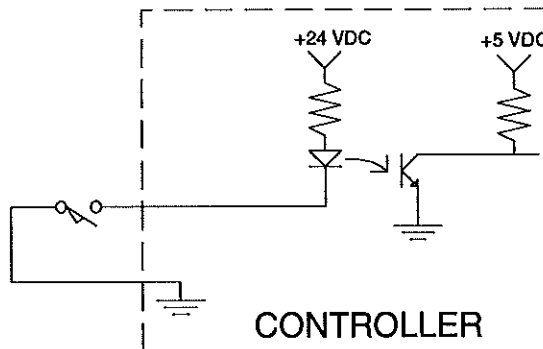
Figure 1-4. Typical Input Circuit

Outputs

The Standard DC output of the XL120 controller is a 4 Ampere open collector transistor. This is available in all configurations and for all outputs. A diagram of this circuit is shown in Figure 1-5. The biasing voltage for the load can be from 12 to 24 volts. If this voltage source comes from outside of the controller, the common of this supply must be connected to the common of the controller. The suppressing diode shown reduces the noise generated by inductive loads when the transistor turns off. The load can be either a DC solenoid or a DC Relay.
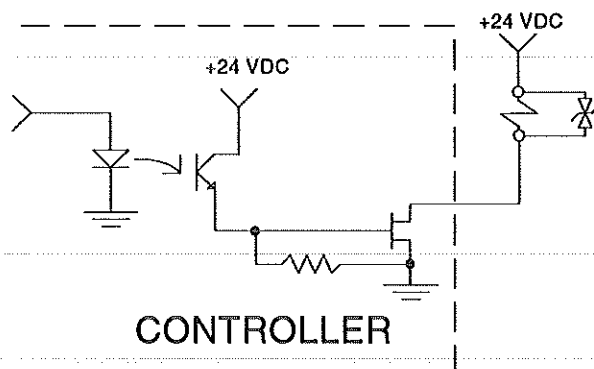
Figure 1-5. Standard DC Output

Special Features

The XL120 Controller has been 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.

Speed Compensation

An electronic counter in an electronic length control system produces an output on an exact interval of material movement by faithfully counting all of the encoder pulses. On an ideal machine, an electronic counter will produce accurate parts. However, an ideal machine does not exist and varying machine conditions will produce varying part lengths.

The best example of this would be a phenomenon that occurs on flying die machines. On such a machine, the counter produces a shear pulse at a regular interval of encoder pulses. However, the material is actually cut at a time after the shear pulse due to delays in the press. It takes time for valves to energize, cylinders to fill and dies to move. During this delay, material moves a distance that is proportional to the duration of this delay and the speed of the material during this delay. The actual shearing operation is displaced from the point at which the counter activates the shear.
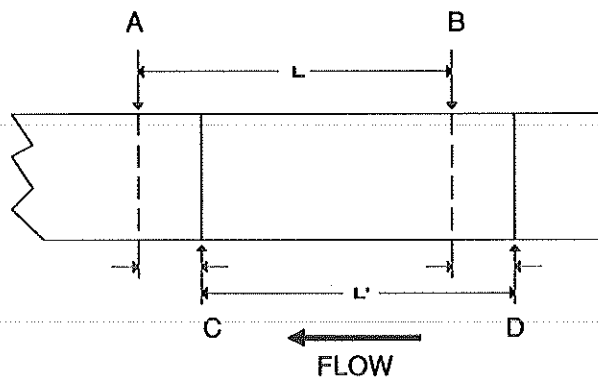
Figure 1-6. Typical Sheared Part Layout.

Figure 1-6 shows what actually happens in a typical part sheared with a flying die. The counter activates the shear at an interval of the part length L at points A and B. Due to the press delay, the material is actually cut at points C and D. The resulting part length L' can be calculated as follows:

$$L' = L - T_1 S_1 + T_2 S_2, \text{ where}$$

- L is the programmed part length
- T_1 is the delay time at the leading edge
- S_1 is the line speed at the leading edge
- T_2 is the delay time at the trailing edge
- S_2 is the line speed at the trailing edge

If the speed and delay remain constant, then $T_1 S_1$ will equal $T_2 S_2$ and L' will equal L. If either parameter changes from one cut to the next then the resulting lengths will also vary.

For most pneumatic and hydraulic presses, the delay time is usually constant for constant applied pressure. However, speed variations are common and are a main source of inaccuracy on flying die machines.

The **XL120** controller eliminates this problem with its Speed Compensation feature. The controller constantly monitors the line speed and calculates a modified shear target in proportion to the line speed and a known delay time. Figure 1-7 shows an example of how Speed Compensation works with a varying line speed. The parts are at intervals of 1000 encoder counts. Instead of the normal shear outputs at 1000, 2000, 3000, etc., the AMS controller calculates targets of 985, 1970, 2985, 3995, etc. in proportion to the changing line speed. If the delay remains constant, then the parts produced should be the correct length.

Speed

Shear Output Point (with speed compensation)

| 0 | 985 | 1970 | 2985 | 3995 |

| 0 | 1000 | 2000 | 3000 | 4000 |

Shear Output (without speed compensation)
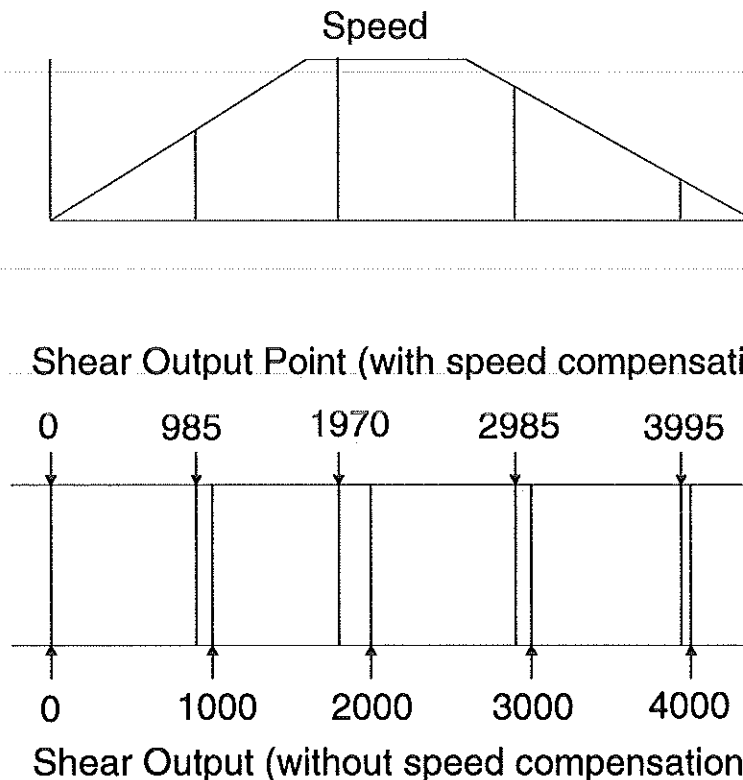
Figure 1-7. Speed Versus Shear Target

Adaptive Compensation for Stopping Machines

Feed-to-stop machines are used instead of flying die machines because the dies are simpler and the machines are normally more accurate. Higher accuracy is normally achieved by slowing the line speed down to a creep speed just before the target. This is done to minimize the effect of a delay in stopping that occurs when the stop signal is given by the controller.

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

If the delay time and slow speed are constant, then lengths are accurate with the exception of the first piece which is normally longer than the ones that follow. The amount in advance that the machine is set into slow speed is determined by the maximum speed of the machine and how quickly the material can decelerate from high speed to slow speed.

The XL120 controller improves the performance of feed-to-stop machines by compensating for the stopping delay time and automatically setting the slowdown distance. With a technique similar to Speed Compensation, the controller uses the speed to calculate an advanced target to stop the machine so that it coasts into the exact shear point. The AMS controller measures the amount of overshoot or undershoot on each move and adjusts its internal parameters to match the characteristics of the machine. A tolerance can be specified by the user so that accuracy is assured.

The AMS controller also has a feature called Adaptive Slowdown that minimizes the feed time of feed-to-stop machines. Figure 1-8a shows the movement profile of a typical feed-to-stop machine. These systems use a fixed length slowdown distance that must be sized for the longest part length run. Short parts then spend a long time in slow speed because the material never reaches full speed when the slow shift point is reached. The controller with Adaptive Slowdown uses the measured line speed and deceleration characteristics of the machine to calculate the optimum point to shift into slow speed.

The result, shown in Figure 1-8b, is less time spent in slow speed on short parts which leads to more productivity. The controller continuously monitors machine parameters to automatically adjust for machine changes.
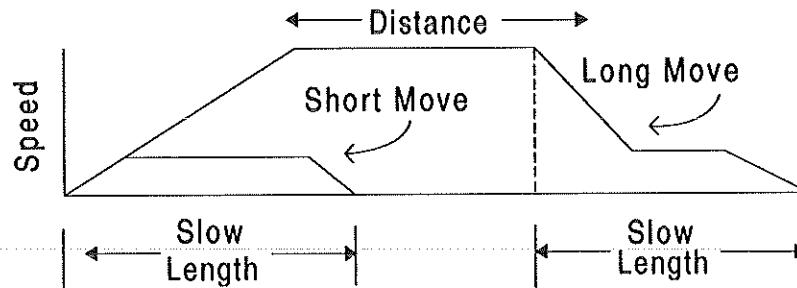
Figure 1-8a. Speed Profile without Adaptive Slowdown
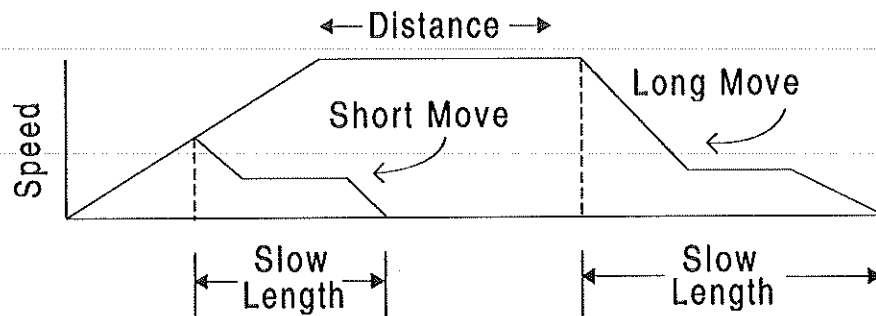
Figure 1-8b. Speed Profile with Adaptive Slowdown

Material Change Point

Most post cut roll former machines will 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 re-threaded through the machine again.

The **XL120** 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 never stops with too much or too little material to finish the order.

Punch Presses

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

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 of the machine and add standard safety features. AMS has eliminated the need for a PLC by building comprehensive control logic into the **XL120** controller. This logic implements the following features:

- Four output configurations for speed control

- Run-Halt control by external contact

- Manual cycle of the Presses only in the Halt mode on feed-to-stop machines

- Manual crop allowed while running on non-stop machines

- Jog in manual only

- Automatic Shear or Press operation only in Run mode

- Halt on emergency stop or overload

The result is that the AMS controller can be adapted to most machines with a minimum amount of external electrical components. The only "programming" that a user must do is select the proper TYPE of machine through some switch settings. The controller then implements the proper logic based on the TYPE.

Installation

Controller Power

Depending on the model of the controller and the style of cabinet, an AMS controller may require 24 VDC or 115 VAC for operating power. Units using AC will also require a 24 VDC supply for use on inputs and outputs. All input power should be within the specification limits.

Power to the controller should be switched independently of other devices through a separate switch. This power should not be interrupted by the emergency stop circuit. In an emergency-stop condition, the controller should be able to track any movement of the material, therefore allowing production to resume after the condition is reset without any loss in accuracy. See Figure 2-1.

Emergency Stop Circuit

Every machine should have some type of emergency stop circuit for the safety of the operator and for the protection of equipment. A typical emergency stop circuit using a control reset function is shown in Figure 2-1. The circuit must be armed by pressing the RESET switch. The E-stop relay will then pull in and latch in the circuit with a holding contact around the RESET switch. A momentary opening of any contact or safety switch will de-energize the circuit and cut off power to all devices. This circuit is easily expanded by adding contact in series and is adaptable to existing systems.

Power to the AMS controller should not be interrupted by the emergency stop circuit. However, the AMS controller must know when an emergency stop has occurred in order to drop the line out of RUN mode. This can be accomplished by breaking the run circuit or by taking away the E-stop input on close-loop controllers. If an emergency stop condition occurs, power should be isolated from all output devices. This would include all 24VDC devices as well as all 115 VAC devices. Please refer again to Figure 2-1.

Figure 2-1

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 by the appropriate setting of the "TYPE" setting switches. The controller can be configured to work with flying-cut or feed-to-stop applications. Outputs are available for SHEAR DOWN and SHEAR UP or SHEAR DIE BOOST.

AMS controllers are designed to connect directly to 24 VDC so-
lenoids for optimal performance. A solenoid driving device, such
as the AMS 3840 power module, can provide more accurate
firing of the press.

If the solenoid for any of the shear outputs is 115 VAC, then an
attempt should be made to replace the solenoid with a compati-
ble 24 VDC type. If this is not possible, then a 24 VDC relay will
have to be installed between the AMS output and the solenoid.

AMS controllers have a timed shear output with a switch input
override feature. The duration of the **SHEAR DWELL** or
SHEAR DOWN output is programmable from 0 to 9.999 sec-
onds. Please refer to timing diagram - Figure 2-2. If the AMS
controller detects a switch closure at the **SHEAR COMPLETE**
input during the dwell time, the shear output will turn off immedi-
ately (Figure 2-3). This is especially useful on mechanical
presses that will 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 regard-
less of the complete input.

Shear Down Output

Shear Up Output

Die Hits Metal

Figure 2-2

Programmed time

Shear Down Output

Shear Up Output

Shear Complete Input

Die Hits Metal
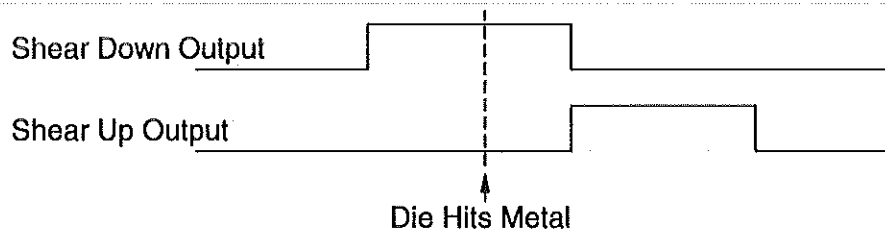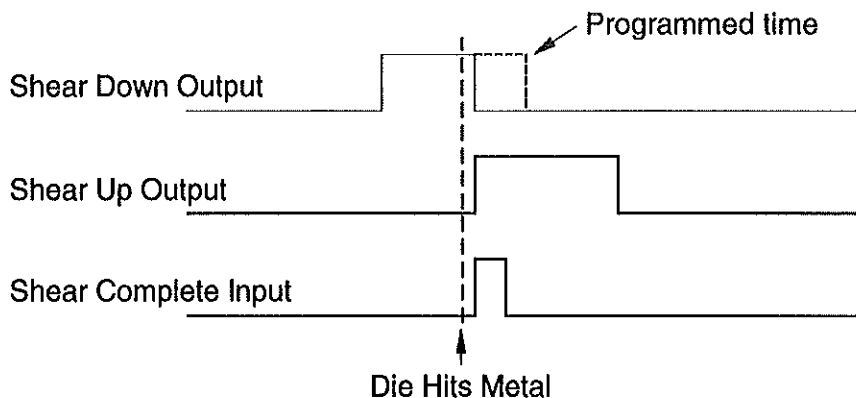
Figure 2-3

Press Control Circuit

The terms and definitions for the press control parameters are identical to it's shear control counterparts. The press parameters will include PRESS DWELL DOWN and PRESS DWELL UP or PRESS DIE BOOST depending on the machine's configuration.

24 VDC Press solenoids can be directly driven by the 24 VDC outputs of the AMS controller. The press outputs can also signal the AMS 3840 power module (or similar unit) or isolation relays for higher voltage solenoids.

Like the shear output, the **PRESS DWELL DOWN** can be programmed from .001 to 9.999 seconds. A **PRESS COMPLETE** input will override the press's timed output and turn off the output immediately upon detection. In some closed loop applications, a 0.0 time can be programmed if a PRESS COMPLETE is used. If a press complete is not detected within ten seconds, then the run output is turned off. The **PRESS DWELL UP** will time out as programmed regardless of the press complete input. See Figures 2-2 and 2-3.

Down Stream Controller Communications

The **XL120** communicates with the Down Stream Controllers via an RS485 communications port. When two or more Down Stream Controllers are used, they must be daisy-chained with the shields of the cables tied to the **XL120** controller only. Refer to figure 2-4.

If more than 10 feet of wire is used between the **XL120** and the last Down Stream controller, a 300 Ω resistor must be added in parallel to the TX / RX connections on the **XL120**, and the last controller in series. The suggested cable used for the communications is a Belden cable # 9841 or #9842, or equivalent.
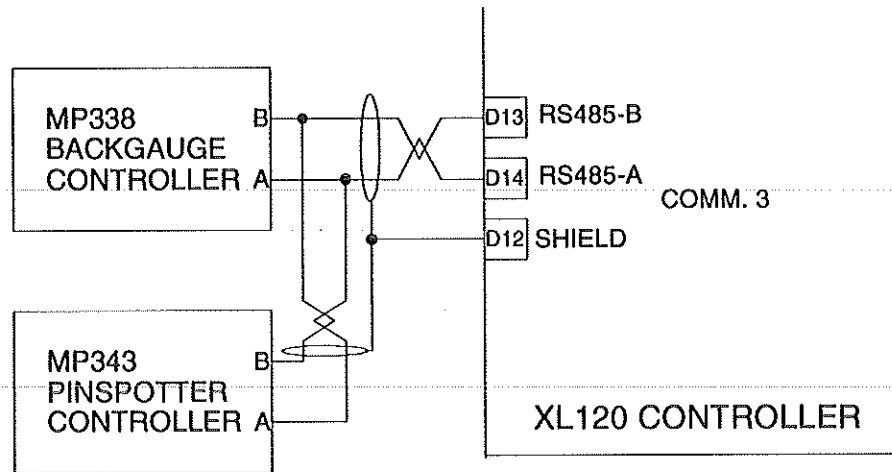
Figure 2-4. Communications Connections

Machine Configuration

This section will describe the setup parameters that are used on the **XL120** controller and will go through the different setup screens that are encountered when the controller has cleared memory or being programmed for the first time.

Clear Memory

Clearing memory will erase all Setup, Pattern, and Order information in the controller's memory.

Don't try clearing memory unless you have written down all Setup, Pattern, and Order information for re-entry.

If you are experiencing controller problems, it is not recommended that you try clearing memory unless you have made extensive troubleshooting checks.

The steps listed include: making sure you have checked the encoder, the shear, the calibration procedure, rechecked the setups, used the built-in diagnostic features, checked the 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: **(1)** make sure that the Security switch is unlocked; **(2)** turn off power to the controller; **(3)** wait five seconds; **(4)** turn the controller back on; **(5)** wait until the AMS logo has scrolled across the screen and the words **"POWER UP TESTING EPROM"** appear at the bottom of the screen; **(6)** hold down the "5" key for at least two seconds and release the "5" key when you see the unit reset (the AMS logo will start to scroll across the screen again).

Setup Parameters

Note: The following descriptions include all possible SETUP PARAMETERS and there are some parameters that are not used for every application. Only use the ones that apply for your particular machine.

```
11:21AM     8/23/97      0FPM          0.000"
ORDER                                     0Ft
MATERIAL                           N/A% COMP.
            Configuration
          Automatic Mode Options
         Machine Layout/Dimensions
             Timing Parameters
                Time Clock




Type 1      8/19/97      2:26PM         V6.5
```

Figure 3-1. Configuration Menu

The first screen that will be displayed by the controller will be the Configuration menu, figure 3-1. Press the ENTER key to view and/or change the AUTOMATIC MODE OPERATION parameters.

ENTER

```
11:31AM    8/23/97        0FPM           0.000"
ORDER                                      0Ft
MATERIAL                             N/A%  COMP.
Parameters                           Setup Value
Halt No More Items?                          Yes
Format                              Decimal Inch
Maximum Sheet Length                     0.0000"
Scrap Length                             0.0000"
Tolerance                                0.1000"
Min Slow Distance                        0.0000"
Set Done Items to Ready?                      No
Auto-Delete Done Orders                  14Days
Use Order Numbers?                           Yes

Type 2      8/19/97       2:26PM            V6.5
```

Figure 3-2. Automatic Mode Options Screen

Halt No More Items?

If YES is selected, the controller will halt when all remaining parts have been loaded into the controller's memory. At this time it is desirable to program more orders so that scrap is not produced. If NO is selected the controller will not halt when all parts are loaded into memory and thus may produce scrap when more orders are run.

Format

This parameter allows the units of measure to be displayed in Decimal Inches or Metric millimeters. The maximum value in either case is 9999.9. Press the "PICK" key or any number key to toggle between the two options and then press "ENTER" when the desired parameter is displayed.

Maximum Sheet Length

The Maximum Sheet Length defines the length of the longest piece the **XL120** controller will be allowed to make. For some applications long part lengths may cause problems for the roll former or other tooling. By setting a value for the Maximum Sheet Length , the user will not be allowed to program any items which make parts longer than this length. Any value from 0 to 1000.0000 inches may be entered.

Scrap Length

When a new coil is loaded with the material threaded through the shear, the **XL** controller may not be able to 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 shear only parts until the next normal part is beyond the first required punch operation. The length of these shear only parts is determined by the SCRAP LENGTH parameter.

The user can set this parameter to produce usable parts or lengths that are at least easy to handle. If a SCRAP LENGTH of zero is entered, the controller will produce scrap pieces at the part length of the current order.

Tolerance

On feed-to-stop machines, the **XL120** controller can check for the material to be within a specified TOLERANCE before activating the shear or punch press. If the machine 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 TOLERANCE should be set small enough to get acceptable parts but wide enough to avoid production interruptions. The **XL120** allows values from 0.0005 inches to 10.0000 inches. The default value for TOLERANCE is 0.1000 inches.

Min Slow Distance

This parameter is used to put the line into slow speed (if using two speed logic). The controller will automatically calculate when to start slowing down and then this distance is added to it (if the DECEL MODE is set to AUTO). Increase this value for a longer slow distance. Decrease this value for a shorter slow distance. A longer slow distance can improve part accuracy but too long a value can slow production. The distance should be set long enough that the material fully reaches the slow speed before stopping.

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 (if the DECEL FACTOR is set to AUTO). The **XL120** controller calculates the distance from the programmed position that the machine should shift into slow speed. This is based on the speed of the material and the deceleration characteristics of the machine.

When the DECEL FACTOR AUTO setting is used, 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. This value should be set long enough that the material fully reaches the slow speed before stopping.

Set Done Items to Ready?

If NO is selected here, when an item is finished running, its quantity done is displayed and its status becomes DONE. If YES is selected, the quantity done is reset to zero, and the status becomes READY, so that the item can be run again without manually reprogramming it.

Press any number key or the PICK key or any number key to toggle between YES and NO to select the desired mode of operation. When the correct choice is highlighted, Press ENTER to record your selection.

Auto-Delete Done Orders

Completed Orders and Items remain in the XL120 controller 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.

Use Order Numbers?

If YES is selected, the user has the capability to program several different items and group them together as orders. This feature can be used as a convenience to the operator if he has many different orders, each containing multiple items to program at the same time.

Using order numbers is also helpful in situations where the material is changed often. Each order is associated with its corresponding material and the AMS controller will warn the operator if he tries to run an order using the wrong coil. If NO is selected, all items will be grouped together with a heading NO ORDERS. USE ORDER NUMBERS must be set to YES when using **XL-LINK** or other communications software.

Minimum Footage to Request Order (With XL Link Only)

If the footage to be run by the controller drops below this value, the next order is automatically downloaded from the **XL Link**.

Halt Delay Minimum (With XL Link Only)

This setup parameter is the amount of time the machine may be halted before the operator is prompted to enter a reason and an employee number upon re-initiating the run mode. This feature is only available if the **XL** is given an **XL-Link** ID code. Entering the number 99 will disable this feature.

Manual Shear Scrap Length (With XL Link Only)

This parameter forces the operator to enter a scrap code when the material cut off during a manual shear is longer than the Manual Shear Scrap Length. This feature is only available if the **XL** is given an **XL-Link** ID code and the parameter Use Scrap Codes under Communications Setup is set to Yes. Entering the number 999 will disable this feature.

```
( SET UP )
```

To exit this screen and to enter the MACHINE LAYOUT/DIMENSIONS screen press the SETUP key.

```
11:53AM    8/23/97      0FPM          0.000"
ORDER                                    0Ft
MATERIAL                          N/A% COMP.
             Configuration
         Automatic Mode Options
       Machine Layout/Dimensions
          Timing Parameters
             Time Clock




Type 2      8/19/97      2:26PM         V6.5
```

Figure 3-3. Configuration Screen with Machine Layout/Dimensions

```
( ENTER )
```

Select the ENTER key to view the next set of parameters.

```
 1:18PM     8/23/97      0FPM          0.000"
ORDER                                    0Ft
MATERIAL                          N/A% COMP.
Parameters                        Setup Value
Machine Configuration               U-Shape
Leading Edge Lock Type               Female
Manual Notch Select              Drive Cleat
Hole Punch Select                Center Hole
Shear-Encoder Dist                   0.0000"
Max Backup Distance                  0.0000"
Coil End Point                       0.0000"
Coil End Offset                      0.0000"
Encoder Direction                         CW
Resolution                    0.0117187505"
Type 2      8/19/97      2:26PM         V6.5
```

Figure 3-4. Machine Layout/Dimensions Screen

Machine configuration

The purpose for this parameter is to determine if the long or short dimension should come out of the shear first. In the case of the U-shape, the last dimension out of the shear is the first into the backgauge. The Z-shape is just the opposite. See figure 3-5. To change this selection use the PICK key or any number key to toggle the selection.
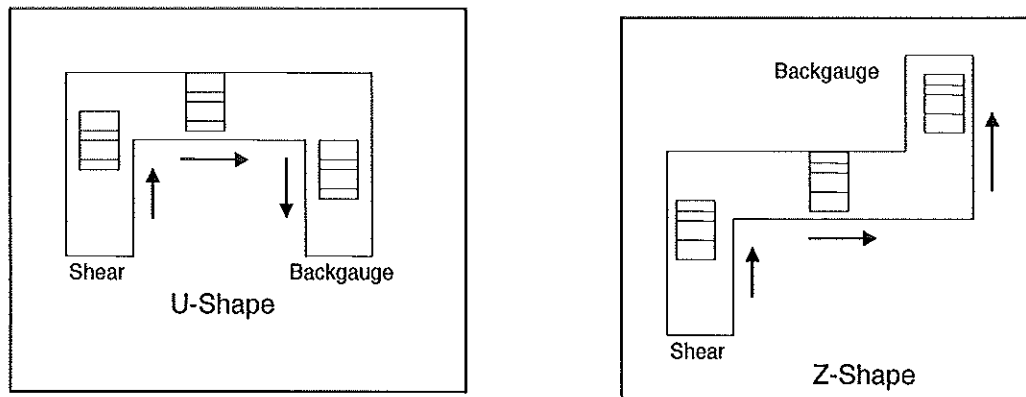
Figure 3-5. U-Shape and Z-Shape Configurations

Leading Edge Lock Type

Typically the female lock connector goes on the leading edge of the part. See figure 3-6.
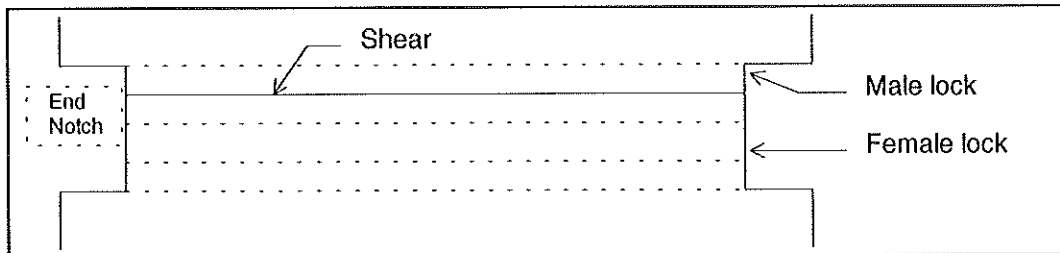
Figure 3-6. Leading Edge Lock Type

Manual Notch Select

This is the tool that will be selected when the manual press input is fired. The options are DRIVE CLEAT and TDF. The default option is DRIVE CLEAT but to change this selection us the PICK key or any number key to toggle the selection.

Hole Punch Select

This parameter will select whether the Center Hole Gag or the Outer Hole Gag is engaged when the Hole Punch fires, during a manual hole punch operation.

Shear-Encoder Distance

The SHEAR-ENCODER DISTANCE is the physical length between the encoder and the shear point. The largest acceptable value is 10,000.0005 inches. This parameter is used in conjunction with a sheet detect switch. The switch is mounted next to the encoder, and when the switch opens at the end of a coil, the SHEAR-ENCODER distance (plus the amount of material past the shear) is added to the scrap total in the FOOTAGE TOTALIZERS.

Max Backup Distance

When the controller is put into run and one of the first operations on the part needs to occur on the metal that has already gone past the press, the controller will automatically back the material up until the operation can be done. The Max Backup Distance is the maximum distance the metal can back up, typically this distance would be somewhat shorter than the shear to encoder distance. If the metal can not back up far enough to fulfill the operation, it will back up as far as it can, then it will insert scrap pieces equal to the programmed Scrap Length until the press operation can be performed.

Coil End Point

A feature of the controller which helps minimize scrap. This is the distance from the shear press to the point where the material can be manually cut in order to change coils. The **XL120** controller will display a new message when it halts the line for a COIL END POINT and will notify the operator of a pending material change. The operator should measure from the COIL END POINT mark towards the shear the length given in the AMS controller message and cut the coil at this point.

The COIL END POINT should be long enough to ensure the cut point does not coast into the machine and become inaccessible. This will prevent the material that is not needed for the current job from entering the machine. The general formula would be:

Coil End Point = Shear to Machine Entrance Distance + Machine Coast Distance

Coil End Offset

The COIL END OFFSET parameter will delay the COIL END POINT warning. This parameter is used on feed-to-stop lines when the customer does not desire the line to be halted within a given distance of the next press operation. The COIL END POINT message will give the distance that the material went past the COIL END POINT mark.

Enter the distance from the COIL END POINT that a shear operation should not occur. For example: assume the COIL END POINT is 10', and the COIL END OFFSET is 1'. If the line is approaching the COIL END POINT, but a shear is about to occur within 1', the COIL END POINT line halt would be delayed so the shear could take place.

Encoder Direction

Pressing any number key or the PICK key toggles between CW (Clockwise) and CCW (Counter-Clockwise) for the direction of the encoder. If you run the line and the display counts negative, change the ENCODER DIRECTION.

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:

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

For an AMS encoder, the encoder count is the model number of 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, RESOLUTION would be as follows:

Model	Resolution
256	0.01171875
500	0.006
1000	0.003

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.

Correction

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: 1) Run ten parts of equal lengths, 120" for example. 2) Measure the ten parts. 3) Find the average length by adding up all ten parts and dividing by ten. 4) 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 **XL120** controller's CALIBRATE TRIM feature automatically computes a new CORRECTION FACTOR which will be used in the controller's length calculations to adjust for errors in the size of the measuring wheel. The **XL** remembers the programmed length of the last part cut and asks the user to enter the actual measured length. The controller then calculates 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.). See page 3-27 for details on using CALIBRATE TRIM.

Filter Constant

The FILTER CONSTANT 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 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 on the high side of the low values. The **XL120** controller will allow values from 1.0 Hz to 200.0 Hz.

Drive Cleat and TDF Setup Parameters

Note: User may need only one or both of the following types of notches.
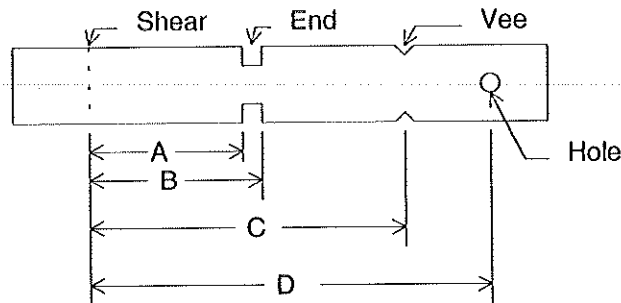
Figure 3-7. Distances for Vee Notch; End Notch Leading and Trailing Edges

Drive Cleat Parameters

DR Vee Notch Distance

Figure 3-7, distance C, this is the distance from the shear to the center of the Vee Notch press.

DR End Notch LE Distance

Figure 3-7, distance A, this is the distance from the shear to the leading edge of the End Notch.

DR End Notch TE Distance

Figure 3-7, distance B, this is the distance from the shear to the trailing edge of the End Notch.

TDF Setup Parameters

TR Vee Notch Distance

Figure 3-7, distance C, this is the distance from the shear to the center of the Vee Notch press.

TR End Notch LE Distance

Figure 3-7, distance A, this is the distance from the shear to the leading edge of the End Notch.

TR End Notch TE Distance

Figure 3-7, distance B, this is the distance from the shear to the trailing edge of the End Notch.

Hole Punch Setup Parameters

Hole Punch Distance

Figure 3-7, distance D, this is the distance from the shear to the center of the hole press.

$$\left(\text{SET UP} \right)$$

To exit this screen and to enter the TIMING PARAMETERS screen press the SETUP key.

```
 2:58PM    8/23/97       0FPM           0.000"
ORDER                                     0Ft
MATERIAL                            N/A% COMP.
              Configuration
          Automatic Mode Options
          Machine Layout/Dimensions
              Timing Parameters
                Time Clock




Type 2     8/19/97       2:26PM          V6.5
```

Figure 3-8. Configuration Screen for Timing Parameters

(ENTER)

Select the ENTER key to view the next set of parameters.

```
 3:23PM    8/23/97       0FPM           0.000"
ORDER                                     0Ft
MATERIAL                            N/A% COMP.
Parameters                        Setup Value
Shear Dwell Down                     *****sec
Shear Reaction                      0.000sec
Shear Boost Dwell                   0.000sec
Shear Boost Reaction               0.0000sec
Die Boost Comp                      0.000sec
Delay After Shear                   0.000sec
Item Complete Dwell                 0.250sec

       Drive Cleat Setup Parameters
Type 1     8/19/97       2:26PM          V6.5
```

Figure 3-9. Timing Parameters

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 0.000 to 9.999 seconds and can be set to the nearest millisecond. If a SHEAR COMPLETE switch is wired in, the SHEAR DWELL should be set to zero. When the SHEAR COMPLETE switch closes, the SHEAR OUTPUT will be turned off immediately. This parameter must be entered or you can not continue to program parts.

Shear Dwell Up

SHEAR DWELL UP is the time necessary for the shear to return from the bottom to the top of its stroke.

Shear Reaction

The SHEAR REACTION time is the time delay that takes place between the time that the shear signal occurs and the time that the die contacts the material. This factor is used on flying die machines only. The maximum value is 0.5000 seconds.
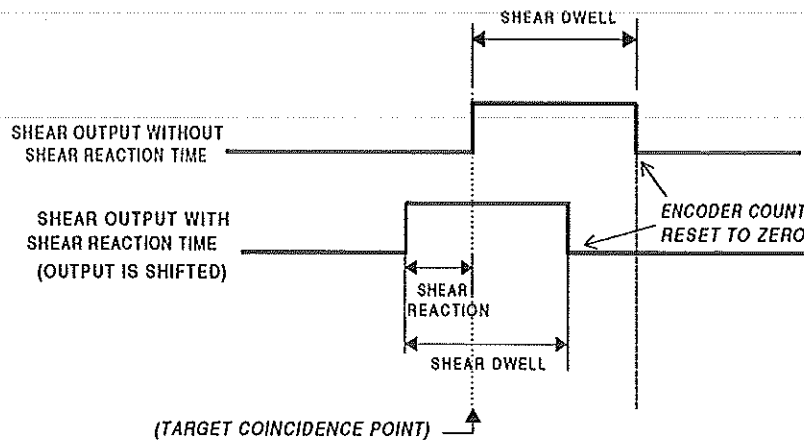
Figure 3-10. Shear Reaction Time

In Figure 3-10, the SHEAR REACTION time will compensate for the time it takes the shear to react to the shear signal. **A SHEAR REACTION time will start the shear output prior to the target coincidence point and keep the shear on for the length of time of the SHEAR DWELL.** This will effectively shift the shear output forward in time which causes the output to start and end earlier than if no SHEAR REACTION time is entered. **A SHEAR REACTION time that is larger than the SHEAR DWELL time is not allowed as it would cause the shear completion time to occur prior to the target coincidence.**

SHEAR REACTION is necessary on some lines because of delays that occur in the shearing of a part due to the time it takes for valves to energize, cylinders to fill, and for dies to move. Since the Shearing function is not instantaneous, the shear must be activated prior to the actual cut point, see figure 3-11.
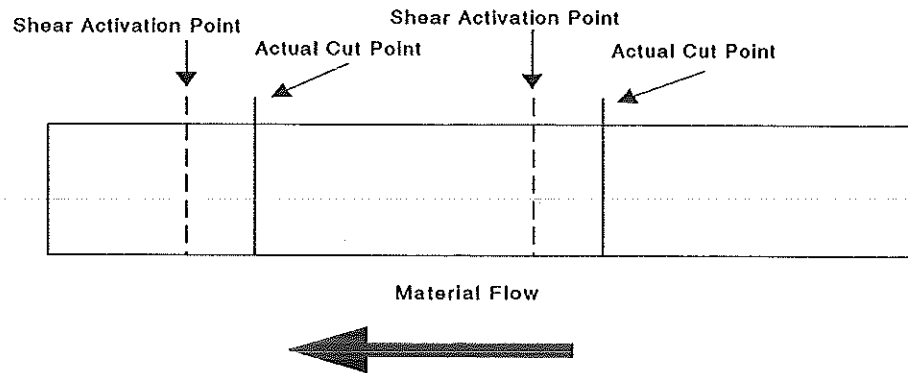
Figure 3-11. Shear Reaction Vs. Actual Cut Point

Calculate the SHEAR REACTION time using the following steps: 1) Set the SHEAR REACTION time to zero. 2) If there is a die boost on the shear die, disable it by disconnecting the wire on the output of the controller. **NOTE: If necessary, slow the line speed down to avoid the metal getting jammed up in the shear die.** 3) Cycle the shear. 4) Run two parts. 5) Mark the parts "1st Part" and "2nd Part." 6) Use the following formula for the new SHEAR REACTION time:

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

7) Once the Shear Reaction time is set, rewire in the die boost output.

Shear Boost Dwell

The SHEAR BOOST DWELL time is the time after the shear that the die continues it's forward velocity to keep from causing damage to the leading edge of the material while the die returns. Refer to figure 3-12 for a visual description of the boost parameters. The range of acceptable values is 0.000 seconds

to 9.999 seconds.   The total Die Boost output "on" time is the Die Boost Reaction time + Shear Dwell + Die Boost Dwell. With a zero Boost Dwell, the Boost output will still equal the Shear Dwell time.
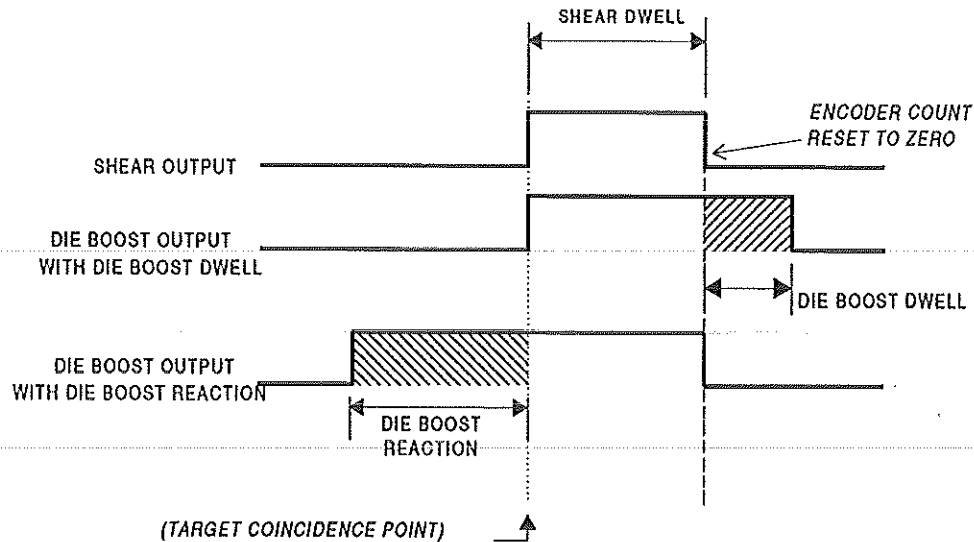
Figure 3-12. Die Boost Timing

Shear Boost Reaction

The DIE BOOST output will be activated at the target coincidence and during the shear output, figure 3-12. The DIE BOOST REACTION time will turn the BOOST on early to allow the die begin matching the line speed before the Press Output (which is often faster than a boost cylinder), is fired. The DIE BOOST DWELL will extend the Boost Output to continue pushing the die forward in order to allow the shear to retract without scraping the part.

When the DIE BOOST REACTION is added, this will advance the DIE BOOST output earlier in time in reference to the Target Coincidence, figure 3-13.   The REACTION does not shift the original output, but adds additional time to it. The DIE BOOST DWELL may still be added to the end of the SHEAR DWELL. Note that the Die Boost Output is not effected by any SHEAR REACTION adjustments.

SHEAR DWELL

SHEAR OUTPUT

SHEAR OUTPUT WITH
SHEAR REACTION TIME
(OUTPUT IS SHIFTED)

*ENCODER COUNT
RESET TO ZERO*

SHEAR
REACTION

SHEAR DWELL

DIE BOOST OUTPUT
WITH BOOST REACTION
AND BOOST DWELL

DIE BOOST
REACTION

DIE BOOST DWELL

(TARGET COINCIDENCE POINT)
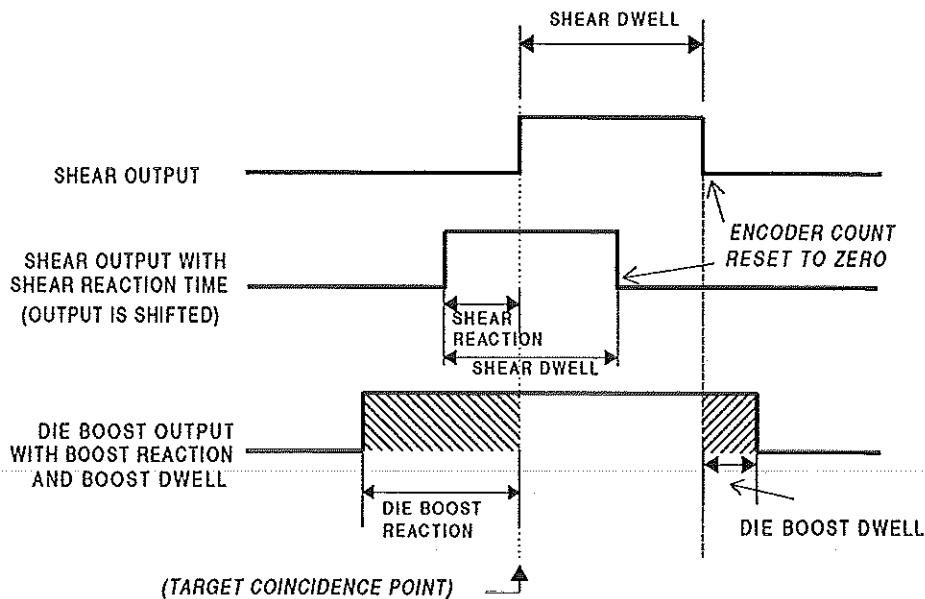
Figure 3-13.   Die Boost Timing with Shear Reaction.

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

Die Boost Comp

The DIE BOOST COMPENSATION is the Length in inches, that the die normally travels forward until it engages the metal during a shear cycle, while in the run mode.

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. Increase this time to produce a longer pause between parts up to a maximum of 60.0 seconds. For no pause, enter zero.

Important Notice:

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

Item Complete Dwell

This parameter sets the time that the ITEM COMPLETE output (#14) is turned on when an item is done and the **XL120** drops out of RUN. The range of time allowed is 0 to 999.99 seconds.

Drive Cleat Setup Parameters

DR End Notch Dwell Down

The DR END NOTCH DWELL DOWN time 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 0.000 to 9.999 seconds which can be set to the nearest millisecond. If a press complete switch is wired in, the DWELL time should be set to zero. When the press complete switch closes, the END NOTCH OUTPUT will be turned off immediately.

DR End Notch Dwell Up

The DR END NOTCH DWELL UP time is the time necessary for the press to return from the bottom to the top of its stroke.

DR End Notch Reaction

The DR END NOTCH REACTION time is the time delay between the time that the punch signal occurs and the time that the die punches the material. This factor is used on flying die machines only. The maximum value is 0.5000 seconds. There is a REACTION time for each Press.

Once the Shear Reaction time and Correction Factor is correct, the END NOTCH REACTION time can be easily calculated. Measure the amount that the notch is lagging it's correct position (amount of error). Then use the following formula of the new END NOTCH REACTION TIME:

$$\text{End Notch Reaction Time} = \left(\frac{\text{Error}}{\text{Line Speed in FPM}} \right) \times 5$$

DR Vee Notch Dwell Down

The DR VEE NOTCH DWELL DOWN time 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 0.000 to 9.999 seconds which can be set to the nearest millisecond. If a press complete switch is wired in, the DWELL time should be set to zero. When the press complete switch closes, the DWELL time will be overridden and the output will be turned off immediately.

DR Vee Notch Dwell Up

The DR VEE NOTCH DWELL UP time is the time necessary for the press to return from the bottom to the top of its stroke.

DR Vee Notch Reaction

The DR VEE NOTCH REACTION time is the time delay between the time that the punch signal occurs and the time that the die punches the material. This factor is used on flying die machines only. The maximum value is 0.5000 seconds. There is a REACTION time for each Press.

Once the Shear Reaction time and Correction Factor are set calculate the VEE NOTCH REACTION time using the following steps: 1) Set the VEE NOTCH REACTION time to zero. 2) Program a "U" shape 30" x 30" part. 3) Cycle the shear. 4) Run the line. 5) Stop after the second vee notch is punched. 6) Jog the material out and measure the leading edge to the first notch (minus any programmed Leading Edge Notch size. This value can be found in the Edit Lock Data, and may be the Male or Female Lock depending upon the actual die configuration). 7) Measure the first notch to the second notch. 8) Use the following formula for the new VEE NOTCH REACTION time:

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

LE to 1st Vee = Leading Edge to 1st Vee Notch minus any programmed Leading Edge Notch size.

TDF Setup Parameters

TR End Notch Dwell Down

The TR END NOTCH DWELL DOWN time 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 0.000 to 9.999 seconds which can be set to the nearest millisecond. If a press complete switch is wired in, the DWELL time should be set to zero. When the press complete switch closes, the END NOTCH OUTPUT will be turned off immediately.

TR End Notch Dwell Up

The TR END NOTCH DWELL UP time is the time necessary for the press to return from the bottom to the top of its stroke.

TR End Notch Reaction

The TR END NOTCH REACTION time is the time delay between the time that the punch signal occurs and the time that the die punches the material. This factor is used on flying die machines only. The maximum value is 0.5000 seconds. There is a REACTION time for each Press.

Once the Shear Reaction time and Correction Factor is correct, the END NOTCH REACTION time can be easily calculated. Measure the amount that the notch is lagging it's correct position (amount of error). Then use the following formula of the new END NOTCH REACTION TIME:

$$\text{End Notch Reaction Time} = \left(\frac{\text{Error}}{\text{Line Speed in FPM}} \right) \times 5$$

TR Vee Notch Dwell Down

The TR VEE NOTCH DWELL DOWN time 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 0.000 to 9.999 seconds which can be set to the nearest millisecond. If a press complete switch is wired in, the DWELL time should be set to zero. When the press complete switch closes, the VEE NOTCH OUTPUT will be turned off immediately.

TR Vee Notch Dwell Up

The TR VEE NOTCH DWELL UP time is the time necessary for the press to return from the bottom to the top of its stroke.

TR Vee Notch Reaction

The TR VEE NOTCH REACTION time is the time delay between the time that the punch signal occurs and the time that the die punches the material. This factor is used on flying die machines only. The maximum value is 0.5000 seconds. There is a REACTION time for each Press.

Once the Shear Reaction time and Correction Factor are set calculate the VEE NOTCH REACTION time using the following steps: 1) Set the VEE NOTCH REACTION time to zero. 2) Program a "U" shape 30" x 30" part. 3) Cycle the shear. 4) Run the line. 5) Stop after the second vee notch is punched. 6) Jog the material out and measure the leading edge to the first notch (minus any programmed Leading Edge Notch size. This value can be found in the Edit Lock Data, and may be the Male or Female Lock depending upon the actual die configuration). 7) Measure the first notch to the second notch. 8) Use the following formula for the new VEE NOTCH REACTION time:

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

LE to 1st Vee = Leading Edge to 1st Vee Notch minus any programmed Leading Edge Notch size.

Hole Punch Setup Parameters

Hole Punch Dwell Down

The HOLE PUNCH DWELL DOWN time 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 0.000 to 9.999 seconds which can be set to the nearest millisecond. If a press complete switch is wired in, the DWELL time should be set to zero. When the press complete switch closes, the HOLE PUNCH OUTPUT will be turned off immediately.

Hole Punch Dwell Up

The HOLE PUNCH DWELL UP time is the time necessary for the press to return from the bottom to the top of its stroke.

Hole Punch Reaction

The HOLE PUNCH REACTION time is the time delay between the time that the punch signal occurs and the time that the die punches the material. This factor is used on flying die machines only. The maximum value is 0.5000 seconds. There is a HOLE PUNCH REACTION time for each Press.

Once the Shear Reaction time and Correction Factor are set, calculate the HOLE PUNCH REACTION time using the following steps: 1) Set the PRESS REACTION time to zero. 2) Program an "L" shaped 60" x 60" part with 2 holes on each leg. 3) Cycle the shear. 4) Run the line. 5) Stop after the second hole is punched. 6) Jog the material out and measure the leading edge to the first hole (minus any programmed Leading Edge Notch size. 7) Measure the first hole to the second hole. 8) Use the following formula for the new HOLE PUNCH REACTION time:

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

LE to 1st hole = Leading Edge to 1st hole minus any programmed Leading Edge Notch size.

Gag Setup Time

The GAG SETUP TIME is the amount of time the gag needs to engage before the punch. This is used only when manually firing any of the punches requires a gag. The range of values allowed is 0 to 9.999 seconds.

Speed Logic Setup Parameters

Stopping Reaction Mode

On feed-to-stop machines, a STOPPING REACTION time parameter is used. This represents the time delay from the time that the controller turns off the movement outputs until the material actually stops. The user has a choice of three STOPPING MODES: AUTO, MANUAL, or OFF.

AUTO: The **XL120** controller turns off the movement outputs prior to the actual shear or punch point to allow for the momentum and inertia of the machine. A new STOPPING REACTION time is calculated after each stop based on the average stopping time for several cycles. This parameter may be overridden in the Manual Calibration mode but the value will be modified on the next part that is run. The maximum value is 5.000 seconds.

MANUAL: The **XL120** controller turns off the movement outputs prior to the actual shear or punch point as above. However, when in MANUAL, the controller does not recalculate a new STOPPING REACTION time after each stop. Whatever value is manually entered remains constant. The maximum value is again 5.000 seconds.

OFF: A STOPPING REACTION time is not calculated and is not used at all by the controller. The movement outputs are turned off when the material past the shear point is equal to the programmed length of the part. This should cause parts to come out long due to the momentum of the machine and material during stopping. Also, when the STOPPING MODE is set to OFF a tolerance test is not performed.

The default mode for STOPPING REACTION time is AUTO which is the recommended mode of operation.

Stopping Reaction

The time it takes for the line to come to a stop after the outputs are turned off. It is adjusted automatically after every stop by the **XL120** if the STOPPING REACTION MODE has been set to AUTO.

Decel Factor Mode

On two-speed machines, a DECELERATION (DECEL) FACTOR is used by the **XL120** controller when changing from fast to slow speeds. The user has the option to select from three DECEL FACTOR MODES: AUTO, MANUAL, or OFF.

AUTO: A DECEL FACTOR is automatically maintained by the **XL120**. It is expressed in inches-per-second-per-second (In/Sec^2) and is used in the Adaptive Slowdown calculation. The parameter can be overridden but will change on the next movement.

MANUAL: A DECEL FACTOR may be manually entered into the controller. The value is used in the Adaptive Slowdown calculation. Some trial and error may be necessary when in the MANUAL mode to find a DECEL FACTOR which works properly. Ideally, the machine should shift from fast to slow at some distance prior to the target (shear or punch point) long enough so that it reaches a constant slow velocity before the movement outputs are turned off.

If the machine tends to shift into slow too soon, increase the DECEL FACTOR. If the machine tends too shift into slow too late, decrease the DECEL FACTOR. The DECEL FACTOR should be used in conjunction with the MINIMUM SLOW DISTANCE to determine the ideal time to change from fast to slow.

While in the MANUAL mode, the **XL120** will not calculate a new value for the DECEL FACTOR after each stop.

OFF: No DECEL FACTOR is used and the **XL** controller will not make an Adaptive Slowdown calculation. The machine will shift from fast to slow when the material has reached the MINIMUM SLOW DISTANCE before the target. For example, if the MINIMUM SLOW DISTANCE has been set to four inches, the machine will shift from fast to slow 4 inches before the shear or punch point. This may or may not be enough distance for the machine to decelerate properly.

The DECEL FACTOR mode defaults to OFF but may be used in MANUAL or AUTO to increase productivity.

Decel Factor

This is used by the **XL** to obtain the proper slowdown distance. It is adjusted automatically after every stop made by the **XL** if the DECEL mode has been set to AUTO.

```
                    ╭─────────────────────╮
                    │       SET UP        │
                    ╰─────────────────────╯
```

To exit this screen and to enter the TIME CLOCK screen press
the SETUP key.

```
┌────────────────────────────────────────────────────┐
│  4:18PM    8/23/97        0FPM          0.000"      │
│ ORDER                                      0Ft      │
│ MATERIAL                         N/A%  COMP.        │
│ ▓▓▓▓▓▓▓▓▓▓▓▓▓ Configuration ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓        │
│              Automatic Mode Options                 │
│           Machine Layout/Dimensions                 │
│               Timing Parameters                     │
│ ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ Time Clock ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓        │
│                                                     │
│                                                     │
│                                                     │
│                                                     │
│ Type 1     8/19/97        2:26PM          V6.5      │
└────────────────────────────────────────────────────┘
```

Figure 3-14. Time Clock Configuration Screen

```
                    ╭─────────────────────╮
                    │       ENTER         │
                    ╰─────────────────────╯
```

Select the ENTER key to view the next set of parameters.

```
 4:24PM       8/23/97        0FPM        0.000"
ORDER                                    0 Ft
MATERIAL                           N/A% COMP.
                    Setup Clock
Time Format                              AM/PM
Set AM/PM                                  PM
Set Hours                                   4
Set Minutes                                24
Set Seconds                                10
Set Day                                    23
Set Month                                   8
Set Year                                 1997


Type 1        8/19/97        2:26PM        V6.5
```

Figure 3-15. Time Clock Setup Screen

This mode allows you to set the **XL120** controller's built-in calendar/clock, as well as to set the time display format.

The first option allows you to choose between AM/PM and 24-Hour (Military-style) time display. Press any number key to toggle between the two modes, and press ENTER when the correct one is shown.

The remaining lines allow entry of the current time and date. When you make any changes on this screen, the **XL** controller will begin keeping track of the time and date from that point.

When using the **XL Link** option, the PC will automatically control the TIME CLOCK and will override any time entered in the controller using this mode.

SET UP

To exit this screen and to enter the **XL120** CONTROLLER screen press the SETUP key. **Note: to get to the next screen a SHEAR DWELL DOWN time must be entered under the TIMING PARAMETERS setup screen.**

```
 4:36PM    8/23/97        0FPM           0.000"
ORDER                                       0Ft
MATERIAL                            N/A% COMP.
              XL120 Controller
             Calibration Trim
              Configuration
           Down Stream Machines
              Edit Lock Data
           Input/Output Status
               Memory Test
              Communications




Type 1     8/19/97       2:26PM           V6.5
```

Figure 3-16. XL120 Controller Setup Screen

Calibrate Trim

The **XL120** controller's CALIBRATE TRIM feature automatically computes a new CORRECTION FACTOR which will be used in the controller's length calculations to adjust for errors in the size of the measuring wheel. The controller displays the length of the last part cut and asks the user to enter the actual measured length. The controller then calculates 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 3/8" long, etc.).

The CORRECTION FACTOR may be computed by hand using the following steps: 1) Run ten parts of equal lengths, 120" for example. 2) Measure the ten parts. 3) Find the average length by adding up all ten parts and dividing by ten. 4) 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

(**ENTER**)

Press the ENTER key to enter the Calibrate trim mode.

```
 4:48PM      8/23/97      0FPM        0.000"
ORDER                                    0 Ft
MATERIAL                          N/A% COMP.
                  Calibrate Trim

Last Part Cut Was                   120.000"

Enter Measured Part                 119.875"

Old Correction                      100.000%

New Correction                      100.104%

UpDate Correction?                        No
Type  2      8/19/97      2:26PM        V 6.5
```

Figure 3-17. Calibrate Trim Screen

(**SET UP**)

To exit the CALIBRATE TRIM mode press the SETUP key. This will return the controller back to the XL CONTROLLER SETUP SCREEN, figure 3-16.

Configuration

This returns the controller to the original setup menu that is seen when the controllers memory is cleared, figure 3-1.

Edit Lock Data

Pressing ENTER will put the controller in the EDIT LOCK DATA SCREEN.

```
 4:59PM    8/23/97      0FPM           0.000"
ORDER                                      0Ft
MATERIAL                          N/A%  COMP.
Lock   Male   Female  Bend   Corner   Offset
  0     0.44   1.38   0.00    0.00     0.25
  1     0.44   1.38   0.03    0.00     0.25
```

Figure 3-18. Edit Lock Data Screen

Lock

The ID used to reference a lock. Valid options are 0-99

Male

The amount of material removed to form the MALE LOCK, see figure 3-19.

Female

The amount of material removed to form the FEMALE LOCK, see figure 3-19.
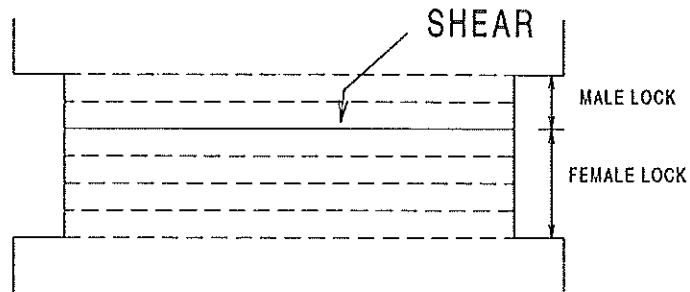
Figure 3-19. Male and Female Lock Formation

Bend

Allows the user to enter a Bend Allowance for each Lock Type programmed. "Bend Allowance" is the length that is subtracted from each side. This is used to compensate for gain due to each bend and the difference between real and nominal measures. For example, when making a ⊏⊐ shaped part (wrap-around type), there will be three corner notches for the three bends. At each bend the **XL120** controller will subtract the BEND ALLOWANCE from both the height section and the width section. So on a part with three bends, the controller subtracts a total of 6 BEND ALLOWANCES from the overall part length. This is shown in figure 3-20.
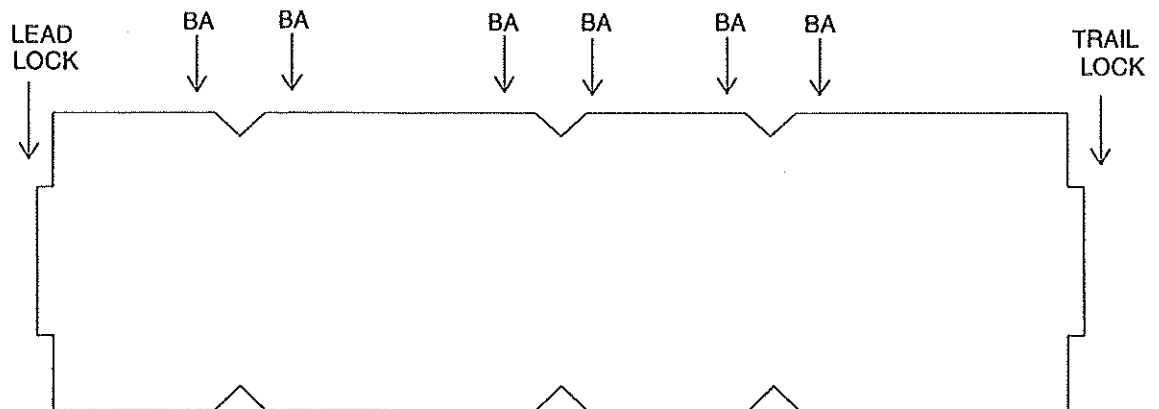
Figure 3-20. Bend Allowance

Corner

The CORNER ROTATION takes into account the amount of material that is added to the leg of the part adjacent to the female notch when the notch is formed. The section of the duct which is adjacent to the female lock will be shortened by one CORNER ROTATION. Female-Female parts will require the CORNER ROTATION programmed to be two times the normal CORNER ROTATION. Male-Male parts require no CORNER ROTATION to be programmed. See figure 3-21.
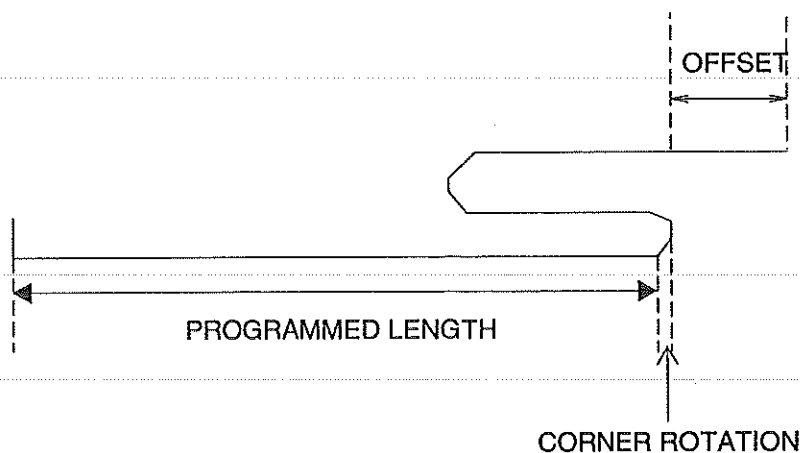
Figure 3-21. Corner Rotation and Lock Offset

Offset

The extra material on the leading edge of the lock that needs to be accounted for when the part hits either the pin spotter or the back gauge. See figure 3-21.

Press SETUP to return to the XL120 Controller Setup screen

Input/Output Status

This mode allows you to view the current status of all the **XL120** controller's inputs and outputs. This can be very helpful in troubleshooting the system during and after installation.

```
 5:04PM      8/23/97        0FPM         0.000"
ORDER                                      0 Ft
MATERIAL                             N/A% COMP.
┌─Inputs──────Inputs──────Outputs─────Outputs─┐
JogFwd   0 ManVee   0 Forward 0 HolePnch 0
JogRev   0 ManHole  0 Slow    0 CntrHole 0
Run      0 EndComp  0 Reverse 0 OutrHole 0
ShrComp  0 VeeComp  0 Shear   0 HolePos  0
Lockout  0 HoleCmp  0 Run     0 ShearUp  0
ManShr   0 Input14  0 EndPnch 0 ItemComp 0
Man End  0 Input15  0 VeePnch 0 Output15 0
Detect   1 Input16  0 DieSlct 0 Output16 0

            1=ON    0=OFF
```

Figure 3-22. Input/Output Status Screen

Press the SETUP key to exit the Input/Output Status Screen
and return to the XL120 Controller Setup Screen.

Memory Test

This causes the controller to enter a self-test mode in which it
verifies all internal memory "chains". If no errors are reported,
all memory can be considered good.

```
 5:08PM      8/23/97        0FPM         0.000"
ORDER                                       0Ft
MATERIAL                             N/A% COMP.
            XL120 Controller
           Calibration Trim
            Configuration
         Down Stream Machines
            Edit Lock Data
         Input/Output Status
              Memory Test
            Communications



Type 1       8/23/97        2:26PM       V6.5
```

Figure 3-23. Memory Test Screen

Communications

```
5:12PM     8/23/97      OFPM        0.000"
ORDER                                OFt
MATERIAL                      N/A% COMP.
        XL120 Controller
        Communications Setup
        Communications Test




Type 1      8/19/97      2:26PM      V6.5
```

Figure 3-24. Communications Screen

Communications Setup

The Communications Setup information is for use with **XL-LINK**
software. Up to 30 **XL** units can be connected on a single
network for communications with a computer for remote order
entry if the Serial Communications option has been purchased.
The following parameters can be programmed:

Network Unit Number	1-30
Baud Rate	300,600,1200,2400,4800,9600,19200,38400
Stop Bit	1 or 2
Data Bit	7 or 8
Parity	Even,Odd,Off

If not using the Link program, set Network Unit Number to zero.
The display will show ** after a zero is entered.

```
┌─────────────────────────────────────────────────┐
│  5:18PM    8/23/97      0FPM       0.000″        │
│ ORDER                                    0Ft     │
│ MATERIAL                        N/A% COMP.       │
│▓▓▓▓▓▓▓▓▓▓▓Communications Setup▓▓▓▓▓▓▓▓▓▓▓▓        │
│ Setup Value                   Parameters         │
│▓Network Unit Number▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓**▓          │
│ Baud Rate                         9600           │
│ Stop Bit                             1           │
│ Data Bit                             8           │
│ Parity                            Even           │
│ Use Scrap Codes                     No           │
│                                                  │
│                                                  │
│                                                  │
│ Type 1      8/19/97       2:26PM      V6.5       │
└─────────────────────────────────────────────────┘
```

Figure 3-25. Communications Setup Screen

Use Scrap Codes

When using the XL-Link package, you may choose to set the parameter USE SCRAP CODES to Yes. This will force the operator to enter a scrap reason any time an INCREASE QUANTITY command is used. It will also force a scrap reason after a manual shear if the setup parameter MANUAL SHEAR SCRAP LENGTH is used. A list of scrap reasons may be downloaded from the PC so the operator may simply choose a scrap reason rather than having to enter a number.

Communications Test

This mode displays the communications Unit number, the Baud rate, the number of messages left to be sent to the office computer, and the display of the last received and transmitted messages. The information on this screen can be very helpful in troubleshooting the communications link with the office computer.

```
 5:22PM      8/23/97      0FPM         0.000"
ORDER                                     0Ft
MATERIAL                        N/A% COMP.
                Communications Test
Unit Number: **                  Baud: 9600
Number of Unsent Messages:                 1
          Press ENTER to Delete Messages
Last Message Received:
     No Job Data Received

Last Message Sent:
     No Production Data Sent


```

Figure 3-26. Communications Test Screen

Part Programming

Programming the **XL120** controller is a simple matter of keying in data in the highlighted field, where characters are shown as light figures against a dark background. The ENTER key is a "take it" command from the operator to the controller, meaning 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 data already programmed. Note that you <u>must</u> use the ENTER key to enter new or altered data into memory.

Changes are made by simply 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. new correct value can then be keyed in. When the correct value is displayed, press the ENTER key to move to the next field.

Order Number

Enter the Programming Mode by pressing the PROGRAM key. The first data item to enter is the Order Number, indicated by the highlighted portion of the display. The Order Number can be up to fifteen characters long and may include the letters A-Z. To enter a letter, simply press the "CE" key and then use the blue UP and DOWN arrows to toggle through the letters and symbols. A RIGHT arrow moves to the next letter or number to be entered.

You may review and correct jobs previously programmed. Press the ENTER key to confirm the present Order Number.

```
10:32PM    8/24/97         0FPM          0.000"
ORDER                                       0Ft
MATERIAL                            N/A%  COMP.
ORDER              MATERIAL        FT    STATUS
123                22GA X 60"       0   Empty
```

Figure 4-1. Order Screen

Material Code

Next to be programmed is the Material Code, which can be up
to twelve characters long, and may include numbers and letters
A-Z. To enter a letter, simply press the "CE" key and then use
the blue UP and DOWN arrows to toggle through the letters and
symbols. A RIGHT arrow moves to the next letter or number to
be entered.

After entering the Material Code, a screen entering the cutting
list appears. On this screen, the Lift Number, Quantity, Part
Type, Height, Width, Lock Number, Velocity, Connector Type,
Punching Option, and Status appears.

You may review and correct jobs previously programmed.
Press the ENTER key to confirm the present Material Number.

```
10:57PM    8/24/97        0FPM              0.000"
ORDER                                           0Ft
MATERIAL                             N/A% COMP.
123                    22GA X 60"
LF   QTY T HEIGHT  WIDTH   L VE CO P  STA
 1    50 □  48.00"  60.00"  1 NO NO 00 Nxt
 1   100 ⊔  36.00"  60.00"  2 HI DR 11 Rdy
 2    75 I  72.00"  60.00"  1 LO TR 33 Rdy
 2    50 L  48.00"  60.00"  3 SP DR 10 Rdy
 2    65 ⊡  60.00"  60.00"  2 NO DR 31 Rdy
 3    30 I  48.00"  60.00"  3 NO TR 13 Rdy
 3     0 ⊡   0.00"   0.00"  0 NO NO 00 Emp
```

Figure 4-2. Part Programming Screen

Description of fields

LF Lift (Bundle) - Used by the **XL LINK** for items within an order. The line will be halted after every item even if they have the same LF. This allows all parts to be formed when using downstream controllers before starting a new lift. One exception is if all characteristics of the line items stay the same (i.e. Lift, Type, Height, Width, Lock, Velocity, Connector, and Hole Punch Options), the controller will stay in run until all parts are made. Another exception is when running shear only parts, the controller will stay in run until a change in Lift numbers or a different part Type is seen, regardless of part length. You can change the sequence of the items by using the MOVE UP and MOVE DOWN keys. Highlight the item to be moved, then press MOVE UP or MOVE DOWN.

QTY Quantity - Enter the number of pieces that you would like to make.

TYP (T)   Part Type - One of four options: The machine configuration (U-shape or Z-shape) will determine which dimension exits the machine first. If a U-shaped configuration is used, the width dimension will exit the machine first. If a Z-shape configuration is used, the height dimension will exit the machine first. There is one exception to this, a U-shaped part will be produced in the order of height, width, and height, regardless of the machine configuration, so the remaining width will need to be programmed separately.

I   - Shear only: When this option is selected, only the lift, qty, type and height (length) fields are enabled. All other fields should be skipped.

☐   - Full wrapper: One piece is made that is bent three times to form a complete section of duct.

⊔   - "U" shaped: One piece is made that is bent two times to form a "U" section. The flat sheet must be programmed separately by programming a ☐ shape piece, programming a width dimension only.

L   - "L" shaped: One piece is made that is bent one time to make an "L" section. For every full piece of duct that is needed, two "L" sections need to be programmed.

⊔̄   - Four piece: One piece is made for each part programmed. For every full piece of duct that is needed, four pieces need to be programmed in two separate lifts. Two pieces are made for the height and two pieces are made for the width.

Height Height of the duct for all but shear-only parts (in which case it is the length of the part).

Width Width of duct. Not valid for shear-only parts.

LK   Lock number (see "Edit Lock Data Screen", figure 2-15). Valid options: 0-99.

VE   Velocity - This is only used by the MP343 Pinspotter. Different velocities require different pin spacing for the insulation. Valid options: HI (high), LO (low), SP (special), and NO (none).

CO Connector type - This determines which set of connector punches to use (drive-cleat or TDF). Valid options: DR (drive-cleat), TR (transverse duct flange), NO (none). When NO is selected, the length of the part produced will include the length of the notches defined under the Lock Number.

P Punching option - For newer machines that support conduit re-enforcement struts. The first digit indicates the number of holes across to produce for the "height" leg (0 - none, 1-9 respectively are the number of holes punched). The second digit is for the number of holes on the "width" leg. The holes are spaced evenly across each leg of the part, see figure 4-3.

Note: When punching holes in Four-Piece duct, you must program half of the completed duct as the height and the other half as the width. Programming all parts as the height or width will result in all of the holes being offset to the same position, causing all of the holes to line up with each other. Likewise, when programming the cap for a U-Shape part the cap piece must be programmed as the width for proper hole alignment.

ST The Status of the part (Ready, Next, Done, Fill, Skip, Delete).

Conduit Hole Punch Patterns for the XL120
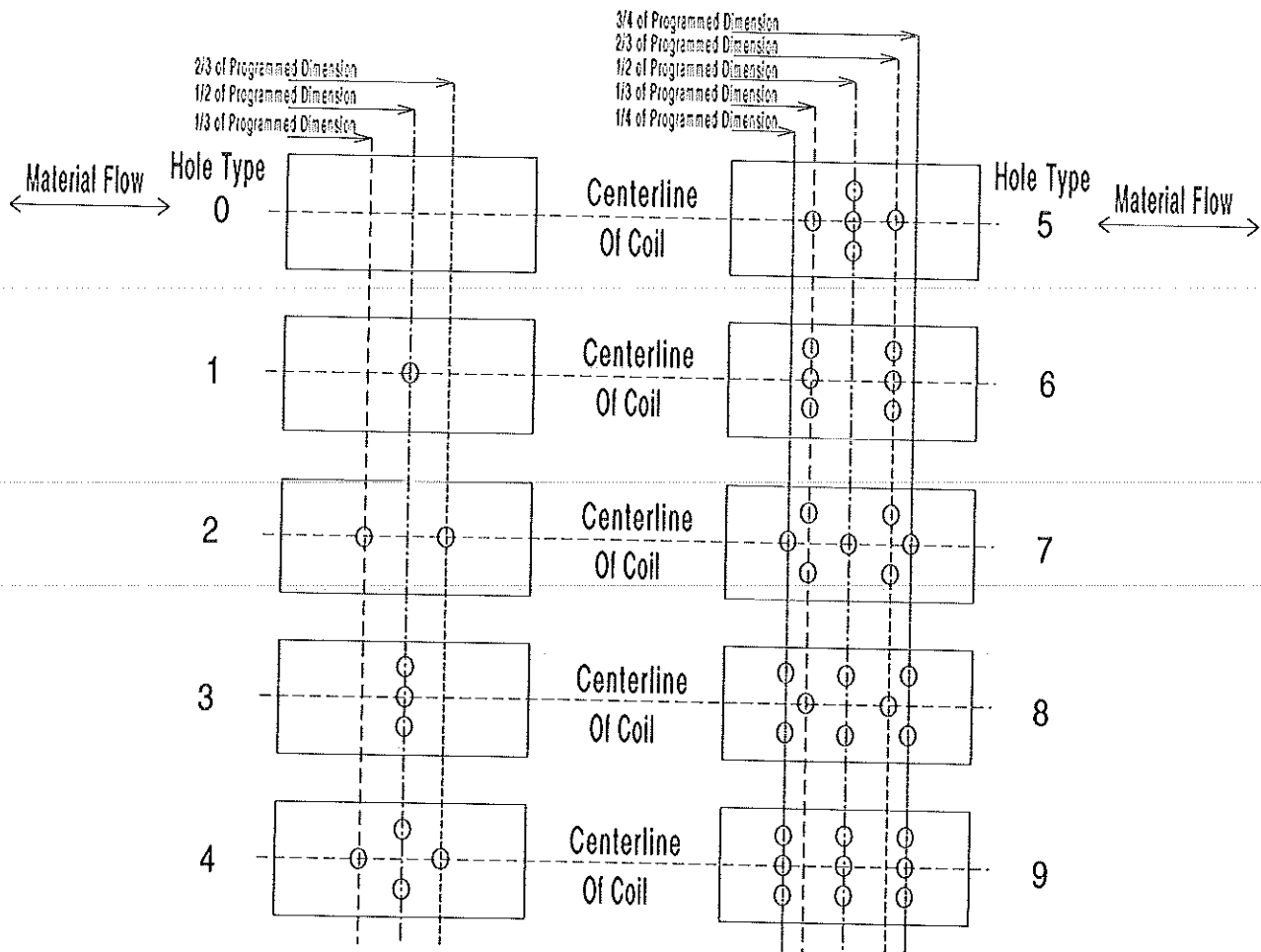
Figure 4-3. XL120 Hole Patterns

Exiting the Program Mode

The **STATUS** key is used to exit the PROGRAM mode and revert to the normal running display.

Note: Be sure to press the STATUS key before you attempt to enter the Run (automatic) mode.

(**STATUS**)
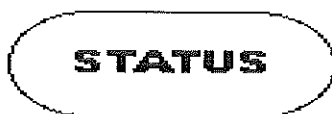
Referencing Controller to the Material

The **XL120** 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 thereafter. This is a process called referencing.

Referencing is simply loading material into the machine past the shear and closing the MANUAL SHEAR input switch. At the bottom of the shear stroke, the length counter is set to zero and the controller is referenced. If there are FILLED parts, the shear must be cycled twice 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.

Running the Machine

Main Status Display

The top three rows of the **XL120** controller's display always show certain vital information, regardless of the controller's current programming mode and resulting display on the lower rows. The top display consists of the current time of day, date, line speed, amount of uncut material past the shear, order number, total length of the order, material code, and percentage of order completion.

```
 1:52PM      8/24/97      0FPM          0.000"
ORDER:      123                         936Ft
MATERIAL:  22GA X 60"              0%  COMP.
LF   QTY  DNE  T  HEIGHT    WIDTH   LK  V  C  PP  S
123                    22GA X 60"
 1    50   0  □ 48.00"   60.00"   1  N  N  00  N
 1   100   0  ⊔ 36.00"   60.00"   2  H  D  11  R
 2    75   0  | 72.00"   60.00"   1  L  T  33  R
 2    50   0  ∟ 48.00"   60.00"   3  S  D  10  R
 2    65   0  ⊐ 60.00"   60.00"   2  N  D  31  R
 3    30   0  | 48.00"   60.00"   3  N  T  13  R
```

Figure 4-4. Typical Status Screen

The parameters given on the status screen are the same as the part programming screen with one more parameter added:

DNE The number of parts that have been completed by the controller.

Other abbreviations include:

LK = Lock number

V = Velocity

C = Connector

PP = Punching Option

S = Status

If there are no items programmed or if the setup parameter "Set Done Items to Ready" is set to YES, the % Comp. Will be displayed as N/A (not applicable).

EXISTING
CMP1000
WIRING

XL120 Controller

JOG FWD

WHT — A → A3 INPUT #1 - JOG FWD
RED — E → C2 I/O COMMON
BRN — C → A4 INPUT #2 - JOG REV

SHEET DETECT

BLK — G → B4 INPUT #8 - SHEET DETECT
GRN — J

SHEAR COMPLETE   BLU — L → A6 INPUT #4 - SHEAR COMPLETE
END COMPLETE   ORG — M → C13 INPUT #11 - END COMPLETE
                         U
VEE COMPLETE   YEL — T → C14 INPUT #12 - VEE COMPLETE
HOLE COMPLETE   GRY — N → C16 INPUT #13 - HOLE COMPLETE
                  PINK — V
MANUAL HOLE   TAN — S

* Provided on accessory
  switch panel

B
D
F
H
K
P

3448
CABLE

R

115VAC   BLK — J → A1 CONTROLLER CPU POWER
AC RET. WHT — K   24V DC + / -   → A2
         GRN — L
         ORG — N
+5 VDC   BLU — E

2041
CABLE

FWD   GRN-BLK — A ← A8 OUTPUT #1 - FORWARD
SLOW   ORG-BLK — I ← A9 OUTPUT #2 - SLOW
REV   WHT-BLK — G ← A10 OUTPUT #3 - REVERSE
SHEAR   RED — M ← A11 OUTPUT #4 - SHEAR
END NOTCH BLU-BLK — H ← A13 OUTPUT #6 - END NOTCH
VEE NOTCH GRN-WHT — F ← A16 OUTPUT #7 - VEE NOTCH
DIE SELECT RED-BLK — B ← B1 OUTPUT8 - DIE SEL
HOLE   BLK-WHT — C ← C3 OUTPUT 9 - HOLE
           RED-WHT — D

AMS
ENCODER

WHT — A → B14   A+
BLK — B → B13   A-
GRN — C → B12   B+
BLK — D → B11   B-
RED — I ← B8   +5VDC
BLK — J ← B7   GND
      G

2148
CABLE   4500-1

	REVISIONS		AMS CONTROLS, INC.
NO.	DATE	BY	
A			TITLE
B			MACHINE INTERFACE
C			DRAWN BY DFK	SCALE		MATERIAL
D			CHK'D	DATE 6-19-97	DRAWING NO.
E			FILE 4328.dw2	APP'D	4328

```
 2:27PM      8/24/97      0FPM         0.000″
ORDER:                                    0Ft
MATERIAL:                       N/A%  COMP.
LF   QTY  DNE  T   HEIGHT   WIDTH   L  V  C  PP  S



```

Figure 4-5. Status Screen With No Items Programmed

Status Mode Display

When the **XL120** controller is in the Status mode, the lower twelve lines of the display are used to show details of the Order currently being run.

The STATUS display is the same as the ORDER ENTRY screen with the addition of the quantity completed. The letter code on the right hand column shows the status of each line. The codes are as follows:

Status Screen	Program Screen	Status
W	Work	The item currently being cut
F	Fill	Item started but not yet being cut
N	Next	Next item to run
R	Ready	This item is ready to run
S	Skip	Skip this item
D	Done	This item is done
X	Delete	This item has been deleted

Setting the Next Order (Item) to Run

To set the Next Order (Item) to run, press the STATUS key to enter the Status Display mode. Then use the blue UP ↑ and DOWN ↓ arrow keys to highlight an Order (Item) which has a current status of READY or SKIP. When the desired row is highlighted, press the NEXT LINE key to cause the status of this Item to change to NEXT. This can be done ONLY while the machine is halted.

If an Item with a punch pattern has been partially completed when another Order (Item) is set to NEXT, two events will happen. The new Order (Item) will obtain a status of NEXT while the partially completed Item will obtain a status of FILLED. A status of FILLED means that information about the next several parts (between one and three) has already been sent to the computer. The XL120 controller will make these few pieces immediately after the RUN input is closed regardless of which line is set to NEXT. The machine will then halt, and the new NEXT LINE TO RUN will be ready for production.

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:

1. Halt the machine.
2. Manually cycle the shear TWICE to eliminate the parts which have already been FILLED.
3. Set NEXT LINE TO RUN as above.
4. Press the RUN input switch.

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

Skipping an Order or an Item

To skip an entire Order, or just an Item, press the STATUS key to enter the Status Display mode, then use the blue UP ↑ and DOWN ↓ arrow keys to highlight the desired ORDER (ITEM). When the desired line is highlighted, press the SKIP LINE key to cause the status of this line to change to SKIP. This can be reversed to READY by pressing the SKIP LINE key again with the same line highlighted.

SKIP LINE
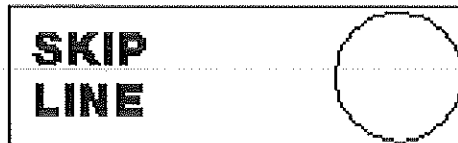
Adding an Item While in the Run Mode

While the machine is running, or any time the **XL120** controller is in the Status Display mode, the operator may add an Item to any Order currently programmed. To do this, use the blue UP ↑ and DOWN ↓ arrow keys to move the highlighted row to the item below which the added line will be inserted. Press the ADD LINE key. Enter the Lift Number, Quantity, Part Type, Height, Width, Lock, Velocity, Connector, and Punch Pattern. This new Item may be set to NEXT (if the machine is halted) or simply be READY for production at a later time.

ADD LINE

Deleting an Order (Item)

To delete an Order (Item), press the STATUS key to enter the Status Display mode, then use the blue UP ↑ and DOWN ↓ arrow keys to highlight an Order (Item) which has the status of READY or SKIP. Press the DELETE LINE key. The status of that Order (Item) is now DELETE (X). To UNDELETE an Order (Item) which has been deleted, simply highlight that row and press the DELETE LINE key again. Any Order (Item) having a status of DELETE will be erased from memory when an **XL120** controller MEMORY TEST is performed or when the power is turned off.

```
┌─────────────────────────────┐
│  DELETE         ╭───────╮   │
│                 │       │   │
│  LINE           ╰───────╯   │
└─────────────────────────────┘
```

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

1. Halt the machine.
2. Manually cycle the shear TWICE to eliminate parts which have already been FILLED.
3. Select any other Order (Item) as NEXT to run.
4. Delete the partially run Order (Item) as above.

Changing the Sequence of Orders (Items)

Orders and Items will be run in the sequence in which they appear on the AMS controller screen. 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 blue MOVE UP or MOVE DOWN key as many times as needed to get to the desired position. This can be done only while the line is halted and the controller is in the PROGRAM mode.

```
╭─────────╮      ╭─────────╮
│  MOVE   │      │  MOVE   │
│  UP     │      │  DOWN   │
╰─────────╯      ╰─────────╯
```

Starting the Machine

After the NEXT LINE is set, the machine is placed in the RUN mode by closing the RUN contact. The **XL120** controller will begin shearing parts to the programmed length and increment the quantity done for each piece cut.

When the quantity done equals the quantity programmed, the line will halt. The line is halted after each line item regardless of the lift number with these two exceptions:

*   If all characteristics of the line items stay the same (i.e. Lift, Type, Height, Width, Lock, Velocity, Connector, and Hole Punch Options), the controller will stay in run until all parts are made.
*   When running shear only parts, the controller will stay in run until a change in Lift numbers or a different part Type is seen, regardless of part length.

Manual Shear

If production has started and the material has to be cut, perhaps to clear a jam up, no other effect occurs except to destroy one piece. 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. 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.

Halting Production

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 any of a number of HALT buttons located on the machine. The movement outputs will be turned off immediately but the **XL120** controller will remain in the RUN mode until the material has stopped. 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).

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 simply highlighting that line and pressing the DELETE LINE key.

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 at noon if the order was completed in the morning, or midnight if the order was completed after noon.

No Parts to Fill in Queue

The **XL120** controller has what is called a queue memory. When the current order has only a few pieces left to run and there is no orders programmed to be run next or if the next order has a different material number, the message "No Parts to Fill in Queue" will be displayed, if the setup parameter "Halt No More Items?" is set to yes.

At this time, it is recommended by the controller to program more jobs for the same material if there are more jobs to be run with the current coil. If a new job is then programmed using the same material that is currently being run and there are jobs with different materials already programmed and one of them is set to Next, it is necessary to set the newly created order to Next before the controller is put back into run.

Footage Totalizer

Coil Inventory

The **XL120** controller has thirty-two pairs of footage totalizers available for keeping track of coil usage. Each pair keeps a running total of good material (on the left) and scrap (on the right) for one of the thirty-two most recently used coils. These totalizers can be viewed only; they cannot be cleared or set to arbitrary values. To view the coil footage totalizers, press the FOOTAGE TOTALIZER key.

```
   FOOTAGE
  TOTALIZER
```

```
 3:21PM     8/24/97       0FPM          0.000"
ORDER:      123                          936Ft
MATERIAL: 22GA X 60"               0% COMP.
             Footage Totalizer
               Change Coil
           Display Coil Data
            Clear Totalizers
          Employee Information

Coil    :1                    Coil Count:   1
Material:22GA X 60"
Employee:      0
               Job        Shift          Coil
Good  :       10Ft        10Ft           10Ft
Scrap :        0Ft         0Ft            0Ft
```

Figure 4-6. Footage Totalizer Screen

Display Coil Footage

To display the COIL FOOTAGE, first press the FOOTAGE TOTALIZER key and then move the highlight bar down to DISPLAY COIL DATA. This will open a new display screen and then move the highlight bar down to DISPLAY COIL FOOTAGE and press ENTER. This display shows the coils contained in inventory, and the amount of good material and scrap material for each.

```
3:25PM    8/24/97        0FPM          0.000"
ORDER:    123                          936Ft
MATERIAL: 22GA X 60"                    0% COMP.
                Display Coil Data
                Display Coil Footage
              Display Coil Material


Coil      :1                      CoilCount:  1
Material:22GA X 60"
Employee:     0
                 Job        Shift        Coil
Good   :        10Ft        10Ft         10Ft
Scrap  :         0Ft         0Ft          0Ft
```

Figure 4-7. Coil Data Screen

Display Coil Material

To display the COIL MATERIAL, first press the FOOTAGE TOTALIZER key and then move the highlight bar down to DISPLAY COIL DATA. This will open a new display screen. Next move the highlight bar down to DISPLAY COIL MATERIAL and press ENTER. This display shows the coils contained in inventory and the corresponding material for each.

Shift Totals and Job Totals

There is also a pair of footage totalizers for keeping track of the amount of material used during a shift. The shift totalizers can be viewed or cleared only; they cannot be set to arbitrary values. The totalizers show the amount of footage that has gone past the shear since the last time the totalizer was cleared, which should be done at shift-change. To clear the shift totalizers, press the FOOTAGE TOTALIZER key, then move the highlight bar down to CLEAR TOTALIZERS and press ENTER.

```
3:29PM    8/24/97        0FPM          0.000"
ORDER:    123                          936Ft
MATERIAL: 22GA X 60"              0% COMP.
              Footage Totalizer
                Change Coil
              Display Coil Data
              Clear Totalizers
            Employee Information

Coil     :1                    CoilCount:  2
Material:22GA X 60"
Employee:       0
                Job       Shift        Coil
Good   :       10Ft       10Ft         10Ft
Scrap  :        0Ft        0Ft          0Ft
```

Figure 4-8. Footage Totalizer/Clear Totalizers Screen

The shift totals will then be displayed, along with the options to clear the Job Totals and to Clear the Shift Totals. Press any number key or the PICK key to toggle the NO response to YES, then press ENTER if you wish to clear the either of the totals.

```
3:33PM    8/24/97        0FPM          0.000"
ORDER:    123                          936Ft
MATERIAL: 22GA X 60"             0% COMP.
              Clear Totalizers
Clear Job Totals                          No
Clear Shift Totals                        No



Coil     :1                    CoilCount:  2
Material:22GA X 60"
Employee:       0
                Job       Shift        Coil
Good   :       10Ft       10Ft         10Ft
Scrap  :        0Ft        0Ft          0Ft
```

Figure 4-9. Clear Job/Shift Totals Screen

The Job Footage Totalizer works in exactly the same way as the Shift Totalizer. This feature is useful when several different orders or jobs are completed during one shift. All footage totalizers display in whole feet.

Special Procedures

Changing 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:

- If the coil has been completely consumed or the material has been cut free of the stock reel, feed the material through the shear in the forward direction and dispose of the scrap piece.

- On a cut-to-length machine with no roll former involved, all of the unused material can be rewound on 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.

- After the machine is empty, close the Manual Shear input.

- This registers all material used to the totalizers. **Note: When using a sheet detect switch, the totalizers are immediately updated and the change coil screen is displayed when the switch opens.**

- Press FOOTAGE TOTALIZER and select CHANGE COIL. If loading a new coil, a new COIL NUMBER must be entered. This number field can accept up to twelve characters.

- Thread the next coil into the machine until a clean edge is past the shear and the material is under the encoder.

Close the Manual Shear input to reference the new coil.

When No Good Footage is Run for a Coil

If after a coil is loaded and no good parts have been run for that coil, the material for an order that has been assigned to be 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 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 is assigned to be NEXT and it is assigned to a different material, the operator will receive a warning that "wrong coil is loaded." This is a warning only and can be ignored.

No Sheet Detect When a New Coil is Entered

If a new coil is loaded in the Change Coil Screen, and the sheet detect input is false, a new coil will not be asked for when the sheet detect switch is actuated.

Handling Material Flaws

With most roll formers and cut-to-length machines, material problems are common. The **XL120** 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 part has been cut by the controller. 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.

The DECREASE QUANTITY is used if it is necessary to decrease the quantity of an order. When the line is halted, pressing the DECREASE QUANTITY will increase the number DONE on the STATUS screen and will increase the GOOD FOOTAGE as well as decrease the SCRAP FOOTAGE of the totalizers.

```
┌─────────────────────────────────┐
│  INCREASE        ╱──────╲        │
│                 ╱   ╱─╲   ╲      │
│  QUANTITY      │    │ │    │     │
│                 ╲   └─┘   ╱      │
│                  ╲──────╱        │
└─────────────────────────────────┘

┌─────────────────────────────────┐
│  DECREASE        ╱──────╲        │
│                 ╱   ┌─┐   ╲      │
│  QUANTITY      │    │ │    │     │
│                 ╲   ╲─╱   ╱      │
│                  ╲──────╱        │
└─────────────────────────────────┘
```
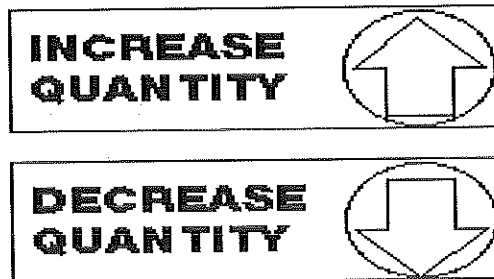
Pressing the INCREASE QUANTITY key while the AMS controller is in the RUN mode will cause the fourth line of the Status Display to flash "Quantity +1" and it will continue to flash until a shear is fired. The current part will be completed with no decrease in quantity, and the controller will continue running the item with no interruption.

If the INCREASE QUANTITY key is pressed while the machine is HALTED, the fourth line of the display will flash the same message and the operator will have two options: Start the machine to make the extra part or press "CE" to cancel the incremented quantity. In either application, if an extra part is made, the Coil Footage Totalizer will be automatically adjusted.

Note: If the "Use Scrap Codes" parameter found in the Communications Setup Screen is set to YES and a Network Unit Number of 1-30 is set, the operator will be prompted to enter Scrap Code after the INCREASE QUANTITY key has been pressed. This code will tell the XL-Link why the scrap piece was produced.

The Increase Quantity key may be pressed up to 20 times with a chance to enter a separate scrap code each time the button is pressed. The scrap footage total will be increased each time a part is made from an Increase Quantity.

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. The second crop starts the production of the part over again and the operator can repeat this process until the good material occurs. The operator would most likely jog the material forward until the flaw is past the shear and then close the MANUAL SHEAR input twice.

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 high job numbers before hand and the operator can switch production to these jobs when extensive flaws occur.

Any parts made from jobs which have Lift Numbers between 900 and 999 will be recorded as scrap material in the FOOTAGE TOTALIZER. Lift Number 0 (zero) is also reserved for scrap parts. When the operator detects an extensive amount of flawed material he may select one of these jobs with the NEXT LINE key. After the flaw has been cleared, he may use the NEXT LINE key again to resume normal production. If the XL-Link program is used, the Scrap Codes programmed at the office PC will coincide with the lift numbers of 900 through 999. For example, Lift # 901 will use scrap code 1 for its scrap reason when produced, Lift # 925 will use scrap code 25 for its scrap reason when produced, etc.

Other Keys

Print Key
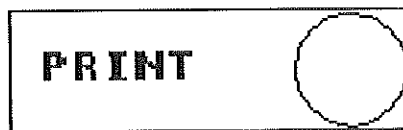
The PRINT KEY is used only with the Bundle tag printer option and is used to print a label when a partial bundle has been run.

Help Key

HELP

The HELP KEY can be used to describe the different fields and screens that are seen on the display.

Home Key and End Key
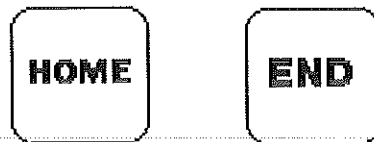
HOME   END

The HOME KEY will move the highlighted cursor to the top line of the selected function even if that line is not present on the screen. The END KEY will move the highlighted cursor to the bottom line of the selected function even if that line is not present on the screen.

Page Up and Page Down Key
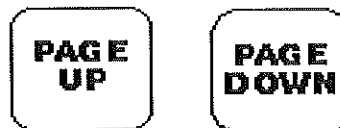
PAGE UP   PAGE DOWN

The PAGE UP KEY will move the highlighted cursor to the top line of the selected function that is present on the screen. The PAGE DOWN KEY will move the highlighted cursor to the bottom line of the selected function that is present on the screen.

Display Key
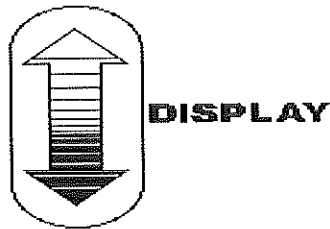
The DISPLAY KEY will lighten or darken the display screen to adjust to the existing lighting.

Part Calculation

There are five types of parts that the **XL120** will produce: shear-only, full-wrapper, "U" shape, "L" shape, and four-piece.

The shear-only part produces a notch-less part whose length is the same as the programmed HEIGHT. The other four types produce sheets for duct work.

The full-wrapper style part has all four walls on one sheet that is bent to produce the finished duct. The "U" shape style produces one piece that consists of two height dimensions and one width dimension. The fourth leg must be made separately by programming one Four-Piece section.

The "L" shape style produces one "L" shaped leg to make half a piece of duct. To make a full piece of duct, twice the number of parts must be programmed.

The Four-Piece style (☐) will produce one part for every one programmed. To make a complete section of duct, two separate lifts must be programmed with 2 pieces in each lift, for each complete section of duct desired. One lift will contain the height dimension, while the other lift will contain the width dimension.

Small duct sections are usually produced in one piece, whereas very large ones are made of four sheets. The following diagrams show the layout of the four duct styles (using TDF connectors):

Full-wrapper:

Bend

Lock seam

Female lock

Vee notch

Male lock

"U" Shape:

Height   Width   Height

Width

Lock seam

Male lock

Vee notch

Female lock

"L" Shape:

Bend

Lock
seam

Male lock   Vee notch   Female lock

Four-piece:

Bend

Male lock   Female lock

Lock
seam
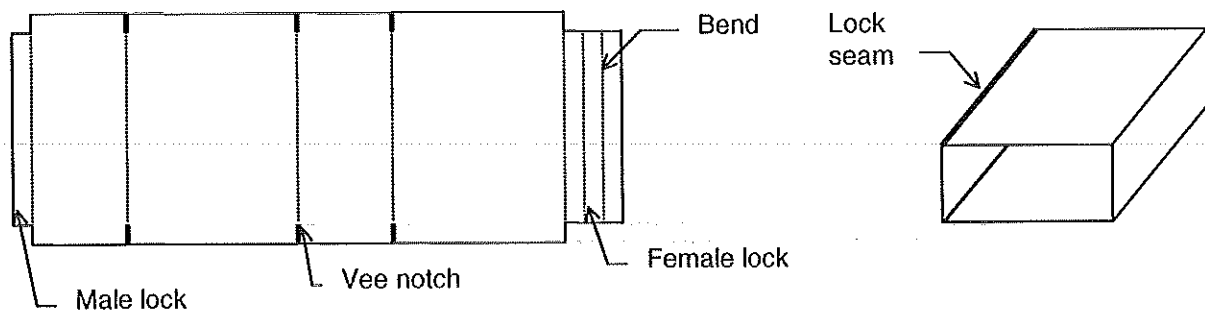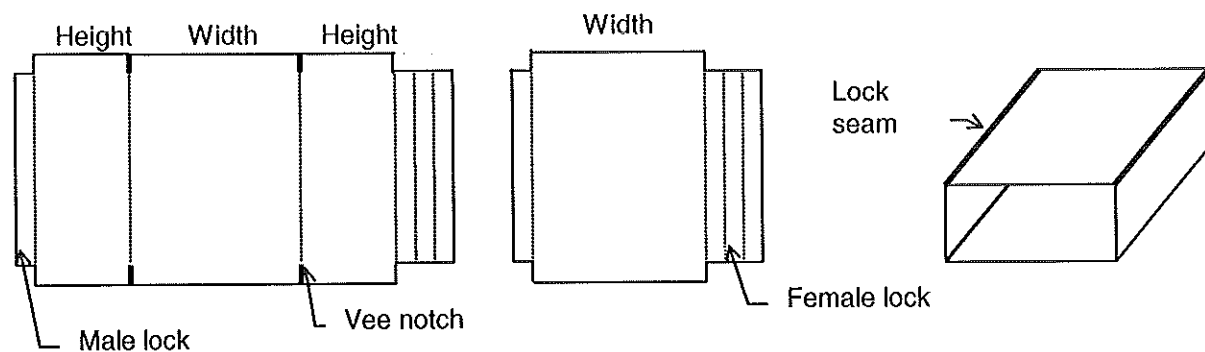
Variations:

- "Machine Configuration" determines if the height or width dimension is produced first. If a "U" configuration is used, the width dimension will exit the machine first. If a "Z" configuration is used, the height dimension will exit the machine first. An exception is when the "U" Shaped part is produced, the height will exit the machine first regardless of the machine configuration.
- "Leading Edge Lock Type" determines if the male or female lock goes on the leading edge of the part.

End Notching:

The size of the end notch may be larger or smaller than the male and female locks. If this is the case, the **XL120** controller will fire the end notch multiple times or double-shear to cut out the extra material. This is only possible with the TDF, however, since the Drive Cleat die shape is not rectangular.

DRIVE CLEAT DIE
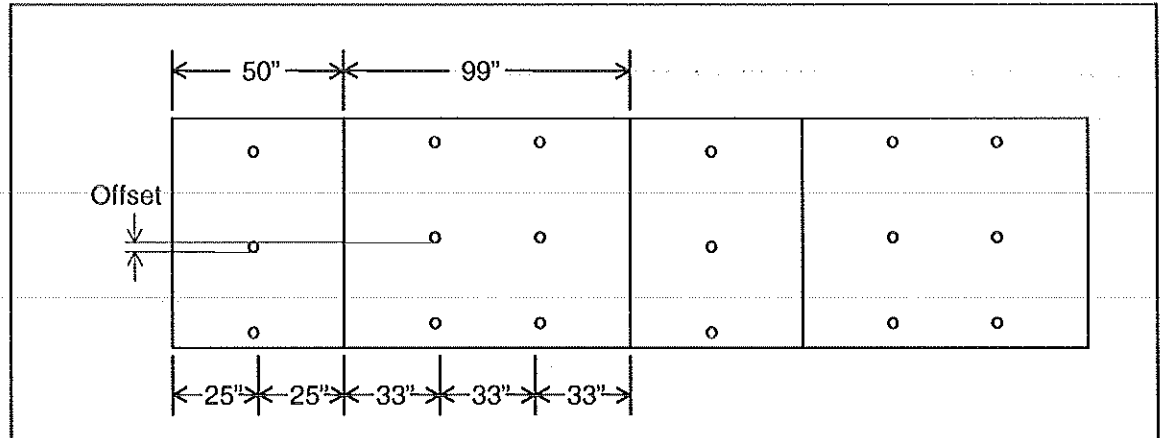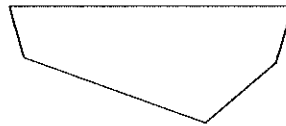
Punching:

Depending on the size of the duct, the gauge of the material, and the type of airflow, it may be necessary to add holes in the part so that conduit supports can be added. When a part is programmed, the user can specify 0-9 holes for each dimension (height and width). The industry specification calls for no more than 48" without a conduit support. The conduits are evenly spaced across the dimension. For example, if the height is 50" and the width is 99" (see figure 4-3), with 3 and 6 holes on each respective leg, the following holes would be punched: height - 1 row of holes at 25"; width - 2 rows of holes at 33" and 66". If holes are specified for both the height and width, the holes on the first dimension out are shifted to the side. This is done with the gag output, "Hole Position" (output 12). If only the center hole is required, the Center Hole gag output, (output 10) is on.

If the two outer holes are required, the Outer Hole Gag output (output 11) is on. If all three are required, both the Center Hole and Outer Hole Gags are on when the Hole Punch output (output 9) is fired.

Secondary Operations

When the controller powers up from a memory clear, it checks for up to 9 downstream controllers. The **XL120** will search only for the controllers it found on the first power up. If a controller is to be added in the future, rather than clearing the memory on the **XL120**, all downstream controllers can be searched for again by entering the Down Stream Machines menu from the main Setup screen, highlighting Search For All Devices, and pressing ENTER. From the Down Stream Machines setup menu, you can change the setups of all of the downstream controllers.

When the operator starts the line, the secondary controllers are programmed with the proper information:

Pinspotter (Pins the insulation on the inside of the duct)
Type of part, Height, Width, Velocity, Bend Allowance, Offset (from Edit Lock Data table).

Backgauge (Bends the metal sheets to form the ductwork)
Type of part, Height, Width, Bend Allowance, Offset (from Edit Lock Data table).

Dual Head Backgauge (used to move the lock rollformers to the correct position)
Total sheet length (including the lock sizes). For example, an "L" shape part with height = 20", width = 30", male lock = 3/8", and female lock = 1 ½" would send 51 7/8", whereas a full-wrapper part with the same dimensions would send 101 7/8".

Notcher (End notches the material to form the locks)
Type of part, Height, Width, Corner Rotation, Bend Allowance, Offset (from Edit Lock Data table).

Options

Options for the controller include PRINT-ON PART printing, BUNDLE TAG printing, BAR CODE SCANNING, and REMOTE TERMINAL.

Print-on-Part Printer

The PRINT-ON-PART PRINTER is used to create an identifier that will be placed directly on the part that is being produced. It can either be sprayed on with an ink jet printer or it can be made into a label that can be attached to the part.

Bundle Printer

The BUNDLE PRINTER will print a bundle tag that can be attached to the parts when a lift is completed. The setup parameters for the printer will appear in the setup screen. After the printer is selected, other options include viewing the print status or activating a bundle reprint.

When a bundle is completed, its information is held in a buffer and this information can be reprinted at any time until a new bundle is completed. A lift whose bundle information is in the buffer cannot be deleted. With the XL-Link package, custom bundle tags can be designed to the individual's needs.

Bar Code Scanner

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

Specific keystrokes for the AMS controller can also be entered by using the 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.

Remote Terminal

The REMOTE TERMINAL is a PC type interface for the controller which offers an additional display for the user. The primary advantage of the REMOTE TERMINAL, other than the additional display, is the ease with which to enter alphanumeric characters.

The controller itself can enter letters for the order and material codes, but requires the user to use the blue UP ↑ and DOWN ↓ keys to scroll through the letters for the entries. With the REMOTE TERMINAL, it has a PC keyboard that allows the user to enter the letters by just typing them in.

In Case of a Problem

The **XL120** is a very reliable product, but things can go wrong.

The user can clear most problems, but AMS experts are always ready to help if needed.

We have many years of experience with all types of length controls and coil processing equipment. Our experience shows that problems are grouped into:

- **Machine problems** (most common)

- **Operator mistakes**

- **Incorrect Setup data**

- **Corrupted controller memory**

- **Cable damage**

- **Controller fault** (least common)

Troubleshooting is just a logical series of steps which leads to the likely cause of a problem. The only tools you need are an accurate scale or steel tape, and perhaps a multimeter.

This guide is a "self help guide" for the user to help troubleshoot the system. Follow these suggestions in the order listed.

Troubleshooting Guide

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? After electrical panel work? After a material change? After an operator change? Trace backwards in time to find out what's different.

Check the Machine

Check the **Encoder** to make sure it tracks the material perfectly.

The encoder **wheel** must be at right angles to the material. The wheel must rotate exactly parallel to the direction of material movement.

The wheel must be in firm contact with the material. **No slippage is allowed!**

Re-run the length **Calibration Trim** procedure after any changes to the encoder mounting.

Check the encoder **cable** connections. They may have worked loose from material movement or vibration. Make sure there are no nicks or cuts in the cable.

Check the **shear** (or punch) press to make sure that it returns fully to its home position after each cycle. The press will make accurate cuts **only** if it starts from a known position for each cycle.

Re-run the length **Calibration Trim** procedure after any changes to either press.

Visually check **other** parts of the machine for loose fasteners, excessive wear, proper lubrication, proper material feed, and roll former adjustment.

Re-run the length **Calibration Trim** procedure after any changes to the machine.

Collect Data

Often the problem is that the machine is making out-of-tolerance parts. To deal with this type of problem, carefully measure the parts made and compare these numbers with those that were programmed. Also take note of the order in which the shear cut the parts.

Write down these measurements for possible later reference.

If length and punch placement seem to vary at random, check the encoder mounting very carefully. The encoder must move with the material, and cannot be allowed to slip. If dimensions are off in a consistent pattern, run the **Calibration Trim** procedure.

Re-check Setups

Re-check Setup values with originally recorded values. When you installed the **XL120** controller, you should have recorded the Setup values on the form provided in the manual for your machine TYPE. Make sure that none of these values has changed.

Run the Calibration mode

When you do the **Calibration Trim**, take great care to make accurate measurements. Be sure that you know how to reduce measuring error as much as possible with the scale or steel tape you use. A loose tip on your steel tape can add a large error into your measurements.

Use Built-in Diagnostic features

The **XL120** has a display mode (press SETUP, then highlight Input/Output Status and press ENTER) that allows you to monitor the controller's inputs and outputs. Watch this display while the machine is running to check for slowdown, stopping, die accelerator, and press actuation points.

On the main Status display, you can watch line speed and distance past the shear. Compare what you see here to what should be happening as the machine runs.

Check incoming Power

Check incoming power for proper voltage. If you suspect fluctuations, watch the needle indication with an analog meter to see if they show up.

More advanced line monitors are available for stubborn cases that you can't see with ordinary meters. Use a recording line monitor to find problems that seldom show up. Your local power company may be able to help with this.

Cycle Power

Cycle power off and on. Try this if the controller "locks up" (won't respond to the keyboard). This **may** restore normal operation after an electrical surge. If not, clear the **XL120**'s memory.

Clear Memory

Clearing memory will erase all Setup, Pattern, and Order information in the **XL120**'s memory.

Do not clear the memory unless you have written down all Setup, Pattern, and Order information for re-entry, and you have tried everything else above.

You can clear all storage in the controller (including Setup and Order data) by following this sequence: **(1)** Make sure that the Security switch is unlocked; **(2)** Turn off power to the controller; **(3)** Wait five seconds; **(4)** Turn the controller back on; **(5)** Wait until the AMS logo has scrolled across the screen and the words **"POWER UP TESTING EPROM"** appear at the bottom of the screen; **(6)** Hold down the "5" key for at least two seconds and release the "5" key when you see the unit reset (the AMS logo will start to scroll across the screen again).

Note: If you are using a Remote Terminal, you will not see the controller reset until after the AMS logo has completely scrolled across the screen.

Electrical Noise

The **XL120** should **not** lock up frequently. If it does, you should suspect that electrical noise is present.

Noise problems can be very hard to locate. The best way to avoid noise is by using good cable layout and wiring methods. Also, noise suppresser devices such as **varistors** are needed in most cases.

Refer to the AMS Application **Note "Noise Suppression Methods"** for details.

FAX Setup and Parts data to AMS

FAX Setup and Parts data to AMS with a full description of the problem. Unless you think your problem is very simple, you might as well FAX this information to us before you call. We'll probably ask you for it anyway.

Include the Model, Serial, and Software Version numbers.

Be sure to send a copy of the Setup Data Sheet, and all information about the problem. **FAX us at 1-314-344-9996.**

Don't forget to include your name and phone number so we can call you back.

Call AMS

If you can't fix the problem without our help, call AMS and speak with our experts. Call us toll-free at **1-800-334-5213.** Have your Model, Serial, and Software Version numbers ready when you call.

XL120 Switch Settings and I/O

Switch	Function
1 OFF	Feed-to-Stop Line
1 ON	Non-Stop (all presses)
2 OFF	Single Speed Line
2 ON	Two Speed Line
3 OFF	No Boost
3 ON	Die Boost

(Two Speed logic is FORWARD/SLOW, which means that the slow output is ON when the line is halted)

Input/Output Designations

No.	Inputs	Outputs
1	Jog Forward	Forward
2	Jog Reverse	Slow
3	Run	Reverse
4	Shear Complete	Shear
5	Setup/Lockout	Run
6	Manual Shear	End Notch
7	Manual End Notch	Vee Notch
8	Sheet Detect	Die Select (0 = Drive Cleat, 1 = TDF)
9	Manual Vee Notch	Hole Punch
10	Manual Hole Punch	Center Hole Gag
11	End Notch Complete	Outer Hole Gag
12	Vee Notch Complete	Hole Position Select (0 = Normal Position, 1 = Offset Position)
13	Hole Punch Complete	Shear Boost/Shear Up
14	Not Used	Item Complete
15	Not Used	Printer Encoder
16	Manual Print Initiate	Print Initiate

Down Stream Machines

This section will describe the setup parameters for the controllers that are used on the machines that are located down stream of the **XL120** controller and will go through the different setup screens that are encountered when the controller has cleared memory or being programmed for the first time.

These controllers are from the **MP300 SERIES** AMS controllers and can be used on a Pinspotter, Backgauge, Dual-head Backgauge, or Post-shear Notcher. The controller may either be a slave unit with access to it only through the **XL120** controller, or it may be a Stand Alone unit which can work by itself or with the **XL120** controller.

After the **XL120** controller has been configured with the initial setup parameters (AUTOMATIC MODE OPERATION, MACHINE LAYOUT/DIMENSIONS, TIMING PARAMETERS, and TIME CLOCK), that were discussed in Section 2 of this manual, the DOWN STREAM MACHINES can be programmed.

```
10:54AM    9/05/97        0FPM           0.000"
ORDER                                       0Ft
MATERIAL                           N/A%  COMP.
                   Configuration
           Automatic Mode Options
           Machine Layout/Dimensions
              Timing Parameters
                   Time Clock



Type 2          9/1/97    1:52PM           V6.5
```

Figure 7-1. Configuration Menu

To exit the initial setup mode push the SETUP key


```
11:15AM    9/05/97      0FPM           0.000"
ORDER                                     0Ft
MATERIAL                         N/A%  COMP.
            XL120 Controller
            Calibration Trim
            Configuration
          Down Stream Machines
            Edit Lock Data
          Input/Output Status
            Memory Test
          Communications




Type 2      9/1/97     1:52PM          V6.5
```

Figure 7-2. Setup Screen

This is the same screen as shown in figure 2-13 with the added DOWN STREAM MACHINES parameter. To configure the other controllers with the **XL120** controller, use the blue down arrow key ↓, until DOWN STREAM MACHINES is highlighted.

```
11:26AM    9/05/97       0FPM           0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
              XL120 Controller
            Calibration Trim
             Configuration
            Down Stream Machines
             Edit Lock Data
           Input/Output Status
              Memory Test
             Communications



Type 2        9/1/97      1:52PM        V6.5
```

Figure 7-3. Down Steam Machines Configuration Screen

Press ENTER and there will be a list of all of the machines that the **XL120** finds upon power up, plus the option of selecting the SETUP or the STATUS of that machine.

```
11:38AM    9/05/97       0FPM           0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
              Down Stream Machine
            PinSpotter Setup
            PinSpotter Status
            BackGauge Setup
            BackGauge Status
          Dual BackGauge Setup
          Dual BackGauge Status
            Notcher Setup
            Notcher Status



Type 2        9/1/97      1:52PM        V6.5
```

Figure 7-4. Down Stream Machine Setup Screen

MP343 Pinspotter

The **MP343** is a computer controller used to run a pinspotting device for pinning insulation to the inside of HVAC ductwork. It can be used independently to run the PINSPOTTER or linked to an **XL120** controller via RS485 communications. The data is then automatically downloaded to the **MP343** as to what size part will be coming next.

The **MP343** has the capability to run the conveyor system feeding the material through the PINSPOTTER. Once the **MP343** is placed into RUN, the forward output turns on and stays on. The PINSPOTTER controller can be run in a single speed mode or in a two speed mode.

Installation

Refer to pages 2-1 and 2-2 for recommended wiring of the Emergency Stop and Run circuits for the MP343 controller. Also refer to drawing # 4411.

Inputs, Outputs, and Dip Switch Settings

The **MP343** controller has eight inputs and eight outputs. The controller also has seven dip switches on the back of the controller (inside the controller on a Consolette model) which are used to configure the controller to a certain machine type.

Inputs

Input 1

Jog Forward- By pressing the Jog Forward button, the forward output (# 1) will turn ON.

Input 2

Jog Reverse- When the Jog Reverse button is pressed, the reverse output (# 3) will turn ON.

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Input 3

Sheet Detect- This input is a normally open switch that is closed by the presence of metal that is to be processed. The Sheet Detect Switch will give the signal to the controller that a part is present and will also reference the controller as to the position of the part. When the trailing edge of the part falls off of the Sheet Detect Switch, the controller will stop firing pins.

Input 4

Run Enable- This input can be used two different ways. 1) If the controller does not have a front panel, the Run Enable Input is used as a Run Input. In this case, the Run Output should be used to latch the Run Button used to engage the Run Input Relay. Refer to the figure on page 2-2. 2) If the **MP343** does have a front panel, it may be wired the same as mentioned above or the Front Panel Run Button may be used. If the Front Panel Run is used, connect Input 4 to DC common.

Input 5

Setup Lockout- Input 5 can be used as a security lockout. With this input "ON", the setups can not be changed, they may only be viewed. The exception to this is "Units of Measurement". With this input "ON", the memory can <u>not</u> be cleared on the controller by pressing the number "5" key during the power up tests.

Input 6

Not Used-

Input 7

Not Used-

Input 8

Manual Cycle- This input will fire the pins when the Run Enable input is OFF. It is the same as pressing the blue CYCLE button on the front of the controller.

Outputs

Output 1

Forward/Fast- This output will vary depending upon what type of speed logic is used. If Forward-Slow speed logic is used, this output will be ON for any movement in the forward direction. If Fast-Slow speed logic is used, this output will be ON for any fast operations. See page 7a-10 for a complete description of Speed Logic operation.

Output 2

Slow- The state of this output will vary depending upon what type of speed logic is used. If Forward-Slow speed logic is used, this output will be ON when the machine is running at slow speed or halted. If Fast-Slow speed logic is used, this output will be ON only when the machine is running at slow speed. See page 7a-10 for a complete description of Speed Logic operation.

Output 3

Reverse- This output will come ON whenever the machine is jogged in the reverse direction.

Output 4

Run- This output is turned on when the **MP343** is in the Run Mode. It is typically used to latch the Run Push Button when Input 4 is used as a Run Input.

Output 5

Fire- This output is used to fire the pins. It remains on for the programmed "Fire Dwell" time.

Output 6

Load- This output is used to load the Pinspotter. It remains on for the programmed "Load Dwell" time.

Output 7

No Liner- This output turns ON when a part is running with "No Velocity" programmed.

Output 8

Out of Spec- If a part is running and the **MP343** has to leave out at least one row of pins in the part, Output 8 will turn ON. This is to notify the operator that at least one row of pins will have to be put in the part by hand for it to be within SMACNA specifications.

Dip Switch Settings

On the back of a panel mount style controller or on the circuit board mounted to the lid of a Consolette style controller, seven small dip switches will be found. These switches are used to setup the proper Unit ID which is used to define the controller as an **MP343** standard Backgauge controller and to establish proper communications with an **XL120** controller, if applicable. The dip switches also determine if the machine runs at one or two speeds and determines the encoder direction.

Caution: Ensure that all power is disconnected from a Consolette style controller before removing the lid. Serious damage to the controller can occur if the lid is removed with the power on.

Switches 1, 2, 3, and 7

Unit ID- Switches 1, 2, 3, and 7 determine the Unit ID and the following two options are valid.

SW1	SW2	SW3	SW7	Unit ID (Used by XL120 only)
Off	Off	On	On	52
On	Off	On	On	53

Switch 4

Speed Control- This switch determines if the machine is to operate at one speed or at two speeds.

Switch 4 OFF	One Speed
Switch 4 ON	Two Speed

Switch 5

Encoder Direction- This switch determines the polarity of the encoder. If the encoder counts are moving the wrong direction, change dip switch 5.

Switch 6

Not Used- Must be set to OFF

Machine Setup Parameters

If the PINSPOTTER SETUP is highlighted and ENTER is selected, the PinSpotter setup screen can be seen. There will be a slight delay while this screen is being loaded.

```
11:45AM      9/05/97        0FPM          0.000"
ORDER                                        0Ft
MATERIAL                              N/A%  COMP.
Parameters                                  Value
Detect-Fire                                0.000"
Fire Reaction                           0.0000sec
Fire Dwell                              0.000sec
Delay After Fire                        0.0sec
Load Dwell                              0.000sec
Hi Vel Distance                        12.000"
Lo Vel Distance                         6.000"
Sp Vel Distance                        12.000"
Hi MaxEdge Dist                         4.000"
Hi MinEdge Dist                         4.000"
Hi Max Brk Dist                         4.000"
```

Figure 7a-1. PinSpotter Setup Screen

Detect-Fire

The DETECT-FIRE is the distance from the sheet-detect switch to the center of the pin fire mechanism. This distance should be as accurate as possible. The DETECT switch must be a normally open switch and it must be mounted so the metal is riding on the encoder before the switch closes.

Fire Reaction

The FIRE REACTION time is the time delay between the time that the fire signal occurs, and the time that the pins enter the material. To calculate the FIRE REACTION time, use the following steps:

1) Set the FIRE REACTION time to zero. 2) Run a sheet of material through the Pinspotter. 3) Measure the distance from the leading edge of the part to the first row of pins minus any programmed offset distance. 4) Calculate the FIRE REACTION using the actual leading edge to pins distance and the programmed leading edge to pins distance as follows:

$$\text{Fire Reaction Time} = \left[\frac{\text{Actual Distance - Prog. Distance}}{\text{Line Speed (in FPM)}}\right] \times 5$$

Fire Dwell

The FIRE DWELL parameter sets the time duration of the PIN FIRE cycle, in seconds. The range of time allowed is 0.001 to 9.999 seconds and is set to the nearest millisecond.

Delay After Fire

The DELAY AFTER FIRE is the amount of time between the PIN FIRE output turning off, and the PIN LOAD output turning on. The range of time allowed is 0.00 to 9.99 seconds.

Load Dwell

The LOAD DWELL parameter sets the time duration of the PIN LOADING device to be activated. The range of time allowed is 0.001 to 9.999 seconds.

Hi Vel Distance

The HIGH VELOCITY DISTANCE parameter sets the maximum spacing between the pins when making High Velocity Ductwork. The MP343 will place the pins between the MINIMUM SPACING DISTANCE and the HIGH VELOCITY DISTANCE. The default distance is 6.000 inches.

Lo Vel Distance

The LOW VELOCITY DISTANCE parameter sets the maximum spacing between the pins when making Low Air Velocity Ductwork. The MP343 will place the pins between the MINIMUM SPACING DISTANCE and the LOW VELOCITY DISTANCE. The default distance is 12.000 inches.

Sp Vel Distance

The SPECIAL VELOCITY DISTANCE parameter sets the maximum spacing between the pins when making Special Air Velocity Ductwork. The **MP343** will place the pins between the MINIMUM SPACING DISTANCE and the SPECIAL VELOCITY DISTANCE. The default distance is 6.000 inches.

Hi MaxEdge Dist

When making ductwork for High Velocity Airflow, the HIGH MAXEDGE DISTANCE is the farthest location away from an edge that the PINSPOTTER will place pins. The **MP343** will place the pins between the HIGH MAXEDGE DISTANCE and the HIGH MINEDGE DISTANCE. The default distance is 4.000 inches.

Hi MinEdge Dist

When making ductwork for High Velocity Airflow, the HIGH MINEDGE DISTANCE is the closest that the PINSPOTTER will place pins to an edge. The **MP343** will place the pins between the HIGH MAXEDGE DISTANCE and the HIGH MINEDGE DISTANCE. The default distance is 4.000 inches.

Hi Max Brk Dist

When making ductwork for High Velocity Airflow, the HIGH MAX BRK DISTANCE is the farthest location away from a bend that the PINSPOTTER will place pins. The **MP343** will place the pins between the HIGH MAX BRK DISTANCE and the HIGH MIN BRK DISTANCE. The default distance is 4.000 inches.

Hi Min Brk Dist

When making ductwork for High Velocity Airflow, the HIGH MIN BRK DISTANCE is the closest to a bend that the PINSPOTTER will place the pins. The **MP343** will place the pins between the HIGH MAX BRK DISTANCE and the HIGH MIN BRK DISTANCE. The default distance is 4.000 inches.

Lo MaxEdge Dist

When making ductwork for Low Velocity Airflow, the LOW MAXEDGE DISTANCE is the farthest location away from an edge that the PINSPOTTER will place pins. The **MP343** will place the pins between the LOW MAXEDGE DISTANCE and the LOW MINEDGE DISTANCE. The default distance is 4.000 inches.

Lo MinEdge Dist

When making ductwork for Low Velocity Airflow, the LOW MINEDGE DISTANCE is the closest that the PINSPOTTER will place pins to an edge. The **MP343** will place the pins between the LOW MAXEDGE DISTANCE and the LOW MINEDGE DISTANCE. The default distance is 4.000 inches.

Lo Max Brk Dist

When making ductwork for Low Velocity Airflow, the LOW MAX BRK DISTANCE is the farthest location away from a bend that the PINSPOTTER will place pins. The **MP343** will place the pins between the LOW MAX BRK DISTANCE and the LOW MIN BRK DISTANCE. The default distance is 4.000 inches.

Lo Min Brk Dist

When making ductwork for Low Velocity Airflow, the LOW MIN BRK DISTANCE is the closest to a bend that the PINSPOTTER will place the pins. The **MP343** will place the pins between the LOW MAX BRK DISTANCE and the LOW MIN BRK DISTANCE. The default distance is 4.000 inches.

Sp MaxEdge Dist

When making ductwork for Special Velocity Airflow, the SPECIAL MAXEDGE DISTANCE is the farthest location away from an edge that the PINSPOTTER will place pins. The **MP343** will place the pins between the SPECIAL MAXEDGE DISTANCE and the SPECIAL MINEDGE DISTANCE. The default distance is 4.000 inches.

Sp MinEdge Dist

When making ductwork for Special Velocity Airflow, the SPECIAL MINEDGE DISTANCE is the closest that the PINSPOTTER will place pins to an edge. The **MP343** will place the pins between the SPECIAL MAXEDGE DISTANCE and the SPECIAL MINEDGE DISTANCE. The default distance is 4.000 inches.

Sp Max Brk Dist

When making ductwork for Special Velocity Airflow, the SP MAX BRK DISTANCE is the farthest location away from a bend that the PINSPOTTER will place pins. The **MP343** will place the pins between the SP MAX BRK DISTANCE and the SP MIN BRK DISTANCE. The default distance is 4.000 inches.

Sp Min Brk Dist

When making ductwork for Special Velocity Airflow, the SP MIN BRK DISTANCE is the closest to a bend that the PINSPOTTER will place the pins. The **MP343** will place the pins between the SP MAX BRK DISTANCE and the SP MIN BRK DISTANCE. The default distance is 4.000 inches.

Minimum Spacing

The MINIMUM SPACING parameter is the minimum amount of space that will be between the rows of pins. This is a physical characteristic of the machine and is dependent upon how fast the Pinspotter can reload, and how fast the line speed is. The **MP343** will place the pins between the MINIMUM SPACING distance and the HI, LO, or SP VEL DIST. The default distance is 3.000 inches.

New Program Delay

This parameter allows a time delay that begins when the **XL120** goes into RUN and lasts until the downstream controller accepts the new part dimensions. The delay allows the **XL120** Coil Line controller to start processing the next item before the previous cut pieces have made it through the machine. Enter the amount of time it takes for a piece to be cut off and make it to the Pinspotter. The Delay range is 0 to 300 seconds.

Since the downstream controllers can not detect when there are delays in the processing of parts, some precautions must be taken to prevent a part being made with the wrong dimensions. If the downstream controller is halted while the NEW PROGRAM DELAY timer is running, the data in the timer will be lost and the timer stopped. When the downstream controller is placed back into RUN it will keep the same dimensions it had prior to being halted. In this case the part data would need to be sent to the downstream controllers again by either placing the **XL120** into RUN or by downloading the data from the Downstream Status Screens.

Note: The time delay can be overridden from the Downstream Status Screen by placing the downstream controller OFF LINE and manually downloading the part data to the controllers. Don't forget to put the controller back ON LINE to continue automatic processing.

Another condition occurs in the following scenario:

If Part A is being processed by the downstream controllers and Part B is cut by the **XL120** Coil Line controller, the timers in the downstream controllers are set. If the Coil Line is halted before the timers have expired, Part B will continue through the machine.

If the Coil Line is then restarted before the downstream controllers timers have expired, the timers are reset. Part B will then reach the downstream machines before the proper part dimensions take effect, which results in the pieces that were made prior to the halting of the Coil Line having the wrong part dimensions. To avoid this condition, allow the timers to expire and the new part dimensions to take effect before restarting the **XL120**. Another solution is remove the part(s) from the machine that have already been made and then run them through later.

The controller can only store one set of data in the timer at a time. This means that if part data has been downloaded to a downstream controller and different data is downloaded before the timer has expired, the first data sent down will be over-written by the second data.

Missed Pin Mode

When a row of pins are fired and there is not enough time to load the Pinspotter before the next row of pins needs to be fired, the **MP343** will display a MISSED PUNCH error and stop the line (if the MISSED PIN MODE is set to NORMAL). With the MISSED PIN MODE set to IGNORE, the row of pins will be skipped and no error will be displayed.

With the MISSED PIN MODE set to FIRE, the **MP343** will fire a row of pins as soon as the FIRE DWELL TIME, DELAY AFTER FIRE TIME, and LOAD DWELL TIME have elapsed.

NOTE:

With this mode set to FIRE, the Max Edge, Min Edge, and Brake Distance are ignored, so the pins may be fired closer to bends and edges than preferred.

Speed Logic

The **MP343** controller has four outputs which control the speed and direction of the machine. To accommodate more than one wiring possibility, the controller 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 1 and 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	OFF	ON	OFF
Output 3 (REV)	OFF	OFF	OFF	OFF	ON
Output 5 (RUN)	ON	ON	OFF	OFF	OFF

Table 7a-1. Status of Outputs in Forward-Slow

Note: All Jogging is performed at fast speed

Machine State					
	Run Fast	Run Slow	Jog Fwd	Halt	Jog Rev
Output 1 (FOR)	ON	OFF	ON	OFF	OFF
Output 2 (SLOW)	OFF	ON	OFF	OFF	OFF
Output 3 (REV)	OFF	OFF	OFF	OFF	ON
Output 5 (RUN)	ON	ON	OFF	OFF	OFF

Table 7a-2. Status of Outputs in Fast-Slow

Note: All Jogging is performed at fast speed

Min Slow Distance

This parameter is used on two speed lines and determines when to put the line into slow speed. The controller will automatically calculate when to start slowing down, and then this distance is added to it (if the DECEL MODE is set to AUTO). Increase this value for a longer slow distance. Decrease this value for a shorter slow distance.

A longer slow distance can improve part accuracy but too long a value can slow production. The distance should be set long enough that the material fully reaches the slow speed before stopping.

The MP343 controller calculates the distance from the programmed position that the machine should shift into slow speed. This is based on 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 (if the DECEL FACTOR is set to AUTO).

When the DECEL FACTOR AUTO setting is used, 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, making sure that the material is at a constant velocity (slow speed) before stopping.

Decel Factor Mode

On two-speed machines, a DECELERATION (DECEL) FACTOR is used by the MP343 controller when changing from fast to slow speeds. The user has the option to select from three DECEL FACTOR MODES: AUTO, MANUAL, or OFF.

AUTO: A DECEL FACTOR is automatically maintained by the controller. It is expressed in inches-per-second-per-second (In/Sec^2) and is used in the Adaptive Slowdown calculation. The parameter can be overridden but will change on the next movement.

MANUAL: A DECEL FACTOR may be manually entered into the **MP343** controller. The value is used in the Adaptive Slowdown calculation. Some trial and error may be necessary when in the MANUAL mode to find a DECEL FACTOR which works properly. Ideally, the machine should shift from fast to slow at some distance prior to the target long enough so that it reaches a constant slow velocity before the movement outputs are turned off.

If the machine tends to shift into slow too soon, increase the DECEL FACTOR. If the machine tends too shift into slow too late, decrease the DECEL FACTOR. The DECEL FACTOR should be used in conjunction with the MINIMUM SLOW DISTANCE to determine the ideal time to change from fast to slow.

While in the MANUAL mode, the AMS controller will not calculate a new value for the DECEL FACTOR after each stop.

OFF: No DECEL FACTOR is used and the controller will not make an Adaptive Slowdown calculation. The machine will shift from fast to slow when the Pinspotter has reached the MINIMUM SLOW DISTANCE before the target. For example, if the MINIMUM SLOW DISTANCE has been set to four inches, the machine will shift from fast to slow 4 inches before the programmed position. This may or may not be enough distance for the machine to decelerate properly.

The DECEL FACTOR mode defaults to OFF but may be used in MANUAL or AUTO to increase productivity.

Decel Factor

This parameter is expressed in inches-per-second-per-second (In/Sec^2) and is used in the Adaptive Slowdown calculation discussed in the DECEL FACTOR MODE above. There is no exact formula for this value so experimentation is necessary. Ideally the machine should shift from fast to slow at some distance prior to the target so that it reaches a constant slow velocity before the movement outputs are turned off. This value is automatically calculated by the controller if the DECEL FACTOR MODE is set to AUTO.

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:

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

For an AMS encoder, the encoder count is the model number of the encoder. A Model 256 is a 256 count encoder. A Model 1000Z is a 1000 count encoder.

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

Model	Resolution
256	0.01171875
256Z	0.01171875
500	0.006
500Z	0.006
1000Z	0.003

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.

Correction

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 pins to become further apart and decreasing the value reduces the distance between the pins.

Filter Constant

The FILTER CONSTANT 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 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 on the high side of the low values. The controller will allow values from 1.0 Hz to 200.0 Hz.

Units

Length measurements can be programmed and displayed as either English inches or Metric millimeters. Press any number key or the PICK key to toggle through the choices.

To exit the PINSPOTTER SETUP screen push the SETUP key.

PinSpotter Status

To view the PINSPOTTER STATUS you must first be in the DOWN STREAM MACHINES CONFIGURATION SCREEN, figure 4-3. Highlight the DOWN STEAM MACHINES line and press ENTER. Highlight the PINSPOTTER STATUS line and press ENTER to view the status screen.

```
 1:46PM    9/05/97       0FPM         0.000"
ORDER                                      0Ft
MATERIAL                          N/A% COMP.
MP343  Version:13.01  Unit:52    Type: 68
Position:  0.000"   Status: Stopped
Inputs:--------          Outputs:-2------
Device: Offline

Type  Height     Width    Offset BendAllow
 ☐     0.00      0.00      0.00       0.00
Velocity
   NO



        Press Enter for Program Page
```

Figure 7a-2. PinSpotter Status Screen

If no parts are programmed, the screen will have the information shown above. When parts are programmed, this screen will show the characteristics of the programmed part.

Pressing the Enter key will take you to the Program page as shown in figure 7a-3.

```
 2:03PM    9/05/97      0FPM        0.000"
ORDER                                 0Ft
MATERIAL                         N/A% COMP.
MP343  Version:13.01  Unit:52    Type: 68
Device                              Off Line
Part Type                                 □
Part Height                           0.00"
Part Width                            0.00"
Offset                                0.00"
Bend Allowance                        0.00"
Velocity                                 NO
Command                        Send Program
```

Figure 7a-3. Pin Spotter Program Page.

The Command line allows the operator to send a new set of dimensions to the **MP343** controller for pinning sheets not made by the **XL120** controller. The Command line may also be used to clear the **MP343's** memory, if necessary. By highlighting the Command line and pressing the PICK key, the Clear Memory or Reference command will be shown on the display. Pressing ENTER will send the specified command to the **MP343**.

To exit this screen press the SETUP button.

Operating Procedure

Pin Placement

The following are the rules that the MP343 follows to determine where the rows of pins must be located based on the size and velocity of the duct.

1. Always put a row of pins between the min and max edge distance from the leading and trailing edges of the sheet of metal. Unless there is a conflict, put holes in the middle of these limits.
2. Never space rows of pins less than the minimum spacing (this is a machine limitation).
3. Never put a row of pins closer than the min edge distance from a brake line.
4. Never put rows of pins spaced greater than the specification spacing (i.e. High Velocity Distance) unless rules 1 through 3 would be violated.
5. Never put a row of pins greater than the max edge distance from a brake line unless it conflicts with rules 1 through 4.
6. Always try to put a row of pins the median edge distance from a brake line unless a row of pins could be saved by putting the last row within the max edge distance from the brake line.
7. If rules 1 through 4 result in the specification spacing not being met, then make only one row of pins out of specification so that an extra row of pins can be put in by hand. If this happens, the "out of spec" output will turn on. If the pin locations can be programmed entirely within specification, the "out of spec" output will be off.

NOTE:

If the velocity is "none", the Pinspotter is disabled and the "No Liner" output will turn on.

Programming

The programming of parts is done with the **XL120** controller. Refer to the Parts Programming section of the manual for the proper procedure.

A second method of programming the parts for the **MP343** is by using the Pin Spotter Program page, figure 7a-3 on page 7a-12.

Device   On Line / Off Line. This parameter must be placed "On Line" for the **XL120** to download part production data to the **MP343.** Select "Off Line" if using the **MP343** separately from the **XL120.**

Type   Part Type - One of four options:
☐   Single sheets which will not cause the Pinspotter to move

L   "L" shaped, single bend duct

U   "U" shaped, double bend duct

0   Wraparound, triple bend duct

Height The height of the duct .

Width   The width of the duct.

Offset The lip that is added to some sheets' length when the lock is formed and is not counted toward the length of the part.
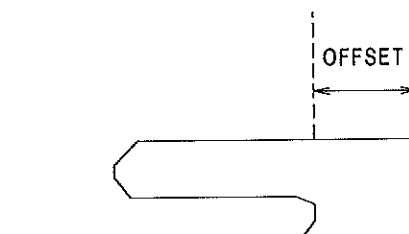
Bend Allowance

"Bend Allowance" is the length that is subtracted from each side of the part. This is used to compensate for gain due to each bend and the difference between real and nominal measures. For example, when making an ☐ shaped part (wrap-around type), there will be three corner notches for the three bends. At each bend the **MP343** controller will subtract the BEND ALLOWANCE from both the height section and the width section. So on a part with three bends, the controller subtracts a total of 6 BEND ALLOWANCES from the overall part length. This is shown in figure below.
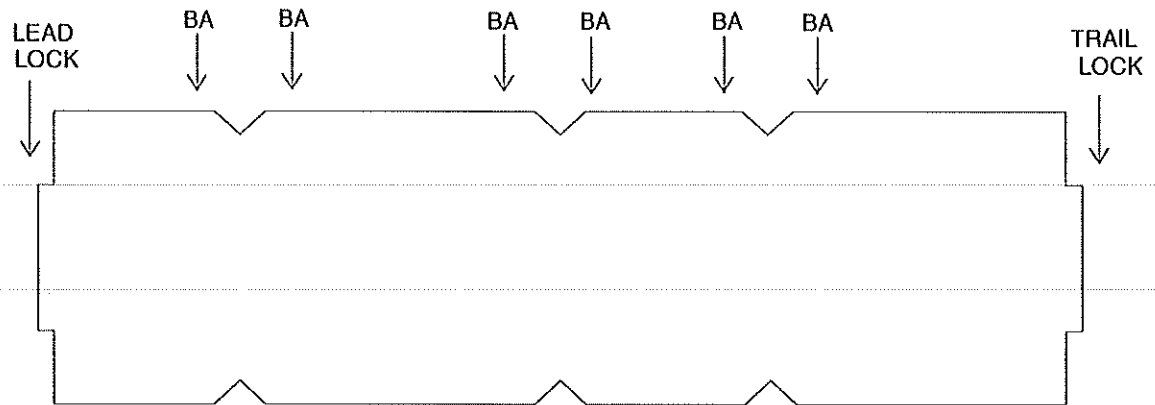
Velocity Different velocities require different pin spacing for the insulation. Valid options: H (high), L (low), S (special), and N (none).

The status screen will also show the MP343 version, unit, and type number, the part position, the controller status, input and output status, and command option.

The controller status options are Stopped, Moving, Jog Fwd, Jog Rev, and Enabled.

The command options are "Send Program", "Reference", and "Clear Memory". The "Reference" command is used only on the Backgauge controller and is ignored by the **MP343**.

Run Operation

Once the RUN ENABLE input (#4) is closed, the MP343 will turn on the RUN and FORWARD outputs until the RUN ENABLE input opens, or the front panel HALT button (if available), is pressed. The MP343 will only fire pins in the RUN mode when the sheet detect switch (input #3) is closed. The sheet detect switch must be mounted so the metal is riding on the encoder before the sheet detect switch is closed.

Note: In order for the MP343 to automatically receive parts data from the XL120, it must be put "On Line". To do this, go to the Backgauge Status Screen by highlighting "Downstream Machines" in the Setup Menu and pressing "Enter". Highlight "Backgauge Status" and press "Enter". Press "Enter" again to go to the Backgauge Program Screen. Highlight the top row labeled "Device" and press the "Pick" key to toggle the option to "On Line". It can also be done at the MP343 controller, if it has a front display panel. Press the "Setup" key and press the number 3 ("3 = Loc / Remote"). Local or Remote mode is indicated on the Status Screen, top row, next to the line speed indicator.

Front Panel Run/ Remote Run Mode

If using the FRONT PANEL RUN button, jumper input 4 (Run/Enable) of the MP343 controller to DC common.

If using a REMOTE RUN/ HALT circuit, Input 4 is the Run input. The Run output (#4), should be used to latch the input, refer to the enclosed Electrical Interface Diagram for wiring. When using a REMOTE RUN, the HALT button on the front panel of the MP343 (if available), will still halt the operation.

Specification

Parameter	Panel Mount	AC Consolette

Mechanical

Size	8"X12.5"X2.25"	8"X12.5"X7.5"
Weight	7lbs.	15lbs.

Electrical

Input Voltage	24VDC ±5%	115VAC ±10%, 50-60Hz
Input Current	.5 Amp.	1 Amp.

Outputs

Forward/Fast	Std DC	Std DC, AC Relay
Slow	Std DC	Std DC, AC Relay
Reverse	Std DC	Std DC, AC Relay
Run	Std DC	Std DC, AC Relay
Fire	Std DC	Std DC, AC Relay
Load	Std DC	Std DC, AC Relay
No Liner	Std DC	Std DC
Out of Spec.	Std DC	Std DC

Inputs

Jog Forward	Yes	Yes
Jog Reverse	Yes	Yes
Sheet Detect	Yes	Yes
Run Enable	Yes	Yes
Setup Lockout	External	Internal
Not Used		
Not Used		
Manual Cycle	Yes	Yes

(Note: The following parameters apply equally to all versions.)

Output Characteristics

Standard DC

Type	Open Collector Transistor
Maximum Current	4 ADC
Maximum Applied Voltage	35 VDC

AC Relay

Type	Form A Dry Circuit Relay
Maximum Current	5 Amp.
Maximum Applied Voltage	240VAC

Solenoid Driver

Type	High Voltage Internal Driver
Minimum Load Resistance	12 Ohms
Maximum Voltage Generated	65 VDC
Maximum Actuation Time	0.25 Seconds

Encoder Input

Type	Quadrature with Complements
Voltage	5VDC
Maximum Encoder Load	200 milliamperes
Maximum Pulse Rate	275,000 pulses/second

Operation

Maximum Part Length	9999.99 inches
	9999.99 millimeters
Units of Measurement	inches, or millimeters

MP343 Switch Settings and I/O

MP343 Switch Settings

Switch	Description
1	Unit ID, see settings below
2	Unit ID, must be OFF
3	Unit ID, must be ON
4	OFF = One Speed/ ON = Two Speed
5	Encoder Direction
6	Not Used, must be OFF
7	Unit ID, must be ON

The proper Unit ID switch setting for the MP343 is: switches 3 and 7 ON. Switches 1, 3, and 7 ON is also a valid Unit ID number for the MP343.

SW1	SW2	SW3	SW7	Unit ID
OFF	OFF	ON	ON	52
ON	OFF	ON	ON	53

MP343 Inputs

Inputs	Description
1	Jog Forward
2	Jog Reverse
3	Sheet Detect
4	Run Enable
5	Setup Lockout
6	Not Used
7	Not Used
8	Manual Cycle

MP343 Outputs

Outputs	Description
1	Forward/Fast
2	Slow
3	Reverse
4	Run
5	Fire
6	Load
7	No Liner
8	Out of Spec.

MP338 BackGauge

The **MP338** is a computer controller used to run a multibend BACKGAUGE positioner for bending metal for HVAC ductwork. The controller can be used independently to run the BACKGAUGE, or linked to an **XL120** controller via RS485 communications. The data is then automatically down loaded to the **MP338** as to what size part will be coming next.

Installation

Refer to pages 2-1 and 2-2 for recommended wiring of the Emergency Stop and Run circuits for the **MP338** controller. Also refer to the drawings at the back of the manual.

Inputs, Outputs, and Dip Switch Settings

The **MP338** controller has eight inputs and eight outputs. The controller also has seven dip switches on the back of the controller (inside the controller on a Consolette model) which are used to configure the controller to a certain machine type.

Inputs

Input 1

Jog Forward- By pressing the Jog Forward button, the Backgauge will move at the programmed jog velocity toward the brake.

Input 2

Jog Reverse- When the Jog Reverse button is pressed, the Backgauge will move at the programmed jog velocity away from the brake.

Input 3

Home- This is the Home or Reference switch input. This switch is used to reference the position of the Backgauge to a known distance from the brake, when a "Reference" is performed.

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Input 4

Run Enable- This input can be used two different ways. 1) If the controller does not have a front panel, the Run Enable Input is used as a Run Input. In this case, the Run Output should be used to latch the Run Button used to engage the Run Input Relay. Refer to the figure on page 2-1. 2) If the **MP338** does have a front panel, it may be wired the same as mentioned above or the Front Panel Run Button may be used. If the Front Panel Run is used, connect Input 4 to DC common.

Input 5

Setup Lockout- Input 5 can be used as a security lockout. With this input "ON", the setups can not be changed, they may only be viewed. The exceptions to this is "Units of Measurement". With this input "ON", the memory can <u>not</u> be cleared on the controller by pressing the number "5" key during the power up tests.

Input 6

Not Used

Input 7

Brake/Clamp Complete- Input 7 is used on a multi-bend Backgauge system to indicate when the bend is complete, so it can move to the next position. The setup parameter "Position Delay" allows a delay time from when Input 7 is engaged until the Backgauge will move to the next bend position.

Input 8

Part Reset- When this input is closed, the Backgauge will move back to the first bend position for the current part being made. If the Backgauge is moving when the input is closed, the Backgauge will finish the move and then reset to the first brake point. To make the Backgauge move immediately to the initial position, halt the Backgauge from moving, momentarily close the Part Reset Input, and then place the **MP338** back into the Run Mode. For a controller with a front panel display, pressing the "Cycle" button will achieve the same results.

Outputs

Output 1

Forward/Fast- This output will vary depending upon what type of speed logic is used. If Forward-Slow speed logic is used, this output will be ON for any movement in the forward direction. If Fast-Slow speed logic is used, this output will be ON for any fast operations. See pages 7b-7 and 7b-8 for a complete description of Speed Logic operation.

Output 2

Slow- The state of this output will vary depending upon what type of speed logic is used. If Forward-Slow speed logic is used, this output will be ON when the machine is running at slow speed or halted. If Fast-Slow speed logic is used, this output will be ON only when the machine is running at slow speed. See pages 7b-7 and 7b-8 for a complete description of Speed Logic operation.

Output 3

Reverse- This output will come ON whenever the machine is moving in the reverse direction, away from the brake.

Output 4

Run- This output is turned on when the MP338 is in the Run Mode. It is typically used to latch the Run Push Button when Input 4 is used as a Run Input.

Output 5

Part Complete- The Part Complete Output turns ON for 0.5 seconds when the final bend of the part has been completed. This output is delayed by the amount of time entered in the "Position Delay" parameter.

Outputs 6 and 7

Output 6, Part Type Low Bit
Output 7, Part Type High Bit

These two outputs provide a binary coded output of what type of part is currently being produced.

Part Type	Output 7, High Bit	Output 6, Low Bit
—	Off	Off
L	Off	On
⊔	On	Off
□	On	On

Output 8

In Position- When the Backgauge has moved to the correct position and is within tolerance, Output 8 will turn ON to indicate the Backgauge is "In Position". When the Brake Complete input turns on, the In Position output will turn off after the programmed "Position Delay" time, and remain off until the backgauge has come to a complete stop.

Dip Switch Settings

On the back of a panel mount style controller or on the circuit board mounted to the lid of a Consolette style controller, seven small dip switches will be found. These switches are used to setup the proper Unit ID which is used to define the controller as an MP338 standard Backgauge controller and to establish proper communications with an XL120 controller, if applicable. The dip switches also determine if the machine is single or double speed and the encoder direction.

Caution: Ensure that all power is disconnected from a Consolette style controller before removing the lid. Serious damage to the controller can occur if the lid is removed with the power on.

Switches 1, 2, 3, and 7

Unit ID- Switches 1, 2, 3, and 7 determine the Unit ID and the following two options are valid.

SW1	SW2	SW3	SW7	Unit ID (Used by XL120 only)
Off	Off	On	Off	44
On	Off	On	Off	45

Switch 4

Speed Control- This switch determines if the machine is to operate at one speed or at two speeds.

Switch 4 OFF	One Speed
Switch 4 ON	Two Speed

Switch 5

Encoder Direction- This switch determines the polarity of the encoder signals. If the encoder counts are moving the wrong direction, change dip switch 5. Encoder counts should get smaller as the Backgauge moves toward the brake and larger as it moves away from the brake.

Switch 6

Not Used- Must be set to OFF

Setup Parameters

If the BACKGAUGE SETUP is highlighted and ENTER is selected, the BackGauge setup screen can be seen. There will be a slight delay while this screen is being loaded.

```
 2:30PM     9/05/97        0FPM            0.000"
ORDER                                         0Ft
MATERIAL                               N/A% COMP.
Parameters                                   Value
Reference Mode                                Near
Ref. Pos.                                  0.000"
Position Delay                        0.0000sec
Multiple Brake                                 No
OverShoot Dist                        10.0000"
Tolerance                              1.0000"
Stopping Mode                              Auto
Stop Reaction                         0.0000sec
Move Delay                            0.0000sec
New Program Delay                     0.0000sec
Resolution                       0.0117187529"
```

Figure 7b-1. BackGauge Setup Screen

Reference Mode

The REFERENCE MODE parameter tells the **MP338** where the reference switch or physical stop is located. The reference point is the center of the brake where the bend occurs. If the switch is close to the reference point and most of the moves of the backgauge occur "behind" the switch or physical stop, the REFERENCE MODE is NEAR. If the switch is behind the backgauge and most of the moves are in "front" of the switch or physical stop, the REFERENCE MODE is FAR. Use any number key to toggle the choices.

Near Reference Mode
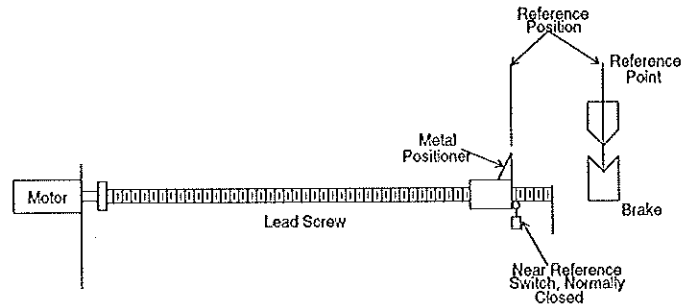
Far Reference Mode
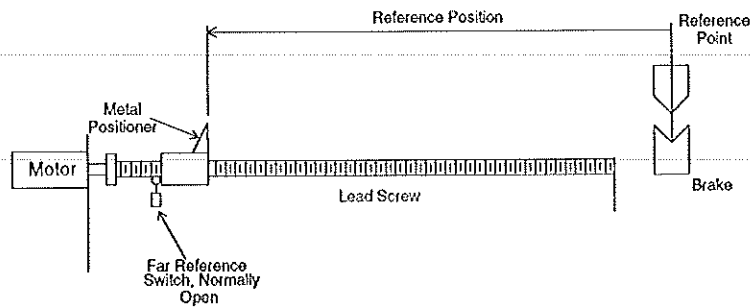
The switch for a NEAR REFERENCE MODE must be normally closed and remain open as long as the backgauge is on the switch or closer to the reference point than the switch. The switch for a FAR REFERENCE MODE must be normally open and remain closed as long as the backgauge is on the switch or farther away from the reference point than the switch.

The controller will automatically reference itself when it is placed in the RUN mode. The reference is always achieved when the controller is moving in the forward direction. If a physical stop with a NEAR REFERENCE is used, the controller will reference itself when the gauge hits the stop going forward. If a physical stop with a FAR REFERENCE is used, the gauge will hit the stop in the reverse direction and then reference when the first forward encoder count is seen.

NOTE: If using a positive stop with a Near Reference Mode, the reference input (Input 3) must be jumpered to DC Common.

Ref. Pos.

The REFERENCE POSITION is the distance from the reference point to the metal positioner after it has reached the physical stop or HOME SWITCH. This distance should be measured as accurately as possible. See page 7b-18 for details on referencing.

Note: When measuring the REFERENCE POSITION, you must take into account any coast that occurs if you perform a reference to measure the position. The best way to measure the distance is to move the backgauge by hand if possible or jog it at a very slow speed until the limit switch just opens and measure from that point.

Position Delay

The POSITION DELAY parameter sets a delay time (in seconds), from when the Brake/Clamp complete input turns on, and the time the outputs turn on to move the backgauge. The limits of this parameter are 0.0000 to 9.9999 seconds

Multiple Brake

With MULTIPLE BRAKE set to NO, the Brake/Clamp Complete input is disabled so that the backgauge can make single bends only. Setting MULTIPLE BRAKE to YES enables the Brake/Clamp Complete input and allows the MP338 to reposition the backgauge after every bend, if necessary.

Speed Logic

The MP338 controller has four outputs which control the speed and direction of the machine. To accommodate more than one wiring possibility, the controller may be run with one of two different SPEED LOGIC settings (if set up as a two speed controller): 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 7b-1 and 7b-2. Any number key or the blue PICK 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	OFF	ON	OFF
Output 3 (REV)	OFF	OFF	OFF	OFF	ON
Output 5 (RUN)	ON	ON	OFF	OFF	OFF

Table 7b-1. Status of Outputs in Forward-Slow

Note: All Jogging and Referencing is performed at fast speed

Machine State					
	Run Fast	Run Slow	Jog Fwd	Halt	Jog Rev
Output 1 (FOR)	ON	OFF	ON	OFF	OFF
Output 2 (SLOW)	OFF	ON	OFF	OFF	OFF
Output 3 (REV)	OFF	OFF	OFF	OFF	ON
Output 5 (RUN)	ON	ON	OFF	OFF	OFF

Table 7b-2. Status of Outputs in Fast-Slow

Note: All Jogging and Referencing is performed at fast speed

Min Slow Distance

This parameter is used to put the line into slow speed (if using two speed logic). The controller will automatically calculate when to start slowing down and then this distance is added to it (if the DECEL MODE is set to AUTO). Increase this value for a longer slow distance. Decrease this value for a shorter slow distance. A longer slow distance can improve part accuracy but too long a value can slow production. The distance should be set long enough that the material fully reaches the slow speed before stopping.

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 (if the DECEL FACTOR is set to AUTO). The MP338 controller calculates the distance from the programmed position that the machine should shift into slow speed. This is based on the speed of the material and the deceleration characteristics of the machine.

When the DECEL FACTOR AUTO setting is used, 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. This value should be set long enough that the material fully reaches the slow speed before stopping.

Overshoot Dist

The MP338 will always move the backgauge toward the target in a forward direction (toward the reference point). When moving away from the reference point to make a bend, or a FAR REFERENCE, the backgauge will overshoot the target by the OVERSHOOT DISTANCE and approach the target in a forward direction. This is done to keep any machine "slop" behind the backgauge.

The allowable range is 0.0 to 50.0 inches. The distance that is entered should be large enough so that the backgauge can get up to full speed before stopping. The default value is 10.0000 inches.

Tolerance

The controller can check for the backgauge to be within a specified TOLERANCE. If the machine has not stopped within this TOLERANCE, the controller will halt and an error will be displayed.

The TOLERANCE should be set small enough to get acceptable parts but wide enough to avoid production interruptions. The controller allows values from 0.0005 inches to 10.0000 inches. The default value for TOLERANCE is 1.0000 inches.

Stopping Mode

The STOP REACTION time represents the time delay from the time that the controller turns off the movement outputs until the backgauge actually stops. The user has a choice of three STOPPING MODES: AUTO, MANUAL, or OFF. Use any number key to toggle through the choices.

AUTO: The controller turns off the movement outputs prior to the actual brake point to allow for the momentum and inertia of the machine. A new STOP REACTION time is calculated after each stop based on the average stopping time for several cycles. This parameter may be overridden, but the value will be modified on the next part that is run. The maximum value is 9.9999 seconds.

MANUAL: The controller turns off the movement outputs prior to the actual brake point as above. However, when in MANUAL, the controller does not recalculate a new STOP REACTION time after each stop. Whatever value is manually entered remains constant. The maximum value is again 9.9999 seconds.

OFF: A STOP REACTION time is not calculated and is not used at all by the controller. The movement outputs are turned off when the backgauge position is equal to the programmed length of the bend. This should cause bends to come out short due to the momentum of the machine and material during stopping. Also, when the STOP MODE is set to OFF a tolerance test is not performed.

The default mode for STOP REACTION time is AUTO which is the recommended mode of operation.

Stop Reaction

The time it takes for the backgauge to come to a stop after the outputs are turned off. It is adjusted automatically after every stop by the controller if the STOPPING MODE has been set to AUTO.

Decel Factor Mode

On two-speed machines, a DECELERATION (DECEL) FACTOR is used by the MP338 controller when changing from fast to slow speeds. The user has the option to select from three DECEL FACTOR MODES: AUTO, MANUAL, or OFF.

AUTO: A DECEL FACTOR is automatically maintained by the controller. It is expressed in inches-per-second-per-second (In/Sec^2) and is used in the Adaptive Slowdown calculation. The parameter can be overridden but will change on the next movement.

MANUAL: A DECEL FACTOR may be manually entered into the MP338 controller. The value is used in the Adaptive Slowdown calculation. Some trial and error may be necessary when in the MANUAL mode to find a DECEL FACTOR which works properly. Ideally, the machine should shift from fast to slow at some distance prior to the target long enough so that it reaches a constant slow velocity before the movement outputs are turned off.

If the machine tends to shift into slow too soon, increase the DECEL FACTOR. If the machine tends to shift into slow too late, decrease the DECEL FACTOR. The DECEL FACTOR should be used in conjunction with the MINIMUM SLOW DISTANCE to determine the ideal time to change from fast to slow.

While in the MANUAL mode, the AMS controller will not calculate a new value for the DECEL FACTOR after each stop.

OFF: No DECEL FACTOR is used and the controller will not make an Adaptive Slowdown calculation. The machine will shift from fast to slow when the backgauge has reached the MINIMUM SLOW DISTANCE before the target. For example, if the MINIMUM SLOW DISTANCE has been set to four inches, the machine will shift from fast to slow 4 inches before the programmed position. This may or may not be enough distance for the machine to decelerate properly.

The DECEL FACTOR mode defaults to OFF but may be used in MANUAL or AUTO to increase productivity.

Decel Factor

This parameter is expressed in inches-per-second-per-second (In/Sec^2) and is used in the Adaptive Slowdown calculation discussed in the DECEL FACTOR MODE above. There is no exact formula for this value so experimentation is necessary. Ideally the machine should shift from fast to slow at some distance prior to the target so that it reaches a constant slow velocity before the movement outputs are turned off. This value is automatically calculated by the controller if the DECEL FACTOR MODE is set to AUTO.

Move Delay

When the RUN input of the **MP338** is enabled, there should be a delay entered before the backgauge starts to move to its new position. This delay is included for safety purposes and allows for notification of personnel of the intended move. The delay can be programmed under the MOVE DELAY parameter. The acceptable range of this parameter is 0.0 to 5.0 seconds.

New Program Delay

This parameter allows a time delay that begins when the **XL120** goes into RUN and lasts until the downstream controller accepts the new part dimensions. The delay allows the **XL120** Coil Line controller to start processing the next item before the previous cut pieces have made it through the machine. Enter the amount of time it takes for a piece to be cut off and make it to the Backgauge (with enough time for the Backgauge to get in position before the metal reaches it). The Delay range is 0 to 300 seconds.

Since the downstream controllers can not detect when there are delays in the processing of parts, some precautions must be taken to prevent a part being made with the wrong dimensions. If the downstream controller is halted while the NEW PROGRAM DELAY timer is running, the data in the timer will be lost and the timer stopped. When the downstream controller is placed back into RUN it will keep the same dimensions it had prior to being halted. In this case the part data would need to be sent to the downstream controllers again by either placing the **XL120** into RUN or by downloading the data from the Downstream Status Screens.

Note: The time delay can be overridden from the Downstream Status Screen by placing the downstream controller OFF LINE and manually downloading the part data to the controllers. Don't forget to put the controller back ON LINE to continue automatic processing.

Another condition occurs in the following scenario:

If Part A is being processed by the downstream controllers and Part B is cut by the **XL120** Coil Line controller, the timers in the downstream controllers are set. If the Coil Line is halted before the timers have expired, Part B will continue through the machine.

If the Coil Line is then restarted before the downstream controllers timers have expired, the timers are reset. Part B will then reach the downstream machines before the proper part dimensions take effect, which results in the pieces that were made prior to the halting of the Coil Line having the wrong part dimensions. To avoid this condition, allow the timers to expire and the new part dimensions to take effect before restarting the **XL120.** Another solution is remove the part(s) from the machine that have already been made and then run them through later.

The controller can only store one set of data in the timer at a time. This means that if part data has been downloaded to a downstream controller and different data is downloaded before the timer has expired, the first data sent down will be over-written by the second data.

Resolution

The RESOLUTION parameter defines the length of the backgauge movement for each increment of the encoder. It is a function of the lead screw lead (the distance the metal positioner travels for one revolution of the screw), and the number of counts per revolution of the encoder. For a directly coupled encoder/lead screw installation, the formula for calculating RESOLUTION is as follows:

$$\text{Resolution} \; = \; \frac{\text{Lead Screw Lead (in inches)}}{4 \; \text{x} \; \text{Encoder Count}}$$

For an AMS encoder, the encoder count is the model number of the encoder. A Model 256 is a 256 count encoder. A Model 1000Z is a 1000 count encoder.

Common lead screws have a ¼" lead, so for this lead screw, the RESOLUTION would be as follows:

Model	Resolution
256	0.00024414
256Z	0.00024414
500	0.000125
500Z	0.000125
1000Z	0.0000625

It is not necessary to precisely measure the lead 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.

Slow Volts

This parameter allows the operator to control the speed of the movement of the backgauge in the SLOW SPEED mode if analog outputs are being used. Increasing this value will cause a faster movement and decreasing this value slows the movement.

The controller provides an analog voltage signal that varies between 0 V and + 10 VDC. This output can drive a 1000 ohm load. The voltage is proportional to the speed of the movement.

Fast Volts

This parameter allows the operator to control the speed of the movement of the backgauge in the FAST SPEED mode if analog outputs are being used. Increasing this value will cause a faster movement and decreasing this value slows the movement.

The controller provides an analog voltage signal that varies between 0 V and + 10 VDC. This output can drive a 1000 ohm load. The voltage is proportional to the speed of the movement.

Correction

The CORRECTION FACTOR adjusts for errors in the backgauge movement. It is expressed as a percentage, with 100% being no correction. Increasing the CORRECTION FACTOR causes the backgauge movement to become longer and decreasing the value shrinks the backgauge movement.

Calculate the CORRECTION FACTOR using the following steps: 1) Force the Backgauge to perform a reference. 2) Jog the Backgauge to a position at the opposite end of the table. 3) Measure the distance that the Backgauge moved. 4) Use the following formula for the new CORRECTION FACTOR.

$$\text{New CF} = \frac{\text{Programmed movement of the Backgauge}}{\text{Actual Measured movement of the Backgauge}} \times \text{Old CF}$$

CF = Correction Factor

Filter Constant

The FILTER CONSTANT can be adjusted in order to improve the line speed display. If the line speed on the display fluctuates, a lower FILTER CONSTANT value will stabilize the display. The default value is 32 Hz, which is considered to be on the high side of the low values. The controller will allow values from 1.0 Hz to 200.0 Hz.

Units

Length measurements can be programmed and displayed as either English inches or Metric millimeters. Press any number key or the PICK key to toggle through the choices.

To exit the BACKGAUGE SETUP screen push the SETUP key.

BackGauge Status

To view the BACKGAUGE STATUS you must first be in the DOWN STREAM MACHINES CONFIGURATION SCREEN, figure 7-3. Highlight the DOWN STEAM MACHINES line and press ENTER. Highlight the BACKGAUGE STATUS line and press ENTER to view the status screen.

```
 2:59PM     9/05/97        0FPM          0.000"
ORDER                                         0Ft
MATERIAL                             N/A%  COMP.
MP338      Version:14.01  Unit:44   Type: 2
Position:  0.000"   Status: Stopped
Inputs:--------          Outputs:-2------
Device: Offline


Type  Height    Width    Offset BendAllow
  ☐    0.00      0.00      0.00      0.00




        Press  Enter  for  Program  Page
```

Figure 7b-2. BackGauge Status Screen

If no parts are programmed, the screen will have the information shown in Fig. 7b-2. When parts are programmed, this screen will show the characteristics of the programmed part.

The information shown on the Status Screen includes the **MP338** version, unit and type number, the part position, the controller status, input and output status, on line and off line status, as well as the current part information.

The controller status options are: Stopped, Reference, Moving, Jog Fwd, Jog Rev, and Enabled.

Pressing the Enter key will take you to the Program page as shown in figure 7b-3.

```
 3:03PM    9/05/97      0FPM         0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
MP338  Version:14.01  Unit:44   Type: 1
Device                             Off Line
Part Type                                 ▯
Part Height                           0.00"
Part Width                            0.00"
Offset                                0.00"
Bend Allowance                        0.00"
Command                        Send Program

```

Figure 7b-3 Backgauge Program Screen

The first function of this screen is to set the downstream machine into the "Local" or "Remote" mode. This is done with the "Device" parameter. Pressing the "Pick" key will toggle between the choices of ON LINE and OFF LINE. After the proper mode is selected, use the "Enter" key to lock the choice in.

If ON LINE is chosen, the downstream device will be in the "Remote" mode and controlled by the **XL120**. When the device is "ON LINE", the part information is sent to the downstream controller. This information will include the Part Type, Part Height, Part Width, Offset, and Bend Allowance parameters.

If OFF LINE is chosen, the downstream device will be in the "Local" mode, and is designed to operate independently, without using the **XL120** as a controlling device. In this mode, parts can be programmed with the downstream controller.

The Command line allows the operator to send a new set of dimensions to the **MP338** controller for bending sheets not made by the **XL120** controller. The Command line may also be used to clear the **MP338's** memory, if necessary. By highlighting the Command line and pressing the PICK key, the Reference or Clear Memory command will be shown on the display. Pressing ENTER will send the specific command to the **MP338**. The command options are "Send Program", "Reference", and "Clear Memory".

To exit this screen press the SETUP button.

Operating Procedure

Referencing

The controller must be referenced to a known position each time power is removed and restored to the unit. The fixed reference position may be one of two items: 1) A home (reference) switch, or 2) A positive stop. Each type of referencing sequence is described below.

Near Referencing With A Home Switch:

NOTE: Referencing is performed at fast speed. A normally closed limit switch must be used for a NEAR REFERENCE.

1. The MP338 determines the state of the Home Switch. If the switch is CLOSED, the MP338 moves the gauge in the forward direction until the Home Switch is OPEN. It then skips to step # 6.
2. If the Home Switch is OPEN, the MP338 moves the gauge in the reverse direction until the Home Switch is CLOSED.
3. It continues the reverse move for the Overshoot Distance.
4. Wait for the gauge to stop.
5. The MP338 moves the gauge in the forward direction until the Home Switch is OPEN.
6. At the CLOSED -> OPEN transition of the Home Switch, the encoder interrupt captures the encoder count and sets it equal to the reference position.

Near Referencing With A Positive Stop:

NOTE: The Home Input (Input 3) must be jumpered to DC Common when using a Positive Stop reference in the Near Reference mode. Referencing is performed at fast speed.

1. The MP338 moves the gauge in the forward direction until it hits the positive stop (Velocity < 1 count/sec).
2. The encoder interrupt captures the encoder count and sets it equal to the reference position.

Far Referencing With A Home Switch:

NOTE: Referencing is performed at fast speed. A normally open limit switch must be used when FAR REFERENCING.

1. The **MP338** determines the state of the Home Switch. If the switch is OPEN, skip to step # 3.
2. If the switch is closed, the controller moves the gauge in the forward direction until the Home Switch is OPEN, and waits for the gauge to stop.
3. The **MP338** moves the gauge in the reverse direction until the Home Switch is CLOSED.
4. The controller continues the reverse move for the Overshoot Distance.
5. It waits for the gauge to stop (Velocity < 1 count/sec).
6. The **MP338** moves the gauge in the forward direction until the Home Switch is OPEN.
7. At the CLOSED -> OPEN transition of the Home Switch, the encoder interrupt captures the encoder count and sets it equal to the reference position.

Far Referencing With A Positive Stop:

NOTE: Referencing is performed at fast speed.

1. The **MP338** moves the gauge in the reverse direction until it hits the positive stop (Velocity < 1 count/sec).
2. It then moves the gauge in the forward direction until 1 encoder count is generated.
3. The encoder position is then set to the reference position distance.

NOTES:

- **All referencing moves are made in fast speed.**
- **If near referencing is used, the home switch must be wired N/C (normally closed). Far referencing requires that normally open contacts be used.**
- **If the operator changes the Reference Mode from near to far (or back), he or she must toggle the home switch input before the change takes effect, or cycle power on the controller.**

<u>Programming</u>

The programming of parts is done with the **XL120** controller. Refer to the Parts Programming section of the manual for the proper procedure.

A second method of programming the parts for the **MP338** is by using the Backgauge Program Screen, figure 7b-3 on page 7b-15.

Device On Line / Off Line. This parameter must be placed "On Line" for the **XL120** to download part production data to the **MP338**. Select "Off Line" if using the **MP338** separately from the **XL120**.

Type   Part Type - One of four options:

   ☐   Single sheets which will not cause the Backgauge to move

   L   "L" shaped, single bend duct

   U   "U" shaped, double bend duct

   0   Wraparound, triple bend duct

   I   Shear only sheets which will not cause the Backgauge to move

Height The height of the duct .

Width The width of the duct.

Offset The lip that is added to some sheets' length when the lock is formed and is not counted toward the length of the part.
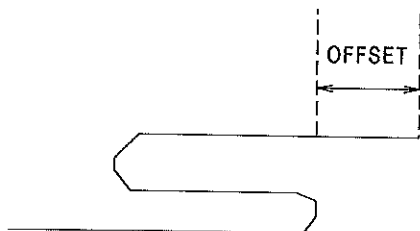
Bend Allowance The length that is subtracted from each side of the part. This is used to compensate for gain due to each bend and the difference between real and nominal measures. For example, when making an ▭ shaped part (wrap-around type), there will be three corner notches for the three bends. At each bend the **MP338** controller will subtract the BEND ALLOWANCE from both the height section and the width section. So on a part with three bends, the controller subtracts a total of 6 BEND ALLOWANCES from the overall part length. This is shown in the figure below.
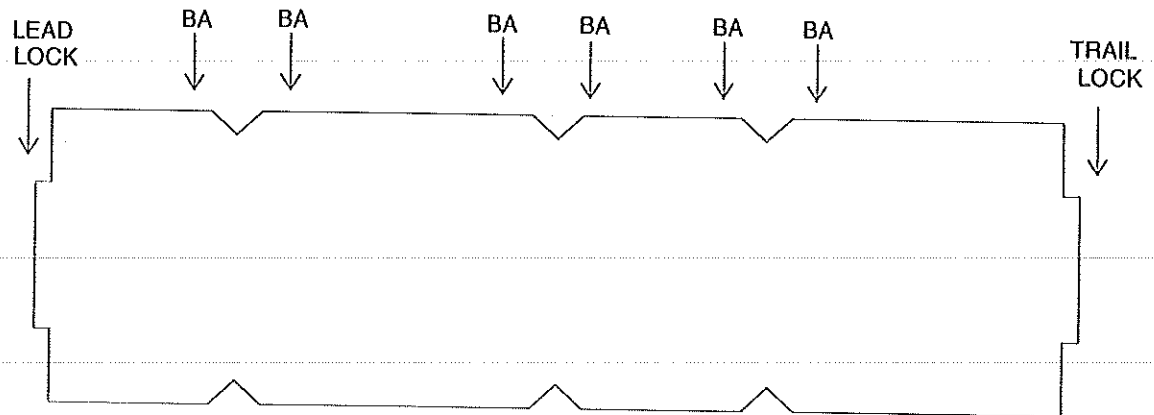
Run Operation

Once a new set position is programmed in, the controller moves to the target while following the rules below.

1. If Current Position > (Set Position + Overshoot Distance), it will move in the forward direction to the target.
2. If Current Position < Set Position, it will move in the reverse direction until condition # 1 is true, then move in the forward direction to the target.

All targets must be approached from the forward direction so that any backlash in the system can be minimized.

If a new set position is programmed in before the controller has been referenced, the reference sequence will be performed before the controller moves to the target.

Note: In order for the MP338 to automatically receive parts data from the XL120, it must be put "On Line". To do this, go to the Backgauge Status Screen by highlighting "Downstream Machines" in the Setup Menu and pressing "Enter". Highlight "Backgauge Status" and press "Enter". Press "Enter" again to go to the Backgauge Program Screen. Highlight the top row labeled "Device" and press the "Pick" key to toggle the option to "On Line". It can also be done at the MP338 controller, if it has a front display panel. Press the "Setup" key and press the number 3 ("3 = Loc / Remote"). Local or Remote mode is indicated on the Status Screen, top row, next to the line speed indicator.

Front Panel Run/ Remote Run Mode

If using the FRONT PANEL RUN button, jumper input 4 (Run/Enable) to DC common. Doing this will disable the Jog Forward and Jog Reverse inputs as well as the Auto Calibrate function while the MP338 is ON LINE or in the Remote mode.

If using a REMOTE RUN/ HALT circuit, Input 4 is the Run input. The Run output (#4), should be used to latch the input, refer to the enclosed Electrical Interface Diagram for wiring. When using a REMOTE RUN, the HALT button on the front panel (if available), will still halt the operation.

Part Reset Operation

Circumstances may arise when you may need to start the Part Bend process over, i.e. if a part gets damaged and the remaining bends cannot be completed.

In order to reset the position of the Backgauge back to the first bend in the part, simply close the Part Reset input (#8). If the Backgauge is moving to a new position when the input is initiated, the Backgauge will finish the move before returning to the first bend position. To stop the Backgauge from moving, and to immediately go to the first bend position, halt the motor by removing the Run Enable input. Momentarily close the Part Reset input (#8) and then close the Run Enable input. The Backgauge will now move to the first bend position.

Specification

Parameter	Panel Mount	AC Consolette

Mechanical

	Panel Mount	AC Consolette
Size	8"X12.5"X2.25"	8"X12.5"X7.5"
Weight	7lbs.	15lbs.

Electrical

	Panel Mount	AC Consolette
Input Voltage	24VDC ±5%	115VAC ±10%, 50-60Hz
Input Current	.5 Amp.	1 Amp.

Outputs

	Panel Mount	AC Consolette
Forward/Fast	Std DC	Std DC, AC Relay
Slow	Std DC	Std DC, AC Relay
Reverse	Std DC	Std DC, AC Relay
Run	Std DC	Std DC, AC Relay
Part Complete	Std DC	Std DC, AC Relay
Part Type Low Bit	Std DC	Std DC, AC Relay
Part Type High Bit	Std DC	Std DC
In Position	Std DC	Std DC
Analog (Optional)	0 to +10VDC	0 to +10VDC

Inputs

	Panel Mount	AC Consolette
Jog Forward	Yes	Yes
Jog Reverse	Yes	Yes
Home	Yes	Yes
Run Enable	Yes	Yes
Setup/Lockout	External	Internal
Not Used		
Brake/Clamp Complete	Yes	Yes
Part Reset	Yes	Yes

(Note: The following parameters apply equally to all versions.)

Output Characteristics

Standard DC

Type	Open Collector Transistor
Maximum Current	4 ADC
Maximum Applied Voltage	35 VDC

AC Relay

Type	Form A Dry Circuit Relay
Maximum Current	5 Amp.
Maximum Applied Voltage	240VAC

Encoder Input

Type	Quadrature with Complements
Voltage	5VDC
Maximum Encoder Load	200 milliamperes
Maximum Pulse Rate	275,000 pulses/second

Operation

Maximum Part Length	999.99 inches
	9999.9 millimeters
Units of Measurement	inches, or millimeters

MP338 Switch Settings and I/O

MP338 Switch Settings

Switch	Description
1	Unit ID, see switch settings below
2	Unit ID, must be OFF
3	Unit ID, must be ON
4	OFF = One Speed/ ON = Two Speed
5	Encoder Direction
6	Not Used, must be OFF
7	Unit ID, must be OFF

The proper Unit ID switch setting for the **MP338** is: switch 3 ON. Switches 1 and 3 ON is also a valid Unit ID number for the **MP338**.

SW1	SW2	SW3	SW7	Unit ID
OFF	OFF	ON	OFF	44
ON	OFF	ON	OFF	45

MP338 Inputs

Inputs	Description
1	Jog Forward
2	Jog Reverse
3	Home
4	Run Enable
5	Setup/Lockout
6	Not Used
7	Brake/Clamp Complete
8	Part Reset

MP338 Outputs

Outputs	Description
1	Forward/Fast
2	Slow
3	Reverse
4	Run
5	Part Complete
6	Part Type Low Bit
7	Part Type High Bit
8	In Position
Pin 14	Analog + (Optional)
Pin 15	Analog - (Optional)

To exit the Backgauge Status screen press the SETUP button

MODEL XL120 CONTROLLER

AMS CONTROLS

For assistance call 1-800-334-5213 and ask for customer service

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

TYPE _____

Serial Number _____
Version Number _____

ON ↑
| | | | | |
1 2 3 4 5 6 7

SETUP DATA SHEET

Machine Data

Automatic Mode Options

Halt No More Item? _____
Format _____
Maximum Sheet Length _____
Scrap Length _____
Tolerance _____
Min Slow Distance _____
Set Done Items to Ready? _____
Auto-Delete Done Orders _____
Min. Footage to Request Order _____
Use Order Numbers? _____
Halt Delay Minimum _____
Manual Shear Scrap Length _____

Machine Layout/Dimensions

Machine Configuration _____
Leading Edge Lock Type _____
Manual Notch Select _____
Hole Punch Select _____
Shear-Encoder Distance _____
Max Backup Distance _____
Coil End Point _____
Coil End Offset _____
Encoder Direction _____
Resolution _____
Correction _____
Filter Constant _____
DR Vee Notch Distance _____
DR End Notch LE Distance _____
DR End Notch TE Distance _____
TR Vee Notch Distance _____
TR End Notch LE Distance _____
TR End Notch TE Distance _____
Hole Punch Distance _____

MODEL XL120 CONTROLLER

AMS CONTROLS

For assistance call 1-800-334-5213 and ask for customer service

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

TYPE

Serial Number _____
Version Number _____

ON →

	1
	2
	3
	4
	5
	6
	7

SETUP DATA SHEET

Machine Data

Timing Parameters

Shear Dwell Down _____
Shear Dwell Up _____
Shear Reaction _____
Shear Boost Dwell _____
Shear Boost Reaction _____
Die Boost Comp _____
Delay After Shear _____
Item Complete Dwell _____
DR End Notch Dwell Down _____
DR End Notch Dwell Up _____
DR End Notch Reaction _____
DR Vee Notch Dwell Down _____
DR Vee Notch Dwell Up _____
DR Vee Notch Reaction _____
TR End Notch Dwell Down _____
TR End Notch Dwell Up _____
TR End Notch Reaction _____
TR Vee Notch Dwell Down _____
TR Vee Notch Dwell Up _____
TR Vee Notch Reaction _____
Hole Punch Dwell Down _____
Hole Punch Dwell Up _____
Hole Punch Reaction _____
Gag Setup Time _____

Speed Logic Setup Parameters

Stopping Reaction Mode _____
Stopping Reaction Time _____
Decel Factor Mode _____
Decel Factor _____

Appendix A   Page 2

Setup Data Sheet

MODEL XL120 CONTROLLER

AMS *CONTROLS*

For assistance call 1-800-334-5213 and ask for customer service

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

TYPE

→ ON

1	
2	
3	
4	
5	
6	
7	
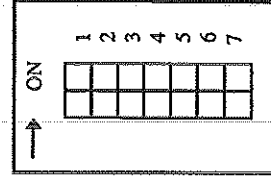
Serial Number _____
Version Number _____

• • •

Appendix A

Page 3

Setup Data Sheet

SETUP DATA SHEET

Edit Lock Data

Lock #	Male	Female	Bend	Corner	Offset
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___
___	___	___	___	___	___

SETUP DATA SHEET

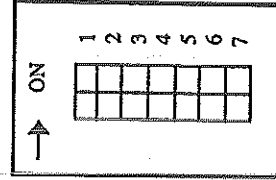## MODEL MP343 CONTROLLER

AMS CONTROLS

For assistance call 1-800-334-5213 and ask for customer service

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

TYPE

→ ON

```
  1
  2
  3
  4
  5
  6
  7
```

Serial Number _____

Version Number _____

● ● ●

Setup Data Sheet

Down Stream Machines

Pinspotter

Detect-Fire _____

Fire Reaction _____

Fire Dwell _____

Delay After Fire _____

Load Dwell _____

Hi Vel Distance _____

Lo Vel Distance _____

Sp Vel Distance _____

Hi MaxEdge Dist _____

Hi MinEdge Dist _____

Hi Max Brk Dist _____

Hi Min Brk Dist _____

Lo MaxEdge Dist _____

Lo MinEdge Dist _____

Lo Max Brk Dist _____

Lo Min Brk Dist _____

Sp MaxEdge Dist _____

Sp MinEdge Dist _____

Sp Max Brk Dist _____

Sp Min Brk Dist _____

Minimum Spacing _____

New Program Delay _____

Missed Pin Mode _____

Speed Logic _____

Min Slow Dist _____

Decel Factor Mode _____

Decel Factor _____

Resolution _____

Correction _____

Filter Constant _____

Units _____

SETUP DATA SHEET

MODEL MP338 CONTROLLER

∧M⎭ *CONTROLS*

For assistance call 1-800-334-5213 and ask for customer service

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

TYPE

Serial Number _____
Version Number _____

ON →

1	
2	
3	
4	
5	
6	
7	

Appendix A

Page 5

Setup Data Sheet

Down Stream Machines

BackGauge

Reference Mode _____
Ref. Pos. _____
Position Delay _____
Multiple Brake _____
Speed Logic _____
Min Slow Dist _____
OverShoot Dist _____
Tolerance _____
Stopping Mode _____
Stop Reaction _____
Decel Factor Mode _____
Decel Factor _____
Move Delay _____
New Program Delay _____
Resolution _____
Slow Volts _____
Fast Volts _____
Correction _____
Filter Const _____
Units _____

XL120 ELECTRICAL INTERFACE DIAGRAM WITH TERMINAL CONNECTIONS

117 VAC

OFF ON   E-STOP   SEE NOTE BELOW E-STOP   RESET   CR1   G

PROTECTIVE DEVICES   CR1

STOP   START   CR2   G
CR3

LINE   ACN
24 VDC POWER SUPPLY

I/O COMMON   I/O POWER (+24)

XL120

"TYPICAL"   CR1   24VDC

Terminal	Input		Output	Terminal	
A2	GND CPU	+24V I/O		+24V CPU	A1
A3	JOG FORWARD / INPUT 1		OUTPUT 1	FORWARD/FAST	A8
A4	JOG REVERSE / INPUT 2		OUTPUT 2	SLOW	A9
A5	RUN / INPUT 3		OUTPUT 3	REVERSE	A10
A6	SHEAR COMPLETE / INPUT 4		OUTPUT 4	SHEAR DOWN	A11
A7	SETUP LOCKOUT / INPUT 5		OUTPUT 5	RUN	A12
B2	MANUAL SHEAR / INPUT 6		OUTPUT 6	END-NOTCH	A15
B3	MANUAL END NOTCH / INPUT 7		OUTPUT 7	VEE-NOTCH	A16
B4	SHEET DETECT / INPUT 8		OUTPUT 8	DIE SELECT	B1
C11	MANUAL VEE NOTCH / INPUT 9		OUTPUT 9	HOLE PUNCH	C3
C12	MANUAL HOLE / INPUT 10		OUTPUT 10	CENTER HOLE GAG	C4
C13	END COMPLETE / INPUT 11		OUTPUT 11	OUTER HOLE GAG	C5
C14	VEE COMPLETE / INPUT 12		OUTPUT 12	HOLE POSITION GAG	C6
C15	HOLE COMPLETE / INPUT 13		OUTPUT 13	SHEAR UP / BOOST	C7
			OUTPUT 14	ITEM COMPLETE	C8

CR2

GND I/O
C2
C16
D4
B5   +24V I/O   C1

RS485-B   D5
COMM. 1
RS485-A   D7
SHIELD   D12   OFFICE PC WITH XL-LINK

REMOTE TERMINAL & KEYBOARD
RED   D9   RS232 TX
COMM. 2
BLACK   D10   RS232 RX
WHITE   D16   RS232 GND
D12   SHIELD

LINE ENCODER
A+   B14   WHT   A
A-   B13   BLK W/ WHT   B
B+   B12   GRN   C
B-   B11   BLK W/ GRN   D
+5V   B8   RED   I
GND CPU   B7   BLK W/ RED   J
SHIELD   B6

MP339 BACKGUAGE CONTROLLER   B   D13   RS485-B
A   D14   RS485-A
COMM. 3
D12   SHIELD

AMS ENCODER1

MP343 PINSPOTTER CONTROLLER   B
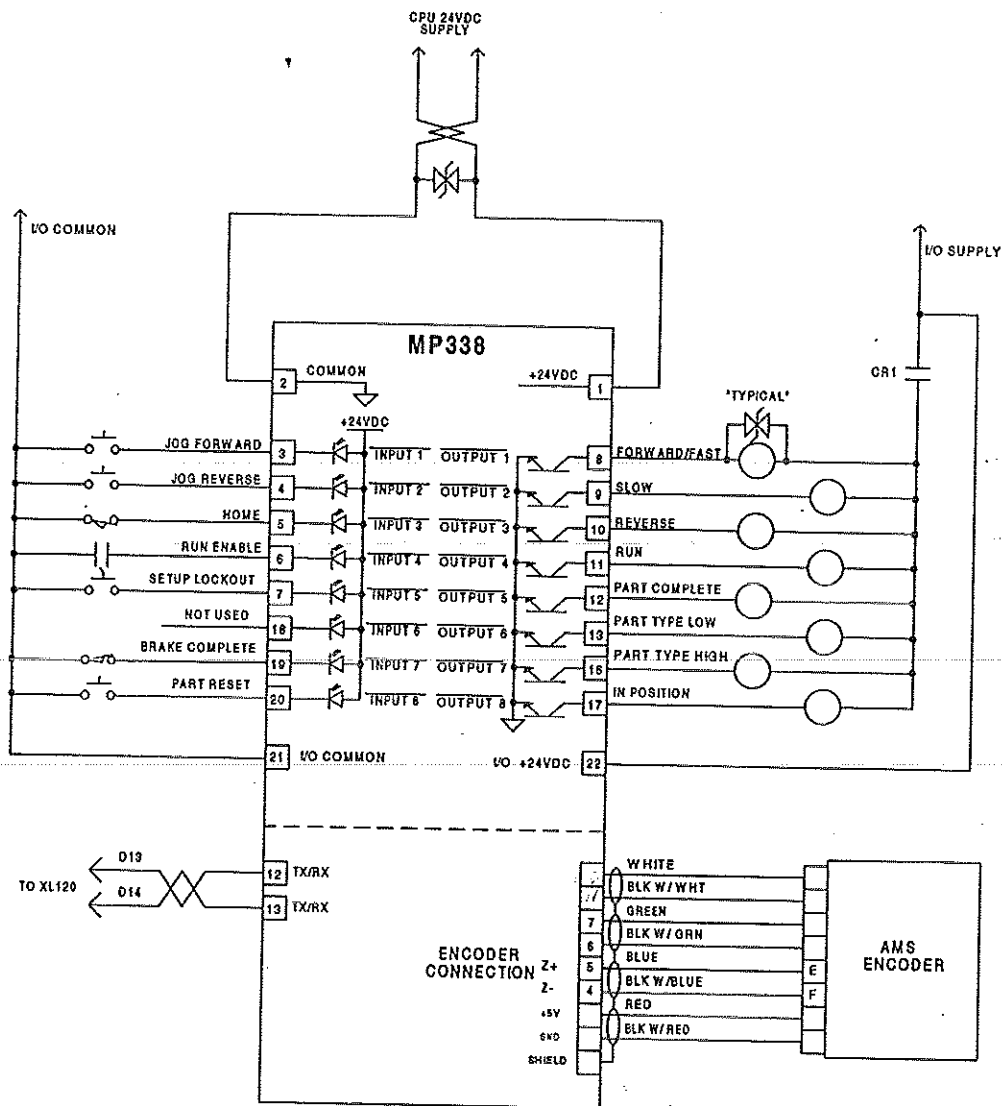A

CHASSIS CONNECTION   D16

NOTES:

† Twisted Pair

The outputs of the controller may be wired directly to the solenoids if they are rated at 24 volts DC.

AMS provides this drawing for illustration purposes only. It is not to be taken as a literal example for wiring your machine. Each machine is different, having its own safety considerations. The customer is responsible for the installation of adequate emergency stop circuitry, safety guards and enclosing all equipment potentially hazardous to personnel.

REVISIONS			AMS CONTROLS, INC.		
NO.	DATE	BY			
A	2-4-97	JKM	TITLE	XL120 ELECTRICAL INTERFACE DIAGRAM	
B	11-21-97	TMG		WITH TERMINAL CONNECTIONS	
C			DRAWN BY KWC	SCALE	MATERIAL
D			CHK'D	DATE 8-2-96	DRAWING NO.
E			FILE 4409.DW2	APP'D	4409

CPU 24VDC
SUPPLY

I/O COMMON

I/O SUPPLY

MP338

2 COMMON

+24VDC 1

CR1

+24VDC

"TYPICAL"

JOG FORWARD	3	INPUT 1
JOG REVERSE	4	INPUT 2
HOME	5	INPUT 3
RUN ENABLE	6	INPUT 4
SETUP LOCKOUT	7	INPUT 5
NOT USED	18	INPUT 6
BRAKE COMPLETE	19	INPUT 7
PART RESET	20	INPUT 8

OUTPUT 1	8	FORWARD/FAST
OUTPUT 2	9	SLOW
OUTPUT 3	10	REVERSE
OUTPUT 4	11	RUN
OUTPUT 5	12	PART COMPLETE
OUTPUT 6	13	PART TYPE LOW
OUTPUT 7	16	PART TYPE HIGH
OUTPUT 8	17	IN POSITION

21 I/O COMMON

I/O +24VDC 22

D13

TO XL120

D14

12 TX/RX

13 TX/RX

ENCODER
CONNECTION

Z+
Z-
+5V
GND
SHIELD

WHITE
BLK W/ WHT
GREEN
BLK W/ GRN
BLUE
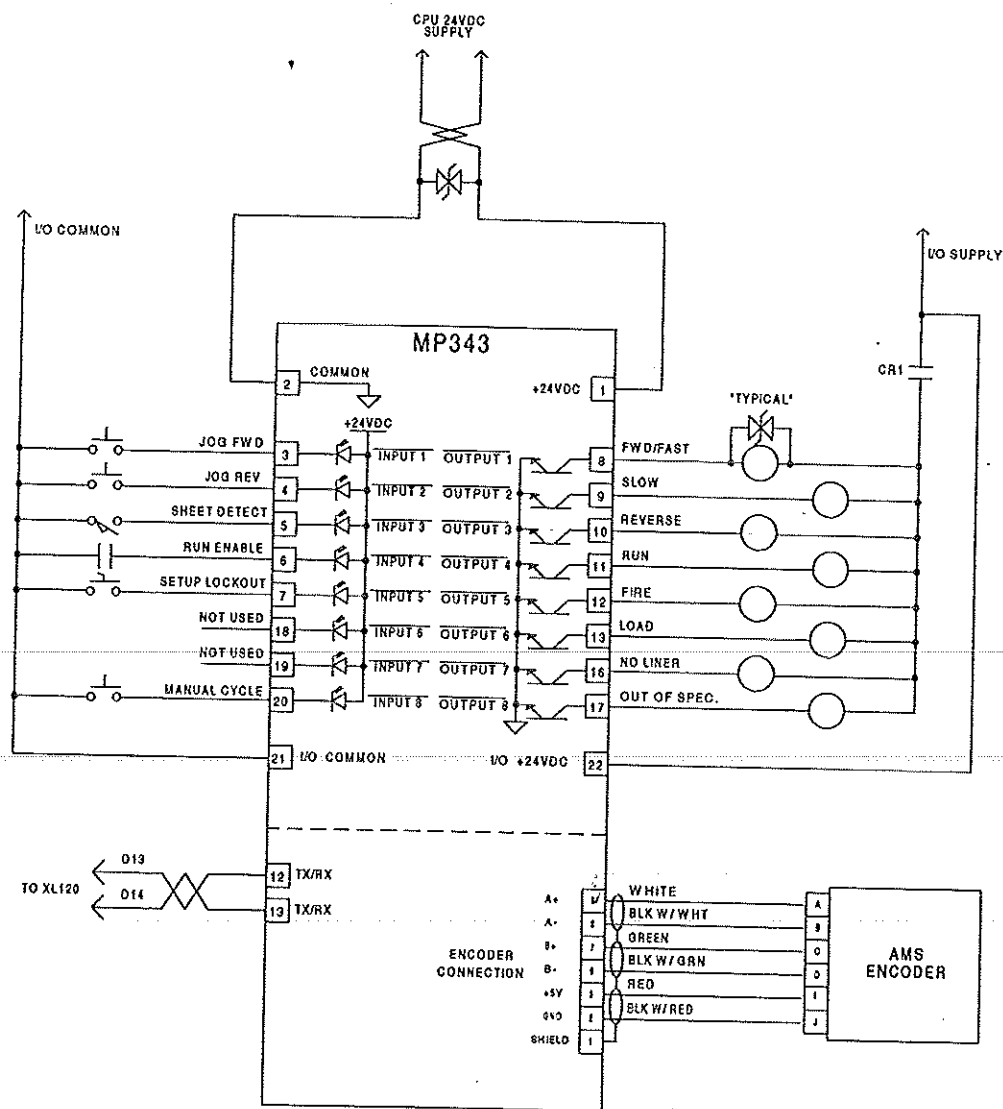BLK W/ BLUE
RED
BLK W/ RED

AMS
ENCODER

E
F

NOTES:

The communications for the Down Stream controllers must
be daisy chained rather than wired in parallel. The shields
must be tied together and connected only at the XL120 controller.
If more than 10 feet of wire is used between the XL120 and the
Down Stream controller, a 300 ohm resistor must be added in
parallel to the TX / RX connections on the XL120 and the last
controller in series.

AMS provides this drawing for illustration purposes only.
It is not to be taken as a literal example for wiring your
machine. Each machine is different, having its own safety
considerations. The customer is responsible for the
installation of adequate emergency stop circuitry, safety
guards and enclosing all equipment potentially hazardous
to personnel.

AMS CONTROLS, INC.

REVISIONS			
NO.	DATE	BY	
A	2-17-97	REB	
B	4-9-97	REB	

TITLE MP338 ELECTRICAL INTERFACE DIAGRAM

DRAWN BY KWC	SCALE	MATERIAL
CHKD	DATE 6-2-96	DRAWING NO.
FILE 4410B.DW2	APPD	4410

CPU 24VDC
SUPPLY

I/O COMMON

I/O SUPPLY

MP343

2	COMMON	+24VDC	1

CR1

+24VDC

"TYPICAL"

JOG FWD	3	INPUT 1	OUTPUT 1	8	FWD/FAST
JOG REV	4	INPUT 2	OUTPUT 2	9	SLOW
SHEET DETECT	5	INPUT 3	OUTPUT 3	10	REVERSE
RUN ENABLE	6	INPUT 4	OUTPUT 4	11	RUN
SETUP LOCKOUT	7	INPUT 5	OUTPUT 5	12	FIRE
NOT USED	18	INPUT 6	OUTPUT 6	13	LOAD
NOT USED	19	INPUT 7	OUTPUT 7	16	NO LINER
MANUAL CYCLE	20	INPUT 8	OUTPUT 8	17	OUT OF SPEC.

21	I/O COMMON	I/O +24VDC	22

TO XL120

O13	12	TX/RX
O14	13	TX/RX

ENCODER
CONNECTION

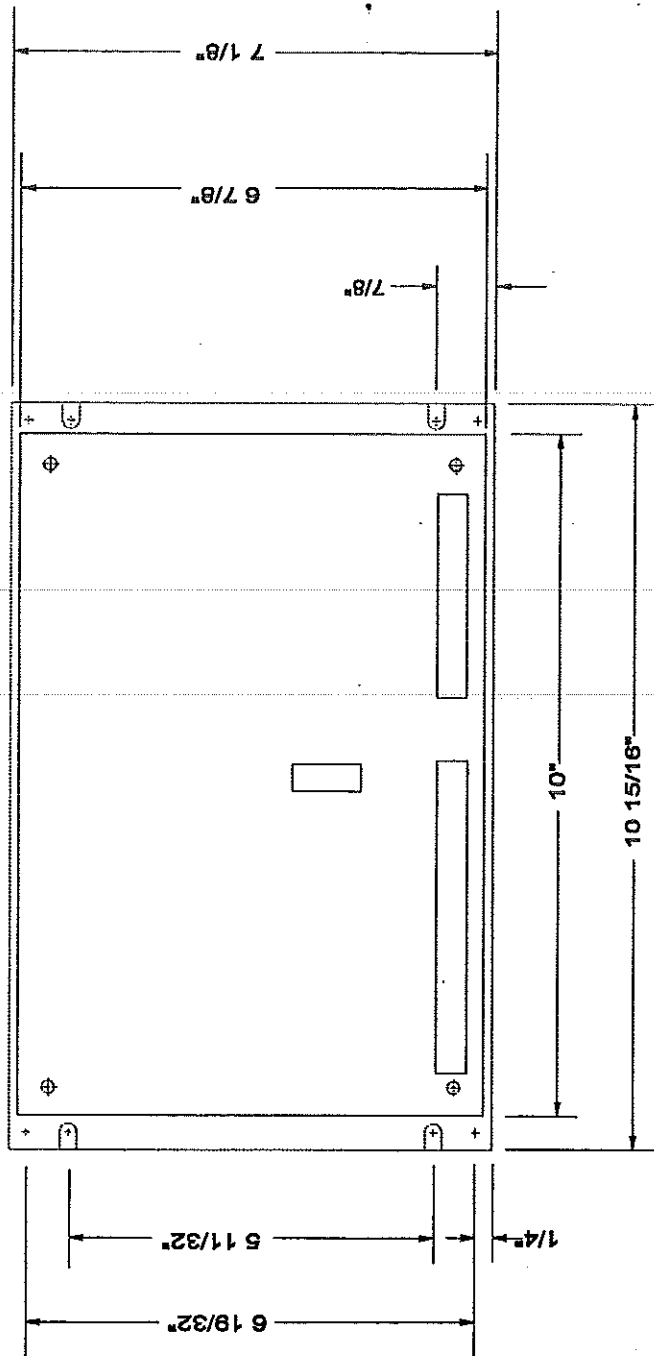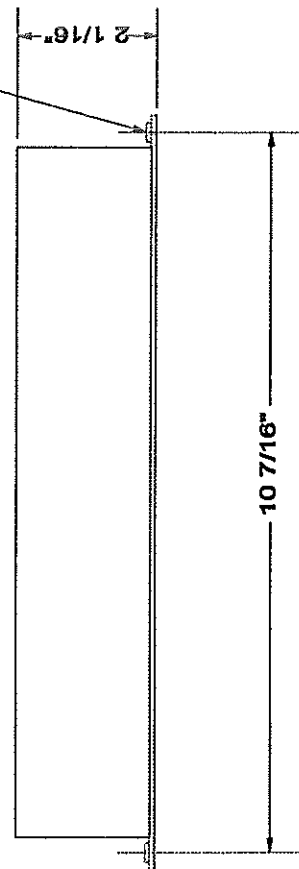| A+ | WHITE | A |
A-	BLK W/WHT	B
B+	GREEN	C
B-	BLK W/GRN	D
+5V	RED	E
GND	BLK W/RED	F
SHIELD		

AMS
ENCODER

NOTES:

The communications for the Down Stream controllers must
be daisy chained rather than wired in parallel. The shields
must be tied together and connected only at the XL120 controller.
If more than 10 feet of wire is used between the XL120 and the
Down Stream controller, a 300 ohm resistor must be added in
parallel to the TX / RX connections on the XL120 and the last
controller in series.

AMS provides this drawing for illustration purposes only.
It is not to be taken as a literal example for wiring your
machine. Each machine is different, having its own safety
considerations. The customer is responsible for the
installation of adequate emergency stop circuitry, safety
guards and enclosing all equipment potentially hazardous
to personnel.

AMS CONTROLS, INC.

TITLE: MP300 REMOTE CONTROLLER MOUNTING DIMENSIONS

MATERIAL

DRAWING NO. 4314

DRAWN BY: JKM SCALE

CHK'D DATE: 9-29-97

FILE: 4314.dw2 APPD
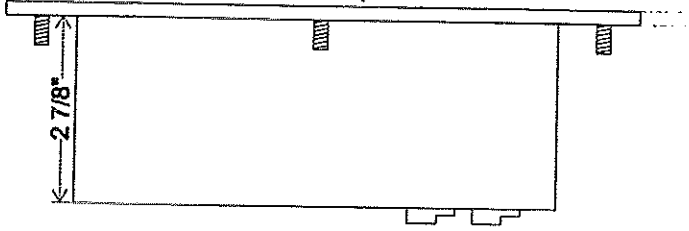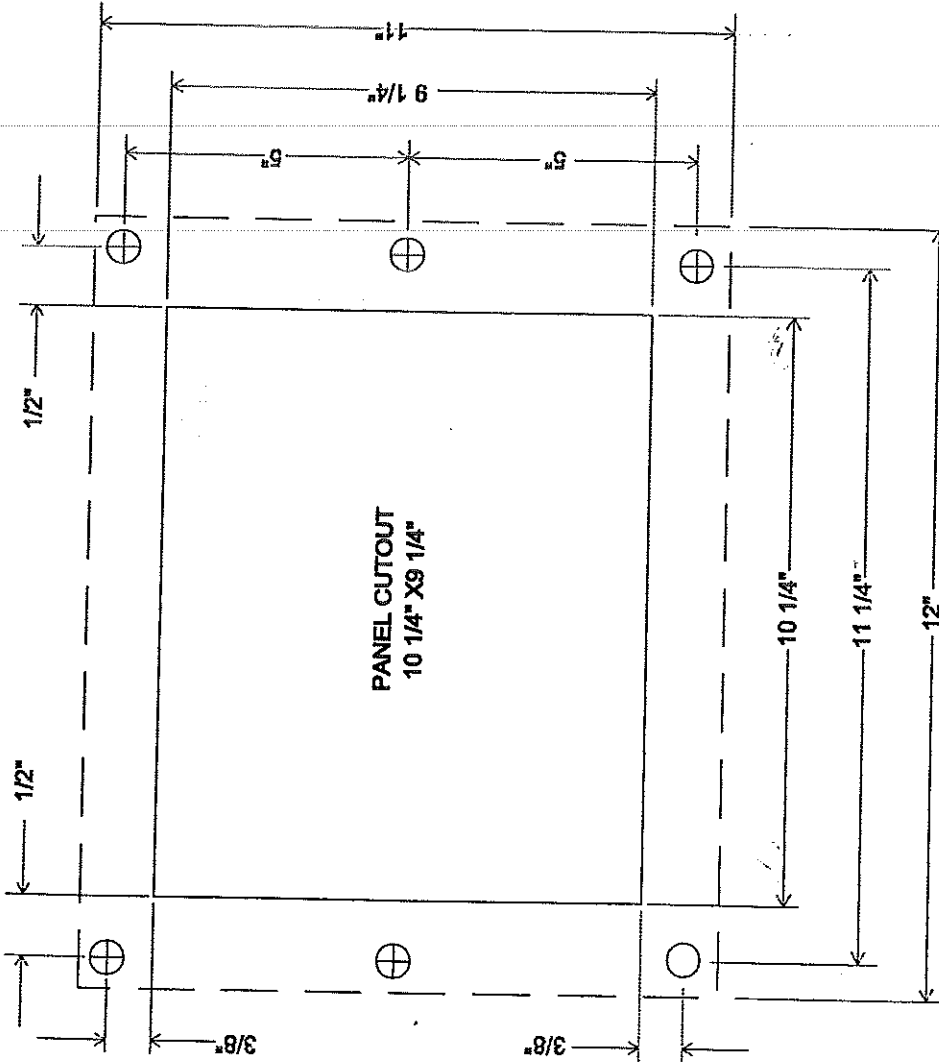
REVISIONS
NO.	DATE	BY
A		
B		
C		
D		
E		

7 1/8"

6 7/8"

7/8"

10"

10 15/16"

5 11/32"

6 19/32"

1/4"

6/32" TAPPED HOLES

2 1/16"

10 7/16"

PANEL CUTOUT
10 1/4" X9 1/4"

2 7/8"

1/2"

1/2"

11"

9 1/4"

5"

5"

10 1/4"

11 1/4"

12"

3/8"

3/8"

⊕ DRILL 1/4" HOLE

NO.	REVISIONS		
	DATE	BY	
A	12-30-86	DFK	
B			
C			
D			
E			

AMS CONTROLS, INC.

TITLE

XL 100 SERIES MOUNTING DIMENSIONS

DRAWN BY	MJA	SCALE		MATERIAL	
CKD		DATE	10-8-91	DRAWING NO.	4316
FILE	4316.dw2	APPD			