AMS *CONTROLS INC.*

XL100CL Closed Loop Controller Reference Manual

Operation & Reference Manual

Operation & Reference Manual

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Chapter Summary

Introduction

AMS Controls Inc. has years of experience with controls for roll formers. Much of this is with multiple press machines that punch and notch prior to cutoff. The **XL100CL SERIES** is the ultimate controllers for roll forming and cut-to-length machines. Unlike general-purpose controllers, AMS controllers are designed specifically for the needs of the roll forming industry. With an AMS controller installed on the roll forming line, many customers report a 20-30% increase in productivity due to the elimination of costly delays. Production can also be monitored with a PC from the office. The Model **XL100CL SERIES** controller is the latest and best of a long line of controllers.

With the **XL100CL SERIES**, parts are produced with a minimum amount of scrap. The powerful microprocessor can sequence from one size to another without waste. This unique feature makes in line punching practical for JIT (just in time) production systems.

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

With the controller design, AMS incorporated the following objectives:

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

Note: This manual applies to version 7 Controllers.

Accuracy

On cut-to-length machines without servo drives, accuracy depends on the repeatability of the machine to run at a constant speed and the repeatable reaction delays for each type of operation, punch and shear. If an electronic length controller is used, accuracy is lost when machine fluctuations occur.

Since the **XL100CL SERIES** Controller is designed exclusively for roll formers and cut-to length machines, it has additional features that give even better accuracy than other closed loop systems with non-repeatability of machines.

Productivity

The AMS controller improves productivity four ways.

First, the improved accuracy with the **XL100CL SERIES** controller allows machines to run at higher line speeds.

Secondly, for feed-to-stop machines, the Adaptive Slow-down 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 fourth way that the AMS controller can improve productivity is with the built in scrap control functions. These functions include "Increment Quantity", "Decrement Quantity", and "Add Line", and are explained in the "Part Programming" section of the manual.

The AMS Controller eliminates a large amount of material waste by requiring only a single manual cut at the beginning of a new coil. This cut can be made while the machine is stopped, as opposed to a flying crop cut, which further reduces waste.

The automatic "Coil End Point" feature helps reduce the amount of scrap created by stopping the line and allowing the operator to cut the coil so that the exact amount of material is used for the order. The controller also includes "Scrap Length" parameters for punching lines

The **XL100CL SERIES** Controller includes an RS-485 communications port for connection to a remote office computer. With optional **XL-LINK** software, orders can be scheduled and sent to the controller, as well as

machine performance monitored from the remote location. Productivity in this application can be greatly increased.

Easy to Use

The **XL100CL SERIES** Controller is a sophisticated computer running very complex programs. This does not mean however, that an expert is required to operate it. A large liquid crystal display (LCD) prompts the operator for information in plain English and with words that are familiar. On the main display, the operator can see the order that is ran, the progress through the order, and the speed of the line.

Easy to Install

The **XL100CL SERIES** Controller has built-in logic to handle most machine control functions. The user no longer needs to add Programmable Logic Controllers (PLCs) or relay logic circuits to get the correct machine sequence and safety features.

The AMS control will control a variety of different machines. For each type of machine, a different set of machine parameters are programmed into the controller. To simplify this procedure, the type of machine is programmed via a set of switches; these switches are in a single (DIP type) package, located on the back of the control. The controller reads the switches to determine the type of machine it is used with. Setup parameters are also limited by the switch settings to the parameters required only for the machine in use.

About this Manual

This manual gives detailed information on the installation, operation and maintenance of the **XL100CL SERIES** 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. A Customer Service Representative can be reached by Phone at 1-800-334-5213, FAX 1-314-344-9996 or questions can be sent through the Web Site at www.amscontrols.com. This Manual tells how to program orders and run them, gives the best way to handle a variety of special circumstances that can come up with most machines types and in the last section, includes a troubleshooting guide to follow if problems arise.

The Setup sheets in the back of this manual provide a place to record information about specific installations. Be sure to record this information at start-up and keep this manual in a safe place for later

referral. If calling AMS for technical assistance, have this manual information, as well as the model number and serial number of the controller. The software version number is also needed and is displayed on the XL screen at power-up.

System Description

The Closed Loop Control System

There are two types of closed loop control systems. The closed loop die accelerator is used on flying die machines. The closed loop roll feeder is used on feed to stop machines.
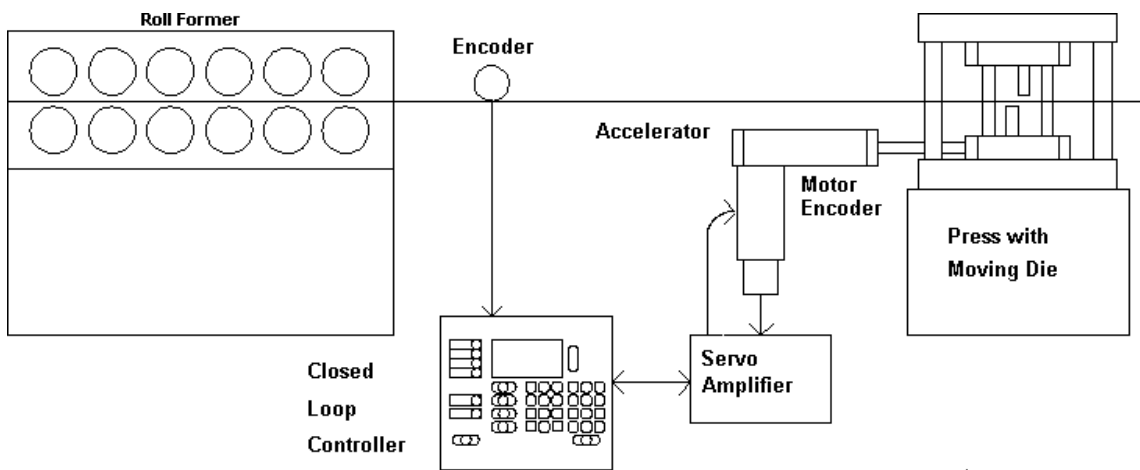
Figure 1.1. Closed Loop Die Accelerator System

The material is driven through the press by the roll former at a steady speed. The closed loop controller measures the material movement. When the cut point is near the cutoff press, the motor accelerates the die. The servo loop attempts to drive the position error between the die and the cut point to zero. When this is achieved, the speed of the die matches the speed of the material, and the cut can occur.

The main difference between this system and the open loop cutoff system with a die boost device is the fact that the controller knows the exact position of the die at all times. This allows the controller to make an exact match up of the cut point with the die. With the open loop system, the controller has no control over the position of the die and depends upon material speed matching and consistent machine speed to get accurate results.
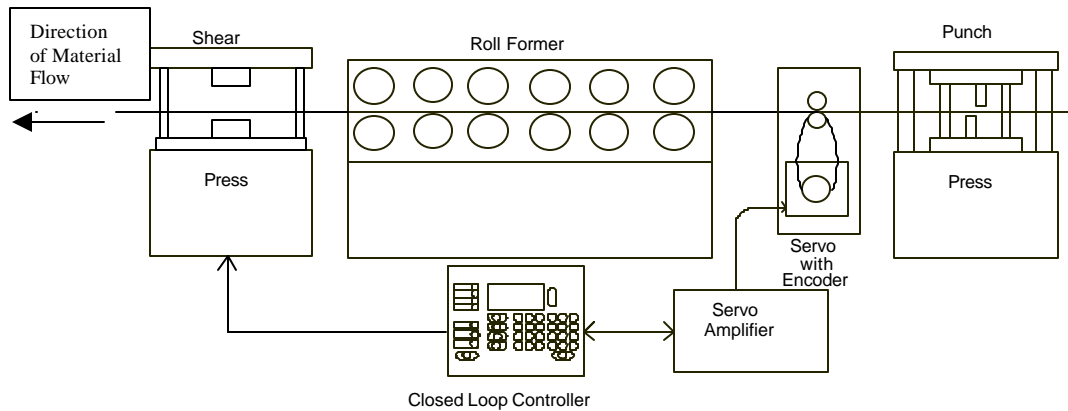
Figure 1.2. Closed Loop Roll Feed System.

A block diagram of the Closed Loop Roll Feed System is shown above. In this system, the **XL100CL SERIES** controller controls the material's position and velocity via the servo amplifier and a set of pinch rollers. The amount of material movement is measured by an encoder (resolver), which is coupled to the motor. This method can generally provide even greater accuracy, since the resolution of most resolvers is much finer than that of most line encoders.

Assuming that there is no slippage between the material and the pinch rolls, the controller is able to track the exact position of the material, control its acceleration and velocity, and stop it at a pre-programmed punch or cut length. Only one punch press is shown in Figure 1.2, but the **XL102CL** can control up to two presses and/or gags, the **XL106CL** can control up to six presses and/or gags, and the **XL112CL** can control up to twelve presses and/or gags.

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

XL100 SERIES Controller Hardware Description

Microcomputer

The **XL100CL SERIES** controller is the critical element of an advanced length control system. It is equivalent to a personal computer (PC) packaged in a rugged industrial enclosure. Programs are stored in EPROM (Electrically Programmable Read Only Memory) electronics instead of temporary disks. These programs were written by AMS to perform the specific task of length control. The PROM is factory programmed.
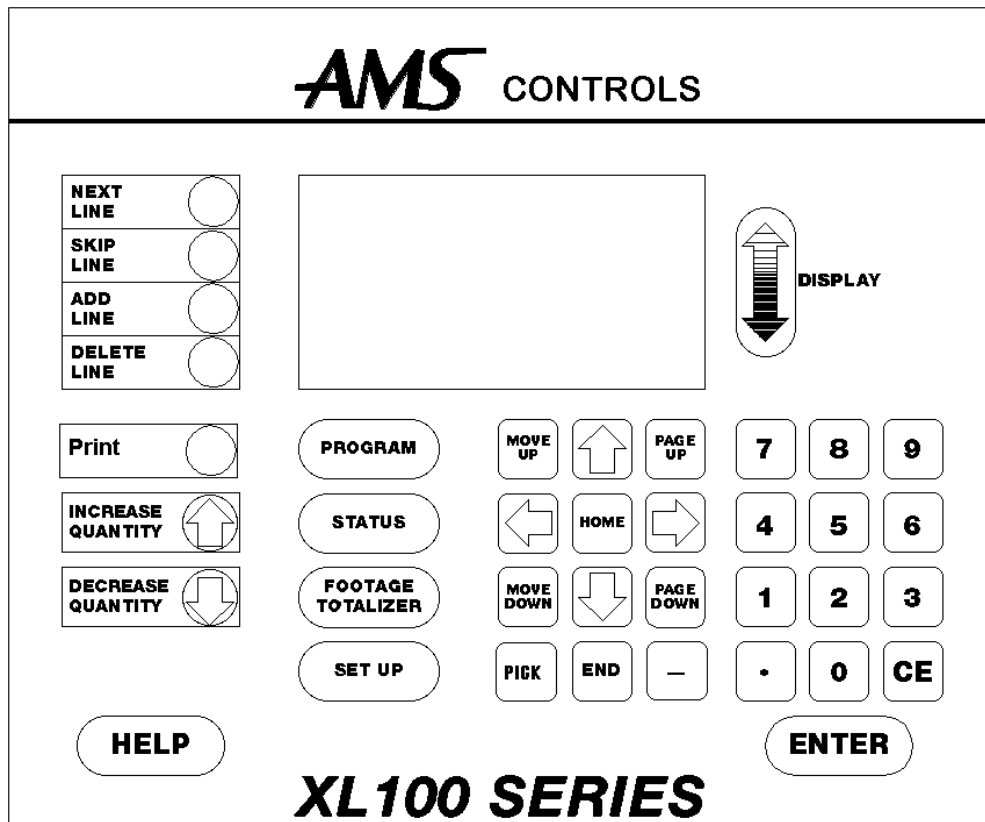
Figure 1.3. The XL100CL SERIES Front Panel

AMS CONTROLS INC.
XL100CL **Series**

The user does not need to write programs for the controller and only has to enter data on what to produce. This data is stored in RAM (Random Access Memory). In a normal PC, this memory is erased when power to the PC is removed. In the **XL100CL SERIES** controller, an internal battery maintains this memory upon controller power down. RAM is used to store machine setup and job information data.

Operator Interface

Replacing the monitor and keyboard of a PC, the **XL100CL SERIES** controller has a LCD (Liquid Crystal Display) screen and a keypad. The LCD has 15 lines of display with 40 character positions on each line. The keypad, shown in Figure 1.3, 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 position, and press the ENTER key to select the highlighted response. This method keeps the data entry simple and avoids input errors. There is also a way to enter user-defined words to describe orders, coils, and material (see section on OPERATING PROCEDURE).

Controller Keys and Functions

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

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 leaving the Status Screen.

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 cannot 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.
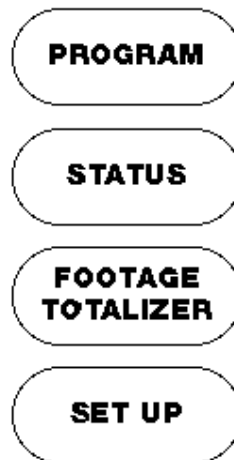
Program

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.
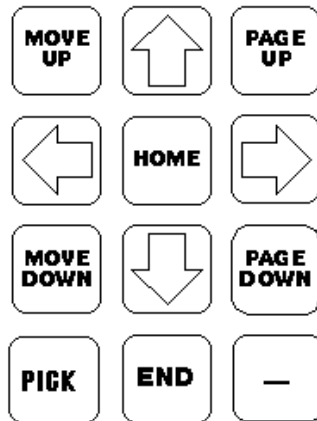
Arrow Keys - ,‾,¬ ,®

     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, changing 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 cannot fit on the current screen, pressing the Page Up or Page Down key a second time, will move to the next page to be displayed.

Home, 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. The Pick key has further functions that are described later in the manual. In these applications the Pick key is used as an editor for Orders, Items, Patterns, etc.

Note: If using a remote terminal, the Insert Key is the same as the Pick key. 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.
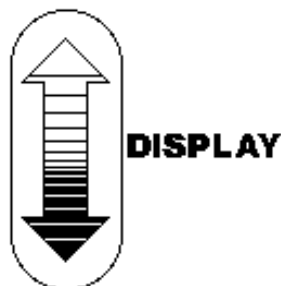
DISPLAY

Display

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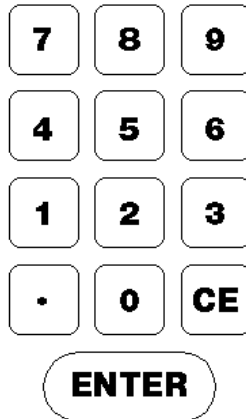
Number Keys, 0-9

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 i.4. The encoder outputs are differential line drivers. These work well in electrically noisy environments, since with twisted pair cable, electrical noise is induced equally on both the normal and the complement signals. The differential line receiver in the **XL100 SERIES** controller looks at the difference in the two signals only. This causes the noise on the two lines to cancel each other and thus greatly increases the noise immunity of the encoder circuit.
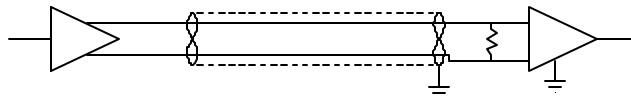
Figure i.4. Simplified Encoder Channel Circuit

There are sixteen total discrete inputs into the **XL100 SERIES** controller. They sense continuity between the input of the controller and the common connection. A typical diagram of an input circuit is shown in Figure i.5. This circuit uses a 5 and 24 VDC biasing circuit internal to the AMS controller. **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 the most common input devices used. The collector of an open collector NPN transistor can also drive the input, with its emitter connected to the common terminal. Current in each input circuit is limited to 15 milli-amperes.
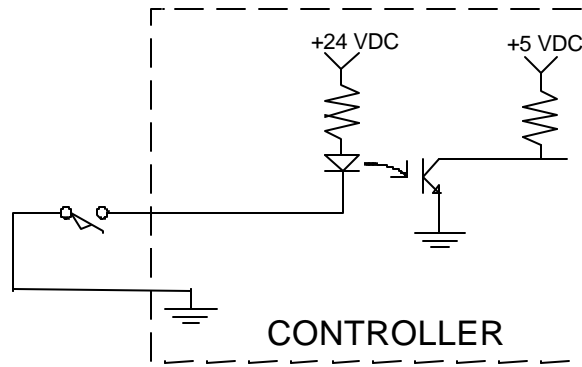
Figure i.5. Typical Input Circuit

Outputs

The Standard DC output of the **XL100CL SERIES** controller is a 4-Ampere JFET. This is available in all configurations and for all outputs. A diagram of this circuit is shown in Figure i.6. The biasing voltage for the load can be from 5 to 24 volts DC. 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 JFET turns off. The load can be either a DC solenoid or a DC Relay.
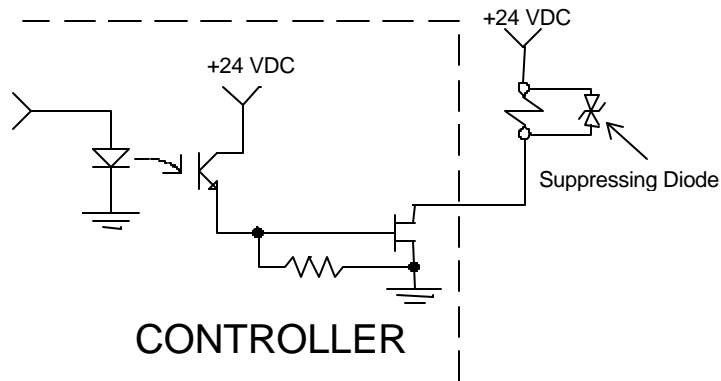
Figure i.6. Standard DC Output

Special Features

The **XL100CL SERIES** 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.

Die Test Mode

A closed loop die accelerator system is a highly sensitive and precise system that must be carefully adjusted to achieve good results. With any sensitive servo system, the possibility for instability is always present. Dampening the response of the loop will stabilize the system but too much dampening will make the system sluggish and unresponsive.

To optimize the system, the die accelerator needs to be tested under normal operating conditions. Test pieces can be cut, but this produces scrap and can cause jamming or die damage if conditions are not right.

To solve this problem, the **XL100CL SERIES** controller has a DIE TEST mode that simulates material movement without actually running the roll former. The operator sets the line speed and part length to run, and the AMS controller will generate internal line encoder pulses to mimic what will happen when the roll former is running. The die accelerator cycles as it normally would, and the only difference between this mode and normal operation is that the controller will not stop the line on an OUT OF TOLERANCE error. The shear will not be cycled when the die is out of tolerance (if a NO CUT mode is selected). While in the DIE TEST mode, both servo amplifier parameters and controller parameters can be adjusted to achieve stable, responsive results. When TOLERANCE is achieved, or at the MINIMUM DIE DISTANCE, the controller will begin cycling the shear.

Die Jog Mode

The DIE JOG mode is only used on Die Accelerators. When using the DIE JOG mode, the operator will have the ability to jog the die in and out by using the JOG FORWARD and JOG REVERSE inputs. The display will show the position of the die. When the JOG FORWARD switch is made, the die will move forward at the programmed JOG VELOCITY. When the JOG REVERSE switch is made, the die will move in the

reverse direction. Pressing the JOG buttons outside of the JOG DIE mode screen will move the roll former or feeding device.

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, however, he makes a mistake and does not allow enough material, then the coil has to be threaded through the machine again.

The **XL100CL SERIES** controller solves this problem by automatically stopping the line when the trailing end of the last piece is at a predetermined point at the entrance to the roll former. The AMS controller is always alert and 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 used on Feed-to-Stop systems, 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 to add standard safety features. AMS has eliminated the need for a PLC by building comprehensive control logic into the **XL100CL SERIES** 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
- Motor starter interlock circuit
- Automatic Shear or Press operation only in Run mode
- Halt on emergency stop or overload

The result is that the **XL100CL SERIES** controller can be adapted to most machines with a minimum amount of external electrical components. The only "programming" that a user must do is selecting the proper TYPE of machine that is used through switch settings on the controller. The controller then implements the proper logic based on the TYPE of machine.

Flexible Punching Options (XL102CL, XL106CL. And XL 112CL Only)

The AMS controller offers a system designed with many punching options within the same controller. Before the **XL100CL SERIES** controller, complex operations required the use of a PLC that needed an expensive custom program written to handle a particular application. The next project required that this process be repeated when the number of presses changed or a different gag arrangement was used.

The **XL100CL SERIES** controller was designed with enough flexibility, to work on virtually any combination of presses and gags. No custom programming is required. The **XL102CL** will control one press with one gag or two individual presses, (shear and punch). The **XL106CL** will control one press with five gags, six individual presses, or any combination of presses and gags. The **XL112CL** will control one press with eleven gags, twelve individual presses, or any combination of presses and gags. The XL112CLE (Expansion) can also control up to 12 presses as well as 64 gags through the use of expansion boards.

Installation

Controller Power

The AMS controller requires a 24VDC supply for operating power. It is preferable to have two 24VDC supplies, one for the inputs and outputs and the other for the controller CPU power. Separate power supplies will isolate the input/output circuits from the Processor, reducing noise interference. The common of the supplies used must be connected to the common of the control, this circuit being grounded. The common of the supply will be switched into the inputs of the controller and the 24 VDC will be used in conjunction with the outputs to pull-in control relaying. All input power should be within the specification limits.

Power to the controller should be switched independent of other devices through it's own circuitry. The emergency stop circuit should not interrupt power. In an emergency-stop condition, the controller will track any movement of the material with controller power still applied. This allows continued production to resume after the emergency stop condition, without loss in accuracy. See Figure 1.1.

Emergency Stop Circuit

An emergency stop circuit is required for each machine, giving operator safety and protection of system equipment.

A typical emergency stop circuit is shown in Figure 1.1. Pressing the guarded push-button RESET switch arms this circuit. The relay remains energized after the RESET switch opens because of the hold-in contacts of the relay. The relay condition depends on current flow through the normally closed emergency stop switches and any other emergency stop contacts in series with the switches. A momentary opening of either switch or contact will cause the relay to de-energize which cuts off power to all load devices. Adding devices in series with the emergency stop contacts or switches easily expands the circuit.

A higher degree of safety is achieved by placing switches behind safety guards and in doors of electric panels. These are wired in the Emergency Stop Circuit, so when opened, the machine is shut down.

The emergency stop circuit should not interrupt power to the AMS controller, however the AMS controller must know when an emergency

stop has occurred in order to drop the line out of the RUN mode. This can be accomplished by breaking the run circuit or by opening the safely interlock input to the control. If an emergency stop condition occurs, power should be isolated from all output devices. This would include all 24VDC devices as well as all 115VAC devices. Please refer again to Figure 1.1.
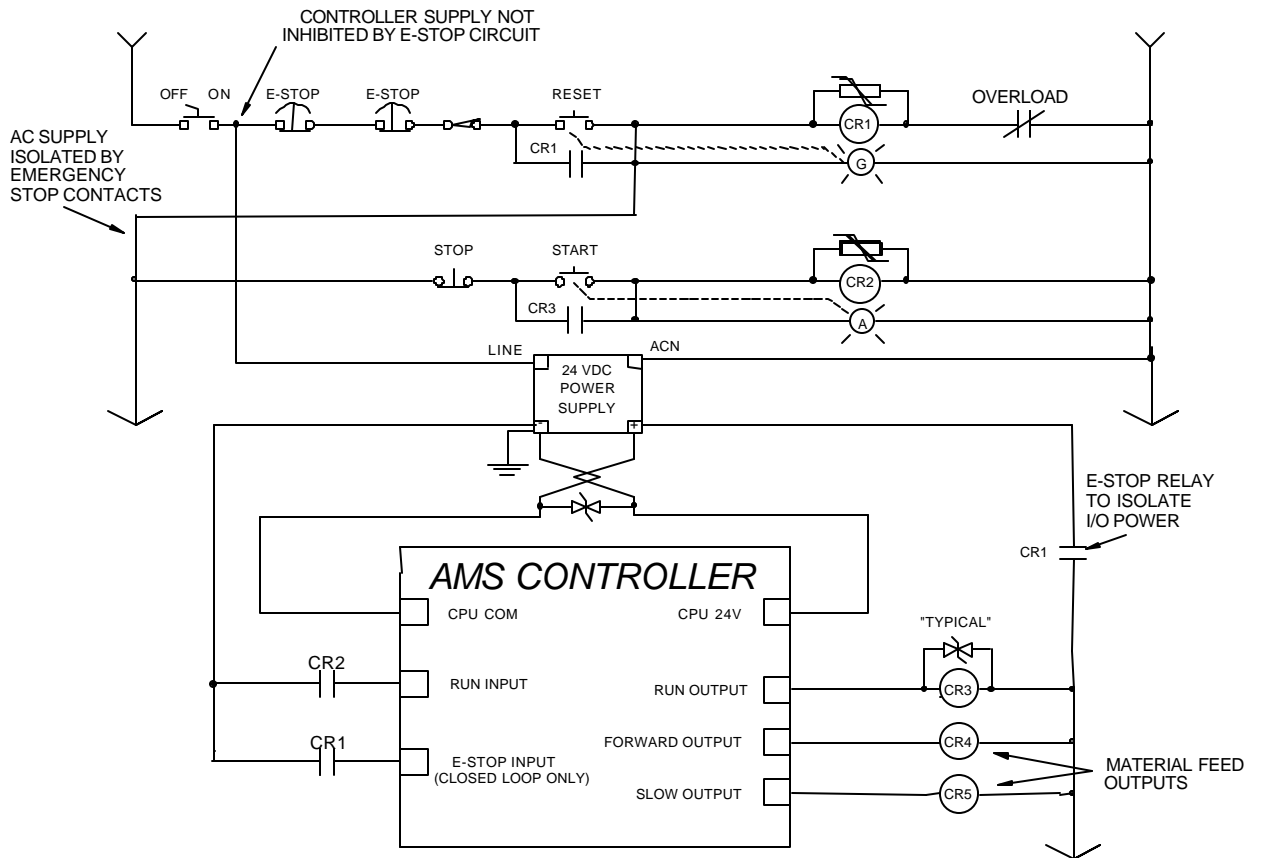
Figure 1.1 E-stop and Run Circuits

Run Circuit

Also shown in Figure 1.1 is the most common way of wiring the run circuit. Note that by wiring the controller in this manner, a halt, a controller error or an E-stop will halt the system. The sequence of events follows:

> ➢ Operator presses a momentary "Run" switch, energizing the "Run" relay (CR2).

> ➢ Once CR2 is energized, this closes the "Run" input to the AMS controller.

> ➢ The AMS controller detects the input.

> ➢ If a job is programmed, no errors exist and all other pertinent items are present, then the controller turns on the "Run" output.

> ➢ The output energizes the "Run Latch" relay (CR3)

> ➢ CR3 closes a set of contacts that latch in around the momentary "Run" switch, maintaining the Run condition.

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

The "Forward" and "Slow" outputs should be used to put the material into motion. If this is the case, a special parameter called "Line Movement Select" should be set to "Fst/Fwd". This parameter selection allows the "Forward" and "Run" outputs to work independently. The "Run" output would then be used purely as an output to latch the run circuit and to energize run lights or safety devices. Using the "Run" output to put the material in motion could cause some problems in the operation of the machine. This is due to other features that are used in the controller. First, some controllers will continue to shear or punch after a halt has been performed in order to catch targets as the line coasts to a stop. Second, a "Delay after Shear" feature is available to stop the material motion (Forward Output) after each cutoff. Even though the motion is turned off in both cases through the "Forward" output, the "Run" output remains on the entire time. If "Run" is used as the motion output in these cases, the line will not stop at the correct times!

The "Line Movement" parameter will allow the user to connect only the "Run" output to the motion device(s). If "Run" is selected as the parameter setting, the run output works more like the forward output. The run output would turn off immediately after the line halts for any reason, even during the deceleration of the line.

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

On two-speed systems, the "Forward" and "Slow" outputs will energize at different times depending on what speed logic is selected. Single speed systems will automatically have the Forward-Slow speed logic. The charts in Tables 1.2 and 1.3 show the output logic for each selection.

Machine State					
Outputs	**Run Fast**	**Run**	**Jog Fwd**	**Halt**	**Jog Rev**
Forward	ON	ON	ON	OFF	OFF
Slow	OFF	ON	ON	ON	ON
Reverse	OFF	OFF	OFF	OFF	ON
Run	ON	ON	OFF	OFF	OFF

Table 1.2 Status of Outputs in Forward-Slow

Machine State					
Outputs	**Run Fast**	**Run**	**Jog Fwd**	**Halt**	**Jog Rev**
Fast	ON	OFF	OFF	OFF	OFF
Slow	OFF	ON	ON	OFF	ON
Reverse	OFF	OFF	OFF	OFF	ON
Run	ON	ON	OFF	OFF	OFF

Table 1.3 Status of Outputs in Fast-Slow

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. This is accomplished by changing the customer available switch settings. The switches are in a single package located on the back of the controller. 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 24VDC solenoids for optimal performance. A solenoid-driving device, such as the AMS 3840 power module, can provide more accurate firing of the press. See Figure 1.4 for wiring possibilities.
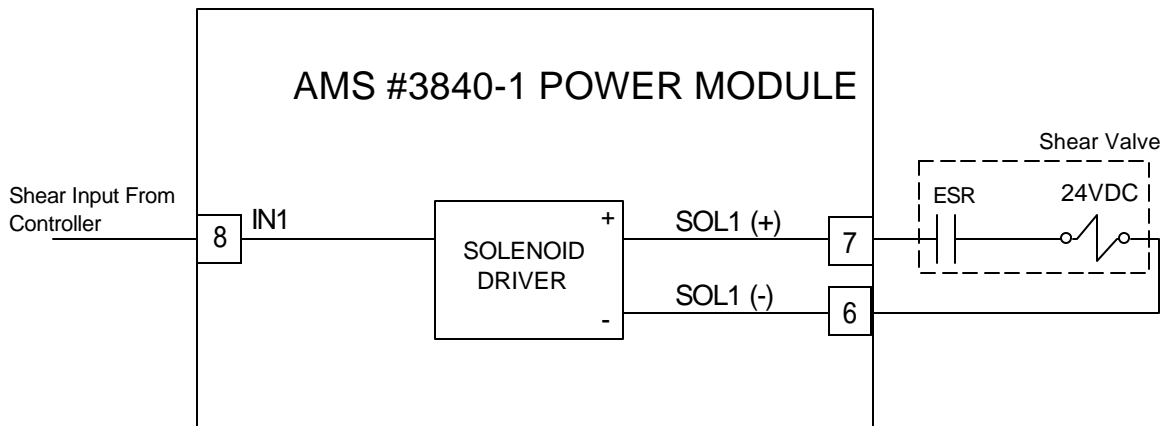
Figure 1.4 3840 power module connection

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

AMS controllers have a timed shear output with an input switch override feature. The duration of the **SHEAR DWELL** or **SHEAR DOWN** output is programmable from 0.000 to 9.999 seconds. Please refer to timing diagram - Figure 1.5. If the AMS controller detects a switch closure at the **SHEAR COMPLETE** input during the dwell time, the shear output will turn off immediately (Figure 1.6).

This is especially useful on mechanical presses that need the shear-complete switch mounted in a location that will return the press to top-dead-center. The SHEAR WELL UP time will time out as programmed regardless of the complete input.

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

Die Hits Metal

SHEAR DWELL
DOWN OUTPUT   .125 SEC.

SHEAR DWELL
UP OUTPUT   .125 SEC.

Figure 1.5

Die Hits Metal

SHEAR DWELL   .0625
DOWN OUTPUT   SEC.

SHEAR COMPLETE
INPUT

SHEAR DWELL
UP OUTPUT   .125 SEC.
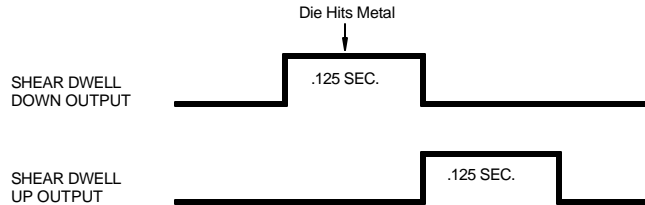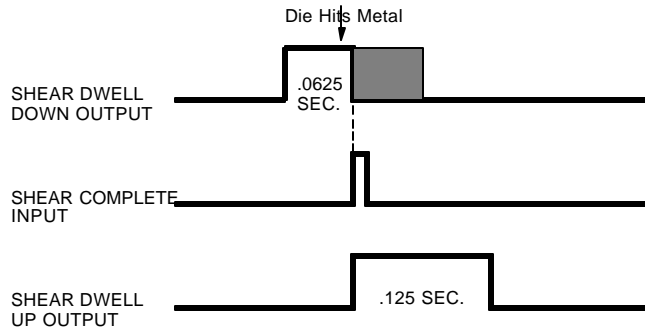
Figure 1.6

Press Control Circuit

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

Like the shear output, the **PRESS DWELL DOWN** can be programmed from 0.000 to 9.999 seconds. A **PRESS COMPLETE** input will override

the press's timed output and turn the output off immediately upon detection.

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

Initial Machine Tests

Manual Shear

The shear can be manually activated using the MANUAL SHEAR input. This causes the SHEAR output to turn on for the SHEAR DOWN time or until the SHEAR COMPLETE input switch closes. Make adjustments to the SHEAR DWELL time or the position of the SHEAR COMPLETE switch until the shear cycles properly.

Manual Press

Entering a tool number under the "Tool Select" parameter in the Machine Data screen can test any one of the tools. When the MANUAL PRESS input is closed, the appropriate gag will be selected and the press will fire for the PRESS DOWN time or until the PRESS COMPLETE switch closes. Make adjustments to the PRESS DOWN time or to the position of the PRESS COMPLETE switch until the press cycles properly.

Jogging

If the jogging inputs are used, they can be tested and adjustments made. On two-speed machines, jogging is always done in slow speed.

Machine Configuration

Setup

The SETUP function key displays a menu of sub functions used to input parameters or to execute diagnostic programs. Move the highlighted bar up or down with the up and down arrow keys to the desired item and press the ENTER key.

```
SET UP          ENTER
```

```
11:59PM   8/31/99     23FPM        10.000"
ORDER                               100Ft
MATERIAL                          35% COMP.
             XL100CL Controller
               Machine Data
             Calibration Trim
                Time Clock
            Input/Output Status
               Memory Test
             Closed Loop Data
              Communications



Type 2    8/24/99    11:02AM        V7.16
```

Figure 2.1. The Setup Menu Screen

Machine Data

In addition to setting the customization switches, the user can further customize the XL100CL SERIES by programming parameters in the Machine Data mode. If the customizing switches have been changed, the XL100CL SERIES will erase all memory and go immediately into the Machine Data mode. The Machine Data mode can be entered in the future by pressing SET UP then ENTER while Machine Data is highlighted.

Some of these parameters are general and apply to all controller models and switch settings. Others apply only to specific models and switch settings. In this section, all of the parameters will be defined. The specific switch settings and I/O listings for each model are listed in Chapter 9.

```
 1:59PM    8/31/99      0FPM       0.000"
ORDER                                  0Ft
MATERIAL                        N/A% COMP.
Parameters                     Setup Value
Halt Mode                      Bundle Halt
Format                        Decimal Inch
Set Done Items to Ready?                No
Auto-Delete Done Orders            14 Days
Use Order Numbers?                    Yes
Shear Dwell Dn                   *****sec
Shear Dwell Up                   *****sec
Shear Kerf                       0.0000"
Shear Reaction                  0.0000sec
Minimum Part                     0.0000"
Type 2       7/2/99     3:04PM     V7.16
```

Figure 2.2. Machine Data Screen

General Parameters

Halt Mode

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

The HALT MODE parameter is located when in the Machine Data mode. This will replace the old setup parameter HALT AFTER JOB. HALT MODE will have four options.

ITEM HALT

BUNDLE HALT (default)

ORDER HALT

DON'T HALT

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

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

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

In the DON'T HALT mode, the controller will halt the machine only when the Material or Pcode changes. The controller will not halt until ALL batches are done.

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

```
PICK
```

Format

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

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

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

Bundle Qty Reload Value

The user may desire to break an order down to bundles with a predetermined number of parts in each bundle. This is the function of the Bundle Qty Reload Value. Programming a value as an example "20" into the parameter, will cause the controller to automatically halt after cutting that value; in this example, after 20 pieces. The reload value will be used in conjunction with the "Halt Mode" parameter.

Bundle Qty Count

This parameter displays the current count from the "Bundle Qty Reload Value" parameter. Even though this is automatically reflected from the actual bundle count, this parameter can be manually over-written. By changing this value, the bundle count can be manipulated to change the parts actually counted before the next automatic halt for the bundle count. Increasing this number will cause the controller to make more parts, decreasing this number will cause the controller to make fewer parts

Set Done Items to Ready?

If NO is selected, when an item is finished running, its remaining quantity is left at zero and its status becomes DONE. If YES is selected, the remaining quantity is reset to the quantity programmed, and the status becomes READY. This enables the item to run again without manually reprogramming it. If YES is selected, the % Comp. (complete) will show N/A (not applicable) on the display screen.

Press 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 XL100CL SERIES 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.

Halt No More Item? (With Punch Only)

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.

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 many different orders are used, 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.

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 a XL-Link ID code. Entering the number 99 will disable this feature.

Minimum Footage to Request Order (With XL-Link Only)

The XL will automatically request more orders to run from the XL-Link when the controller has less than a specified amount of material to make. This value will be displayed as feet or meters depending upon the FORMAT selection.

Manual Shear Scrap Length (With XL-Link Only)

Sets the maximum length of material than can be manually cut without prompted for a Scrap Code. Manual cuts producing lengths longer than this maximum will force the operator to input the Scrap Code before being allowed to run again. The Unit ID must be programmed to a valid number and Scrap Codes must be enabled before the parameter is displayed.

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 a time somewhat longer than the expected time for the SHEAR COMPLETE switch to turn on. When the SHEAR COMPLETE switch closes, the SHEAR DWELL time is overridden and the output is turned off immediately.

NOTE: To ensure that a feed-to-stop line is not restarted until the shear complete switch has closed, it is now possible to enter a SHEAR DWELL TIME OF ZERO. With a zero entered, the controller will interpret this as "do not restart the line until the complete switch closes." If the complete input is not made within 10 seconds, then the line is halted. A non-stop line with a SHEAR DWELL OF ZERO will run normally as long as the shear complete is activated after a shear. If the shear complete is not activated, the machine will continue to run for ten seconds, halt automatically and display an error.

Shear Dwell Up

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

Auxiliary Shear Compensation

Used on XL100CL Series Controllers when configured to use auxiliary controllers. The range of this parameter setting is 0 to 1000, with a default value of zero (disabled). The parameter is used to compensate for a long first part after a cutoff operation by the auxiliary controller. The cutoff

operation is initiated by the XL100CL Series controller giving the auxiliary controller a shear output to trigger it's cut operation. The parameter only applies to machines where an auxiliary device controls the shear. The value should be equal to the Shear to Detect distance plus the Minimum Die Distance of the auxiliary controller in inches.

Aux Shear Compensation = Shear Detect + Minimum Die Distance.

Shear Kerf

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

Shear Reaction

SHEAR REACTION time is used in high-speed flying die applications to reduce the overall stroke length of the cut cycle. Without a reaction time, the XL100CL SERIES controller waits until the die has moved to the MINIMUM DIE DISTANCE before the Shear Output is turned on.

The SHEAR REACTION time causes the controller to turn on the Shear Output early, allowing time for relays to activate and solenoid valves to energize. The tolerance test is performed at the end of the Shear Dwell Down signal (after the part has been cut). A SHEAR REACTION of 0 to 0.5 seconds is allowed, but the user should note that the Shear Output is not turned on before the die has started its acceleration ramp.

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

Minimum Part

The MINIMUM PART defines the length of the shortest piece the XL100CL SERIES controller is allowed to make. For some applications short part lengths may cause problems for the roll former or other tooling. By setting a value for the MINIMUM PART, the user is not allowed to program any items that make parts shorter than this length. Any value from 0 to 999.999 inches may be entered.

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 longer time delay that is now allowed must not be confused for a machine-off condition!

Item Complete Dwell (XL100CL Only)

This sets the length of time the ITEM COMPLETE output (ITEM COMP on the I/O screen), will remain on at the completion of each line item. This output can be useful on pre-cut lines that need to keep the output drive running at the end of a batch, in order to process the last few parts. This parameter defaults to .25 seconds when the controller is first powered on and the parameter limits are 0 to 99.99 seconds.

Shear-Encoder Distance

The SHEAR-ENCODER DISTANCE is the physical length between the encoder and the shear point. The largest acceptable value is 10,000 inches. This parameter is used when loading new coils as well as in conjunction with the "Coil End Point" parameter in order to properly track total coil usage.

Coil End Point

This is a feature of the controller that 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 XL100CL SERIES 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 roll former and become inaccessible.   To prevent the material that is not needed for the current job from entering the roll former, use the general formula:

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

Coil End Offset

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

Enter the distance from the COIL END POINT that a press 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 can take place.

Mode Select

This mode describes whether the controller is used to count holes or operates in the default (STANDARD) setting as a standard controller and is only active in non-stop applications. In the STANDARD mode, the controller uses a programmed part length to control the cutoff press. The operator can change this parameter to COUNT HOLE any time the line is halted. When changed, the controller will not loose track of holes that have already been counted before the cut-off. In the COUNT HOLE mode the shear press fires dependent on the number of holes counted and the distance from the last hole. The number of holes to count and the distance from the last hole to shear is programmed in the Program Orders screen.

No Hole Stop

When in the Hole Mode, this parameter keeps the line from running when a hole-detector is faulty. If holes are not detected within a programmed distance determined by the parameter, the line will halt. The default value zero disables this feature.

Shear-Detect

This is the physical distance from the hole-detector and the shear home position. Default is 10 inches.

Min Hole Spacing

This parameter should never be zero. The default is 1 inch. The parameter requires a value smaller than the minimum distance between holes of the parts being produced and keeps the controller from counting the leading and trailing edge of the same hole, giving extra hole counts.

Hole-Detect Logic

Selects the logic of the hole detect input. The default ACTIVE LOW triggers a hole count when the input goes low. An ACTIVE HIGH triggers a hole count when the input goes high.

Line Movement Select (Single speed, non-stopping lines only)

Used on flying cut lines only, the Line Movement parameter determines whether the forward output will be used to move the material or if the run output is used. Pressing any number key will choose between "Fst/Fwd" and "Run".

With the parameter set to "Run" the Run output turns off immediately after the Halt button is pressed. Warning; though the run output is turned off with a Halt, presses will continue to fire as the material coasts to a stop! The "Delay After Shear" feature will not work in this mode.

If the Line Movement parameter is set to the default "Fst/Fwd", the "Run" output remains on while the material coasts to stop, and the "Forward" output shuts off immediately. In this mode the "Delay After Shear" feature is operational. During the coast-to-stop period, presses will fire.

If the Run output is wired to control the motion of the material, the setup parameter Line Movement should be set to "Run". If the Forward output is wired to control the motion of the material the setup parameter Line Movement should be set to "Fst/Fwd".

Use Caution when the "Line Movement Select" parameter is set to "RUN". When the line is halted, the Fast, Forward and Run outputs will all turn off. However, the press(es) will continue to fire on any targets that may coast by them. Lights or buzzers that operate with the run output will not be energized unless the customer uses external timers.

Scrap Length (All Models Except XL100CL Without a Punch)

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 lengths of these shear only parts are 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. For example, if your SHEAR TO PUNCH DISTANCE is 300" and the SCRAP LENGTH is set to 120," the XL controller will make 3 pieces that are 120" long, that may be sold without holes. If a SCRAP LENGTH of zero is entered, the controller will produce pieces at the part length of the current order.

Loop Gain

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

Jog Select Mode? (Non-Stopping only)

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

Jog Velocity

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

Minimum Die Return Velocity (Non-Stopping only)

When the Die on a Die-accelerator is returning after a cut, it will return only as fast as is necessary to make the next target. If a faster return is desired, the "Min Velocity" parameter can be used to set the lowest

allowable return velocity.   The range of this parameter is 10 to 500 FPM.

Maximum Die Return Velocity

MAX VELOCITY sets the running speed in a feed-to-stop machine. In a flying die machine, it sets the maximum return speed of the die.

Slow Run Velocity

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

Acceleration

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

Return Accel

The RETURN ACCELERATION sets the acceleration for the flying die to return to home after the cut has been made. This parameter typically can be set higher than the forward ACCELERATION since the die return is not a critical movement. This will decrease the overall cycle time of each cut. The RETURN ACCELERATION can also be adjusted for a lower value, which will result in less wear and tear on the actuating system. Units are expressed in inches per second, per second (Inches/second^2).

Minimum Die Distance

The MINIMUM DIE DISTANCE defines the shortest distance from the home position that a cut can be made. With most presses, improper cutting will occur if the die is not near the center of the press, or if it is not up to the full line speed. The MINIMUM DIE DISTANCE defines one side of this acceptable window. As the die accelerates for a cut, the die must be past this MINIMUM DIE DISTANCE and in tolerance (if a "no cut" mode is selected), before a cut can be made. This is also the place that all manual referencing will occur, unless a Die Home Offset is entered.

The MINIMUM DIE value must also meet the following criteria:

(Min Die Dist – Die Home Offset) =   (Line Velocity²) / (2 • Acceleration)

In the formula, Velocity is the expected speed of the line expressed in inches per second (found by dividing the FPM as displayed by 5), and Acceleration is the programmed parameter in the controller expressed in inches / second ^{2}.

The formula will produce a MINIMUM DIE DISTANCE that will allow the die to achieve a stable speed prior to cutting. If the current line velocity goes beyond velocity with which the Minimum Die Distance was calculated, the line will be halted and an error will be displayed.

Maximum Die Dist

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

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

Manual Shear Die Distance

The Physical movement of the Die from the Die Home position to perform a manual shear. When a Die Home Offset is used, this parameter will give the physical movement for a Manual Shear from the Die Home offset position.

Enable Alternate Die Parameters

Due to customer request, a new feature has been added to closed loop models of XL controllers. This change provides a simple procedure for changing from long parts running at high speeds to short parts running at a slower speed. This implementation required an alternate list of setup parameters that pertain to the die accelerator. Once the new setup values are entered, the user can select which list of parameters to use by means of an input selector switch. The new list of setup parameters is included in the Machine Data list and contains the following.

Enable Alternate Die Parameters

➢ Alternate Minimum Die Distance

➢ Alternate Maximum Die Distance
➢ Alternate Manual Shear Die Distance
➢ Alternate Die Home Position

The setup lockout key locks out all parameters.

Only the "Enable Alternate Die Parameters" setup appears in the list until the user toggles its selection to "Yes". This causes the four remaining "alternative" parameters to appear. This parameter only enables the other parameters to appear in the list, it does not apply the alternate values to the running operation. This is accomplished by external switching to the controller. The last four parameters define alternate values for the setups they are named after. As with previous versions, the Alt. Die Home Position cannot be edited while the line is running. All distances are assumed to be measured from the die home switch.

The alternate parameter list may be selected for use by activating an input while the controller is halted. The input number is input 16. When the input is turned OFF the original values are applied. When the input is turned ON, the alternate values are in effect. The alternate values may be used regardless of the state of the setup parameter "Enable Alternate Die Parameters".

When running the machine with either the standard parameters or when using the alternate parameter list, the Shear Die will perform one of two functions controlled by the AMS Controller. If an unprocessed target lies between the die home switch and the Maximum Die Distance target, the shear will move forward to the target and perform a cut. On earlier versions the shear would return to its respective home position and then move forward. If the target is before the shear, the material will move forward. The Shear Die will perform the cut at the proper location as the target passes by. After both conditions, the Die will return to the appropriate home position as set by the Home Offset Distance parameter.

Die Home Offset

For Die Accelerator applications, this parameter will cause the Die to return to the Die Home Offset position versus the Die Home switch position after each cycle.

Advance After Cut

ADVANCE AFTER CUT is the distance on a non-stop line that the die will advance after the shear down and during the shear up. The

purpose of this parameter is to prevent the shear blade from scraping against the leading edge of the metal as it moves up.

Retract After Cut

RETRACT AFTER CUT is the distance on a feed-to-stop line that the die will retract after the shear down and during the shear up. The purpose of this parameter is to prevent the shear blade from scraping against the trailing edge of the metal as it moves up.

On Tolerance Error?

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

When the XL100CL SERIES controller detects that a part is about to be made outside of the specified tolerance range, the operator has four options:

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

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

> **NOTE:** WARN ONLY and WARN NO CUT are special cases that will drastically affect the operation of your machine. The options are commonly used for extrusion lines. Consult AMS Controls before using a WARN mode.

If **WARN ONLY** is selected, the controller will make the cut without stopping the line. An error message will remain on the display until it is

cleared by the operator, but the line will continue to run. The Warn Only mode checks for tolerance at the end of the "Shear Dwell Down" time.

If the fourth option **WARN NO CUT** is selected, the controller will prompt the operator with an error message, but the line will not stop and the cut will not be made. Operators should be very cautious when using this option. If several parts in a row are out of tolerance, a large amount of uncut material beyond the shear can build up very quickly. The Warn No Cut mode checks for tolerance between the Minimum and Maximum Die Distances.

When the WARN modes are used on extrusion lines the following differences are seen:

> ➢ Manual Crop - When attempting to perform a manual crop in the WARN mode, a standing cut will not be made. The controller will find the Home Switch without making a crop.

> ➢ Auto Crop - After the Manual Shear button is pressed the controller will then be in the Auto Crop mode, and the display will flash "Auto-Crop". When the RUN mode is entered, the machine will then make a flying crop at the MINIMUM DIE DISTANCE.

When the WARN ONLY mode is selected, the tolerance is checked only at the bottom of the stroke while the cut is being made. If the machine is out of tolerance, a warning is given but the machine will continue to cut the parts.

When the WARN NO CUT mode is selected, the tolerance will first be checked at the MINIMUM DIE DISTANCE. If the machine is still not within tolerance by the MAXIMUM DIE DISTANCE, the machine will continue to run but no cut will be made.

Pressing any number key or the PICK key toggles between the four options.

Tolerance

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

Offset Volts (Auto)

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

Offset Integral

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

Lag Compensation (Auto)

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

Lag Integral

A Die Accelerator parameter, the LAG INTEGRAL defines the integral time constant for the removal of velocity error (LAG), when tracking a moving target.

Derivative

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

If it is determined that this parameter is to be used, start with a value of 3 seconds and then decrease the value until a change in pitch or "hum" is heard in the motor. The "hum" indicates that the controller is

---

overcorrecting the error. When this occurs, increase the value until the system stops oscillating.

CAUTION: Changing this value will amplify any noise in the system, as well as the error, which can cause problems in the system. This parameter may also increase the tolerance of the system that could cause variation errors. Entering a zero for DERIVATIVE will disable the parameter.

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.

Line Resolution

The RESOLUTION parameter defines the length of material movement for each increment of the encoder. It is a function of the circumference of the measuring wheel and the number of counts per revolution of the encoder. The formula for calculating RESOLUTION is as follows:

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

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.

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
2000	0.0015

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

Die Resolution

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

Motor Resolution

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

Correction Feature

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

$$Correction = \frac{\Pr ogrammedLength}{ActualLength} \times OldCorrectionFactor$$

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 a proper value for stable lines. The controller will allow values from 1.0 Hz to 200.0 Hz.

Tool Select (XL102CL, XL106CL, XL112CL Only)

On machines using one or more presses with multiple gagged tools, TOOL SELECT determines which tool will be activated when a MANUAL PRESS input occurs. To operate properly, all of the tools, presses, and gags must be defined in the EDIT TOOL DATA menu.

Press Dwell (When There Is More Than One Press)

For each press on the machine, a dwell time is programmed. This sets the time duration of each press cycle in seconds. PRESS DWELL DOWN is the time it takes for the press to go from the top of its stroke to

the bottom and PRESS DWELL UP is the return time.   On flying die machines these parameters are combined into one called PRESS DWELL. The range of time allowed is 0.000 to 9.999 seconds, which can be set to the nearest millisecond. The PRESS DWELL time will be overridden by the closure of a PRESS COMPLETE switch if one or more of those inputs are used.

Initial Machine Tests

Directions and Polarity

Before engaging the servo drive, polarity of all encoders should be checked. It would be safest to disconnect the motor from the drive system (particularly on Die Accelerators) so that no die or roller movement can occur.

After programming the initial configuration values, press the STATUS key to get to the normal running display. The length past the shear is shown in the upper right corner of the display. This will show the relative position of the material with respect to the die. On flying die machines, rotate the line encoder in the same direction that the material moving through the machine would cause it to rotate. If the displayed length decreases, then the direction is wrong and the configuration switches must be changed.

On roll feeders, the encoder is mounted to the motor and the rolls must be turned by hand to check the direction. Again, if the direction is wrong, the configuration switches must be changed.

After setting the encoder directions, connect the DRIVE ENABLE output so that the analog polarity can be checked. Be sure that no material is loaded into the machine. Use the JOG FORWARD switch or DIE JOG FORWARD switch, in the case of the die accelerator, to activate the drive. If the drive runs out of control, then the analog polarity or the motor encoder direction is wrong, and the configuration switches must be changed.

Manual Shear

Performing a MANUAL SHEAR on the machine is also referred to as "Referencing". In the feed-to-stop mode, closing the input switch connected to the shear input can manually activate the shear. This causes the SHEAR output to turn on for the SHEAR DWELL time, or until the SHEAR COMPLETE input switch closes. Make adjustments to the SHEAR DWELL time or the position of the SHEAR COMPLETE switch until the shear cycles properly.

In the flying die mode, a manual CYCLE function consists of a series of moves. In this mode, the die must be referenced to the machine and the material referenced to the die. When the CYCLE button is pressed, the controller seeks the closing point of the DIE RETRACTED switch. If

the switch is initially open, the die will move in reverse until the switch is made then come just off of the switch and then back on it again.

If the switch is initially closed, the die will move in the forward direction until the switch opens and then it will move in the reverse direction until it closes.

Note: The cycle switch must be maintained until the shear is fired.

After the DIE RETRACTED switch is found, the die will move to the MANAUL SHEAR DIE DISTANCE from the home position and the cut will be made.

Manual Press

Entering that tool number under the "Tool Select" parameter in the Machine Data screen can test any one of the tools. When the MANUAL PRESS input is closed, the appropriate gag will be selected and the press will fire for the PRESS DWELL time or until the PRESS COMPLETE switch closes.

Make adjustments to the PRESS DWELL time or to the position of the PRESS COMPLETE switch until the press cycles properly.

Encoder Operation on Feed Systems

Single Encoder

The single encoder will always use the motor encoder for position feedback during jog and run operations.

Two Encoder

When using two encoders, the Servo Positioning Encoder will vary by the operating mode and by the position of the sheet detect switch. The table below describes the operation of the two-encoder system when in the Jog and Run Mode. When using both a line encoder and a motor encoder, the material must be fully engaged into the encoder before the sheet detect switch is made.

	Jog Mode	Run Mode
Sheet Detect True	1	2
Sheet Detect False	3	4

1. The controller will use the Line Encoder for material positioning.

2. The controller will use the Line Encoder for material positioning.

3. The controller will use the Motor Encoder for material positioning.

4. The controller will shift from the Motor Encoder to the Line Encoder when the RUN mode is entered, and go back to Motor feedback when halted.

Slip Test on Feed-to-Stop Machines with 2 Encoders

For a controller to display a MAXIMUM SLIP ERROR, the following conditions must be true:

There must be a sheet loaded (sheet detect input must be true). Previously the controller had to be in the RUN mode before a slip test was performed. Now the slip test is done while in JOG or RUN.

The velocity from at least one of the two encoders must be greater than 10 FPM.

The difference in velocity between the two encoders must be greater than 50 % of the motor encoder velocity for at least 0.25 consecutive seconds.

If all of the conditions above are satisfied, the controller will display a "Maximum Slip Error" and shut down the control loop. The operator may then initiate another JOG or RUN without clearing the error message.

Testing Without Material

Feed-To-Stop Mode

Since feedback comes from the encoder on the motor, it is easy to test the system without material by just programming an order and running it. Start with the TOLERANCE set to about one inch and a five second DELAY AFTER SHEAR. This will avoid OUT OF TOLERANCE errors until parameters have had a chance to adjust themselves.

The long delay will allow time for the error to be read at the end of each cycle. After stable operation is achieved, LOOP GAIN, MAX VELOCITY, and ACCELERATION can be adjusted to optimize performance.

Die Accelerator Mode

Normal operation cannot be used to test performance without material in this mode since the line encoder must be turning. To handle this situation, a DIE ACCELERATOR TEST mode has been included. From the Setup Menu screen highlight the line that is listed "Closed Loop Data" and press ENTER.

```
11:59PM   8/31/99      0FPM         0.000"
ORDER                                    0Ft
MATERIAL                          N/A% COMP.
          XL100CL Controller
            Machine Data
           Calibration Trim
             Time Clock
         Input/Output Status
            Memory Test


           Communications



Type 2    8/24/99    11:02AM        V7.16
```

Figure 2.3. The Closed Loop Data Setup Screen

Highlight the Jog Die Accelerator line and press "enter" to jog the die forward and reverse.

```
11:59PM    8/31/99      0FPM         0.000"
ORDER                                  0Ft
MATERIAL                       N/A% COMP.
              XL100CL Controller
              Jog Die Accelerator
             Die Accelerator Test
              Tolerance Display
               Graphic Display
             Test Phase of Analog




Type 2    8/24/99    11:02AM      V7.16
```

Figure 2.4. Closed Loop Data Selection Screen

```
 1:53PM    7/18/99      0FPM         0.000"
ORDER                                  0Ft
MATERIAL                       N/A% COMP.
              Test Mode Jog Die



       Die Home Switch : Off
       Die Position :  0.000"



```

Figure 2.5. Test Mode Jog Die Screen

The Jog Die screen will tell the operator if the die is on or off of the home switch and will also give the die position relative to the home

position. The value in the upper right corner of the display refers to the location of the edge of the metal in relation to the die. In the Jog Die mode the die can be jogged back and forth with no movement of the material.

A standing crop can also be performed in this mode by jogging the die out and activating the manual shear. This is typically done to cut a scrap piece while halted or while cutting hand-measured pieces at the end of a coil no longer able to be driven by the material feeding device.

Highlight the Die Accelerator Test line of the Closed Loop Data Selection Screen (figure 2.4), and press enter to start the test. The DIE ACCELERATOR TEST program is a function designed to simulate an actual run operation. The controller will first ask for the length of the part to be run along with the line velocity to be simulated.

When the program is run, the controller will generate line encoder pulses in proportion to the programmed speed. The system will function normally with the exception that the mill outputs will not turn on, and a tolerance error will not occur.

While the program is running, parameters such as LOOP GAIN, ACCELERATION, and TOLERANCE can be adjusted to achieve optimum performance. NOTE: Do not change the CORRECTION FACTOR while this program is running.

When running the Die Accelerator Test, the screen goes to the "Tolerance Display" screen. The Tolerance Display will list the following items: Tolerance Error, Max Tolerance, Offset Volts, Analog Output, Lag Comp, and End of Stroke. This screen allows the operator to view the parameters listed as the machine goes through the DIE ACCELERATOR TEST. This screen is instantaneously updated as the test is performed. For information on the Tolerance, Offset Volts, and Lag Comp see the section on General Parameters starting on page 2-2.

"Tolerance Error" gives the current error that is being recorded by the Die Accelerator Test, and "Max Tolerance" will list the maximum error that was recorded during the Die Test. This value can be reset to the current tolerance while the machine is running by pressing the "CE" key.

"Analog Output" gives a visual display of the voltage that is driving the actuator. As the die is driven in the forward direction this voltage will be positive, and as the die is driven in the reverse direction the voltage will be negative. This value should typically be set not to exceed 8.5 to 9

volts at full speed and should never reach the maximum voltage of 10 volts.

"End of Stroke" is the actual distance that the die traveled from the reference point.

The GRAPHIC DISPLAY SCREEN is a visual representation of how the Die is reacting to the Analog Signal. Figure 2.6 shows a typical display of a Die Accelerator system. (Systems will differ, and not all system setups will show the same display. The purpose of the figure is to show the operator how to read a typical display).

This display can be seen by selecting the Closed Loop Data Screen and then selecting Graphic Display (figure 2.4) while the machine is running. The controller will show this screen when performing a Die Accelerator Test, if the "PICK" key is pressed. Otherwise the controller will display the Tolerance Display information while the Die Accelerator Test is being performed. An updated Graphic display will be started if the "CE" key is pressed.

NOTE: The Graphic Display will take an 8 second sample of the operation being performed (once it has been triggered). Be sure to wait for this period of time before trying to reset the machine.

10:15 AM	7/19/97	100FPM	119.82"
Order		Run Test Die	99990Ft
Material			0% Comp.

2.5

Graphic Display

0.4   0.8   1.2   1.6

-2.5   Tolerance Error = 0.0006
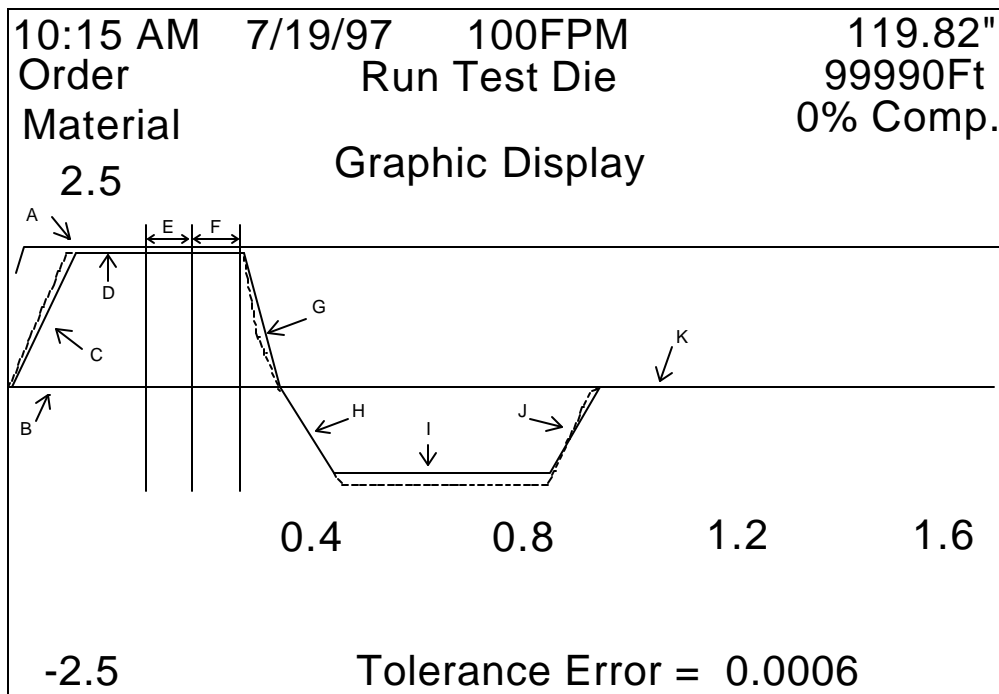
Figure 2.6. Graphic Display Screen

The dashed waveform in the display shows the analog voltage that is moving the die. The solid waveform in the display shows the actual movement of the die in response to the analog signal. The 2.5 and -2.5 are the analog voltage values while the 0.4, 0.8, 1.2, and 1.6 points show the display against the passage of time, in seconds.

A. = The speed that the line is moving (Line Velocity).

B. = The Analog "zero" volt reference point which indicates that the die is not moving.

C. = The acceleration of the die to try to match the line speed.

D. = The point in which the die has matched the line speed and is tracking the material prior to the shear.

E. = The shear down time that was programmed in the Machine Data Mode. The actual shear will take place near or at the line between E and F.

F. = The shear up time that was programmed in the Machine Data Parameters. If an Advance After Cut time was programmed, it will be seen during this time as an increase in the positive direction.

G. = The deceleration of the die to a stop after the shear is made.

H. = The return acceleration necessary to force the die to return to the home position.

I. = The constant speed movement of the die as it returns back to the home position.

J. = The deceleration of the die to stop at the home position.

K. = The die is now home and not moving. During this time the controller will wait for the next target to again approach the shear point and when it does, another acceleration is generated as the waveform repeats itself.

When the display is first shown, the waveform is displayed with the analog voltage reading + 10 and - 10 volts, and the time displayed will be 2.0, 4.0, 6.0, and 8.0 seconds. These values can be changed, and allows the operator to change the perspective of the waveform just like a wave can be changed on an oscilloscope.

To change the analog voltage value, use the blue MOVE UP and MOVE DOWN keys.
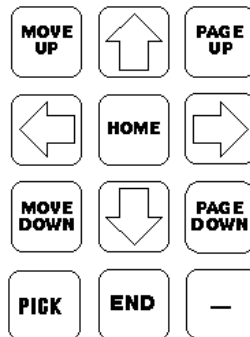
The available voltage ranges for the analog voltage is 10 volts, 5 volts and 2.5 volts positive and negative. Pressing the MOVE DOWN key will decrease the voltage to 5.0 and - 5.0 volts and then to 2.5 and -2.5 volts. Pressing the MOVE UP key will increase the voltage to 5.0 and pressing it again will increase the voltage back to 10.0.

The time base can be changed in the same manner as the voltage by pressing the PAGE UP and PAGE DOWN keys. The PAGE DOWN key will decrease to a minimum of a 0.8 second sample. When the PAGE UP key is pressed, the range will be increased up to the maximum of an 8 second sample.

The $\uparrow$, $\downarrow$, $\leftarrow$, $\rightarrow$ arrow keys can be used to isolate a section of the wave form as pressing the appropriate arrow will move the wave form on the screen in that direction. The UP arrow moves the wave form up, the DOWN arrow moves it down, the LEFT arrow moves it left, and the RIGHT arrow moves it right.

The final adjustments to the display can be performed with the 1, 2, and 3 number keys.

When the display is first shown, the analog signal and the actual die position are shown. If the machine is a Die Accelerator, the line velocity is also shown. To remove one of these waveforms from the display, the number keys are used.

```
 7   8   9

 4   5   6

 1   2   3

 .   0   CE

   ENTER
```
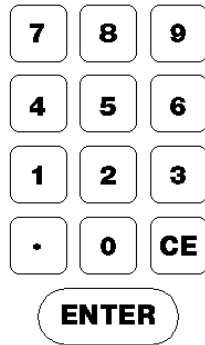
Key "1" = Removes the Analog Signal waveform.

Key "2" = Removes the Line Velocity waveform.

Key "3" = Removes the Actual Die Position waveform.

Pressing the appropriate number key a second time will put the waveform back onto the display.

Test Phase of Analog

```
11:59PM   8/31/99      0FPM        0.000"
ORDER                                 0Ft
MATERIAL                       N/A% COMP.
 Test Polarity and Encoder Direction
Analog Output:            0.0000Volts
Encoder Position:            0.0000"



        MOTOR DRIVE IS ENABLED
   Make manual adjustments to drive
   Until all motor drift is removed



      Press the ENTER key to continue

```

Figure 2.7. Test Phase of Analog

The Test Phase of Analog screen is used during initial setup to determine if the analog polarity and the encoder direction are in phase. Follow the on screen prompts and refer to the dip switch settings for the closed loop XL Controller model being used for proper setup.

Calibration

After good performance is achieved in tests without material the machine can be loaded and actual parts run to check for calibration. Short length parts can be run to verify consistent lengths.

After repeatable lengths are achieved, the system can be calibrated. The longest possible part size should be run. If short parts must be used, try to use a vernier caliper for the measurement. If parts longer than 4 feet are run, the only practical measuring device is a steel tape. Verify the accuracy of these devices by comparing several steel tapes measuring the same object. The ends of these tapes can be damaged and give bad readings. If this is questionable, have someone hold the tape carefully on the one-inch mark and subtract an inch from each measurement made.

The best way to calibrate the system is to run 10 parts, carefully measure them, and calculate an average length. The new CORRECTION FACTOR is calculated as follows:

$$\text{New Correction} = \frac{\text{Old Correction x Programmed length}}{\text{Average Measured Length}}$$

For machines with a punch press, if parts are being made at the correct programmed length but the punch spacing is incorrect, a simple adjustment to the SHEAR-PRESS distance may solve the problem. Load the machine until there is material under both the punch press and the shear press. Manually cycle both presses, then jog the material forward until the punched hole is beyond the shear and cut it off. Now accurately measure the length from the leading edge of the material to the reference point of the hole or pattern and enter this length for your SHEAR-PRESS distance.

If you do not wish to calculate the CORRECTION FACTOR yourself, the controller will do it automatically with the CALIBRATE TRIM mode.

Calibrate Trim

The XL100CL SERIES' CALIBRATE TRIM feature automatically computes a new CORRECTION FACTOR, which is used in the controller's length calculations to adjust for errors in the size of the measuring wheel.

```
3:28PM     8/13/99      0FPM        0.000"
ORDER                                 0 Ft
MATERIAL                       N/A% COMP.
              Calibrate Trim

Programmed Length Was           120.000
Enter Measured Part             120.000
```

Figure 2.8. Calibrate Trim Screen

The XL100CL SERIES remembers the programmed length of the last part cut and asks the user to enter the actual measured length.

```
 3:28PM      8/13/99      0FPM        0.000"
ORDER                                   0 Ft
MATERIAL                         N/A% COMP.
               Calibrate Trim

Last Part Cut Was                 120.000"

Enter Measured Part               120.000"

Old Correction                    100.000%

New Correction                    100.000%
```

Figure 2.9 Calibrate Trim Response Screen

The controller then calculates a new CORRECTION FACTOR and asks the user if he 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.). Also, the CORRECTION FACTOR may be computed by hand using the formula described on page 2-30.

Time Clock

This mode allows you to set the XL100CL SERIES' 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 XL100CL SERIES 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.

```
 2:07PM      5/17/99        0FPM        0.000"
ORDER                                    0 Ft
MATERIAL                            N/A% COMP.
                  Setup Clock
Time Format                              AM/PM
Set AM/PM                                   PM
Set Hours                                    2
Set Minutes                                  7
Set Seconds                                 10
Set Day                                     17
Set Month                                    5
Set Year                                  1997


Type 6         3/9/99       4:01PM       V7.16
```

Figure 2.10. Time Clock Setup Screen

Input/Output Status

This mode allows you to view the current status of all the XL100CL SERIES' inputs and outputs. This can be very helpful in troubleshooting the system during and after an installation.

```
 9:04AM      6/3/99          0FPM        0.000"
ORDER                                     0 Ft
MATERIAL                           N/A% COMP.
 Inputs        Inputs      Outputs     Outputs
JogFwd   0 E-Stop   0 Fast     0 Output9   0
JogRev   0 DieHome  0 Slow     0 ItemComp  0
Run      0 Input11  0 Reverse  0 Output11  0
ShrComp  0 Input12  0 Shear    0 Output12  0
Lockout  0 Input13  0 Enable   0 Output13  0
ManShr   0 Input14  0 ShearUp  0 Output14  0
ManPun   0 Input15  0 Output7  0 Output15  0
Detect   1 Input16  0 Run      0 Output16  0


```

Figure 2.11. Input/Output Status Screen

E-Stop Input

This input enables the controller's outputs to become operational. The enable, shear and motion outputs will remain off until an E-Stop input is given. The same outputs will turn off if the E-Stop input is lost. It is highly recommended to use this input properly with closed-loop systems.

Feed-OK Input (Feed-To-Stop only)

The FEED-OK input must be turned ON before the controller will recognize a Jog or Run input.

If the FEED-OK input is turned OFF while the controller is jogging, the motor will decelerate to a stop at the programmed acceleration velocity.

If the FEED-OK input is turned OFF while the controller is in the Run mode, the motor will decelerate to a stop at the programmed acceleration velocity and wait for the FEED-OK input to be turned on again. The Run and Drive Enable outputs are NOT turned off.

Setup Lockout Input

This input will normally be in the form of a security key and will keep the operator from changing critical parameters on the controller. The SETUP LOCKOUT input does NOT lock the operator out of the following parameters:

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

Enable Output

After an ENABLE OUTPUT, the controller will wait 2 seconds before attempting to control the drive system. This allows time for the drive to react to the ENABLE OUTPUT for it's internal programming. This will include the drive being enabled by a JOG, RUN, or MANUAL CYCLE input.

Memory Test

This causes the XL100CL SERIES 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.

```
10:31AM    5/8/99     10FPM        3.002"
ORDER                                 5 Ft
MATERIAL                         25% COMP.
            XL100CL Controller
               Machine Data
             Auto Calibration
             Calibration Trim
            Manual Calibration
                Time Clock
            Input/Output Status

             Communications

Type 17     3/7/99       7:09AM     V7.16
```

Figure 2.12. Memory Test Screen

Clearing Memory While Energizing Controller

There has been a small change in the memory clear procedure. 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 (see the section in the back of the controller manual titled "In case of a Problem"). The steps listed include: making sure you have checked the encoder, the shear, the calibration procedure, rechecked setups, used the built-in diagnostic features, checked the incoming power, and cycled power off and on.

You can clear all data storage in the controller (including Setup and Order data) by following this sequence:

> ➢ make sure that the security switch is unlocked

> ➢ Turn off power to the controller

> ➢ Wait five seconds

> ➢ Turn the controller back on

> ➢ Wait until the AMS logo has scrolled across the screen and the words "POWER UP TESTING EPROM" appear at the bottom of the screen

> ➢ 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).

Communications

```
 2:31PM    7/21/99      0FPM       0.000"
ORDER                                  0Ft
MATERIAL                       N/A% COMP.
            XL100 Controller
          Communications Setup
           Communications Test




Type 49     4/11/99      8:42AM     V7.16
```

Figure 2.13. Communications Screen

Communications Setup

The "Communications Setup Screen", figure 2.13, displays information for use with XL-LINK software. Up to 30 controllers can be connected on a single network for communications with a computer for remote order entry, when the Serial Communications option has been purchased. The Baud Rate listed below does not match itself to the office computer's Baud Rate. The typical rate is 9600. 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.

When the XL-Link program is used, there are lists of codes that are available. These codes include: SCRAP CODES, PRODUCT CODES, DELAY REASONS, and EMPLOYEE NUMBERS. Explanations of these codes follow.

Scrap Code

The SCRAP CODE parameter is used with the XL-Link program and will define what type of scrap is produced. In the COMMUNICATION screen the question is asked "USE SCRAP CODES?" with a choice of YES and NO.

If scrap codes are used, and are defined by name via the XL-Link program, the controller will provide a list when INCREASE QUANTITY is selected. If scrap codes are used but   are not defined, the operator can enter a numerical number for the type of scrap produced by an INCREASE QUANTITY.

00 = General Production Scrap

01 to ZZ = The valid range of codes

This coincides with lift # 900 through 9ZZ, i.e. "9" plus a 2 digit scrap code = lift number to generate specific scrap.

Product Code

The PRODUCT CODE parameter enables an operator to use and designate a particular PRODUCT CODE for use on a per order basis. The controller prompts the user for a "Yes" or "No" answer to the prompt "Use Product Codes?"

This PRODUCT CODE will describe the specific product being produced for an order or the tooling required for a specific product. If the PRODUCT CODE changes when going from one order to another, a warning is posted and the new product code must be entered into the controller.

Delay Reason

Any time the line is halted longer than the HALT DELAY MINIMUM (new setup parameter), the operator is prompted to enter a 2-digit DELAY REASON before he is allowed to re-enter the RUN mode. This code is added to all production records to be used by the XL-Link software. If the XL-Link is not being used, a DELAY REASON is not necessary.

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

Employee Numbers

Each time an operator is prompted to enter a DELAY REASON (see description above), he/she will also be prompted to enter his/her EMPLOYEE NUMBER. This number can be up to 7 digits long (1-9999999), and will be included on all production records when using the XL-Link Communications Software.

The operator is also prompted to enter the employee number at every shift change. The employee number may be changed at any time by entering the FOOTAGE TOTALIZER menu under the subheading of EMPLOYEE INFORMATION.

```
 3:45PM    1/31/99        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
Use Product Codes                        No



Type 4       1/21/99        8:02AM     V7.16
```

Figure 2.14. Communications Setup Screen

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 test 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.

```
1:37PM     3/15/99        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 2.15. Communications Test Screen

Request Order

When a Network Unit Number is selected in Communications Setup, the REQUEST ORDER field becomes active. REQUEST ORDER allows the user to request orders for download from the XL-Link. The display shown by figure 2.16 gives this function.

```
3:45PM   1/31/99        0FPM        0.000"
ORDER                                   0Ft
MATERIAL                         N/A% COMP.
            Communications Menu
          Request Order  from Link




          Press any Key to Continue

Type 4      1/21/99       8:02AM      V7.16
```

Figure 3-16. Used When Requesting Order From Link

Edit Tool Data

The AMS Model XL100CL SERIES Controller

Before the **XL100CL SERIES** controller, machine designers often had to use "Flagged Cutoffs" or simple counters to measure the part length prior to the shear function. The "Flagged Cutoff" uses a rod that is the length of the desired part with a metal plate that activates the shear when the part strikes the metal or some other triggering device. The setup time on this system can be extensive and involves much trial and error as the rod and metal plate are moved back and forth to achieve the exact part length desired. If the next order has a different part length, another extensive setup time is required. This is a time consuming process and is definitely not suited for short production runs.

Another method that was used, was a simple counter that measured a fixed number of counts before a part was sheared. The counter by itself does not allow for any Shear Reaction time, and will give incorrect lengths if the speed of the line is varied. Programming lengths and patterns where often complicated and confusing.

The AMS controller takes a different approach to multiple press control. With the **XL100CL SERIES** controller, the user enters machine parameters and finished part dimensions. The controller determines the machine sequence. It not only handles the normal sequence for a part but also the transitional sequences required when the part pattern changes. The AMS controller can go from one part pattern to another with no scrap generated between part types.

The result is a machine that most operators can program from a part drawing. It is ideally suited for short production runs and special

patterns, giving the same quality operation for larger production requirements.

This section describes the various press parameters and functions used by the **XL100CL SERIES** controller. A user should read this section carefully in order to make the best use of the features of the controller.

Glossary of Terms

The following definitions apply throughout this document:

Press

A press is a device that closes a die set that is to punch, notch or shear a given material. Air, hydraulics, or a mechanical flywheel may power the press.

Die Set

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

Gag

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

Tool

A tool is the smallest section of a die set that can be engaged with one cycle of the press. A tool may produce a single hole, notch or shear, or a group of holes, notches and shear. In the **XL100CL SERIES** controller, a tool is defined by a press number, an optional gag number (or multiple gag numbers), and an offset distance from the front of the press.

Pattern

A pattern is a set of tool operations that define most of the details of a finished part. Each entry has a tool number, a reference designation, and a dimension.

Batch Item

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

Machine Configuration

The **XL100CL SERIES** controller can be adapted to several types of machines. The **XL102CL** can control a machine with two individual presses, a machine with only one press and one gag, or any combination of presses and gags that add up to two. The **XL106CL** can control a machine with six individual presses, a machine with only one press and five gags, or any combination of presses and gags that add up to six. The **XL112CL** can control a machine with twelve individual presses, a machine with only one press and eleven gags, or any combinations of presses and gags that add up to twelve. Once the configuration of the machine is determined, the AMS controller can be set to match that configuration. Please refer to Section 9 of this manual, on each individual controller for the proper switch configuration.

Programming Press Parameters

PRESS 1 is always connected to OUTPUT Number 4, the first press output, and must contain the shear die. For this reason, it is always called the SHEAR OUTPUT in the controller.

For the SHEAR PRESS, the Shear Dwell Down, Shear Dwell Up, and Shear Kerf are programmed. The Dwell is the time required to energize the press for full movement. The Kerf is the amount of material removed if the shear has two cutting edges and removes a slot of material during the shear cycle. If other presses are used, a separate Dwell time is programmed for each press.

Determining the Machine Zero Reference Point

For each application, a Machine Zero Reference Point is required. From this point, an offset to each die can be measured. The only requirement for this point is that it must be downstream from any tool location to avoid a negative reference. See Figure 3.1.
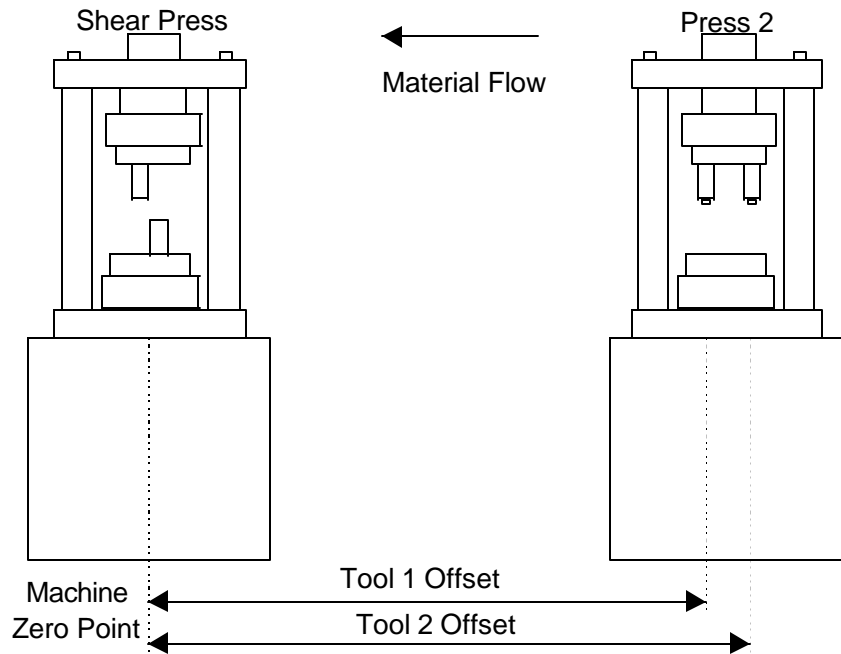
Figure 3.1. Press Reference Distance

In most cases the easiest point to use for a reference point, is the back edge of the shear die. Tool offsets are then determined by activating all dies, including the shear, with material loaded and clamped in a stationary position. The strip is then fed forward and the distance from the leading edge to each die is measured. These dimensions become the tool offsets.

Some dies may have tools that are downstream of the shear. In these cases, the back edge of the shear cannot be used as the reference point. An arbitrary reference point can then be chosen past the tool that is downstream, as long as all offsets are positive numbers. In this case, the tool for the shear will have a positive offset from the arbitrary reference point.

Programming Tool Parameters

SET UP   ⬇   ENTER
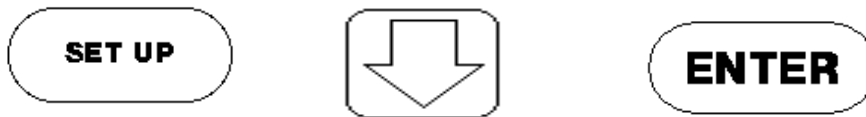
The EDIT TOOL DATA screen is used to enter tool data. A typical tool data entry screen is shown in Figure 4-2. Each entry contains: TOOL NUMBER, PRESS NUMBER, GAG NUMBER, OFFSET DISTANCE, and NAME.

```
 2:00PM    5/15/96     0FPM         0.000"
ORDER                                   0Ft
MATERIAL                      N/A% COMP.
TOOL      PRESS  GAG       OFFSET    NAME
  0         1      2         0.000"   SHEAR
  1         1      3         4.000"   2HOLE1

  3         1      5        28.000"   2HOLE3
  4         1      6        36.000"   SQUARE
  5         1      0         8.000"    PRESS
```

Figure 3.2. Typical Edit Tool Data Screen

The TOOL NUMBER is any alphanumeric number from 0 to ZZZ. TOOL 0 is reserved for the shear and must always be programmed. (See Figure 3.2, Line 1.) Otherwise, there is no other restriction on the TOOL NUMBER (except for MACROS which use tool numbers Z00-ZZZ and are discussed in the "Operating Procedure" section of this manual and Extended MACROS which use numbers 650-ZZZ and are discussed in the "Options" section of this manual). Tools can be entered in any order and numbers can be skipped.

The PRESS NUMBER refers to the PRESS OUTPUT associated with that tool. The PRESS NUMBER must be from 1 to the number of presses programmed into

the configuration switches. If any other number is entered, an error will be displayed.

The GAG NUMBER is usually the OUTPUT NUMBER that is energized when this tool is to be activated. The number must be greater than the number of presses programmed into the configuration switches and not greater than the number of maximum presses allowed (**XL102CL** = two, **XL106CL** = six, **XL112CL** = twelve). The number 0 can also be used. This designates that no gag is to be energized for this tool. (See Figure 3.2, Line 6)

The OFFSET DISTANCE is the distance from the designated machine zero point to a reference point on the tool. In some cases, this point may be the centerline of a hole or cluster of holes. In others it may be the leading or trailing edge of a notching die.

The NAME is any 8-character name that may help the operator identify a particular tool. Programming the NAME is not necessary.

More than one tool can be defined for a single die. For example, a notching die that removes a piece from the corner of both the leading and trailing edges can have a tool defined for both corners. They would have the same press and gag data but different offsets. When programming a pattern, one can use one tool for the leading edge referenced from the leading edge and the other for the trailing edge referenced from the trailing edge. The dimensions used would come directly from the part drawing.

A second use for multiple tool entries is for cases where dies may be changed to run certain parts. Offsets for both dies would be available and patterns that used these dies would contain the corresponding tool reference. This means that no change in tool data is required when dies are changed.

Nested Tooling

If a press has multiple dies, the user has the option of assigning different tool numbers to each die, or the press can be labeled as having one tool number with multiple gags. Each die can then be operated separately by using a different tool number.

When using gags, the operator is not limited to just one gag per tool. Multiple gags may be assigned to the same tool. As an example, assume that you have a shear for Press 1 and several tools on Press 2, figure 3.3.
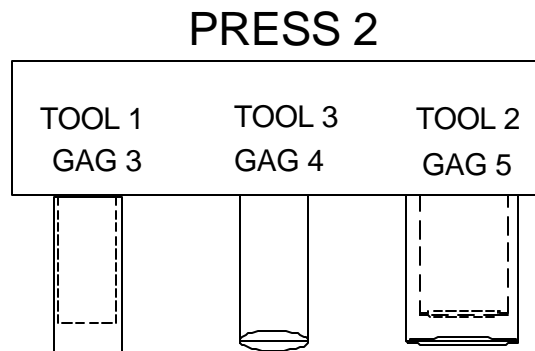
Figure 3.3. Example Punch Press

With this tool arrangement, the following part can be made:
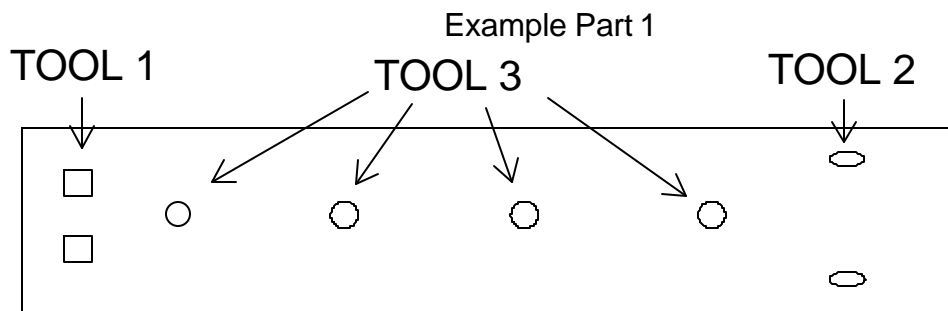
If there are parts that can be made with all of the tools at once (see Example Part 2), the individual tools could be entered separately, or the whole press could be assigned another tool number, which would reduce the programming steps.

Example Part 2

TOOL 1   TOOL 2   TOOL 4

TOOL 3
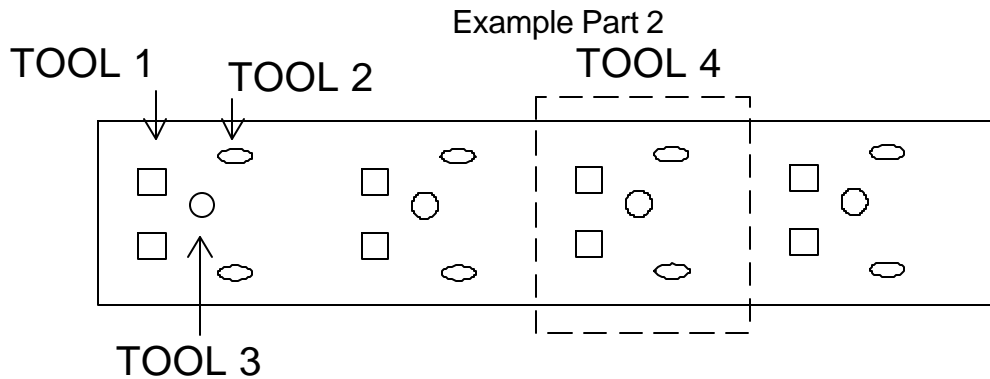
An example of the Edit Tool Data screen is shown in figure 4-4, and Part 1 can be made with Tools 1, 2, and 3. Part 2 could be made with Tools 1, 2, and 3, but a better method would be to use Tool 4, which includes all three tools.

```
2:34PM     5/15/96      0FPM         0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
TOOL      PRESS  GAG      OFFSET      NAME
  0         1     0       0.000"     SHEAR
  1         2     3      32.000"     SQUARE

  3         2     5      38.000"     1HOLE
  4         2     3      32.000"     PRESS
  4         2     4      35.000"     PRESS
  4         2     5      38.000"     PRESS
```

Figure 3.4. Different Gags on the Same Tool and Press

When using NESTED TOOLING to make the part, use the standard references when programming a part (Leading Edge, Length = 24"). This will place the first tool in the group at that point.

Part Programming

Pattern Programming

Tool locations on specific parts are defined in the PROGRAM PATTERNS screen. All details about the part except the total length are defined here. The part length is defined in the PROGRAM ORDER section when parts are to be actually made. This allows patterns to be defined independent of the length.

Often, the same basic pattern may work for several length parts. The **XL100CL SERIES** controller allows holes to be defined relative to the leading edge, trailing edge, or center of a part.

Some users may not be able to use this feature. For them, they would only use the leading edge reference on each tool and define the total length in the PROGRAM ORDER screen.

To program a pattern follow these keystrokes:
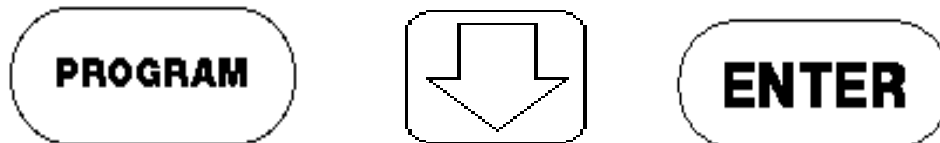
When first entering the PROGRAM PATTERN mode, a screen for entry of PATTERN NUMBERS similar to Figure 5-1 is displayed. This screen shows the user what patterns are stored in memory, how many operations each pattern has, and what the status of each pattern is. A pattern with no operations is said to be EMPTY. The pattern *** designates a new pattern. Enter the new pattern when the cursor is on this line. If no *** is visible, move the cursor down until one appears (or press the "END" key and then "ADD LINE"). Patterns previously programmed can be reviewed or changed by moving the cursor to that number and pressing the ENTER key.

```
2:32PM    4/22/97       0FPM          0.000"
ORDER                                     0Ft
MATERIAL                         N/A% COMP.
PATTERN         # OF OPERATIONS      STATUS
   100              6            Permanent
   101              7            Permanent
   102              3            Permanent
   200             14            Permanent
   201             17             Permanent
   ***              0            Empty
```

Figure 4.1. Initial Program Pattern Screen

If the pick key is pressed while the cursor is on the Pattern ID field during Item Edit, the controller goes directly to the Pattern Operation Editor for the specified pattern number. If no pattern exists for the current number, an error message is displayed. The Program key must be pressed to go back to the Item editor.


```
PICK
```

If the Pick key is pressed while the cursor is on the Pattern ID field during Item Edit, the controller goes directly to the Pattern Operation Editor for the specified pattern number. If no pattern exists for the current number, an error message is displayed. The Program key must be pressed to go back to the Item editor.

While in the Edit Patterns screen, the Pick Key may be used to initiate a search for a specific pattern. When depressed, a box appears to enable the user to enter a Pattern ID and initiate a search. The Pick Key begins the search below the currently selected pattern. If a matching number is found, that pattern is placed to the top line of the editor. If no match is found, an error message is displayed.

To delete a pattern, move the cursor to that number and press the DELETE LINE key. The status of that pattern then changes from PERMANENT to DELETE. To retrieve a deleted pattern press the DELETE LINE key again to change its status back to PERMANENT. Any patterns with the status of DELETE will be erased from memory when the power to the **XL100CL SERIES** controller is turned off or when a MEMORY TEST is performed.

The PATTERN screen shows TOOL NUMBER, REFERENCE, and LENGTH for each entry. Figure 4.2 shows a typical screen.

```
 4:20PM    2/14/97      0FPM         0.000"
ORDER                                   0Ft
MATERIAL                          N/A% COMP.
PATTERN:   100
TOOL        REFERENCE             LENGTH
  1         Leading Edge             1.000"

  3         Leading Edge            26.000"
  1         Trailing Edge            1.000"
  2         Trailing Edge           13.000"
  3          Trailing Edge          26.000"




```

Figure 4.2. Program Pattern Screen for Sample Pattern 100

The TOOL NUMBER is an alphanumeric entry up to three characters long. This entry can be from 1 to ZZZ. TOOL NUMBER 0 is reserved for the SHEAR and does not have to be programmed here if a length is specified in the Program Orders menu. If length is programmed into the pattern, it is not necessary to enter a length in the Program Orders menu. The tool number does not have to exist in the table of TOOL DATA at this time. It may be programmed later. However, an error will

occur when the part is run and a tool number is called for in the pattern and cannot be found.

The **REFERENCE** field, which is demonstrated in Figure 4.3, consists of the following options:

LEADING EDGE

Tool location measured from leading edge of the part.

TRAILING EDGE

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

LEAD CENTER

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

TRAIL CENTER

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

EVEN SPACE

Tool location measured relative to the leading edge of the part or from the previous location of a LEADING EDGE entry of the same tool. When the part is made, this tool is repeated at this spacing until the end of the part is reached, or until it reaches the spacing limit as described in the next paragraph.

Note: When programming an EVEN SPACE pattern, the EVEN SPACE location must be immediately preceded by a LEADING EDGE location to define a reference point, and then followed by a SPACING LIMIT.

SPACING LIMIT

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

To select the proper reference, press any number key or the "PICK" key until the desired choice is displayed and then press ENTER.
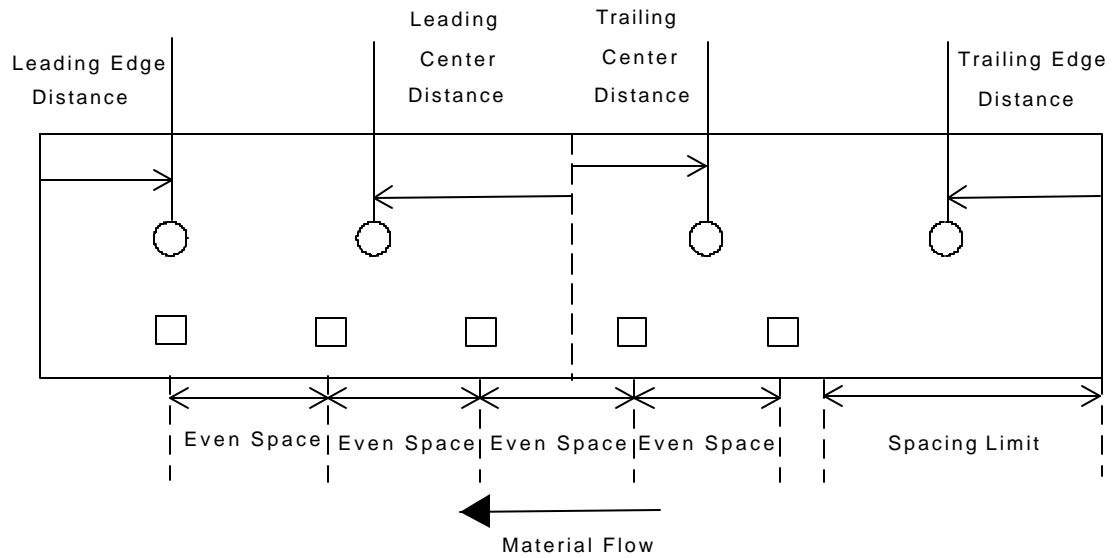
Figure 4.3. Reference Examples

Order Programming

The above two keystrokes will get the Programs Order Screen. Parts are scheduled for production using this screen. Following is a brief description for programming orders from this screen. See Chapter 6 for more details on Order Programming. The special function Pick Key also enables a search function and is described below.

The Pick Key may be used to initiate a search function while in the Edit Orders Screen. A graphical box will appear enabling the user to enter an Order, Material or Product Code and search for it. The search begins with the first record below the currently selected record and will continue to the bottom of the list. If a matching number is found, the order is moved to the top of the editor. If no match is found, an error message is displayed.

Parts are scheduled for production using the PROGRAM ORDERS screen. Following is a brief description for programming orders from this screen.

```
 4:01PM    3/15/97      0FPM        0.000"
ORDER                                  0Ft.
MATERIAL                       N/A% COMP.
1
LF       QTY      LENGTH     PAT O   STATUS
 1       10       360.000"   100 R    Next
```

Figure 4.4. Program Order Screen

Lift Number

The LIFT NUMBER is an alphanumeric three-digit character that
represents a subgroup of an order. This entry can be from 1 to ZZZ.
When the **XL100CL SERIES** controller encounters a LIFT NUMBER
change while running, the machine will stop (depending upon the HALT
MODE selected, see Section 3 of this manual for details), allowing the
operators to bundle the product. The LIFT NUMBER is automatically
repeated when entering information for the next line item. When the
LIFT NUMBER changes, the previous number can be over written.

Note: When a lift number of 0 or any numbers in the range, 900-9ZZ is
used, the controller will count all parts produced as scrap.   This block of
numbers is specifically used with the XL-Link program to produce
reports for scrap accountability.

Quantity

The QUANTITY (QTY) is the number of parts to be produced for this
line. If a QUANTITY of zero is entered, the status for that item is
automatically set to EMPTY. Any item or order with a status of EMPTY
is erased from memory when the user exits the PROGRAM mode.

Length

LENGTH designates the total length of the part to be produced, regardless of any patterns assigned to it. A length of 0.000" is valid only if the pattern includes a tool 0 function.

Pattern Number

PATTERN NUMBER designates the preprogrammed pattern used for this item. PATTERN 0 is recognized as a SHEAR ONLY part. No pattern data needs to be programmed. For punch patterns, alphanumeric characters from 1 to ZZZ can be used.

Option

The O symbol between PAT and STATUS in figure 4.4 represents the OPTION that is being used for the programmed pattern.

Examples of OPTIONS are shown in Figure 4.5. Options available are as follows:

R-(RIGHT)

Part is produced as programmed.

L-(LEFT)

Part is produced with the pattern reversed.

A-(ALTERNATE RIGHT-LEFT)

Two parts are produced for each quantity, a RIGHT and a LEFT. This pair is only counted as one part.

M-(MIRRORED)

Part pattern for the leading edge is mirrored on to the trailing edge. Symmetrical parts are produced.

FLOW

RIGHT

LEFT

ALTERNATING

MIRRORED
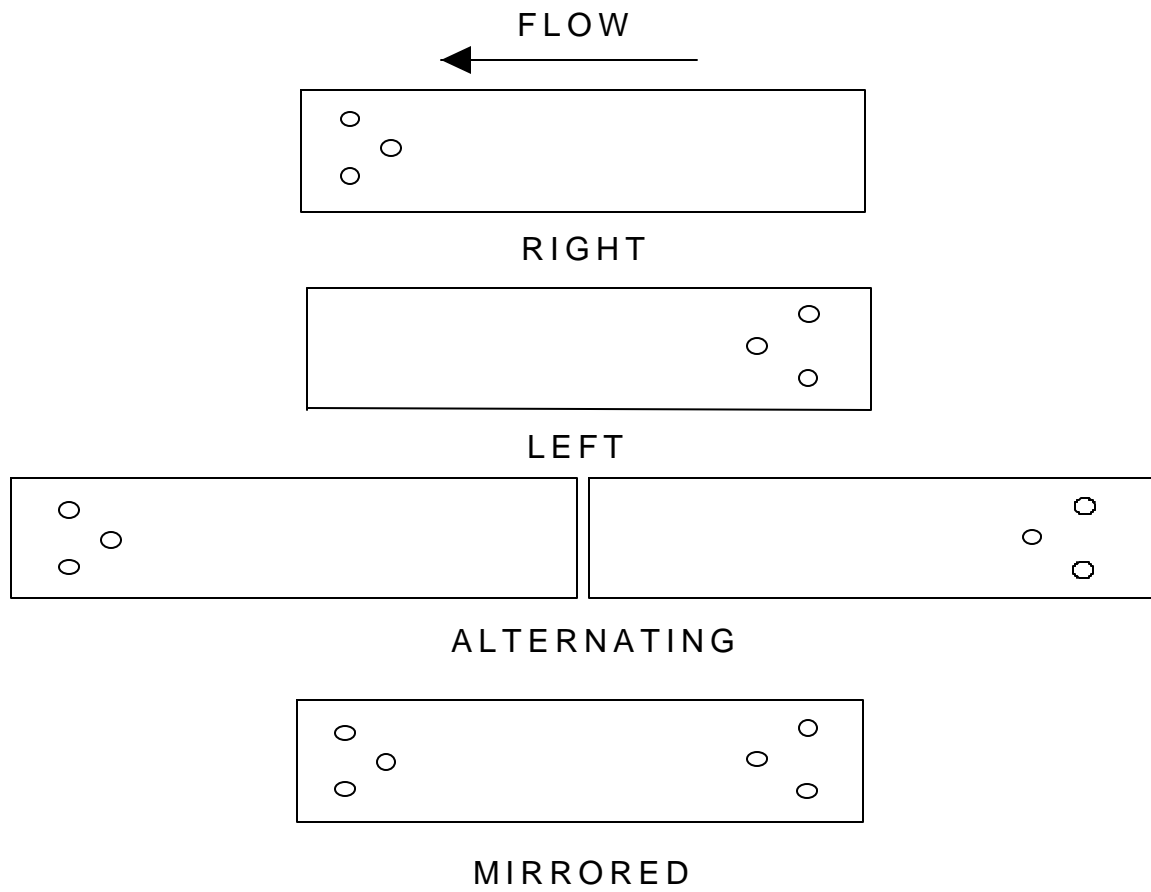
Figure 4.5. Examples of Options

Application Example 1

Single Press with Multiple Gags

In this example, the user has one large press with a gagged die. The end products produced are purlins used in metal buildings. These parts typically have a standard pattern of holes on the leading and trailing ends but the total length varies from one order to the next. This makes the pattern scheme of the **XL100CL SERIES** controller ideal for this application.

Example Parts

PATTERN 100
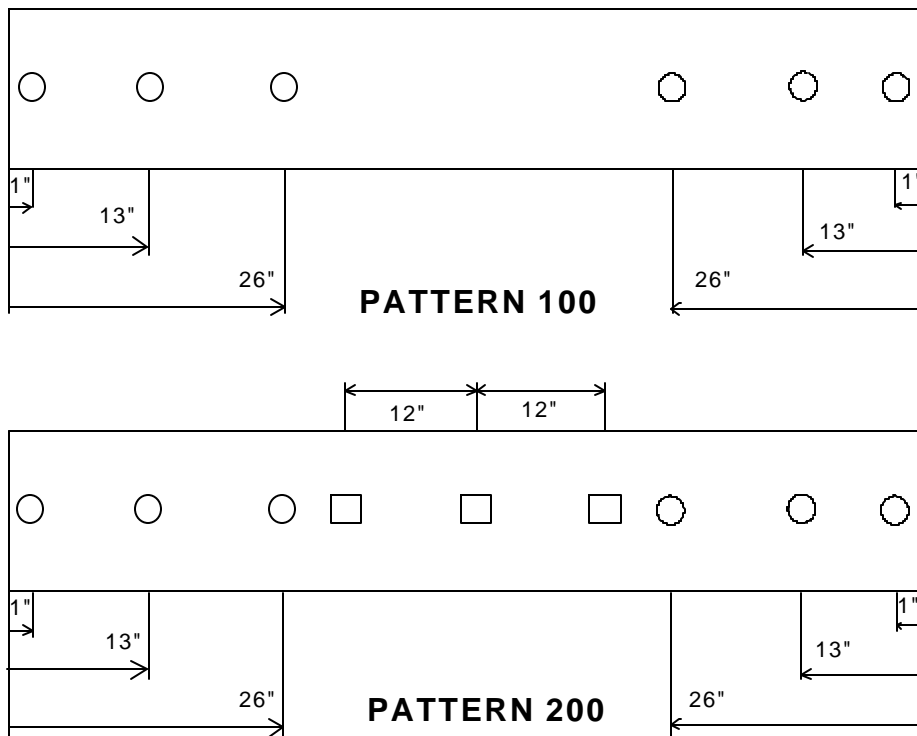
PATTERN 200

Pattern 100 uses Leading Edge and Trailing Edge references while Pattern 200 uses Leading Edge, Trailing Edge, Leading Center, and Trailing Center references.

Die Layout
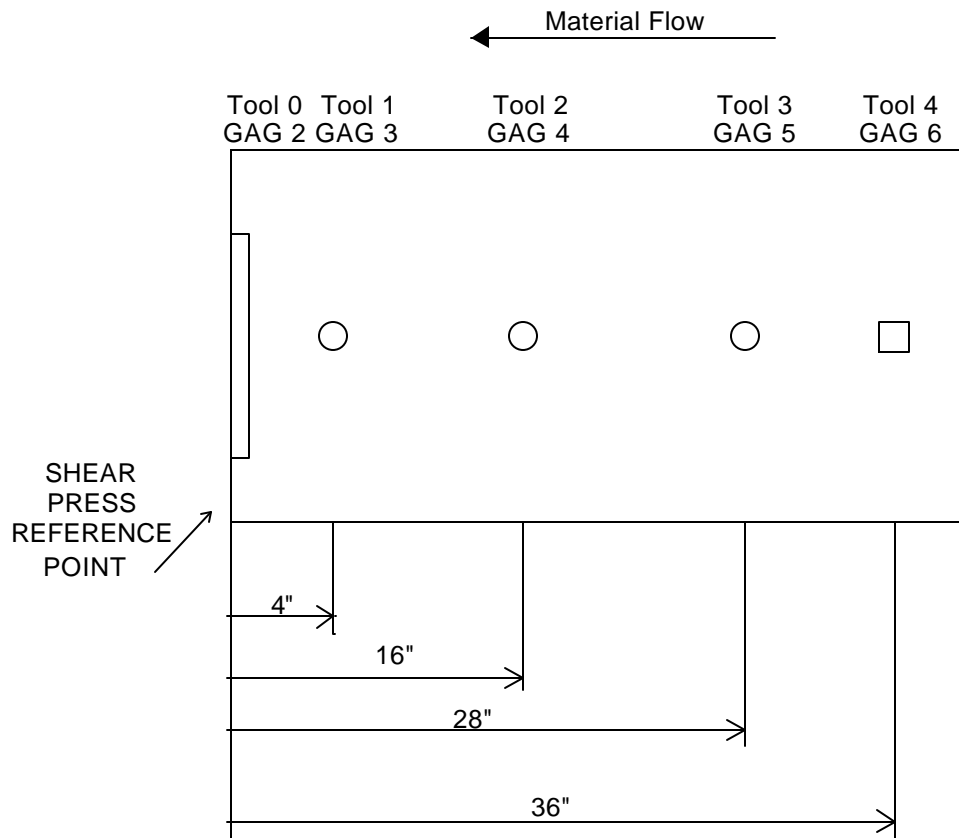
This layout shows the physical location of the cut point versus the physical location of the punch dies.

Tool Data Screen

```
9:36AM    1/15/97       0FPM          0.000"
ORDER                                     0Ft
MATERIAL                            0% COMP.
TOOL     PRESS   GAG      OFFSET     NAME
  0        1      2        3.000"     SHEAR
  1        1      3        4.000"    2HOLE1

  3        1      5       28.000"    2HOLE3
  4        1      6       36.000"    SQUARE




```

Pattern 100 Screen

```
8:23AM    2/14/97       0FPM          0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
PATTERN:   100
TOOL       REFERENCE              LENGTH
  1        Leading Edge            1.000"

  3        Leading Edge           26.000"
  1        Trailing Edge           1.000"
  2        Trailing Edge          13.000"
  3        Trailing Edge          26.000"



```

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

Pattern 200 Screen

```
11:44AM    4/10/97      0FPM        0.000"
ORDER                                  0Ft
MATERIAL                     N/A% COMP.
PATTERN:   200
TOOL       REFERENCE            LENGTH
  1        Leading Edge          1.000"

  3        Leading Edge         26.000"
  4        Lead Center          12.000"
  4         Lead Center          0.000"
  4        Trail Center         12.000"
  1        Trailing Edge         1.000"
  2        Trailing Edge        13.000"
  3        Trailing Edge        26.000"
```

Special Pattern Notes:

The preceding patterns have no relation to the actual length of the part.

The Leading Center reference of 0 is the equivalent of a Trailing Center reference of 0.

The 1st and 2nd hole from each end can actually be fired together. The pattern shows holes at 12 inches apart and the dies are also physically 12 inches apart. This can be used as an advantage and will require two less press operations per part. This saves wear on equipment, and could increase productivity and possibly line speed.

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Operating Procedure

Programming Overview

One or many orders can be entered into the **XL100CL SERIES** controller at any one time, with or without running existing programs. The ability to program more than one order at a time lets the user change sizes without stopping the machine. This saves time on short runs, but the efficiency of a multiple batch controller can be lost if the controller is not easy to program. The AMS controller solves this problem with its clear and concise method of programming.

The programming of punch patterns is separate from the programming of part lengths. Once a punch pattern has been programmed, it may be used in conjunction with any appropriate length. Punches that fall past the end of a part are ignored.

```
10:05AM   8/27/97      0FPM          0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
                   PROGRAM

          Program          Orders
          Program          Patterns
          Copy             Patterns
```

Figure 5.1. Program Menu Screen

Entering Orders

An order consists of an Order Number, Material code and a Product code, followed by one or more detail lines each consisting of a Lift (Bundle) Number, a Quantity, a Length, and if a punch is used, a Punch Pattern Number and a Punch Mode. Order Numbers may or may not be used at the customer's discretion, and are required if the "USE ORDER NUMBERS?" parameter in the Machine Data Setup is set to YES.

```
 1:37PM    6/17/97      0FPM        0.000"
ORDER:   32786-R1                    600Ft
MATERIAL: 16GA GALV           N/A% COMP.
ORDER NUMBER      MATERIAL          PCODE
32786-R1           16GA GALV          WLPNL
```

Figure 5.2. Order/Material Pcode Entry Screen

Programming the **XL100CL SERIES** 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: You must use the ENTER key to enter new or edited data into memory.**

ENTER

Edits (or changes) are simply made by writing over the old value. Pressing the first numeric key causes the old value to be erased and the new numbers to shift in from the right. In case of a mistake during an

entry, press the CE (Clear Entry) key to erase the entry and start over. A new correct value can then be keyed in. When the correct value is displayed, press the ENTER key to move to the next field.

Order Number

Enter the Programming Mode by pressing the PROGRAM key. The first option is Program Orders. Make sure this option is highlighted and press the ENTER key. The first data item to enter is the Order Number (see figure 5.2), indicated by the highlighted portion of the display. The Order Number can be up to eighteen characters long (Unless PRODUCT CODES are used, then the order number is limited to 15 characters). You may review and correct jobs previously programmed. Press the ENTER key to confirm the present Order Number.

Material Code

Next to be programmed is the Material Code, which can be up to twenty characters long, and may include numbers, the letters A-Z, and some symbols. Only 18 characters will be allowed when using PRODUCT CODES. You may review and correct jobs previously programmed. 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. Do not press "ENTER" until the entire number or word is completed. Pressing "ENTER" will take the operator to the next location.

Product Code

PRODUCT CODE can now be programmed if PRODUCT CODES are enabled for use in the Communications Setup screen. The Product Code can be 5 characters long and can consist of numbers and letters.

After entering the Product Code, a screen for entering the cut list appears. On this screen, the Lift Number, Quantity, Length, Pattern Number, and Options appear. This is the only screen that will be seen if not using Order Numbers.

If PRODUCT CODE is not selected for use in the Communications Setup screen, than Product Code will not be displayed. Pressing ENTER after inputting the material field will cause the cut list screen to display immediately.

```
1:45PM    6/17/97       0FPM       0.000"
ORDER:   32786-R1                   600Ft
MATERIAL: 16GA GALV             0% COMP.
32786-R1          16GA GALV
LF      QTY        LENGTH      PAT  O   STATUS

 1      15         240.000"    200  R    Ready




```

Figure 5.3. Part Programming Screen

Note: Each order consists of one or more line items, or, lengths to be cut.

Lift (Bundle) Number

The first input field is for the Lift (LF), or Bundle Number. Finished parts that are kept together or bundled as a unit should be made in sequence, and should all have the same Lift Number. The machine will automatically stop when it encounters a new Lift Number (if the BUNDLE HALT mode is selected). This enables the operator to take whatever action is needed to get the just-finished bundle out of the way so that the next one can be produced. If there are a number of orders that have previously been entered, you can program another order by pressing the "END" key and then the "ADD LINE" key.

Quantity

After the Lift Number is entered, the Quantity will be highlighted. Enter here the number of pieces needed of a single length. The Quantity can be set from 1 to 9999 pieces.

Length

After the Quantity is programmed, the Length field will be highlighted. Enter here the finished length of the part to be made (do not count the shear kerf; the controller will automatically add in this amount, if any). Enter the length using the appropriate Display Format as selected when the **XL100CL SERIES** controller was installed. If you are using the Feet Fractional Inch or Feet Decimal Inch display mode, use the decimal point (•) key, or the "enter" key to finish entering the Feet portion, and switch to the Inch entry field. In the Feet Fractional Inch display mode, use the "decimal point" key or the "enter" key to separate the elements of the Inch entry as well. The longest length the AMS controller will accept is 3500.000" or 291' 8", depending upon the Format mode.

When entering lengths, no leading or trailing zeros are required. The following entries (in Decimal Inch mode) each produce the same 10-inch part:

> 10
> 010
> 10.
> 10.00
> 10.000

Punch Pattern

If Punch Pattern zero is selected, a shear-only part will be produced. Pattern numbers in the range 1-ZZZ will reference an already-programmed punch pattern, or one to be programmed later, and add a punch or punches to the part. Note that any punch pattern referenced in an ITEM must be defined before the ITEM is run.

Punch patterns Z00-ZZZ are used exclusively as MACRO patterns, which are explained later. Punch Patterns 650-ZZZ are Extended MACROS and are explained in the "Options" section of this manual.

Standard Macro Programming

Pattern program numbers Z00-ZZZ are reserved for creating multiple operations that can be used in another pattern. A MACRO is a single pattern or keystroke that can be used to represent multiple patterns or keystrokes.   If a series of operations are frequently used in other patterns, it can be turned into a MACRO and the operator need only enter one pattern to represent a number of operations. If more MACROS are required, an Extended MACRO Option is available which uses pattern numbers 650 through ZZZ. See the "Options" section of this manual for more information.

Edit Tool Data

Tool data should be entered by the normal procedure in the EDIT TOOL DATA screen. Tool Number zero is reserved for the shear and must always be entered. Each tool is defined by an alphanumeric Tool Number from 0 to Z00, a Press Number, Gag Number, and Offset Distance. Tool numbers Z00-ZZZ may not be programmed. These Tool Numbers are reserved for MACRO patterns and may be programmed later. Defining a Tool Number greater than Z00 will result in an error.

Programming Macro Patterns

Programming Macro Patterns is very similar to non-macro applications. Press the PROGRAM key to enter the Program Mode. Select PROGRAM PATTERNS. Any number (1 - ZZZ) can be used to define a pattern, however, patterns Z00 - ZZZ may be inserted into other patterns as MACROS.

Macro Patterns

Enter the first tool to be used in this MACRO pattern. You may use any Tool Number that has been defined in the Edit Tool Data mode. You may NOT use Tool Numbers Z00 - ZZZ (a MACRO within a MACRO). Trying to do so will result in an error.

Enter a Reference location for the tool. Within a MACRO pattern the only valid Reference locations are LEAD CENTER and TRAIL CENTER. Enter a Length (offset from the Reference location) for the tool. This is the same procedure that is used on non-macro applications.

Enter as many tools in the pattern as required up to but not including tool Z00. When finished, press the PROGRAM key to enter more patterns or press the STATUS key to return to the Status mode. This pattern may now be run as a standard pattern or inserted into another pattern as a MACRO.

Inserting Macros Into Other Patterns

Again select PROGRAM PATTERNS from the PROGRAM menu. To enter an ordinary pattern select a number between 1 and Z00. Program the patterns normally.

To insert a MACRO into an ordinary pattern use the MACRO Pattern number in place of the tool number. Enter the Reference location and offset length for the MACRO Pattern. All of the tool operations within the MACRO (remember only LEADING CENTER and TRAILING CENTER are valid) will be located with respect to this location. You

may insert as many MACROS as you like within the same standard pattern. When finished, press the PROGRAM key and enter more patterns or press the STATUS key to return to the Status mode.

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

A Programming Example Using Macro Patterns

Suppose you have an **XL112** controller with one press and seven gags, and your tool data looked like this:

```
11:16AM   7/25/97      0FPM        0.000"
ORDER                                 0Ft
MATERIAL                          0% COMP.
TOOL      PRESS  GAG      OFFSET    NAME
   0        1      2       0.000"
  10        1      3       9.000"

  12        1      5      31.000"
  20        1      6      35.000"
  21        1      7      40.000"
  22        1      8      45.000"
```

Material Flow

Tool 0   Tool 10   Tool 11   Tool 12 Tool 20 Tool 21 Tool 22

SHEAR
PRESS
REFERENCE
POINT

9"

20"

31"

35"

40"

45"

AMS CONTROLS INC.
XL100CL **Series**
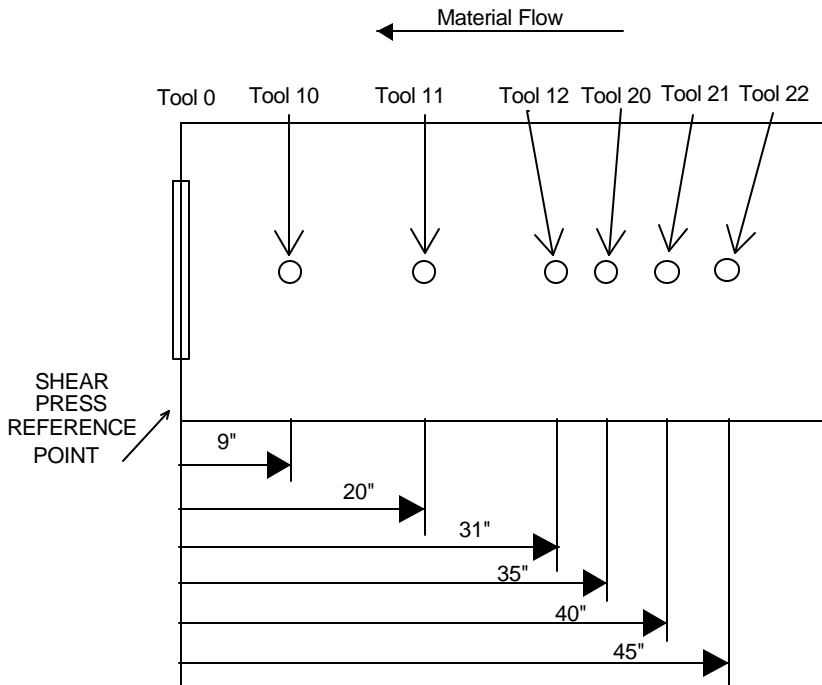
Some sample **MACRO** patterns could look like this:

Pattern Z00

```
11:23AM    7/25/97        0FPM         0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
PATTERN:   Z00
TOOL         REFERENCE              LENGTH
 10        Trail Center            1.000"
 11        Trail Center            3.000"
```

Center of Part

1"   3"   5"

Tools   10   11   12

Material Flow
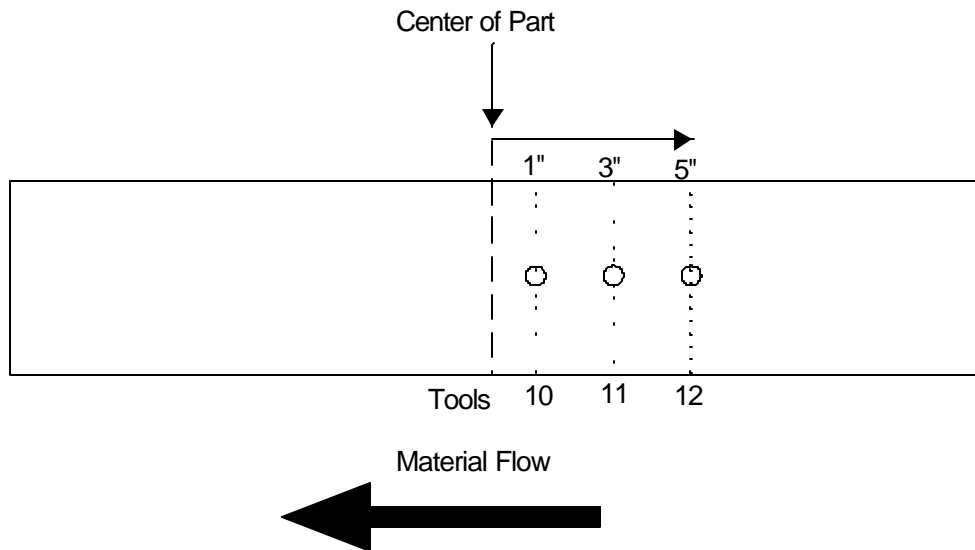
Pattern Z01

```
11:29AM    7/25/97      0FPM        0.000"
ORDER                                   0Ft
MATERIAL                       N/A% COMP.
PATTERN:   Z01
TOOL        REFERENCE            LENGTH
 20         Lead Center          5.000"
 21         Lead Center          0.000"
```

Center of Part

5"   5"

Tools   20   21   22

Material Flow

Operating Procedure

XL100CL **Series**
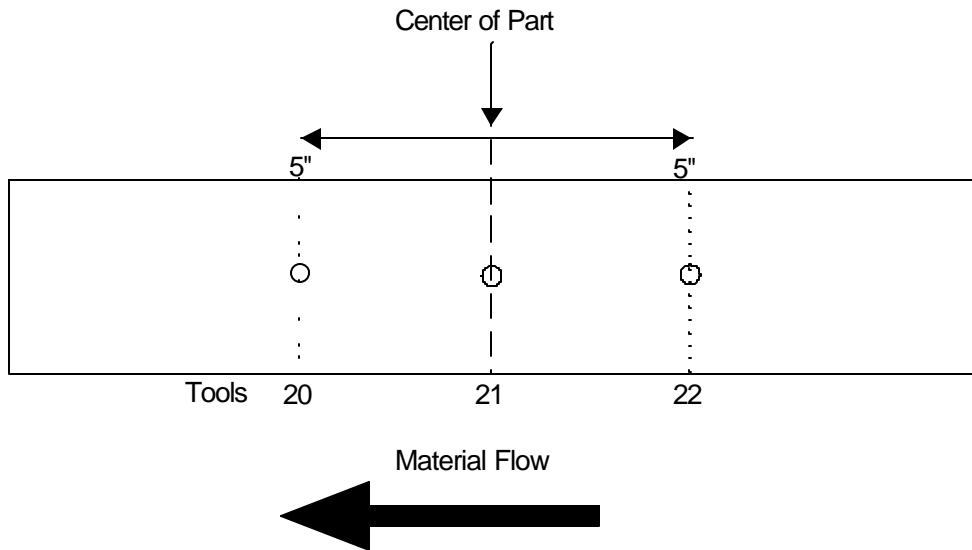
Pattern Z02

```
11:33AM    7/25/97      0FPM          0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
PATTERN:   Z02
TOOL        REFERENCE              LENGTH
 11        Lead Center            10.000"


```
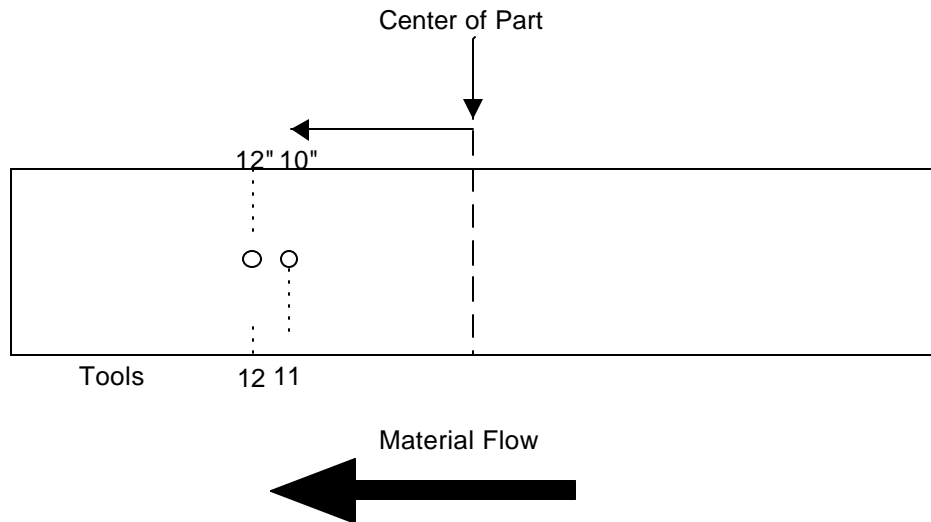
Center of Part

12" 10"

Tools   12 11

Material Flow

Some sample **STANDARD** patterns may look like this:

Pattern 1

```
11:36AM   7/25/97      0FPM        0.000"
ORDER                                 0Ft
MATERIAL                      N/A% COMP.
PATTERN:  1
TOOL       REFERENCE          LENGTH
  1        Leading Edge       10.000"
Z00        Leading Edge       30.000"
Z01        Lead Center         0.000"
Z02        Trailing Edge      30.000"
```

Note: Notice that the operations using MACROS are placed as needed at the center and at 30 inches from either end of the part.
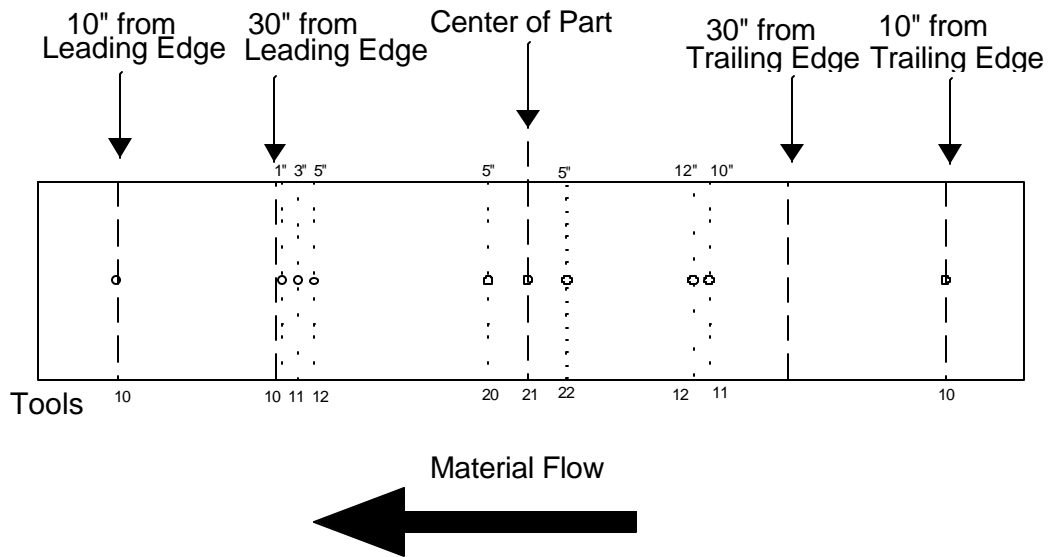
Tools

Material Flow

Pattern 2

```
11:42AM   7/25/97      0FPM        0.000"
ORDER                                0Ft
MATERIAL                        N/A% COMP.
PATTERN:   2
TOOL       REFERENCE            LENGTH
Z01        Leading Edge        20.000"

Z01        Spacing Limit       15.000"



```

Note that the **MACRO** operation occurs at equal intervals as set by
using the "Even Space" reference.   There is no pattern at 95" because
of the "Spacing Limit".

AMS CONTROLS INC.
XL100CL **Series**
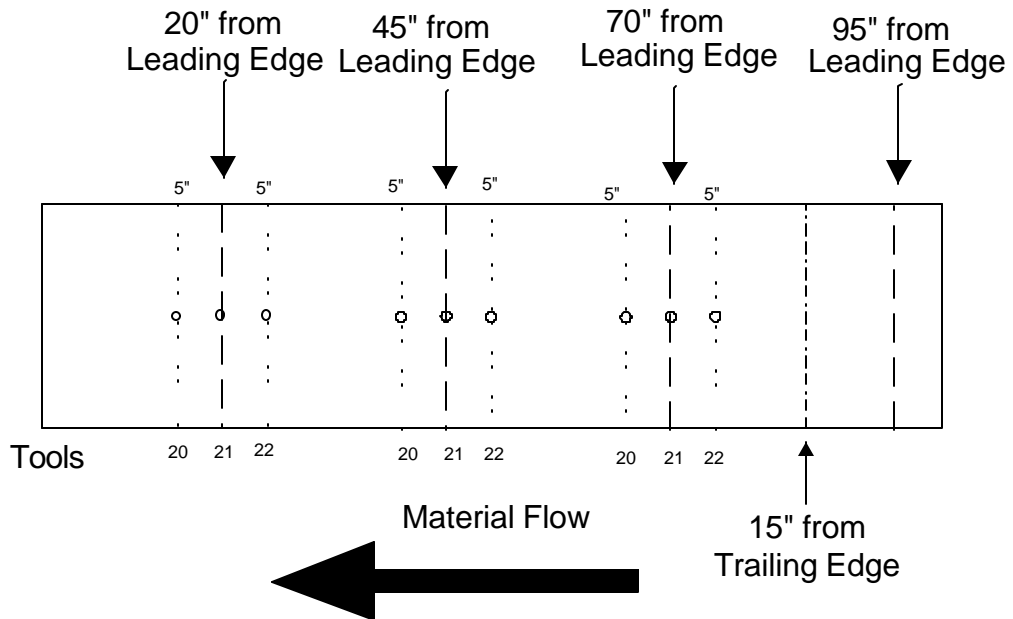
Now jobs may be run with Pattern 1 or Pattern 2, which contain
MACROS Z00 and Z01, or jobs may be programmed to make parts that
only have Patterns Z00 or Z01.

Example:

```
11:48AM   7/25/97      0FPM         0.000"
ORDER:    XXXXX                        0Ft.
MATERIAL:                      N/A% COMP.
XXXXX
LF        QTY      LENGTH      PAT O  STATUS

 1        100       80.000"     2   R    Ready
 2        200       55.000" Z00  R    Ready
 2        500       60.600" Z01  R    Ready
```

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. The controller will not enter the Run Mode if it is
in the Program Screen. Pressing STATUS enables any edits or
additions to be used.

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XL100CL **Series**

Referencing Controller to the Material

The **XL100CL SERIES** 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 the controller is set to punch and 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.

On some flying die machines there are a series of moves that are made. Refer to page 3-17 for this sequence.

On feed-to-stop machines, the controller re-references itself to the material on each automatic cut, at the bottom of the shear cycle. This is done to improve accuracy. The material can overshoot or undershoot the shear point on each feed. With simple electrnonic counters, an overshoot on one cut, followed by the udnershoot on the next cut, will cause the second part to be short by the sum of the overshoot plus the undershoot. By re-referencing on each cut, the XL100CLCL controller limits the error to either an undershhot or an overshoot. This effectively cuts the error in half.

Running the Machine

Main Status Display

The top three rows of the **XL100CL SERIES** 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     6/17/97      0FPM        0.000"
ORDER:   32786-R1                    600Ft
MATERIAL: 16GA GALV             0% COMP.
 LF   QTY    DONE      LENGTH   PAT O STATUS
32786-R1           16GA GALV           WLPNL

  1   15     0       240.000" 200 R  Ready
```

Figure 5.4. Typical Status Screen

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).

```
 1:52PM      6/17/97        0FPM          0.000"
ORDER:                                       0Ft
MATERIAL:                          N/A% COMP.
LF   QTY   DONE      LENGTH      PAT O STATUS



```

Figure 5.5. Status Screen With No Items Programmed

Status Mode Display

When the **XL100CL SERIES** 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:

Program Screen	Status 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 or 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) that 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.
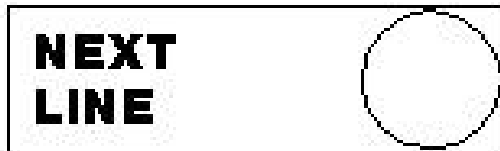
If an Item with a punch pattern has been partially completed when another Order (Item) is set to NEXT, two changes of status will occur. The new Order (Item) will obtain a status of NEXT while the partially completed Item will obtain a status of FILLED. A status of FILLED means that information about the next several parts (between one and three) has already been targeted in memory. The **XL100CL SERIES** 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 (depending upon the halt mode), 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:

➢ Halt the machine.
➢ Manually cycle the shear (***TWICE*** for punch parts only) to eliminate the parts that have already been FILLED.
➢ Set NEXT LINE TO RUN as above.
➢ 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, and 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. The controller must be in **STATUS** mode for the SKIP LINE key to take effect. SKIPPED items can be set to "NEXT" or "DELETE" without setting them to "READY" first.

```
SKIP         ⬭
LINE
```

Adding an Item While in the Run Mode

While the machine is running, or any time the **XL100CL SERIES** 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, Length, Pattern Number, and Pattern Mode. 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) that 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 **XL100CL SERIES** controller MEMORY TEST is performed or when the power is turned off.

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

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

➢ Halt the machine.
➢ Manually cycle the shear (***TWICE*** for punched parts) to eliminate parts that have already been FILLED.
➢ Select any other Order (Item) as NEXT to run.
➢ 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 move the selected line to the desired position. This can be done only while the line is halted and the controller is in the PROGRAM mode. This will move orders in the "Orders Screen" and items in the "Program Items Screen".

```
┌─────────┐        ┌─────────┐
│  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 input. The **XL100CL SERIES** controller will begin shearing parts at the programmed length and increment the quantity completed for the item.

When the quantity completed reaches the programmed total, the controller will automatically halt or continue running the next sequential line without halting, depending or how the Machine Data parameter

'HALT MODE" is set. See Chapter 2 of this manual for the 'HALT MODE" settings.

Manual Shear

On feed-to-stop machines, the MANUAL SHEAR input is active only when the machine is halted. Most flying die machines have the capability to shear on the fly. The MANUAL SHEAR may or may not be active in the RUN mode depending upon the switch configuration. 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 (only during punching routines). 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 (again, only during punching routines).

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 XL100CL SERIES controller will remain in the RUN mode until the material has stopped or until 5 seconds has past. Because of this, the feeding device should be connected to the FORWARD output and <u>not</u> the RUN output.** 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 during the POWER UP TEST or by running the MEMORY TEST.

Requesting Order (When using XL-Link Only)

If XL-Link is used to program orders into the **XL100CL SERIES** controller, the "Request Order" feature may be used. This is done by selecting the "Communication" item from the setup menu. Once "Communication" is selected the screen in figure 6-6 will be displayed. Highlight the "Request Order" selection and press enter to ask for an order form the XL-Link program. The controller will verify your request by the prompt "Request Order From Link, Press any Key to Continue". One or more orders will than automatically download from the XL-Link database.

```
1:52PM   6/17/97      0FPM        0.000"
ORDER:   32786-R1                  600Ft
             Communications Test
                 Request Order




Type      1      7/7/98    1:24PM   V 7.10
MATERIAL: 16GA GALV                0% COMP.
```

Figure 5.6. Request Order Screen

Footage Totalizer

Coil Inventory

The **XL100CL SERIES** 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 are view only; they cannot be cleared or set to arbitrary values. To view the coil footage totalizers, press the FOOTAGE TOTALIZER key.


```
 1:52PM    6/17/97      0FPM         0.000"
ORDER:   32786-R1                     600Ft
MATERIAL: 16GA GALV             0% COMP.
                Footage Totalizer

              Change Product Code
              Display Coil Data
              Clear Totalizers
            Employee Information


Employee:   0                     PCODE:WMPNL
                    Job       Shift
Good    :          122ft        1ft
Scrap   :           856ft        7ft
```

Figure 5.7. 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. 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.

```
2:54PM   6/17/97       0FPM            0.000"
ORDER:  32786-R1                        600Ft
MATERIAL: 16GA GALV              0% COMP.
               Display Coil Data

               Display Coil Material



Coil:
Material:
Employee:   0                    PCODE:WMPNL
                  Job      Shift
Good    :        122ft       1ft
Scrap   :         856ft       7ft
```

Figure 5.8. 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.

Changing Product Code

If PRODUCT CODES are enabled in the "Communications Setup" screen, a "Change Product Code" selection will be displayed in the Footage Totalizer screen. Highlighting the selection and pressing "ENTER" will display a screen with the prompt to "Enter Product Code". See figure 5.9.

```
1:52PM   6/17/97      0FPM        0.000"
ORDER:  32786-R1                    600Ft
MATERIAL: 16GA GALV              0% COMP.

Enter Product code:                 WLPNL




Employee:  0                    PCODE:WMPNL
                     Job      Shift
Good    :          122ft        1ft
Scrap   :           856ft        7ft
```

Figure 5.9 Enter Product Code

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 and cut, 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. The messages "CLEAR JOB TOTALS" and "CLEAR SHIFT TOTALS" will be displayed. Select the appropriate totalizer and press any number key or the PICK key to toggle the NO response to YES, then press ENTER if you wish to clear the respective total.

```
1:52PM   6/17/97      0FPM        0.000"
ORDER:   32786-R1                   600Ft
MATERIAL: 16GA GALV              0% COMP.
              Footage Totalizer
                Change Coil
            Change Product Code
             Display Coil Data

           Employee Information


Employee:  0                    PCODE:WMPNL
                    Job       Shift
Good    :          122ft        1ft
Scrap   :          856ft        7ft
```

Figure 5.9. Clear Totalizers Screen

This feature is useful when several different orders or jobs are completed during one shift.

All footage totalizers display in whole feet, or whole meters if the controller is set to a metric display mode.

Special Procedures

When the XL-Link program is used, there are lists of codes that are available. These codes include: SCRAP CODES, DELAY REASONS, and EMPLOYEE NUMBERS. Explanations of these codes follow.

Scrap Code

The SCRAP CODE parameter is used with the **XL-Link** program and will define what type of scrap is being produced. In the COMMUNICATION screen the question is asked "USE SCRAP CODES?" with a choice of YES and NO.

If scrap codes are used, and are defined by name via the **XL-Link** program, a list will be provided by the controller when INCREASE QUANTITY is selected or if a manual cut is made that is longer that the "Manual Shear Scrap Length" parameter. If scrap codes are used but are not defined by the Link program, the operator can enter a numerical number for the type of scrap produced by an INCREASE QUANTITY.

> 00 = General Production Scrap
>
> 01 to ZZ = the valid range of codes

This coincides with lift # 900 through 9ZZ, i.e. "9" plus a 2 digit scrap code = lift number to generate specific scrap.

Delay Reason

Any time the line is halted longer than the HALT DELAY MINIMUM (new setup parameter), the operator is prompted to enter a 2-digit DELAY REASON before he is allowed to re-enter the RUN mode. This code is added to all production records to be used by the **XL-Link** software. If the **XL-Link** is not being used, a DELAY REASON is not necessary.

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

Employee Numbers

Each time an operator is prompted to enter a DELAY REASON (see description above), he/she will also be prompted to enter his/her EMPLOYEE NUMBER. This number can be up to 7 digits long (1-9999999), and will be included on all production records when using the **XL-Link** Communications Software.

The operator is also prompted to enter the employee number at every shift change. The employee number may be changed at any time by entering the FOOTAGE TOTALIZER menu under the subheading of EMPLOYEE INFORMATION.

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, as is the case with most roll formers, 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.

➢ 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 sixteen characters.

➢ If loading a partially used coil which is already in the coil inventory of the **XL100CL SERIES** controller, press the ENTER key when prompted to enter a COIL NUMBER. Select one of the coils already contained in inventory by highlighting the correct line and pressing enter.

➢ 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 acceptable parts are ran for that coil, the material for the order that is assigned 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 <u>not</u> 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 and the sheet detect input is false (not activated), a new coil will not be asked for when the sheet detect switch is actuated. In previous versions if the coil information was entered into the controller before the coil was physically changed and the sheet detect switch activated, the controller would call for another coil change when the new coil is actually changed and the sheet detect switch closed.

Handling Material Flaws

With most roll formers and cut-to-length machines, material problems are common. The **XL100CL SERIES** controller has features that aid the operator when these flaws occur.

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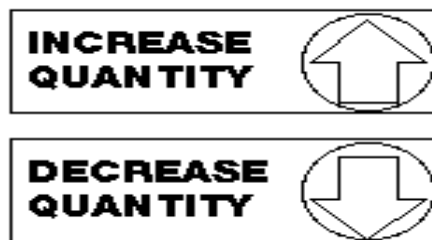
Increase Quantity

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, but 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 scrap total in the Coil Footage Totalizer is automatically adjusted.

If a small flaw is detected before the shear, the operator may wish to crop the flaw out to minimize the amount of scrap material. On flying die machines, the MANUAL SHEAR input is active while the machine is running. The crop starts the production of the part over again and the operator can repeat this process until good material occurs. A MANUAL SHEAR in the Run Mode will not produce a part smaller then the MINIMUM PART LENGTH. The **XL100CL SERIES** controller will delay the cut until this amount of material has past. In the case of feed-to-stop machines, the machine must be halted before the MANUAL SHEAR input is active. The operator would most likely jog the material forward

until the flaw is past the shear and then close the MANUAL SHEAR input a second time.

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

There are times when material flaws can be extensive and last for a large portion of a coil. A user may find that this material is easier to handle if it is cut into short lengths rather than relying on the operator to crop repeatedly. There may also be secondary outlets for such material if they can be cut to standard lengths of perhaps 8, 10, and 12 feet. If this is the case, jobs for this purpose can be programmed at lift number 0 or between 900 and 9ZZ before hand, and the operator can switch production to these jobs when extensive flaws occur.

Any parts made from jobs that have Lift Numbers 0 or are between 900 and 9ZZ will be recorded as scrap material in the FOOTAGE TOTALIZER. A common use of this is to use different lift numbers to represent different types of scrap (900 = bad paint, 901 = bent edge, etc.). If **XL-Link** is installed, these scrap codes can be sent to the **Link** PC and allows for the tracking of the different types of scrap encountered on the machine.

If the ADD LINE function that is discussed on page 6-19 is used, a pattern number of zero, or 900 to 9ZZ, will allow the operator to create the designated number of parts as scrap. When the operator detects an extensive amount of flawed material, he/she may select one of these jobs with the NEXT LINE key. After the flaw has been cleared, he/she may use the NEXT LINE key to set the original lift being run and to resume normal production.

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

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

Decrease Quantity

The DECREASE QUANTITY key is used when it is necessary to decrease the quantity of an order. A common use of this function is when scrap is produced at some point, but later it is manually cut or altered so that it is no longer considered to be scrap. Using DECREASE QUANTITY at this point can adjust what needs to be produced after the "once scrap" parts are now made usable. The scrap may have come from a manual cycle, INCREASE QUANTITY, or from a lift that is dedicated to scrap. When the line is halted, pressing the DECREASE QUANTITY will increase the number DONE on the STATUS screen.

To decrement an order the line must first be halted. If the DECREASE QUANTITY key is pressed while the machine is halted, the fourth line of the display will flash "Enter Quantity To Decrement" and line 5 will default to a quantity of 1. If the number to be decremented is one, just press ENTER. If the number to be decremented is another number, enter that number into the controller and then press ENTER. The controller will then ask for a coil number that you wish to decrement the quantity against. If the coil number is the one that is presently in use, that coil number will appear on line five, so just press ENTER.

Note: If there are parts already in the controller's queue, they will not be decremented. To decrement parts that are in the queue, first double cycle the shear or press to clear the queue, then press DECREASE QUANTITY and enter the number to be decremented and then the coil number to be decremented against.

Troubleshooting

The **XL100 SERIES** controller 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 that lead to the likely cause of a problem. The only tools you need are an accurate scale or steel tape, and perhaps a multi-meter.

This 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, electrical panel work, or a material change or after an operator change? Trace back in time to find what is 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 **XL100 SERIES** 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 have 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 **XL100 SERIES** controller 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 boost, 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 controller's memory.

Clear Memory

Clearing memory will erase all Setup, Pattern, and Order information in the **XL100 SERIES** controller'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:

Make sure that the Security switch is unlocked

Turn off power to the controller

Wait five seconds

Turn the controller back on

Wait until the AMS logo has scrolled across the screen and the words **"POWER UP TESTING EPROM"** appear at the bottom of the screen

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).

Electrical Noise

The AMS controller 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 some 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.

Contact AMS

AMS Controls, Inc.

12180 Prichard Farm Road

Maryland Heights, MO 63043

Tel # 1 (800) 334 – 5213

Fax # 1 (800) 344 – 9996

Check our website at "amscontrols.com"

email us at support@amscontrols.com

Optional Devices

There are some features offered by AMS Controls that are not present on all controllers. The following options will be discussed in this section:

➢ Print-on-Part Printer

➢ Bundle Tag Printer

➢ Expansion Board

➢ Remote Terminal

➢ Bar Code Scanner

➢ Extended Macro Patterns

➢ Auxiliary Controller

➢ Hole Detect

As a guide to help the user find the different options available, an index is provided below.

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. To install the PRINT-ON-PART PRINTER use drawings 4425, 4426, 4368CL-25, 4369_1, 4369_2, 4370, 4468, and 4469 located in Appendix C.

Outputs to the Printer

Print Initiate Output

The location of the output signal that is sent from the controller to activate the printer will vary depending upon the model controller and the number of presses that are used by the system.

When using the XL100CL controller, the Print Initiate output will always be on Output 16 (terminal C10). When using the XL102CL, XL106CL, or XL112CL controller, the Print Initiate output will be the next available press output. See the chart below to determine the correct Print Initiate output for each instance.

Controller Model	Number of Presses	Initiate Output	Terminal
XL100CL	1 or 2	16	C10
XL102CL	1	6	A13
	2	7	A16
XL106CL/XL112CL	1	6	A13
	2	7	A16
	3	8	B1
	4	9	C3
	5	10	C4
XL112CL Only	6	11	C5
	7	12	C6
	8	13	C7
	9	14	C8
	10	15	C9

Note: When using the Print-on-Part Printer, the maximum number of gags and/or presses for the XL112CL without an expansion board is 10.

Printer Encoder

When using the Print-on-Part Printer, the user has the option of using the internal timing of the printer or to use an encoder output that is generated by an external encoder. The internal timing of the printer will print at the same speed regardless of variations in the line, which could result in variations in the printing process. The printer encoder, however, will send to the printer encoder pulses, which allow the printer to adjust to the line variations. An 80-count encoder is suggested.

```
1:23PM    8/24/96         0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
              XL100CLP Controller
               Machine Data
              Edit Tool Data
             Calibration Trim
            Manual Calibration
               Time Clock

            Input/Output Status
               Memory Test
              Communications

Type 17      3/15/96        4:43PM      V7.0
```

Figure 7.1. Printer Setup Screen

In order to use the PART PRINTER, the type of printer must first be selected. When the PRINTER SETUP mode is selected, the first screen allows you to enter the SELECT PART PRINTER mode.

```
 1:25PM    8/24/96         0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
               Printer Menu





Type 17      3/15/96        4:43PM      V7.0
```

Figure 7.2. Printer Menu Screen

A choice of printers will be offered. Select the printer that applies to your application and hit the ENTER button.

```
 1:32PM    8/24/96        0FPM          0.000"
ORDER                                      0Ft
MATERIAL                          N/A% COMP.
            Select Part Printer
           Selected: No Printer
                No Printer
                 Citoh T4
               Telesis 3225
               Matthews 2001
                Fox 8231M
                Willet 3150



Type 17      3/15/96        4:43PM      V7.0
```

Figure 7.3. Select Part Printer Screen

When the proper printer is selected, the controller returns to the
PRINTER SETUP screen. If you reenter this screen you will again enter
the PRINTER MENU screen with an added option of viewing the PART
PRINT STATUS or, depending upon the printer, PART PRINT SETUP
and/or TEST PRINT ON PART.

```
 1:50PM    8/24/96        0FPM          0.000"
ORDER                                      0Ft
MATERIAL                          N/A% COMP.
              Printer Menu
           Select Part Printer
           Part Printer Status






Type 17      3/15/96        4:43PM      V7.0
```

Figure 7.4. Printer Menu with Part Print Status

```
 1:50PM     8/24/96          0FPM          0.000"
ORDER                                         0Ft
MATERIAL                              N/A% COMP.
                   Printer Menu
                Select Part Printer
                 Part Printer Setup
                 Part Printer Status




Type 17      3/15/96         4:43PM       V7.0
```

Figure 7.5. Printer Menu with Part Printer Setup

```
 1:50PM     8/24/96          0FPM          0.000"
ORDER                                         0Ft
MATERIAL                              N/A% COMP.
                   Printer Menu
                Select Part Printer
                 Part Printer Setup
                 Part Printer Status
                 Test Print on Part




Type 17      3/15/96         4:43PM       V7.0
```

Figure 7.6. Menu with Part Printer Setup & Test Print

The options included in this mode will vary depending upon the printer
that was selected. The setup and status screens that will be seen for
each of the specific printers follow:

Citoh T4 Printer

```
1:55PM   8/24/96        0FPM        0.000"
ORDER                                    0Ft
MATERIAL                        N/A% COMP.
           Citoh T4 Printer Status
Printer         : Install Ok
Rs485           : Device is on line

Command Busy  : No
Paper Out     : No
Ribbon Out    : No
Printing Batch: No
Busy Printing : No
Printer Pause : No
Label Present : No
```

Figure 7.7, Parameters listed for the Citoh Printer.

Printer: This parameter shows that the proper hardware to communicate to the printer is installed in the XL controller, and will display INSTALL OK.

RS485: DEVICE IS ON LINE indicates that the controller is able to communicate with the RS485 board (AMS 4370). RESPONSE TIMEOUT is displayed when the controller cannot communicate with the RS485 board.

Command Busy: If the printer has received print instructions from the controller and there is an order being produced, this status will be YES. If there is no print order to be run, the status will be NO.

Paper Out: If the printer runs out of paper, this status will be YES. If paper is present, the status is NO.

Ribbon Out: If a ribbon is not present in the printer, this status will be YES. If there is a usable ribbon in the printer, the status is NO.

Printing Batch: If the printer is receiving print instructions from the controller, this status will be YES. This indicates there is information in the printer buffer.

Busy Printing: This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will return to NO.

Printer Pause: If the PAUSE button is pressed on the front of the Citoh printer, the controller will display a YES. Press the PAUSE again to reset this parameter to NO.

Label Present: This requires the use of a separate sensor from the PAPER OUT sensor, and will indicate that the label has been ejected from the printer.

Telesis 3225 Printer

```
 2:12PM    8/24/96        0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
        Telesis 3225 Printer Setup
Setup Value                       Parameters
Two Speed Logic
```

Figure 7.8. Telesis 3225 Printer Setup

The AMS controller with the Telesis printer is currently designed for the feed-to-stop mode only, so the SPEED LOGIC should be set to NO.

```
 2:17PM    8/24/96        0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
        Telesis 3225 Printer Status

Printer : Install Ok

Rs485 Error
Device is on line
Ready    :    No
Printing:    No
Done     :    No
Fault    :    No
```

Figure 7.9. Telesis 3225 Printer Status

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In figure 7.9 the printer status parameters are shown.

Printer: This parameter shows that the proper hardware to communicate to the printer is installed in the XL controller, and will display INSTALL OK.

RS485 Error: DEVICE IS ON LINE indicates that the controller is able to communicate with the RS485 board (AMS 4370). RESPONSE TIMEOUT is displayed when the controller cannot communicate with the RS485 board.

Ready: If the printer has received print instructions from the controller and there is an order being produced, this status will be YES. If there is no print order to be run is the status will be NO.

Printing: This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will return to NO.

Done: This display will change momentarily to YES when a part is printed.

Fault: If a fault is detected this parameter will display YES. If there are no errors, it will display NO.

Matthews 2001 Printer

```
 2:29PM    8/24/96        0FPM          0.000"
ORDER                                     0Ft
MATERIAL                           N/A% COMP.
        Matthews 2001 Printer Setup
Setup Value                        Parameters

Dot Size                                 1000
Print Bold Characters                      No
Encoder Enable                        Disable
Print Speed                              6000
Printer Reaction                    0.000sec
Two Speed Logic                            No
Print Trigger Source               XLOutput
```

Figure 7.10. Matthews 2001 Printer Setup

Select Print Direction: The position of the printer with respect to the direction of the material flow will determine whether to choose a direction of right or left. Selecting RIGHT will cause the printer to print characters from left to right. Selecting LEFT causes the printer to print from right to left. Press any number key or the PICK key to choose the correct option.

Dot Size: Expressed as a time (in microseconds), during which a dot is printed. The longer the time, the larger the dot. The range of acceptable values is 100 to 5000 microseconds and the default value is 1000 microseconds.

Print Bold Characters: A status of YES will print all characters in bold face. A status of NO will print normally.

Encoder Enable: With the encoder disabled, the Matthews 2001 printer will use the print speed to determine how fast to print the message. With the encoder enabled, the printer uses an encoder pulse input (from the XL controller or from an external encoder mounted on the line). This allows the printer to print at speeds that vary with changes in the line speed.

Print Speed: With the ENCODER ENABLE set to DISABLE, the print speed is the amount of time delay between the columns of dots in a character (expressed in microseconds). The larger the number, the more spread out the character will be. The accepted range of values for the print speed is 0 to 25,500 microseconds with 6000 microseconds given as the default value.

With the ENCODER ENABLE set to ENABLE, this number is a divide by function of the line encoder. It is used to divide the number of encoder pulses received from the line encoder by the print speed. It then sends that number of pulses to the printer. This must be done due to the printer's slow calculation time. There is no exact formula for the print speed value; it is mainly a trial and error method due to the type of encoder used and the operating speed of the line. This number will typically be less than 15 for a 256 encoder. As a rule of thumb, if the printed letters are too close together, increase the print speed value. If the printed letters are too far apart, decrease the print speed value.

Printer Reaction: The time between the XL telling the printer to print and the printer executing the command. The acceptable range of values is 0 to .5 seconds.

Two Speed Logic: If YES is selected, it will shift the machine into slow speed just before printing (if the controller is set up for two speed punching). Select NO on non-stopping, single speed lines.

Printer: This parameter shows that the proper hardware to communicate to the printer is installed in the XL controller, and will display INSTALL OK.

Printer Trigger Source: Selects what device will trigger the print message during operation. If "XLOutput" is selected, the XL series controller will give a print initiate through the appropriate output. If "Photocell" is selected, then the internal detector on the printer will initiate the print message.

```
 2:37PM    8/24/96         0FPM          0.000"
ORDER                                      0Ft
MATERIAL                         N/A% COMP.
       Matthews 2001 Printer Status
Printer  : Install Ok
Rs485    : Device is on line
Version  :  SD2001 Ver 1.2
Memory   : MEMORY OK 1740 BYTES FREE
Prnt Msg :         50.000"
```

Figure 7.11. Matthews 2001 Printer Status

RS485: DEVICE IS ON LINE indicates that the controller is able to communicate with the RS485 board (AMS 4370). RESPONSE TIMEOUT is displayed when the controller cannot communicate with the RS485 board.

Version: Lists the current software version of the Matthews printer.

Memory: This parameter will show the number of bytes left in the printer buffer.

Prnt Msg: The PRINT MESSAGE is the last message that was sent to the printer buffer. If there is no programmed message from an **XL Link** program, the default message is the controller's programmed part length and pattern number.

Fox 8231M Printer

```
  2:43PM    6/14/97        0FPM        0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
             Fox 8231M Printer Setup
Setup Value                        Parameters
Printer Dwell                      0.000sec
Stop to Print                            No
Test for Tolerance                       No
Printer Reaction                   0.000sec
Edge Offset                          0.250"
BackFeed                             0.000"
Print Speed                      4.5 In/Sec
Slew Speed                       4.5 In/Sec


```

Figure 7.12. Fox 8231M Printer Setup

When the Fox 8231M Printer is selected from the SELECT PART PRINTER option, figure 7.12 will appear for the PART PRINTER SETUP and figure 7.13 for PART PRINTER STATUS.

Printer Dwell: The time (in seconds) that the controller will transmit an enable signal to the printer. This parameter can also be adjusted to shorten or lengthen the applicator stroke.

Stop to Print: If YES is selected, it will shift the machine into slow speed just before printing (if the controller is set up for two speed punching). Select NO on non-stopping, single speed lines.

Test for Tolerance: The TOLERANCE value that was entered under the SETUP parameters apply to the printer as well as all other presses. When the line is halted to perform a press or printer operation, the controller will check to see if any other presses (including the printer) are in tolerance. If another press is in tolerance, that operation will be performed along with the original operation.   The Test for Tolerance parameter will either enable the test for the printer with YES, or disable the test for the printer with NO.

Printer Reaction: The time difference between the XL telling the printer to print and the printer executing the command. The acceptable range of values is 0 to 8.0 seconds

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Edge Offset: There is a distance between the point on the label path at which printing occurs and the point at which the label is completely out of the printing mechanism and can be removed. It is sometimes desirable to feed the label out of the print mechanism to the point at which it can be easily removed or applied before printing the next label. This value is the distance that the label will be moved. The acceptable range of values for this parameter is 0 to 512.000" and the default value is 0.250".

BackFeed: When the EDGE OFFSET parameter is used, it is possible that the next label to be printed may have moved beyond the print head so that part of the label is past the printing area. If this is the case, the label may be "backed up" by using the BACKFEED parameter. This parameter will define the distance that the next label to be printed will be fed backwards, so that the entire label in is the printing area. The acceptable range of values for this parameter is 0 to 1.000" and the default value is 0.000".

Print Speed: The PRINT SPEED parameter sets the maximum speed at which label stock will be fed though the print head while printing is occurring. Typically higher print speeds will cause some reduction in print quality. It may be desirable to sacrifice some print quality for increased label speed. This feature allows the label to be printed at the highest speed that results in acceptable print quality. The print speed may be reduced to obtain the best quality with acceptable label speed while the label is being fed. The acceptable range of values for this parameter is 1.0 to 8.0 inches per second and the default value is 4.5 inches per second.

Slew Speed: The SLEW SPEED parameter sets the maximum speed at which label stock will be fed through the print head while printing is not occurring. In other words, the speed while the printer is "slewing" past unprinted areas. This feature allows the printer to use the highest slew speed that results in acceptable print quality. Typically the slew speed will be set equal to or higher than the print speed. If there is a large difference between the speed settings, print quality may be reduced. If the Print Speed parameter is changed, it may be necessary to change the Slew Speed as well, because the highest print quality is attained when the difference between the Print Speed and the Slew Speed is kept small. The acceptable range of values for this parameter is 1.0 to 8.0 inches per second and the default value is 4.5 inches per second.

Please use drawings 4468 and 4469 for reference.

```
 2:48PM   6/14/97        0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
          Fox 8231M Printer Status
Printer        : Install Ok
Rs485          : Device is on line

Command Busy   : No
Paper Out      : No
Ribbon Out     : No
Printing Batch : No
Busy Printing  : No
Printer Pause  : No
Label Present  : No


```

Figure 7.13. Fox 8231M Printer Status

Printer: This parameter shows that the proper hardware to communicate to the printer is installed in the XL controller, and will display INSTALL OK.

RS485: DEVICE IS ON LINE indicates that the controller is able to communicate with the RS485 board (AMS 4370). RESPONSE TIMEOUT is displayed when the controller cannot communicate with the RS485 board.

Command Busy: If the printer has received print instructions from the controller and there is an order being produced, this status will be YES. If there is no print order to be run, the status will be NO.

Paper Out: If the printer runs out of paper, this status will be YES. If paper is present, the status is NO.

Ribbon Out: If a ribbon is not present in the printer, this status will be YES. If there is a usable ribbon in the printer, the status is NO.

Printing Batch: If the printer is receiving print instructions from the controller, this status will be YES. This indicates there is information in the printer buffer.

Busy Printing: This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will read NO.

Printer Pause: If the PAUSE button is pressed on the front of the Citoh printer, the controller will display a YES. Press the PAUSE again to reset this parameter to NO.

Label Present: This requires the use of a separate sensor from the PAPER OUT sensor, and will indicate that the label has been ejected from the printer.

Willett 3150 Printer

```
  3:15PM    6/14/97        0FPM        0.000"
 ORDER                                      0Ft
 MATERIAL                          N/A% COMP.
        Willett 3150 Printer Setup
 Setup Value                      Parameters

 Invert Text                               No
 Char Width                                10
 Char Gap                                   3
 Char Slant                                 5
 Printer Reaction                   0.000sec




```

Figure 7.14. Willett 3150 Printer Setup

Select Print Direction: The position of the printer with respect to the direction of the material flow will determine whether to choose a direction of right or left. Selecting RIGHT will cause the printer to print characters from left to right. Selecting LEFT causes the printer to print from right to left. Press any number key or the PICK key to choose the correct option.

Invert Text: This parameter allows the print to be inverted, or printed "Upside-down" to allow for different print head positions and/or directions of product movement. Selecting YES will invert the text and selecting NO will not invert the text.

Char Width: The width, or length of the printed character is programmed with this parameter. There is no unit of measurement for this parameter as it is just a numeric input. The acceptable range of values is 1 to 288, and the default value is 10.

Char Gap: The gap between the printed characters can be adjusted by changing this parameter. There is no unit of measurement for this parameter as it is just a numeric input. The acceptable range of values is 1 to 9, and the default value is 3.

Char Slant: The slant value of each print head may be adjusted to compensate for different print head slant angles. How much the print is slanted will be affected by 1) the width setting, 2) the slant value, 3) the angle at which the print head is mounted, and 4) the line speed if an encoder is not being used. The slant value will rotate the text clockwise or counter-clockwise depending upon the value. The acceptable range of values is 1 to 9 and the default value is 5. Decreasing the

slant and width values will rotate the text clockwise. Increasing the slant and width values will rotate the text counter-clockwise.

```
2:37PM   6/14/97        0FPM         0.000"
ORDER                                    0Ft
MATERIAL                          N/A% COMP.
       Willett 3150 Printer Status
Printer  : Install Ok
Rs485    : Device is on line
Version  : W3150Si V3.2




Type 0    5/12/97      2:43PM        V7.0
```

Figure 7.15. Willett 3150 Printer Status

Printer Reaction: The time between the XL telling the printer to print and the printer executing the command. The acceptable range of values is 0 to 8.000 seconds.

Printer: This parameter shows that the proper hardware to communicate to the printer is installed in the XL controller, and will display INSTALL OK.

RS485: DEVICE IS ON LINE indicates that the controller is able to communicate with the RS485 board (AMS 4370). RESPONSE TIMEOUT is displayed when the controller cannot communicate with the RS485 board.

Version: Lists the current software version of the Willett printer.

Test Print on Part

In order to obtain the best print quality it is important to purge all trapped air from the system. The "Test Print on Part" function of the Printer Menu will purge the jets on both heads (A and B).   Continue to purge the print head until a steady stream of ink emerges from all the nozzles. The purge function will take about 5 seconds for head A and then another 5 seconds for head B.

Caution: This process can cause ink to be released from the print head and create a pool of ink on the part. Absorbent material should be kept handy whenever purging is done.

After purging the lines, the print head is ready for printing. Occasional purges may be required to improve the print quality during use.

Bundle Tag Printer

Citoh T4 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. The following information can be printed:

> ➢ Order field
> ➢ Material field
> ➢ Coil inventory number
> ➢ Quantity
> ➢ Length
> ➢ Pattern
> ➢ Bundle # of ___

When a BUNDLE PRINTER is selected, there will be a PRINTER SETUP parameter in the SETUP screen.

```
 3:30PM    9/4/96         0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
              XL102CLB Controller
                  Machine Data
                 Edit Tool Data
                Calibration Trim
               Manual Calibration
                  Time Clock
                 Printer Setup
               Input/Output Status
                  Memory Test
                 Communications

Type 1       6/10/96        8:46AM     V7.0
```

Figure 7.16. Printer Setup Screen

In order to use the BUNDLE PRINTER, the type of printer must first be selected. When in the PRINTER SETUP screen, Highlight SELECT BUNDLE PRINTER mode. The first screen allows you to enter the respective printer.

```
 3:41PM    9/4/96         0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
                 Printer Menu
              Select Bundle Printer







Type 1       6/10/96        8:46AM     V7.0
```

Figure 7.17. Printer Menu Screen

```
 3:46PM    9/4/96          0FPM          0.000"
ORDER                                        0Ft
MATERIAL                            N/A% COMP.
        Select Bundle Printer
        Selected: No Printer
              No Printer
              Citoh T4




Type 1       6/10/96       8:46AM      V7.0
```

Figure 7.18. Select Bundle Printer Screen

When the proper printer is selected, the controller returns to the PRINTER SETUP screen. If you reenter this screen you will again enter the PRINT MENU screen with added options of BUNDLE PRINT SETUP, BUNDLE PRINT STATUS and selecting BUNDLE REPRINT.

```
 3:52PM    9/4/96          0FPM          0.000"
ORDER                                        0Ft
MATERIAL                            N/A% COMP.
              Printer Menu
        SSeleelect Bundle Printer
           Bundle Printer Setup
           Bundle Printer Status
             Bundle RePrint




Type 1       6/10/96       8:46AM      V7.0
```

Figure 7.19. Printer Menu w/ Bundle Status & Reprint

The BUNDLE PRINT SETUP allows the operator to select the number of bundle tags that will be produced per bundle print. 1 to 10 identical tickets may be printed for each different print. Printer speed may limit the speed at which the bundles are actually ran in order for all previous tickets to be printed properly. This should be taken into account when programming the number of tickets to be printed.

```
3:57PM   9/4/96        0FPM         0.000"
ORDER                                    0Ft
MATERIAL                        N/A% COMP.
          Citoh T4 Printer Setup
Setup Value                       Parameter
Number of tickets to print                2




```

Figure 7.20. Citoh Printer Setup Screen

The BUNDLE REPRINT will print the last item that was completed, and the BUNDLE PRINT STATUS will give the current printer status. A sample screen for the BUNDLE PRINTER follows.

Printer: This parameter shows that the proper hardware to communicate to the printer is installed in the XL controller, and will display INSTALL OK.

RS485: DEVICE IS ON LINE indicates that the controller is able to communicate with the RS485 board (AMS 4370). RESPONSE TIMEOUT is displayed when the controller cannot communicate with the RS485 board.

Command Busy: If the printer has received print instructions from the controller and there is an order being produced, this status will be YES. If there is no print order to be run, the status will be NO .

Paper Out: If the printer runs out of paper, this status will be YES. If paper is present, the status is NO.

```
3:57PM    9/4/96         0FPM         0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
              Citoh T4 Printer Status
Printer  : Install Ok
Rs485    : Device is On Line

Command Busy   : No
Paper Out      : No
Ribbon Out     : No
Printing Batch : No
Busy Printing  : No
Printer Pause  : No
Label Present  : No
```

Figure 7.21. Citoh T4 Printer Status

Ribbon Out: Ifa ribbon is not present in the printer, this status will be YES. If there is a usable ribbon in the printer, the status is NO.

Printing Batch: If the printer is receiving print instructions from the controller this status will be YES. This indicates there is information in the printer buffer.

Busy Printing: This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will read NO.

Printer Pause: If the PAUSE button is pressed on the front of the Citoh printer, the controller will display a YES. Press the PAUSE again to reset this parameter to NO.

Label Present: This requires the use of a separate sensor from the PAPER OUT sensor, and will indicate that the label has been ejected from the printer.

CITOH SETUP MODES

The following setup modes are explained in detail in the CITOH printer manual.

1. NORMAL OPERATING MODE - Normal operation.

2. PRINTER SETTING MODE - Print mode selection, end-of-ribbon detection, label-peeling sensor actuation and use of auto-cutter are provided.

Press "PAUSE" and "FEED" key simultaneously to enter the printer setting mode. Press "STOP" to exit.

3. SELF - TEST MODE - Performs test printing and then is set to data dump mode.

Press "FEED" key while turning power on. Turn power off to exit.

4. SYSTEM MAINTENANCE MODE - Allows user to set communications and memory switches to a specific value.

Press "PAUSE", "FEED", and "STOP" keys while turning power on.

5. Press "STOP" key to exit.

NOTE: The C.ITOH printer works properly with the default parameters listed below:

Baud Rate   9600 bps

Data Length   8 bits

Parity   Parity N

Flow Control   XON/XOFF

Interface   RS232C

Model   NativeOF

Voltage Setting PE *.*V

Additional information is also available on custom bundle tag labels. The XL-Link for Windows package is required to produce custom labels.

If the line is halted in the middle of an order, a printing function can be activated with the PRINT key on the front panel.

PRINT

This will print a tag for the parts that have been completed so far. When RUN is pressed again, the rest of the order will be completed and a BUNDLE TAG will be printed for the remainder of the order, only.

Zebra Z4000 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. The following information can be printed:

Order field

Material field

Coil inventory number

Quantity

Length

Pattern

Bundle # of ___

When a BUNDLE PRINTER is selected, there will be a PRINTER SETUP parameter in the SETUP screen.

```
 3:30PM    9/23/01       0FPM        0.000"
ORDER                                   0Ft
MATERIAL                        N/A% COMP.
              XL102CLB Controller
                Machine Data
                Edit Tool Data
              Calibration Trim
              Manual Calibration
                 Time Clock

             Input/Output Status
                Memory Test
                Communications

Type 1        6/10/96       8:46AM    V7.22
```

Figure 7.16. Printer Setup Screen

In order to use the BUNDLE PRINTER, the type of printer must first be selected. When the PRINTER SETUP mode is selected, the first screen allows you to enter the SELECT BUNDLE PRINTER mode.

```
 3:41PM    9/23/01       0FPM        0.000"
ORDER                                   0Ft
MATERIAL                        N/A% COMP.
                Printer Menu




Type 1        6/10/96       8:46AM    V7.22
```

Figure 7.17. Printer Menu Screen

```
 3:46PM    9/23/01        0FPM        0.000"
ORDER                                    0Ft
MATERIAL                      N/A% COMP.
            Select Bundle Printer
            Selected: No Printer


               Citoh T4
              Zebra Z4000






Type 1        6/10/96        8:46AM    V7.22
```

Figure 7.18. Select Bundle Printer Screen

When the proper printer is selected, the controller returns to the
PRINTER SETUP screen. If you reenter this screen you will again enter
the PRINT MENU screen with added options of BUNDLE PRINT
SETUP, BUNDLE PRINT STATUS, BUNDLE REPRINT and TEST
BUNDLE PRINT.

```
 3:52PM    7/23/01        0FPM        0.000"
ORDER                                    0Ft
MATERIAL                      N/A% COMP.
               Printer Menu


           Bundle Printer Setup
           Bundle Printer Status
              Bundle RePrint
             Test Bundle Print






Type 1        6/10/96        8:46AM    V7.22
```

Figure 7.19. Printer Menu with Bundle Status and Reprint

The BUNDLE PRINT SETUP allows the operator to select the number
of bundle tags that will be produced per bundle print. 1 to 10 identical
tickets may be printed for each different print.

Printer speed may limit the speed at which the bundles are actually ran in order for all previous tickets to be printed properly. This should be taken into account when programming the number of tickets to be printed.

```
3:57PM   7/23/01         0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
        Zebra Z4000 Printer Setup
Setup Value                       Parameter
Number of tickets to print               2
Length of Label                      6.00"




```

Figure 7.20. Z4000 Printer Setup Screen

The BUNDLE REPRINT will print the last item that was completed. BUNDLE PRINT STATUS will give the current printer status. A sample screen for the BUNDLE PRINTER follows.

```
3:57PM   7/23/01         0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A% COMP.
        Zebra Z4000 Printer Status
Printer: Install Ok        Tx:         72
Rs485  : Device is On Line  Rx:        72

Paper Out      :N/A Ram Corrupted  :N/A
Pause Active   :N/A Head Up        :N/A
Buffer Full    :N/A Ribbon Out     :N/A
Partial Format :N/A Printing       :N/A

Resp: None
```

Figure 7.21. Z4000 Printer Status

Printer: This parameter shows that the proper hardware to communicate to the printer is installed in the XL controller, and will display INSTALL OK.

RS485: DEVICE IS ON LINE indicates that the controller is able to communicate with the RS485 board (AMS 4370). RESPONSE TIMEOUT is displayed when the controller cannot communicate with the RS485 board.

Paper Out: If the printer runs out of paper, this status will be YES. If paper is present, the status is NO.

Pause Active: Is shown as YES when the printer has paused due to an error or by pressing the "Pause" button on the printer to halt automatic operation.

Buffer Full: If the printer buffer is full, the status will be shown as YES.

Partial Format: Format status returned from the Zebra printer.

Ram Corrupt: Will displayed as YES if the resident memory is detected as incorrect

Head Up: Is shown as YES if the head had not be locked in the printing position

Ribbon Out: If a ribbon is not present in the printer, this status will be YES. If there is a usable ribbon in the printer, the status is NO.

Printing: This parameter will read YES when the printer is in the process of making a label. When the label has been printed it will read NO.

Note: The Zebra printer works properly with the communication parameters listed below:

- ➤ Baud Rate   =   9600 bps
- ➤ Data Length   =   8 bits
- ➤ Parity   =   Parity N
- ➤ Flow Control   =   XON/XOFF
- ➤ Interface   =   RS232C
- ➤ Model   =   NativeOF
- ➤ Voltage Setting   =   PE *.*V

Additional information is also available on custom bundle tag labels. The XL-Link for Windows package is required to produce custom labels.

If the line is halted in the middle of an order, a printing function can be activated with the PRINT key on the front panel.

This will print a tag for the parts that have been completed so far. When RUN is pressed again, the rest of the order will be completed and a BUNDLE TAG will be printed for the remainder of the order, only.

Expansion Board
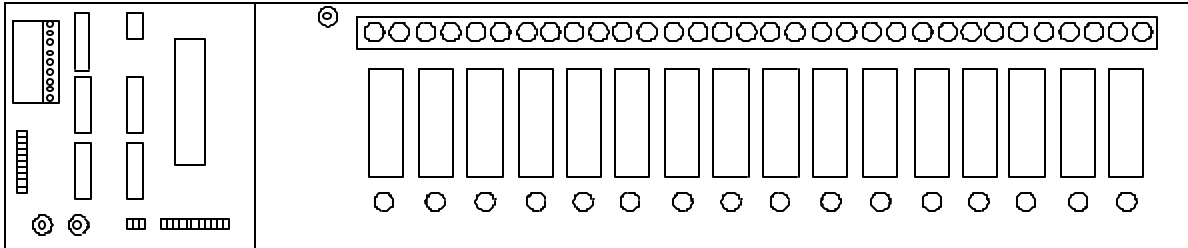
To install the EXPANSION BOARD use drawings 4353A, 4357B, and 4425 located in Appendix C.

EXP Hardware

To use the expansion option the following equipment is required:

➢ 5 volt, 6 amp power supply
➢ Expansion board EXP-1
➢ Input/output card EXP-IO
➢ Communication cable (open ended for Phoenix- style)

Expansion Board Characteristics

The EXP-1 expansion board will be used with up to 16 plug-in modules (typically ODC-5 and/or OAC-5) which are labeled 0-15 on the expansion board. These modules are used for gags 13 through 28. Module 0 would be gag 13 and Module 15 would be gag 28.

The ODC-5 output modules are normally open contacts and are rated to withstand up to 3 amps. The OAC-5 modules are solid-state devices and are rated to withstand up to 1 amp.

Note: OAC-5 is a solid-state device and must be installed properly. Do not connect this module backwards.

Gags are immediately set for the next operation after the previous operation is completed. Gags that are manually fired will be energized 0.5 seconds before the press fires, and held ON until the completion of the cycle.

The expansion board will also include an LED representing each module. When the LED is on, it indicates that the module is receiving a signal to energize. These LEDs can be used to troubleshoot the circuitry if the appropriate gag is not energizing.

The 32 connection terminal strip is connected to the normally open contacts associated with each module. A "power on" indicator light is located next to the terminal strip

Connected to the expansion board is a plug-in input/output (I/O) EXP-IO board. The I/O board will interface the controller to the expansion board. Communication between the EXP-IO board and the AMS controller is with an RS-485 converter and the gag board can be placed up to 4000 feet away from the controller.

Located on the I/O board are two strips labeled "Group A" and "Group B", which have movable jumpers. The jumpers must be set as specified for the I/O circuitry to work properly (see the enclosed electrical interface diagram for the proper jumper connections).

The I/O board will also have two communication lights labeled "REC" and "XMT" that will flash when there is communication taking place, to and from the XL controller.

Remote Terminal
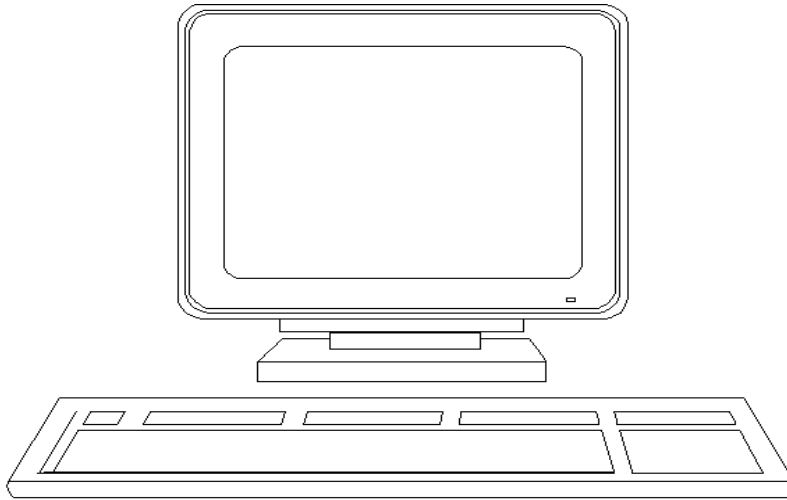
The Remote Terminal option will add a second control interface to a line. The primary advantages for this option is an enlarged controller display, the ease of entering alphanumeric letters with the Remote Terminal keyboard and the ability to control the line from more than one location.

The Remote Terminal uses the RS232 format and can be located at other locations on the line other than just by the controller. The Remote Terminal can be located up to 75 feet away from the controller (recommended), but may be placed further, with additional special hardware.

The keyboard on the Remote Terminal is the same as a normal PC keyboard with added functions that allow it to emulate the controllers keypad. A list of the special keyboard keys follows.

SELECT- An added key located in the upper right corner next to the "Scroll Lock" light

JOB STAT- ESC

HELP- F1

SET UP- F2

PRG- F3

COIL FT- F4

NEXT LINE- F5

SKIP LINE- F6

ADD LINE- F7

DEL LINE- F8

INC QTY- F9

DEC QTY- F10

MOVE UP- F11

MOVE DOWN- F12

PRINT BDLE TAG- Print Scrn/SysRq key

CE- Delete key

TELEVIDEO MONITOR SETUP

Insure Controller is off and press **ALT-CTRL-ESC** (JOB STAT) at the same time to enter the setups screen of the Monitor.

Use **ARROWS** to move.

Use **SPACE BAR** to select.

Use **ENTER** to store new selection.

Set the Monitor to the Default Settings. This is accomplished by selecting **COMMAND** on the Tool-Bar located at the top of the screen. Select **DEFAULT PARAMETERS** and press ENTER. Follow the on-screen command and select Y for yes.

On the Tool-Bar on the top of the screen, ARROW over until the GENERAL MENU is selected. Press the SPACE BAR until **PERSONALITY** is **WYSE 160/60/150/120,** then press ENTER.

ARROW over to COM 1 on the tool-bar Menu at the top of the screen. Change the following by moving with the ARROWS, change the selection by pressing the SPACE BAR and then ENTER to store the selection.

Change the BAUD RATE to 19.2K.

Change the REC HANDSHAKE to BOTH.

Change the XMIT DELAY to None.

Press CTRL and S at the same time to Save and Exit. Follow the on-screen directions and press Y for yes.

With the Monitor left powered up, apply power to the controller. The Remote Terminal and Keyboard should now be operational.

NOTE: When using the TELEVIDEO MONITOR on a previously powered controller, the controller's memory will need to be cleared during the controller power-up sequence by pressing the 5 key. This enables the controller to detect the monitor upon initial powering. If the monitor is not present on initial powering, the controller will no longer search for the monitor. The monitor must be powered first or at the same time as the controller for the control to detect the monitor's presence.

Bar Code Scanner
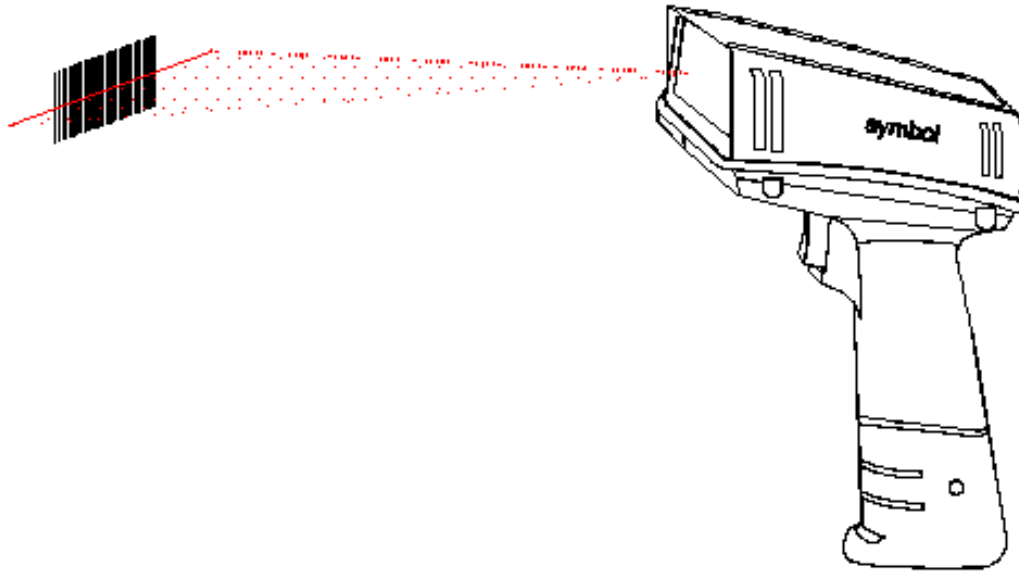
The BARCODE SCANNER system allows a code to be entered with one scan. These codes include:

Scrap codes

Delay codes

Employee numbers

Coil inventory numbers

Using the scanner, specific keystrokes for the AMS controller can also be entered. The following is a list of codes that are used by AMS to create bar codes for use by the BARCODE SCANNER. There are many types of software programs that can be used, but the type that works best is one that uses barcode font code 128. Contact your AMS representative for available barcode programs.

REQUIRED AMS CODE	DESIRED KEYSTROKE OR HOT KEY
013	Enter
027	Status
001 064 013	Help
001 065 013	Setup
001 066 013	Program
001 067 013	Footage Totalizer
001 068 013	Next Line
001 069 013	Skip Line
001 070 013	Add Line
001 071 013	Delete Line
001 072 013	Increase Quantity
001 073 013	Decrease Quantity
027 084	End
027 087	Delete
012	Right Arrow
008	Left Arrow
011	Up Arrow
010	Down Arrow
027 074	Page Up
027 075	Page Down
030	Home
001 096 013 XX 013	Enter Delay Reason Hot Key
XX = 2 digit delay code	
001 097 013 XXXXXXX 013	Enter Employee # Hot Key
XXXXXXX = 7 digit employee code	

<u>001</u> <u>099</u> <u>013</u> <u>XX</u> <u>013</u>   Scrap Code w/Inc. Qty Hot Key

XX = 2 digit scrap code

<u>001</u> <u>100</u> <u>013</u> <u>XXXXXXXXXXXXXXXX</u> <u>013</u>Load Coil- Coil Completely Used Hot
XXXXXXXXXXXXXXXX= 16 digit coil inventory code   Key

<u>001</u> <u>101</u> <u>013</u> <u>XXXXXXXXXXXXXXXX</u> <u>013</u>Load Coil-Coil <u>Not</u> Completely Used
XXXXXXXXXXXXXXXX= 16 digit coil inventory code   Hot Key

Each 3-digit number listed above (i.e. 013, 027, 001, 084) represents a
single ASCII character

Note: When making the barcodes you must use the format as defined.
You should NOT take individual keystrokes and link them together to
form a barcode. When AMS makes further software changes it may
alter the keystroke sequence, which will invalidate any barcodes made
by stringing together keystrokes.

Extended Macro Patterns

Pattern numbers 650 - ZZZ are reserved for creating special patterns, called MACRO PATTERNS, which can be used within another pattern. If a specific sequence of operations is frequently used in numerous parts, it can be turned into a MACRO PATTERN, and the operator need only enter one pattern to represent a number of operations. STANDARD MACRO PATTERNS were discussed in the Operating Procedure section of this manual and used the numbers Z00 - ZZZ for MACRO PATTERNS. The EXTENDED MACRO PATTERN OPTION increases the numbers of available MACRO PATTERNS, and includes Pattern Numbers 650 to ZZZ.

Programming Patterns

Programming patterns, when using MACRO PATTERNS is very similar to non-macro pattern applications. Press the PROGRAM key to enter the Program Mode. Select PROGRAM PATTERNS. Any number (1 - ZZZ) can be used to define a pattern, however, patterns 650 - ZZZ may be inserted into other patterns as MACRO PATTERNS.

Edit Tool Data

Tool data should be entered by the normal procedure in the EDIT TOOL DATA screen. Tool Number zero is reserved for the shear and must always be entered. Each tool is defined by a Tool Number, Press Number, Gag Number, and Offset Distance. The only difference is that tools 650 - ZZZ may not be programmed as a Tool Number. These Tool Numbers are reserved for MACRO PATTERNS and will be programmed later. Defining a Tool Number greater than 649 will result in an error.

Macro Patterns

Enter the first tool to be used in this MACRO PATTERN. You may use any Tool Number that has been defined in the Edit Tool Data mode. You may NOT use Tool Numbers 650 - 999 (a MACRO PATTERN within a MACRO PATTERN). Trying to do so will result in an error.

Enter a Reference location for the tool. Within a MACRO PATTERN, the only valid Reference locations are LEAD CENTER and TRAIL CENTER. Enter a Length (offset from the Reference location) for the tool. This is the same procedure that is used on non-macro pattern applications.

Enter as many tools in the MACRO PATTERN as required. When finished, press the PROGRAM key to enter more patterns or press the STATUS key to return to the Status mode. This pattern may now be run as a standard pattern or inserted into a standard pattern as a MACRO PATTERN.

Inserting Macros Patterns Into Standard Patterns

Again, select PROGRAM PATTERNS from the PROGRAM menu. To enter an ordinary pattern select a number between 1 and 649. Program the patterns normally.

To insert a MACRO PATTERN into a standard pattern, use the MACRO PATTERN number in place of the tool number. Enter the Reference location and Offset Length for the MACRO PATTERN. All of the tool operations within the MACRO PATTERN will be located with respect to this location. You may insert as many MACRO PATTERNS as you like within the same standard pattern.   When finished, press the PROGRAM key and enter more patterns, or press the STATUS key to return to the Status mode.

Jobs can be run with ordinary patterns, with MACRO PATTERNS, or with ordinary patterns that contain MACRO PATTERNS.

A Programming Example Using Macro Patterns

Suppose you have an **XL112CLM** controller and your tool data looks like the following screen:

Tool Data Screen

```
11:16AM   7/25/97        0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         0% COMP.
TOOL      PRESS  GAG       OFFSET     NAME
   0        1      2         0.000"
  10        1      3         9.000"

  12        1      5        31.000"
  20        1      6        35.000"
  21        1      7        40.000"
  22        1      8        45.000"
```

Some sample MACRO patterns might look like this:

Pattern 975

```
11:23AM   7/25/97        0FPM         0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
PATTERN:   975
TOOL         REFERENCE              LENGTH
 10          Trail Center           1.000"
 11          Trail Center           3.000"
```

Pattern 976

```
11:29AM   7/25/97        0FPM         0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
PATTERN:   976
TOOL         REFERENCE              LENGTH
 20          Lead Center            5.000"
 21          Lead Center            0.000"
```

Pattern 977

```
11:33AM   7/25/97      0FPM        0.000"
ORDER                                 0Ft
MATERIAL                       N/A% COMP.
PATTERN:   977
TOOL         REFERENCE           LENGTH
 11          Lead Center        10.000"




```

Some sample standard patterns may look like this:

Pattern 1

```
11:36AM   7/25/97      0FPM        0.000"
ORDER                                 0Ft
MATERIAL                       N/A% COMP.
PATTERN:   1
TOOL         REFERENCE           LENGTH
 10             Leading Edge
        10.000"
975             Leading Edge
        30.000"
976             Lead Center
         0.000"
977             Trailing Edge
        30.000"



```

*Note: Shows a Macro Pattern within a standard pattern.

Pattern 2

```
11:42AM   7/25/97      0FPM        0.000"
ORDER                               0Ft
MATERIAL                 N/A% COMP.
PATTERN:  2
TOOL      REFERENCE
LENGTH
976       Leading Edge
          20.000"
976       Even Space
          25.000"
976       Spacing Limit
          15.000"
```

Now jobs may be run with Pattern 1 or Pattern 2, which contain
MACROS 975 and 976, or jobs may be programmed to make parts that
only have Patterns 975 or 976.

Example:

```
11:48AM   7/25/97      0FPM        0.000"
ORDER:    XXXXX                     0Ft.
MATERIAL:                N/A% COMP.
XXXXX
LF        QTY    LENGTH    PAT O   STATUS
 1        100    120.000"   1   R
Next
 1        100     80.000"   2   R
Ready
 2        500     60.600"  976  R
Ready
```

Auxiliary Controller

The **Auxiliary Controller** is available without a display, programming accomplished through the **XL100CL SERIES Controller**.

This section describes the **Auxiliary Controller** operation and the different setup screens that are encountered when the controller has cleared memory or is programmed for the first time.

When the XL100CL SERIES powers up, it searches for any auxiliary controllers, listing them as they are found. If a controller is not found, it is no longer searched for during subsequent power-ups.

Note: When installing an Auxiliary Controller with an existing XL100CL SERIES, the memory of the XL100CL SERIES needs cleared to detect the new Auxiliary Controller upon power-up. It is always preferable to copy Controller information before clearing memory, so that set-up parameters can be re-entered.

Up to eight Auxiliary Controllers may be used for each XL100CL SERIES Controller; each Auxiliary Controller is designated by the Auxiliary Controller respective (DIP) switch settings. Below is an example of a **SL301HCLS** Controller.

SW1	SW2	SW3	Device #	Unit #	Type
OFF	OFF	OFF	1	30	0
ON	OFF	OFF	2	31	1
OFF	ON	OFF	3	32	2
ON	ON	OFF	4	33	3
OFF	OFF	ON	5	34	4
ON	OFF	ON	6	35	5
OFF	ON	ON	7	36	6
ON	ON	ON	8	37	7

Figure 7.22. Switch settings for SL301HCLS. SW4-SW7 are used for machine configuration.

Note: See switch settings in the Appendix of this manual for the controller being used.

Installation

Installing the **Auxiliary Controller** on a machine involves the following steps:

- ➢ Mechanical Installation
- ➢ Electric wiring
- ➢ Setting the customizing switch (DIP Switch)
- ➢ Programming the setup data
- ➢ Stabilizing the Loop
- ➢ Calibration

Mechanical Installation

The typical installation of the **Auxiliary Controller** is inside a console or rack. No display or keypad is used on the controller itself.

Electrical Installation

Installing the **Auxiliary Controller** requires knowledge of electric control circuits and of the machine that the controller is connected to. An accurate wiring diagram is essential for trouble-free installation. If none is available, it is valuable to trace wiring in the machine and reconstruct the wiring diagram. The time spent shall be saved when troubleshooting, installing and solving machine problems.

Controller Power

The **Auxiliary Controller** is powered by 24 VDC. Power should be within plus or minus 5% and not interrupted by the emergency stop circuit, see figure 2. The controller can continue to monitor the material position after an emergency stop with power still applied and will continue production after an emergency stop, without loss of accuracy.
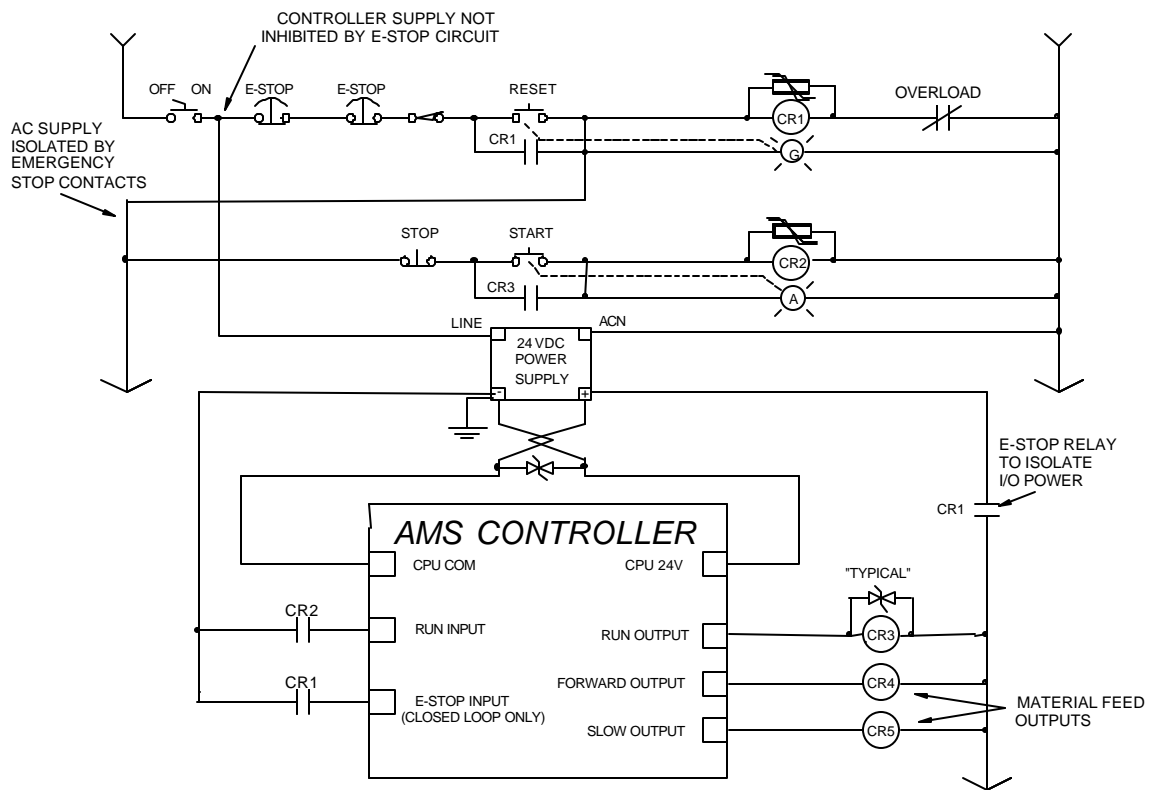
Figure 7.23. Typical drawing showing customer external connections to an AMS Controller.
Run Circuit

Figure 7.23 is the most common way of wiring the run circuit. Note that by wiring the controller in this manner, a halt, controller error or E-stop will halt the system. The sequence of events should go as follows:

Operator presses a momentary "Run" switch, energizing the "Run" relay (CR2).

Once (CR2) is energized, this closes the "Run" input to the AMS controller.

The AMS controller detects the input.

If a job is programmed, no errors exist and all other pertinent items are present, then the controller turns on the "Run" output.

The output energizes the "Run Latch" relay (CR3).

(CR3) closes a set of contacts that latch around the momentary "Run" switch maintaining the run mode.

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

Controllers used for Single-speed, non-stopping lines will contain a parameter called "Line Movement". The default value of "FWD/FST" will operate the controller as just described. If "Run" is selected, the Run output will turn on and off with the Forward and Fast outputs. The "Delay After Shear" parameter will be disabled if "Run" is selected.

Caution should be used during operation of the controller! The press(es) may continue to fire on targets while the material is decelerating to a stop after the line is halted and the Run output has turned off!

A Closed-loop system uses Forward-Slow speed logic when the outputs are available. The chart in Table 3 will show the output logic for different conditions. These outputs can be used with different motion devices to control the line.

Machine State

Output	Run Fast	Run Slow	Jog Fwd	Halt	**Jog Rev**
Forward	ON	ON	ON	OFF	OFF
Slow	OFF	ON	ON	ON	ON
Reverse	OFF	OFF	OFF	OFF	ON
Run	ON	**ON**	**OFF**	**OFF**	**OFF**

Table 3. Status of outputs in Forward-Slow

Emergency Stop Circuit

An emergency stop circuit is required for each machine, giving operator safety and protection of system equipment. A typical emergency stop circuit is shown in Figure 2. Pressing a guarded push-button RESET switch arms this circuit. The relay remains energized after the RESET switch opens because of the hold-in contacts of the relay. The relay condition depends on current flow through the normally closed emergency stop switches and any other emergency stop contacts in series. A momentary opening of either switch or contact will cause the

relay to de-energize which cuts off power to all load devices. Adding devices in series with the emergency stop contacts or switches easily expands the circuit.

A higher degree of safety can be achieved by placing switches behind safety guards and in doors of electric panels. These are wired in the Emergency Stop Circuit, so when opened, the machine is shut down.

The emergency stop circuit should never interrupt power to the Auxiliary Controller. However, the Controller must know when an emergency stop has occurred in order to disable the RUN mode. An E-Stop input to the Control will perform this function. In Figure 2 an unused contact of the reset relay is connected. When this contact opens, the Controller will go into an emergency stop condition, disabling the run function.

Shear Control Circuit

Optimal performance of the shear circuit is met when customizing the AMS controller for the type of press and feed control used. This is accomplished by the appropriate selection of switch settings. These switches are in a single switch package located on the back of the controller. Through proper selection, the Control can be configured for flying-cut or feed-to-stop machines. The Controller will supply SHEAR DOWN, along with SHEAR UP and SHEAR DIE BOOST functions when selected for varying applications.

AMS controllers are designed to connect directly to 24 VDC solenoids for optimal performance. A solenoid-driving device, such as the AMS 3840 power module, can provide greater accuracy when firing presses.

AMS controllers have a timed shear output with a switch input (PRESS COMPLETE) override feature. The duration of the **SHEAR DWELL UP** or **SHEAR DWELL DOWN** output is programmable from 0.000 to 9.999 seconds. Please refer to timing diagram, Figure 4. If the AMS controller detects a **SHEAR COMPLETE** switch closure during the dwell down time, the shear output will turn off immediately, Figure 5. This is especially useful on mechanical presses that need the shear-complete switch mounted in a location that will return the press to top-dead-center. The SHEAR DWELL UP time will time out as programmed regardless of the complete input.
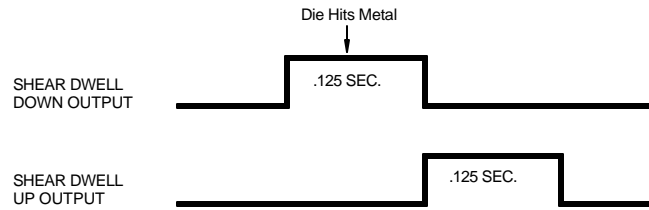
Figure 7.24
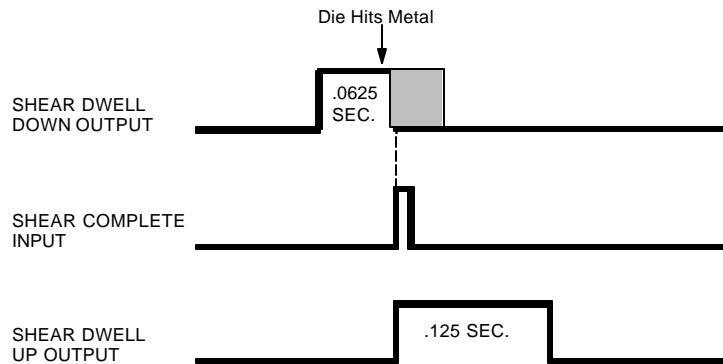
Figure 7.25

Drive Control Circuit

The **Auxiliary Controller** has two ways of controlling the servo drive device. The ANALOG OUTPUT is connected to the speed reference input of the servo drive and is a 0-10 VDC analog signal. The DRIVE ENABLE output of the controller connects to the enable circuit of the servo drive. This circuit switches common, an open causing a complete shutdown of the drive. When used, the DRIVE ENABLE should completely de-energize the motor. In a hydraulic servo system, the output should turn the hydraulic system completely off.

Run Mode Control Circuit

The machine is placed in the RUN mode by closing the RUN input. If a valid job is programmed, the **Auxiliary Controller** will turn the RUN output on. This seals the contact across the RUN switch, the machine remaining in RUN until a batch halt occurs or the HALT switch is pressed. See drawing, Figure 2

Setting the Customizing Switches

When installing the **Auxiliary Controller**, the customizing switches must be set before initial power is applied. These switches are found by removing the cover of the controller. The switches are located near the center of the printed circuit board in a single (DIP) switch package. There are seven switch segments in the package numbered 1 through 7. The switches are changed to either ON or OFF to match machine requirements. See the drawings at the end of this section for proper switch settings for the Controller used.

Initial Power Test

Before plugging external connectors into the controller, check for proper voltage and voltage polarity. This is accomplished by monitoring the voltage on the connector that supplies the plus 24 VDC and common. See the respective drawing of the Controller for proper terminal connection to be tested.

Configuration Programming

In addition to setting customizing switches, the user can further customize the **Auxiliary Controller** to the machine by programming parameters in the Configuration mode. The Configuration mode has a list of parameters that are customer selected. The parameters are selected after changing the customizing switches, since the **Auxiliary Controller** erases all memory, setting the Configuration mode back to the factory default settings after a switch change.

Some of these parameters are general and apply to all switch settings and **Auxiliary Controllers**; others apply only to certain controllers and switch settings. In this section, all parameters will be defined and discussed.

General Parameters

Press (SHEAR) Dwell Down

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

closes, the PRESS (SHEAR) DWELL time is overridden and the output turns off immediately.

Press Dwell Up

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

Note: To ensure that a feed-to stop line is not restarted until the press complete switch has closed, it is now possible to enter a PRESS DWELL time of zero. With zero entered, the controller will interpret this as "do not restart the line until the complete switch closes." If the complete input is not made within 10 seconds, then the line is halted. A non-stop line with a PRESS DWELL of zero will run normally as long as the press complete is activated after a press cycle. If the press complete is not activated, the machine will continue to run for ten seconds, halt automatically and display an error.

A programmed time greater than zero is treated as it has been in the past, it will give a timed output according to the PRESS DWELL TIME or turn on until a PRESS COMPLETE is seen, whichever comes first. If any value other than zero is entered, this feature is disabled.

Press Reaction Time

The PRESS (SHEAR) REACTION time is used in high-speed flying die applications to reduce the overall stroke length of the cut cycle. Without a reaction time, the Auxiliary Controller waits until the die has moved to the MINIMUM DIE DISTANCE before the Shear Output is turned on.

The PRESS (SHEAR) REACTION time causes the controller to turn the Shear Output on early. This allows time for relays to activate and solenoid valves to energize. The tolerance test is performed at the end of the Shear Dwell Down signal (after the part has been cut). A SHEAR REACTION of 0.0 to 0.5 seconds is allowed, but the user should note that the Shear Output is not turned on before the die has started its acceleration ramp.

Also note that the PRESS (SHEAR) REACTION time is only in effect when the parameter ON TOLERANCE ERROR is set to "Cut & Stop".

Refresh Done Job (SL350HCLR ONLY!)

This Parameter can be ignored and is only applicable in non-auxiliary applications.

Batching (SL350HCLR ONLY!)

This Parameter can be ignored and is only applicable in non-auxiliary applications.

Mode (SL350HCLR ONLY!)

This parameter is used to select between modes of the controller. The two options are Count Hole and Standard. This parameter must be set to Count Hole to operate normally as an auxiliary controller.

Press-Detect (Shear-Detect on SL350HCLR)

The press to detect distance is the physical distance between the shear press and the hole detector. The hole detector should be located as close to the shear press as possible for accuracy. However, the detector must have enough distance (typically 10" or more) to allow the controller time to see the hole and activate the shear press. Units for PRESS-DETECT are in inches or millimeters.

Minimum Hole Spacing

For Minimum Hole Spacing, enter a value slightly smaller than the minimum distance between holes in the material. When the Auxiliary Controller detects a hole in the run mode, the material must move the MINIMUM HOLE SPACING distance forward before another hole can be detected. This prevents the controller from accidentally reading twice on the leading and trailing edge of the same hole. Units for MINIMUM HOLE SPACING are in inches or millimeters.

No-Hole Stop

This parameter defines the maximum length of material past the shear without the proper holes made, in making the current part. Operators may use this parameter to protect machinery in the case of a photo-detector failure. The Auxiliary Controller will halt the line and display an error message if the "Length Past Shear" +" Shear To Detector Distance" is greater than "No-Hole Stop Distance".

This function is disabled if No-Hole Stop equals zero inches or the operator chooses the standard operating mode.

Minimum Part (SL350HCLR ONLY!)

This parameter can be ignored and is only applicable in non-auxiliary applications.

Loop Gain

LOOP GAIN sets the sensitivity of the servo loop (electronic drive). Lowering this number will make the drive less responsive. If it is too low, the system will become sluggish. Raising this number makes the system more sensitive and responsive. If the LOOP GAIN is too high, the system will become unstable and oscillate. Great care should be used in changing this number. Make gradual changes.

Jog Die Velocity

The JOG DIE VELOCITY sets the speed during die jog operations and also for referencing.

Max Die Velocity

MAX DIE VELOCITY sets the maximum return speed of the die.

Acceleration

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

Return Accel

RETURN ACCELERATION sets the acceleration for the flying die to return home after the cut is made. This parameter typically is set higher than the forward ACCELERATION, since the die return is not a critical movement. This decreases the overall cycle time of each cut. The RETURN ACCELERATION is also adjustable to a lower value. This results in less wear and tear on the actuating system. Units are expressed in inches per second, per second (Inches/second^2).

Min Die Dist

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

Note: The minimum Die Distance must meet the following criteria.

Minimum Die Distance = Velocity squared divided by 2 times acceleration, this value plus 11 percent.

(Velocity * Velocity) /(2 * Acceleration)+11%

In the formula, Velocity is the expected speed of the line expressed in inches per second **(_not_ feet per second)**, and Acceleration is the programmed parameter in the controller expressed in inches / second ^{2}.

The formula will produce a MINIMUM DIE DISTANCE that will allow the die to achieve a stable speed prior to cutting.

Max Die Dist

The MAXIMUM DIE DISTANCE defines the furthest distance from the home position that a shear can occur. This defines the other side of the acceptable window within the press. If the die reaches the MAXIMUM DIE DISTANCE and is not within tolerance, an error will occur. When the machine is operated in a "no cut" mode and the tolerance is not obtained, no cut will be made. If the tolerance is obtained at the MAXIMUM DIE DISTANCE, the cut will be made. Because of this, the MAXIMUM DIE DISTANCE needs adjusted so that enough travel is left over to complete the cycle.

Advance After Cut

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

On Tolerance Error

When a tolerance error occurs, some roll form manufacturers would prefer that the controller cut an incorrect part, instead of producing a large amount of material past the shear. This is especially true if the material past the shear is not easily reversed.   In some cases it is preferred that the line is stopped, with the operator inspecting the part to determine if it is usable. On the other hand, other users may be concerned with a possible speed mismatch if a cut is made on the error.

When the controller detects that a part is about to be made outside of the specified tolerance range, the operator has two options:

If **STOP NO CUT** is selected, the controller will display an error message and stop the line without making the cut.

If **CUT & STOP** is selected, the controller will make the cut, then stop the line and display an error message.

Auto Crop - After the Manual Shear button is pressed the controller is in the Auto Crop mode. The display will flash "Auto-Crop". When the RUN mode is entered, the machine will then make a flying crop at the MINIMUM DIE DISTANCE.

Tolerance

TOLERANCE defines the acceptable band of length variation that a user will accept and defines both the upper and lower limits. For a TOLERANCE of 0.01 inch the allowable range of variation would be $\pm$ 0.01 inch. If the controller is unable to achieve a length within this band, an error occurs and the machine is stopped.

Offset Auto

The OFFSET AUTO is the voltage required to hold the feed rolls at stop, with no drift in either direction. This parameter is automatically adjusted by the AMS controller, and can be adjusted by the customer. Customer adjustment is done if the initial value is grossly off, and the time to automatically correct the error would be excessive. The more common usage of this parameter is for monitoring the amount of offset, and making external balance adjustments to the drive. This parameter should be as close to zero as possible giving the controller the maximum control range.

Offset Integral

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

Lag Auto

LAG AUTO (COMPENSATION) is an integral used to correct for conditions where the speed is matched, but the position lags behind the

target. This parameter is automatically adjusted and is not normally changed by the user. If this value becomes unstable, there may be a problem in the system.

Lag Integral

A Die Accelerator parameter, the LAG INTEGRAL defines the integral time constant for the removal of velocity error (LAG), when tracking a moving target.

Derivative

This parameter is used in special application loop control systems. On systems that use hydraulics or have a lot of inertia, it is possible that the systems have a slow response time. If this is the case, entering a DERIVATIVE value can increase the response. The sluggish response of the machine will result in an error, and the purpose of the DERIVATIVE is to anticipate the rate of change in the error, and amplify the rate of change to improve performance.

If it is determined that this parameter is to be used, start with a value of 10 seconds (or less), and then decrease the value until a change in pitch or "hum" is heard in the motor. This indicates that the controller is overcorrecting the error. When this occurs, increase the value until the system stops oscillating.

<div align="center">CAUTION:</div>

Changing this value will amplify any noise in the system, as well as the error. This can cause problems in the system. The parameter may also increase the tolerance of the system, which could cause variation errors. Entering zero for the DERIVATIVE will disable the parameter.

Line Resolution

The RESOLUTION parameter defines the length of material movement for each increment of the encoder. It is a function of the circumference of the measuring wheel and the number of counts per revolution of the encoder. The formula for calculating RESOLUTION is as follows:

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

Note: Above circumference is in inches.

For the AMS encoder, the encoder count is the model number on the encoder. A Model 256 is a 256-count encoder. A Model 1000 is a 1000-count encoder.

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

Model	Resolution
256	0.01171875
500	0.006
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.

Circumference (SL350HCLR ONLY!)

This is the physical circumference of the rotary rolls in inches. Typical circumference is 24" and is the parameter default.

Rotary Count (SL350HCLR ONLY!)

This is the total number of encoder counts received by the controller per one revolution of the rolls. For example, a servo drive is setup to output 1250 counts per revolution and we are using a 7:1 gearbox. The following formula would apply.

Rotary Counts = Servo Counts x 4 x Gear Ratio

In this particular case the rotary count parameter should be set to 35,000.

Rotary Start (SL350HCLR ONLY!)

This parameter is used to inform the controller at what position or angle the Rotary die must be at line speed to enter the material. This parameter is expressed in Degrees and defaults to 135. If this number is too small the controller will error with a Drive Not Responding message, indicating that not enough time was allowed to accelerate to line speed. If this number is too large the die will enter the material before line speed was matched and cause material jam ups. It is recommended that the default number be used.

Rotary Stop (SL350HCLR ONLY!)

This parameter is used to inform the controller at what position or angle the die is no longer in the material. This parameter is expressed in degrees and defaults to 225. The default parameter is recommended.

Die Resolution

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

Correction Factor

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

The best way to calibrate the system is to run 10 parts, carefully measure them, and calculate an average length. The new CORRECTION FACTOR is calculated as follows:

$$\text{New Correction} = \frac{\text{Old Correction x Programmed length}}{\text{Average Measured Length}}$$

Filter Constant

The FILTER CONSTANT can be adjusted to improve accuracy. A low value is used on machines with very stable line speeds. A high value (greater than 50 Hz) is used when rapid fluctuations in line speeds occur. Some trial may be necessary to achieve an accurate value.

The default value is 32 Hz, which is considered to be the higher of the low side values. The controller will allow values from 1.0 Hz to 200.0 Hz.

Units

Length measurements can be programmed and displayed as either inches or millimeters. The parameter is selectable between either ENGLISH for inches or METRIC for mm and cm. The ENGLISH parameter will also measure in feet and feet/minute while the METRIC parameters will also measure in meters and meters/second. Press any number key to toggle through the choices, and then press ENTER to record your selection

Jog Select

The default is LINE with the selection of LINE or DIE. LINE will enable a line jog except when the controller is in the Die Jog screen. DIE mode will enable jog of the die at all times. This parameter is displayed only in the non-stopping mode.

Minimum Velocity

This is the minimum die return speed. The default is 10.0 FPM with a range of 10 to 500 FPM. This parameter is only displayed in the non-stopping mode.

Shear Dead Band

Shear Dead Band provides a programmable delay between turning off the Shear Down output and turning on the Shear Up output. Delay occurs anytime the shear is fired, including run, test and normal modes. Default is 0.000, which disables the feature. The adjust range is 0.000 to 9.999 seconds. Delay will occur during both stopping and flying-cut modes of operation.

Print On Coil Changes

This is a parameter for Citoh bundle ticket printers. A value of YES will print a bundle ticket for every coil change. A NO will not print a bundle ticket for a coil change.

Manual Shear Die Distance

Defines the location that all manual shear operations will occur. The default is 0.000 " with the adjust range between 0.000 " to 350.000 ". The Setup Lockout on the Control locks out this parameter.

Hole Detect

The two selections are ACTIVE LOW and ACTIVE HIGH. LOW is the default. In LOW, the encoder interrupts look to see if the input from the Omron or Banner hole detect switches are on (LOW) to initiate a hole count. For ACTIVE HIGH, the encoder interrupts look to see if the input is off (HIGH) to initiate the hole count.

Line movement

Used to select either "FWD/FST" or "RUN". In the Default mode "FWD/FST", the Run Output will initiate before any tasks are started and will stay on until all press tasks have stopped. "RUN" will initiate the Run output when the Fast or Forward output is on for the first time and

will stay on until the Fast or Forward output is turned off for the last time. This mode is only active for single speed, open loop, and non-stopping lines. In this mode the delay after shear will not work.

Editing the Auxiliary Controller Parameters

The **XL100CL SERIES** controller should first be configured with its initial setup parameters (figure 7.26), as discussed in Chapter 2 of this manual. The Auxiliary Controllers can then be programmed through the auxiliary screens.

```
10:59AM    9/05/97        0FPM        0.000"
ORDER                                    0Ft
MATERIAL                         N/A COMP.
Parameters                      Setup Value
Halt Mode                       Bundle Halt
Format                         Decimal Inch
Set Done Items to Ready?                 No
Auto-Delete Done Orders            14 Days
Use Order Numbers?                      Yes
Shear Dwell Dn                     1.000sec
Shear Boost Dwell                  0.000sec
Die Boost Comp                     0.0000"
Shear Kerf                         0.0000"
Minimum Part                      30.0000"
Type 17    9/1/97      1:52PM         V6.5
```

Figure 7.26. Machine Data Screen

To exit the initial setup mode press the SETUP key

SET UP

```
11:15AM    9/05/97        0FPM          0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
             XL100CLS Controller
                Machine Data
               Edit Tool Data
              Calibration Trim
             Manual Calibration
            Auxiliary Controllers
                 Time Clock
             Input/Output Status
                Memory Test
               Communications

Type 17      9/1/97     1:52PM         V6.5
```

Figure 7.27.   Setup Menu Screen including "Auxiliary Controllers" selection.

This is the standard setup screen with the added AUXILIARY
CONTROLLERS selection. To configure the auxiliary controller(s) with
the **XL100CL SERIES** controller, use the blue down arrow key ↓, until
AUXILIARY CONTROLLERS is highlighted.

```
11:26AM    9/05/97        0FPM          0.000"
ORDER                                     0Ft
MATERIAL                          N/A% COMP.
             XL100CLS Controller
                Machine Data
               Edit Tool Data
              Calibration Trim
             Manual Calibration
            Auxiliary Controllers
                 Time Clock
             Input/Output Status
                Memory Test
               Communications

Type 17      9/1/97     1:52PM         V6.5
```

Figure 7.28. Setup with Auxiliary Controllers Highlighted Screen

Press ENTER and there will be a list of options for the auxiliary
controller.

```
11:38AM  9/05/97      0FPM        0.000"
ORDER                               0Ft
MATERIAL                     N/A% COMP.
        Auxiliary Controller Menu
            Auxiliary Setup
           Auxiliary Program
            Auxiliary Status
         Auxiliary Terminal Mode
          Search For All Devices




Type 17      9/1/97    1:52PM      V6.5
```

Figure 7.29. Auxiliary Controller Menu Screen

When one of the "Auxiliary" options is chosen in this screen, there will be a list of all of the auxiliary controllers found, so the operator can chose which controller they wish to view or edit. If there is only one auxiliary controller found, this list will not be shown and the operator is taken directly to the selected option.

Auxiliary Setup

This screen is used for viewing or editing the setup parameters for the auxiliary controllers. When this screen is first entered, the message "Uploading Setup Parameters" will be seen on the controller screen. A list of the controller setup parameters will then be given, and the operator will enter these parameters the same way as the **XL100CL SERIES** controller setup parameters.

Once the operator has selected an auxiliary controller to setup, the setup values are temporarily stored in the **XL100CL SERIES** controller. This allows the user to edit parameters without having to upload them every time. Use this screen to adjust the setup parameters for the auxiliary controllers. The setups will be lost in the **XL100CL SERIES** controller, when power is turned off or when setups from another unit are uploaded.

```
 1:00PM  9/05/97     0FPM         0.000"
ORDER                              0Ft
MATERIAL                    N/A% COMP.
Parameters    Auxiliary Setup    Value

Press Dwell Up                0.000Sec
Press Reaction               0.0000Sec
Press-Detect                 10.0000"
Min Hole Space                 0.000"
No Hole Stop                   0.000"
Loop Gain                       1.000
Jog Die Velocity               10FPM
Max Die Velocity               50FPM
Acceleration                  10In/S2
               Return
```

Figure 7.30. Auxiliary Setup Screen.

To exit this screen, press the SETUP key.

Auxiliary Program

This screen is used for editing program data of the auxiliary controllers and may also allow functions to clear memory or perform diagnostic tests on the auxiliary controller.

```
 1:22PM  9/05/97     0FPM         0.000"
ORDER                              0Ft
MATERIAL                    N/A% COMP.
       Auxiliary Controller Program


Hole Count                          0
Length From Hole               0.000"
Die Test Length              120.000"
Die Test Velocity              50FPM
Command                  Send Program



```

Figure 7.31.   Auxiliary Controller Program Screen.

The first three programming lines of the Auxiliary Program screen allow the operator to program the number of parts (Quantity), the Hole Count, and the Hole Offset Length (Length From Hole).

Quantity

Simply key in the desired quantity, and press ENTER to confirm. The quantity can be set from 1 to 9998 pieces. The Auxiliary Controller treats the quantity 9999 as a special case. When an order with a quantity of 9999 pieces is run, the quantity does not decrement when a piece is made. This is done so that he master **XL SERIES** controller can regulate the number of parts being made.

Hole Count

Key in the number of holes per each part and press ENTER to confirm. The **Auxiliary Controller** detects holes in the material and cycles the shear press when this number is reached. To cut on every hole detected, program a count of one. The maximum number of holes per part is 500.

Length From Hole

The next item to be programmed for a job is the Length From Hole. Key in the number of inches or millimeters and press ENTER to confirm. **THIS IS NOT THE OVERALL LENGTH OF THE PART**. The Offset Length is the distance from the leading edge of the last hole counted to the point where the shear occurs. See figure below.
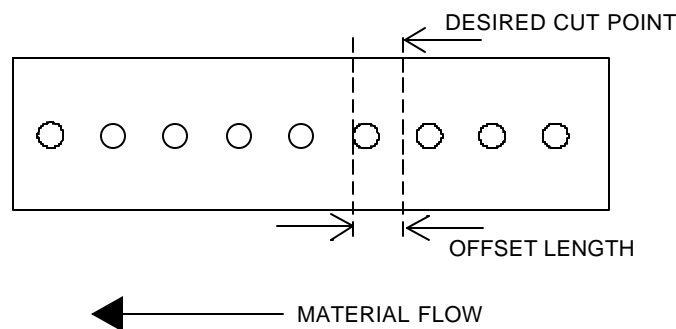
The next two programming lines set the length and velocity of the Die Test function.

The last programming line (Command) has three functions. The PICK key can be used to toggle through the selections.

Send Program- This function will send the part information to the auxiliary controller.

Die Accel Test- This function is designed to simulate an actual run operation. When this program is run, the controller will generate line encoder pulses in proportion to the programmed speed. The system will function normally with the exception that the mill outputs will not be turned on, and a tolerance error will not occur.

Clear Memory- This function will clear the memory of the auxiliary controller.

To exit this screen, press the SETUP button.

Auxiliary Status

This screen is used for viewing the current status information of the auxiliary controller.

```
 2:24PM   9/05/97        0FPM          0.000"
ORDER                                      0Ft
MATERIAL                          N/A% COMP.
MP301HCL    Ver:14.00    Unit:30   Type:   0
Position:      0.000"        Status:    Halted
Speed:          0FPM          Holes:         0
Inputs:      --------       Outputs:  --------

TolError:  0.0000"       LagComp:0.0000Sec
Offset:       0.000V    StrokeEnd:    0.000"

Prg Data:   Qty    Left    HoleCnt    Length
             0       0        0       0.000"
```

Figure 7.32. Auxiliary Status Screen

The information on the status screen includes the Auxiliary Controller version, unit, and type number, the current length past the shear, the auxiliary controller status, the line speed, the number of holes counted, the input and output status, the value of the tolerance error, the lag

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XL100CL **Series**   **Optional Devices**

compensation, the offset voltage, the length of the die stroke, and the programmed part information.

To exit the Auxiliary Status Screen, press the SETUP key.

Auxiliary Terminal Mode

This screen is used to view the current screen data of the **Auxiliary Controller** and to send it keystrokes. The main purpose of this screen is to quickly compare information between 2 or more **Auxiliary Controllers** as the operator can quickly jump back and forth between controllers without uploading and storing the information in memory as is done with the Auxiliary Setup Screen.

```
 3:51PM  9/05/97      0FPM          0.000"
ORDER                                   0Ft
MATERIAL                        N/A% COMP.
MP301HCL  Ver: 14.00  Unit: 37  Type:   7



        *************************
        *1=Configure    2=In/Out *
        *3=Test Communications   *
        *************************




        Press END Key to Exit
```

Figure 7.33. Auxiliary Terminal Mode Screen

When this screen is activated, the controller will only accept keystrokes that are allowed by the auxiliary unit. When in the configuration mode and scrolling from one parameter to another, the "Enter" Key will scroll forward to the next parameter and the "Setup" key will scroll backward to the previous parameter.

Note: Although the setup parameters can be edited from this screen, it is highly recommended that the Auxiliary Setup Screen be used when editing the auxiliary controllers.

The information that is located in the center of the screen is an emulation of the **Auxiliary Controller** screen. The primary information that can be seen is the configuration, input and output status, and test communications option (shown in figure 10), or die accelerator test and error display. The "Setup" key will toggle between these two choices.

Note: If the XL100CL SERIES controller can not communicate with the auxiliary controller, the message "Error! No Response From RS485 Port" will be seen. To clear the error message, press the "CE" key.

Pressing "Setup" will not allow the operator to exit this screen. The "End" key must be used to exit this screen.

Search For All Devices

This option is used to search the communications system for all on line auxiliary controllers. With "Search For All Devices" highlighted and the "Enter" key pressed, the controller will start the search with the status of the search listed at the bottom of the controller screen.

```
 4:44PM  9/05/97      0FPM          0.000"
ORDER                                 0Ft
MATERIAL                        N/A% COMP.
          Auxiliary Controller Menu
              Auxiliary Setup
             Auxiliary Program
              Auxiliary Status
           Auxiliary Terminal Mode



Searching For:  MP301HCLS Flying Press 2
Device Found :  MP301HCLS Flying Press 1
```

Figure 7.34. Search For All Devices Status Screen

Note: At the end of the search the controller will return to the Auxiliary Controller Menu screen, Figure 7.29.

Initial Machine Tests

Manual Shear

The shear can be manually activated using the CYCLE input. This causes the SHEAR output to turn on for the SHEAR DWELL time or until the SHEAR COMPLETE input switch closes. Make adjustments to the SHEAR DWELL time or the position of the SHEAR COMPLETE switch until the shear cycles properly.

Jogging

The Die can be jogged forward and in reverse with the Die Jog Forward Input and Die Jog Reverse Input.

Referencing Controller to the Material

The **Auxiliary Controller** measures relative movement of the material through the machine and has no way of measuring the absolute amount of material that is past the shear. In order to cut accurate lengths, the controller must know how much material is past the shear at some point in time and then it can make relative measurements there after. This is a process called referencing.

Referencing is simply loading material into the machine past the shear and activating the CYCLE input. The Die must locate the reference switch, move to the minimum die distance, fire the press, and then return to the reference switch (home location).

Note: The Manual Cycle switch must be held closed until the referencing process is complete or an error will be displayed.

At the bottom of the shear stroke, the length counter is set to zero and the **Auxiliary Controller** is referenced. The controller will remain referenced as long as the encoder stays in contact with the material and the material does not move while the controller is turned off.

Die Accelerator Test

There are two ways that the DIE ACCELERATOR TEST can be performed. The purpose of the test is to simulate an actual run operation without creating scrap material.

The first method is to use the COMMAND function in the Auxiliary Controller Program screen, figure 7.31. Select the Die Test Length and the Die Test Velocity of the line that you wish to use. Toggle the COMMAND choices with the "PICK" key until "Die Accel Test" is highlighted and then press ENTER.

The second way to perform a DIE ACCELERATOR TEST is to use the Auxiliary Terminal Mode Screen, figure 12. Press the SETUP button until the option 1 = Die Accelerator Test, 2 = Error Display is shown. Press the number 1 on the number keypad to enter the Die Accelerator Test mode. The display will then prompt the operator for the test length and velocity. Press ENTER to start the test.

Ensure that the material is referenced by activating the Manual Shear Input and that the E-Stop input is closed before performing the test. During the test the controller will generate line encoder pulses in proportion to the programmed speed and move the die to simulate a

shearing operation. While the test is being performed, the Auxiliary Status Screen, figure 7.32, will be displayed.

Running the Machine

After an order has been entered, the machine is placed in the RUN mode by either activating the RUN input. The **Auxiliary Controller** will begin counting holes and shearing parts to the programmed hole count. It will decrement the quantity remaining after each piece is cut and halt the line automatically when the quantity remaining reaches zero.

Note: If the target is beyond the die when the RUN mode is entered, a "Missed Shear: error message will be generated.

Tolerance Error Display

The user may display the length error after each cut part. To enter this display, use the Auxiliary Terminal Mode Screen, toggle the SETUP key until 1 = Die Accelerator Test, 2 = Error Display is shown, and press the number 2. Note that this display shows the electronic tolerance error of the cut part by comparing the number of pulses received by the Line Encoder to the number of pulses received by the Die Encoder. The physical tolerance of the cut part may or may not be as accurate as the displayed value due to mechanical tolerances in the die accelerator mounting, cutoff press, or material tracking inaccuracies.

Clear Holes

During jogging operations, the controller continues to count holes and records their positions in memory. If for any reason, the operator wishes to discard all of the hole locations, which are currently in the controller's memory, he may do so by clearing the "Hole Queue." To clear the hole queue, the machine must be halted. Cycle the shear press TWICE by activating the MANUAL CYCLE input.

Any holes, which have been counted but not yet cut off, will be cleared from memory. After the controller is placed back into the RUN mode, it will begin a new count of holes after the first hole passes the photo-detector.

Switch Settings for Slave Controllers

SL 301 H Plus Switch Settings and I/O

SW1	OFF	Feed-to-Stop Shear
	ON	Non-Stop Shear

SW2	OFF	Shear Die Boost Active
	ON	No Shear Die Boost

SW3	OFF	Single Speed Shear
	ON	Two Speed Shear

SW4 Not Used – Must be OFF

SW5	**SW6**	**SW7**	
OFF	OFF	OFF	Unit ID 30
ON	OFF	OFF	Unit ID 31
OFF	ON	OFF	Unit ID 32
ON	ON	OFF	Unit ID 33
OFF	OFF	ON	Unit ID 34
ON	OFF	ON	Unit ID 35
OFF	ON	ON	Unit ID 36
ON	ON	ON	Unit ID 37

NO.	INPUTS	OUTPUTS
1	Jog Forward	Forward/Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Shear Complete	Shear
5	Setup Lockout	N/A
6	N/A	Run
7	Hole Detector	Shear Die Boost/Shear Up
8	Manual Shear	N/A

Shear Up is available when Die Boost is not used.

SL 301 HCLR Switch Settings and I/O

SW1   Line Encoder (1) Direction

SW2   Die Encoder (2) Direction

SW3   Sets the Analog output voltage polarity   (+ or -)

SW4	SW5	SW6	
OFF	OFF	OFF	Unit ID 30
ON	OFF	OFF	Unit ID 31
OFF	ON	OFF	Unit ID 32
ON	ON	OFF	Unit ID 33
OFF	OFF	ON	Unit ID 34
ON	OFF	ON	Unit ID 35
OFF	ON	ON	Unit ID 36
ON	ON	ON	Unit ID 37

SW7   Must be off.

NO.	INPUTS	OUTPUTS
1	Jog Forward	Forward
2	Jog Reverse	Not Used
3	Remote Run	Reverse
4	Manual Shear	Run Disable
5	Setup/Lockout	Drive Enable
6	Home	Not Used
7	Hole Interrupt on SL	Not Used
8	E-Stop	Run

SL 301 HCL Switch Settings and I/O

Closed Loop Flying Press Slave Controller

SW1	SW2	SW3	
OFF	OFF	OFF	Unit ID 30
ON	OFF	OFF	Unit ID 31
OFF	ON	OFF	Unit ID 32
ON	ON	OFF	Unit ID 33
OFF	OFF	ON	Unit ID 34
ON	OFF	ON	Unit ID 35
OFF	ON	ON	Unit ID 36
ON	ON	ON	Unit ID 37

SW4   Sets the direction of Encoder 1 (Line Encoder)

SW5   Sets the direction of Encoder 2 (Die Encoder)

SW6   Sets the Analog output voltage polarity + -

SW7   Not Used - Must be OFF

NO.	INPUTS	OUTPUTS
1	Die Jog Forward	Not Used
2	Die Jog Reverse	Not Used
3	Run	Not Used
4	Press Complete	Press Down
5	Manual Cycle	Drive Enable
6	Die Retract	Not Used
8	E-Stop (Drive Ready)	Run

SL 301 HCLS Switch Settings and I/O

Closed Loop Flying Press Slave Controller

SW1	SW2	SW3	
OFF	OFF	OFF	Unit ID 30
ON	OFF	OFF	Unit ID 31
OFF	ON	OFF	Unit ID 32
ON	ON	OFF	Unit ID 33
OFF	OFF	ON	Unit ID 34
ON	OFF	ON	Unit ID 35
OFF	ON	ON	Unit ID 36
ON	ON	ON	Unit ID 37

SW4   Sets the direction of Encoder 1 (Line Encoder)

SW5   Sets the direction of Encoder 2 (Die Encoder)

SW6   Sets the Analog output voltage polarity + -

SW7   Not Used - Must be OFF

NO.	INPUTS	OUTPUTS
1	Die Jog Forward	Not Used
2	Die Jog Reverse	Not Used
3	Run	Not Used
4	Press Complete	Press down
5	Manual Cycle	Drive Enable
6	Die Retract	Press Up
7	Hole Detector	Not Used
8	E-Stop	Run

Hole Detect Option

Hole Counters are an available option for the **XL100CLCL SERIES** controller. When this option is added, the controller will take on its model number followed by an H (XL100CLCL becomes a XL100CLCLH). Following is a typical drawing; Notice the hole detect input is input 16.
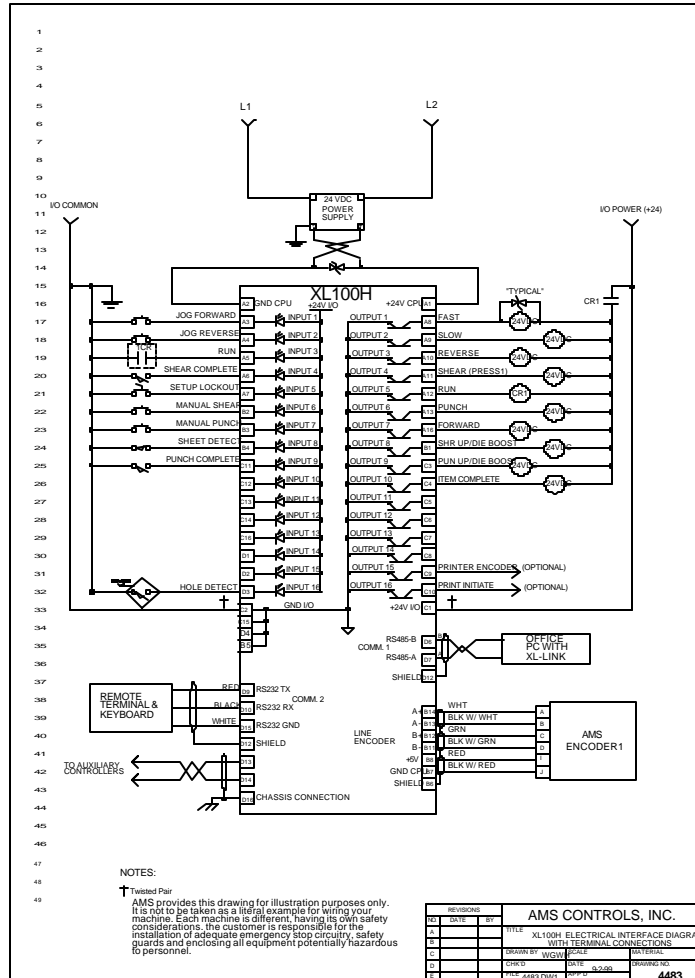
Figure 7.35. Typical Drawing of Controller Using Hole Detect Input.

The **XL1XXCLH SERIES** has the same general parameters as other AMS hole counting controllers. These parameters are located in the Machine Data section of the controller and follow. Use the Pick key or any number key to toggle between the selections and press Enter to save the new value.

Hole Option Parameters

Mode

In the Machine Data section of the controller, Mode describes whether the controller is working as a standard controller or is used to count holes. Select COUNT HOLE to run the controller as a hole detector or select STANDARD for normal controller operation. In the HOLE mode, the operator will enter the number of holes before a shear instead of actual part length. In the STANDARD mode, the controller uses part length when calculating a shear point.

Shear Detect

SHEAR-DETECTOR DISTANCE is the physical distance between the shear press and the hole detector. The detector should be located as close as possible to the shear press for best accuracy but far enough away (typically 10" or more), for enough time to see the hole and activate the shear press.

Minimum Hole Spacing

Enter a value smaller than the minimum distance between holes in the material. When the Hole Counter detects a hole in the run mode, the material must move the MINIMUM HOLE SPACING distance forward before another hole is detected. This parameter prevents the controller from accidentally reading the same hole twice.

No Hole Stop Distance

This parameter defines the maximum length of material allowed past the shear press before enough holes are detected to make the current part. This parameter is used to protect machinery in case of photo-detector failure. If a hole is not detected in the specified distance (Length Past Shear + Shear To Detector Distance is greater than the No-Hole Stop Distance), the line will stop and an error message will be displayed.

Hole Detect Logic

Selects the logic of the Hole Detect input. **Active Low** triggers a hole count when input 16 is circuit common. **Active High** triggers a hole count when input 16 goes high. Default is Active Low.

Programming

When programming for the shear point after a number of hole counts, use the **PROGRAM** screen. This screen is programmed as a typical **XL100CLCL SERIES** controller, except the **HOLE** count and **OFFSET** can be entered for the shear.

Enter the amount of holes in the **HOLE** parameter that should be counted before the shear point, which is determined by the **OFFSET** parameter. The **OFFSET** is the distance from the last hole, where the shear should occur.

```
4:44PM  9/05/97       0FPM          0.000"
ORDER                             0 HOLES
MATERIAL
LF   QTY   DONE   HOLE    OFFSET  PAT    STA
1    20            10         20  100   NEXT




```

Figure 7.36. Status Display Screen When Mode Select Is Set For Count Hole.

When the MODE SELECT is changed to **Count Hole** in [SETUP]/[MACHINE DATA] program area of the controller, the above status display, figure 7.36, is shown. The programming of the order is similar to programming a standard order with the following exceptions:

Programming in Hole Mode

QTY:

Is the number of part pieces required. In the above example, 20 parts will be produced for the order.

Hole:

This is the number of holes that are to be counted for each part. In figure 7.36, 10 holes are to be detected before the shear.

Offset:

This is the distance from the last hole that the shear is to occur. The reference of the hole for this distance is set by the "Shear-to-Detector Distance" parameter. In the above example, the shear will occur 20 inches past the hole

Controller Model Type

There are many different types of controllers available from AMS Controls. The factors that will influence the model selected include whether the machine is a "Feed-To-Stop" line or "Flying Cut", and the number of presses that are to be controlled.

The following section deals with each individual controller and will give a brief description of each of the open loop controllers, the proper position for the configuration switches, a list of the inputs and outputs, and a list of the machine setup parameters for that model.

In the back of the manual there is a generic setup data sheet that includes all possible setup parameters. Please fill in the appropriate data for your individual controller on this sheet, as it will help the AMS Customer Service Department troubleshoot your machine in the event it is not performing at the required standards.

The numbers shown are the numbers of the basic controller without options. The Remote Terminal and Bar Code Scanner are hardware additions and do not change the controller number. The two Printers and Expansion Board will change the controller number with the appropriate letter or letters added to the end of the number (M = Extended Macros, B = Bundle Tag Printer, P = Print-on-Part Printer, E = Expansion Board, F = Flying Gagged Press Operation).

XL100CLB = Has Bundle Tag Printer option

XL112CLE = Has Expansion Board option

XL106CLM = Has Extended Macros

XL102CLFP = Has a single flying gag and has Print-on-Part Printer

XL112CLMBEP = Has Extended Macros, Bundle Tag Printer, Expansion Board, and Print-on-Part Printer

XL102CLBP= Has Bundle Tag Printer and Print-on-Part Printer

XL100CL

General Description

The **XL100CL** is capable of controlling a single press (cutoff) or two presses (punch and cutoff), and it will control machines with stationary or flying dies. The **XL100CL** will continually monitor position, speed, and velocity, while automatically compensating for any changes that occur on the line.

Switch Settings and I/O

SW1	SW2	
OFF	OFF	Feed-to-Stop, One Encoder (Resolver)
ON	OFF	Feed-to-Stop, Two Encoders
OFF	ON	Closed Loop Die, Single Speed
ON	ON	Closed Loop Die, Two Speed (Fast-Slow)

SW3   NOT USED - MUST BE SET TO OFF

SW4   Sets the direction of Encoder 1
/Line Encoder on Die Accelerator
/Motor Encoder on Feed-to-Stop

SW5   Sets the direction of Encoder 2
/Die Accelerator Encoder on Die Accelerator
/Line Encoder on Feed-to-Stop

SW6   Sets the Analog output voltage polarity + -

SW7   OFF   No Punch
ON   Punch Enable (Feed-to-Stop Only)

NO.	INPUTS	OUTPUTS
1	Jog Forward	Fast
2	Jog Reverse	Slow
3	Run	Reverse
4	Shear Complete	Shear
5	Setup Lockout	Drive Enable
6	Manual Shear	Punch/Shear Up*
7	Manual Punch	
8	Sheet Detect	Run
9	Drive Ready (E-Stop)	
10	Feed Ready/Die Retract	Batch Complete
11	Punch Complete	
12		
13		
14		
15	Print Detect**	Printer Flush**
16	Slow Run (FTS) or	Part Print Trigger

General Parameters

The following is a list of the machine setup parameters for the **XL100CL**. For detailed description of the parameters see Chapter 2 "Machine Configuration."

- Halt Mode
- Format
- Set Done Items to Ready?
- Auto-Delete Done Orders
- Halt No More Item? (With Punch Only)
- Use Order Numbers?
- Halt Delay Minimum (With XL Link Only)
- Minimum footage To Request Order (With XL-Link Only)
- Manual Shear Scrap Length (With XL-Link Only)
- Shear Dwell Down
- Shear Dwell Up
- Shear Kerf
- Shear Reaction
- Minimum Part
- Delay After Shear
- Item Complete Dwell
- Shear-Encoder Distance
- Coil End Point
- Coil End Offset
- Line Movement Select (single speed, Die Accelerator only)
- Scrap Length (Punching Only)
- Loop Gain
- Jog Select Mode? (Die Accelerator Only)
- Jog Velocity
- Min Velocity (Die Accelerator Only)
- Max Velocity
- Velocity at Maximum Analog
- Acceleration
- Return Accel (Die Accelerator Only)
- Min Die Dist (Die Accelerator Only)
- Max Die Dist Die Accelerator Only)
- Manual Shear Die Distance
- Die Home Offset

- Minimum Slow Distance
- Advance After Cut (Die Accerlator)Retract After Cut (Feed-to-Stop Only)
- On Tol Error? (Die Accelerator Only)
- Tolerance
- Offset Volts (Auto)
- Offset Integral
- Lag Comp (Auto) (Die Accelerator Only)
- Lag Integral (Die Accelerator Only)
- Derivative
- Encoder Direction (Feed-to-Stop Only)
- Line Resolution
- Die Resolution (Die Accelerator Only)
- Motor Resolution (Feed-to-Stop Only)
- Correction
- Filter Constant
- Press Dwell (When There Is More Than One Press)
- Mode Select
- No Hole Stop Distance
- Shear –Detector Distance
- Minimum Hole Spacing
- Hole Detect Logic

XL102CL

General Description

The **XL102CL** is capable of controlling a single press (cutoff and gag) or two presses (punch and cutoff), and it will control machines with Feed-to-Stop or Flying Cut lines. The **XL102CL** will continually monitor position, speed, and velocity, while automatically compensating for any changes that occur on the line.

Switch Settings And I/O

SW1   Sets the Direction of Motor Encoder

SW2   Sets the Analog output voltage polarity + -

SW3	OFF	One Encoder
	ON	Two Encoders

SW4	**SW5**	**SW6**	**SW7**	
OFF	OFF	OFF	OFF	One Press (Shear)
ON	OFF	OFF	OFF	Two Presses

All remaining Press Outputs are available for Gags

NO.	INPUTS	OUTPUTS
1	Jog Forward	Run
2	Jog Reverse	Not Used
3	Run	Not Used
4	Shear Complete	Shear (Press 1)
5	Setup Lockout	Drive Enable
6	Manual Shear	Press 2
7	Manual Press	Part Print Trigger*
8	Sheet Detect	
9	Drive Ready (E-Stop)	
10	Feed Ready	
11		
12		
13		
14		
15	Print Detect**	
16	Slow Run	Printer Flush**

* Part Print Trigger uses next available press output.
** Used only for Matthews DOD 5000 print-on-part printer.

General Parameters

The following is a list of the machine setup parameters for the **XL102CL**. For detailed descriptions of the parameters see Chapter 2 "Machine Configuration."

- Halt Mode
- Format
- Set Done Items to Ready?
- Auto-Delete Done Orders
- Halt No More Item? (With Punch Only)
- Use Order Numbers?
- Halt Delay Minimum (With XL Link Only)
- Minimum footage To Request Order (With XL-Link Only)
- Manual Shear Scrap Length (With XL-Link Only)
- Shear Dwell Down
- Shear Dwell Up
- Shear Kerf
- Shear Reaction
- Minimum Part
- Delay After Shear
- Item Complete Dwell
- Shear-Encoder Distance
- Coil End Point
- Coil End Offset
- Scrap Length (Punching Only)
- Loop Gain
- Jog Velocity
- Max Velocity
- Slow Run Velocity
- Velocity at Maximum Analog
- Acceleration
- Minimum Slow Distance

- Retract After Cut
- Tolerance
- Offset Volts (Auto)
- Offset Integral
- Encoder
- Line Resolution
- Motor Resolution
- Correction
- Filter Constant
- Press Dwell (When There Is More Than One Press)
- Mode Select
- No Hole Stop Distance
- Shear –Detector Distance
- Minimum Hole Spacing
- Hole Detect Logic

XL106CL

General Description

The **XL106CL** is capable of controlling a single press (cutoff) or six presses (five punches and cutoff or any combination of presses up to six), and it will control machines with Feed-to-Stop or Flying Cut lines. The **XL106CL** will continually monitor position, speed, and velocity, while automatically compensating for any changes that occur on the line.

Switch Settings And I/O

SW1	Sets the Direction of Motor Encoder		
SW2	Sets the Analog voltage polarity + -		
SW3	OFF	One Encoder	
	ON	Two Encoders	

SW4	SW5	SW6	SW7	
OFF	OFF	OFF	OFF	One Press (Shear)
ON	OFF	OFF	OFF	Two Presses
OFF	ON	OFF	OFF	Three Presses
ON	ON	OFF	OFF	Four Presses
OFF	OFF	ON	OFF	Five Presses
ON	OFF	ON	OFF	Six Presses

All remaining Press Outputs are available for Gags

NO.	INPUTS	OUTPUTS
1	Jog Forward	Run
2	Jog Reverse	Not Used
3	Run	Not Used
4	Shear Complete	Shear (Press 1)
5	Setup Lockout	Drive Enable
6	Manual Shear	Press 2
7	Manual Press	Press 3
8	Sheet Detect Press 4	
9	Drive Ready (E-Stop)	Press 5
10	Feed Ready Press 6	
11	Press 2 Complete	Part Print Trigger*
12	Press 3 Complete	
13	Press 4 Complete	
14	Press 5 Complete	
15	Print Detect**	
16	Slow Run	Printer Flush**

* Part Print Trigger uses next available press output.
** Used only for Matthews DOD 5000 print-on-part printer.

General Parameters

The following is a list of the machine setup parameters for the **XL106CL**. For detailed description of the parameters see Chapter 2 "Machine Configuration."

- Halt Mode
- Format
- Set Done Items to Ready?
- Auto-Delete Done Orders
- Halt No More Item? (With Punch Only)
- Use Order Numbers?
- Halt Delay Minimum (With XL Link Only)
- Minimum footage To Request Order (With XL-Link Only)
- Manual Shear Scrap Length (With XL-Link Only)
- Shear Dwell Down
- Shear Dwell Up
- Shear Kerf
- Minimum Part
- Delay After Shear
- Item Complete Dwell
- Shear-Encoder Distance
- Coil End Point
- Coil End Offset
- Scrap Length (Punching Only)
- Loop Gain
- Jog Velocity
- Max Velocity
- Slow Run Velocity
- Velocity at Maximum Analog
- Acceleration

- Retract After Cut (Feed-to-Stop Only)
- Tolerance
- Offset Volts (Auto)
- Offset Integral
- Encoder Direction (Feed-to-Stop Only)
- Line Resolution
- Motor Resolution (Feed-to-Stop Only)
- Correction
- Filter Constant
- Press Dwell (When There Is More Than One Press)
- Mode Select
- No Hole Stop Distance
- Shear –Detector Distance
- Minimum Hole Spacing
- Hole Detect Logic

XL112CL/XL112CLE

General Description

The **XL112CL** is capable of controlling a single press (cutoff) or eleven presses (eleven punches and cutoff or any combination of presses up to eleven), and it will control machines with Feed-to-Stop or Flying Cut lines. The **XL112CL** will continually monitor position, speed, and velocity, while automatically compensating for any changes that occur on the line.

Switch Settings And I/O

SW1	Sets the Direction of Motor Encoder			
SW2	Sets the Analog output voltage polarity + -			
SW3	OFF	One Encoder		
	ON	Two Encoders		

SW4	**SW5**	**SW6**	**SW7**	
OFF	OFF	OFF	OFF	One Press (Shear)
ON	OFF	OFF	OFF	Two Presses
OFF	ON	OFF	OFF	Three Presses
ON	ON	OFF	OFF	Four Presses
OFF	OFF	ON	OFF	Five Presses
ON	OFF	ON	OFF	Six Presses
OFF	ON	ON	OFF	Seven Presses
ON	ON	ON	OFF	Eight Presses
OFF	OFF	OFF	ON	Nine Presses
ON	OFF	OFF	ON	Ten Presses
OFF	ON	OFF	ON	Eleven Presses
ON	ON	OFF	ON	Twelve Presses

All remaining Press Outputs are available for Gags

NO.	INPUTS	OUTPUTS
1	Jog Forward	Run
2	Jog Reverse	Not Used
3	Run	Not Used
4	Shear Complete	Shear (Press 1)
5	Setup Lockout	Drive Enable
6	Manual Shear	Press 2
7	Manual Press	Press 3
8	Sheet Detect	Press 4
9	Drive Ready (E-Stop)	Press 5
10	Feed Ready	Press 6
11	Press 2 Complete	Press 7
12	Press 3 Complete	Press 8
13	Press 4 Complete	Press 9
14	Press 5 Complete	Press 10
15	Print Detect**	Press 11
16	Slow Run	Press 12 / Part Print

* Part Print Trigger uses next available press output.
** Used only for Matthews DOD 5000 print-on-part printer.

General Parameters

The following is a list of the machine setup parameters for the **XL112CL**. See section 3 for a detailed description.

- Halt Mode
- Format
- Set Done Items to Ready?
- Auto-Delete Done Orders
- Halt No More Item? (With Punch Only)
- Use Order Numbers?
- Halt Delay Minimum (With XL Link Only)
- Minimum footage To Request Order (With XL-Link Only)
- Manual Shear Scrap Length (With XL-Link Only)
- Shear Dwell Down
- Shear Dwell Up
- Shear Kerf
- Minimum Part
- Delay After Shear
- Item Complete Dwell
- Shear-Encoder Distance
- Coil End Point
- Coil End Offset
- Scrap Length (Punching Only)
- Loop Gain
- Jog Velocity
- Max Velocity
- Slow Run Velocity
- Velocity at Maximum Analog
- Acceleration

- Minimum Slow Distance
- Retract After Cut (Feed-to-Stop Only)
- Tolerance
- Offset Volts (Auto)
- Offset Integral
- Encoder Direction (Feed-to-Stop Only)
- Line Resolution
- Die Resolution (Die Accelerator Only)
- Motor Resolution (Feed-to-Stop Only)
- Correction
- Filter Constant
- Press Dwell (When There Is More Than One Press)
- Mode Select
- No Hole Stop Distance
- Shear –Detector Distance
- Minimum Hole Spacing
- Hole Detect Logic

XL102CLF

General Description

The **XL102CLF** is specifically designed to control a gagged, single press flying die machine. The **XL102CLF** will continually monitor position, speed, and velocity, while automatically compensating for any changes that occur on the line.

Switch Settings And I/O

SW1   Sets the Direction of the Line Encoder
SW2   Sets the Analog output voltage polarity $+ / -$
SW3   Sets the Direction of the Die Accelerator Encoder
SW4-SW7   Two Speed Die Accelerator Mode

NO.	INPUTS	OUTPUT
1	Jog Forward	Run
2	Jog Reverse	Foward
3	Run	Reverse
4	Shear Complete	Shear (Press1)
5	Setup/Lockout	Drive Enable
6	Manual Shear	Gag 2
7	Manual Punch	Not Used
8	Sheet Detect	Not Used
9	E-Stop	Not Used
10	Die Retract	Not Used
11	Not Used	Not Used
12	Not Used	Not Used
13	Not Used	Not Used
14	Not Used	Not Used
15	Not Used	Not Used
16	Not Used	Print Initiate

General Parameters

The following is a list of the machine setup parameters for the **XL102CLF**. For detailed description of the parameters, see section 3 "Machine Configuration."

- Halt Mode
- Format
- Set Done Items to Ready?
- Auto-Delete Done Orders
- Halt No More Item?
- Use Order Numbers?
- Halt Delay Minimum (With XL Link Only)
- Minimum Footage to Request Order (With XL-Link Only)
- Manual Shear Scrap Length (With XL-Link Only)
- Shear Dwell Down
- Shear Dwell Up
- Shear Kerf
- Shear Reaction
- Minimum Part
- Delay After Shear
- Shear-Encoder Distance
- Coil End Point
- Coil End Offset
- Line Movement Select (single speed, Die Accelerator only)
- Scrap Length
- Loop Gain
- Jog Select Mode? (Die Accelerator Only)
- Jog Velocity
- Min Velocity (Die Accelerator Only)
- Max Velocity
- Velocity At Maximum Analog
- Acceleration
- Return Acceleration
- Min Die Dist
- Max Die Dist
- Die Home Offset
- Advance After Cut
- On Tol Error?

- Tolerance
- Offset Volts (Auto)Offset Integral
- Lag Comp. (Auto)
- Lag Integral Derivative
- Line Resolution
- Die Resolution
- Correction
- Filter Constant
- Tool Select
- Press Dwell (When There Is More Than One Press)

XL106CLF

General Description

The **XL106CLF** is specifically designed to control a gagged, single press flying die machine. The **XL106CLF** will continually monitor position, speed, and velocity, while automatically compensating for any changes that occur on the line.

Switch Settings And I/O

SW1	Sets the Direction of the Line Encoder
SW2	Sets the Analog output voltage polarity $+ / -$
SW3	Sets the Direction of the Die Accelerator Encoder
SW4-SW7	Two Speed Die Accelerator

NO.	INPUTS	OUTPUT
1	Jog Forward	Run
2	Jog Reverse	Forward
3	Run	Reverse
4	Shear Complete	Shear (Press1)
5	Setup/Lockout	Drive Enable
6	Manual Shear	Gag 2
7	Manual Punch	Gag 3
8	Sheet Detect	Gag 4
9	E-Stop	Gag 5
10	Die Retract	Gag 6
11	Not Used	Not Used
12	Not Used	Not Used
13	Not Used	Not Used
14	Not Used	Not Used
15	Not Used	Not Used
16	Not Used	Print Initiate

General Parameters

The following is a list of the machine setup parameters for the **XL106CLF**. For detailed description of the parameters see section 3 "Machine Configuration."

- Halt Mode
- Format
- Set Done Items to Ready?
- Auto-Delete Done Orders
- Halt No More Item?
- Use Order Numbers?
- Halt Delay Minimum (With XL Link Only)
- Minimum Footage to Request Order (With XL-Link Only)
- Manual Shear Scrap Length (With XL-Link Only)
- Shear Dwell Down
- Shear Dwell Up
- Shear Kerf
- Shear Reaction
- Minimum Part
- Delay After Shear
- Shear-Encoder Distance
- Coil End Point
- Coil End Offset
- Line Movement Select (single speed, Die Accelerator only)
- Scrap Length
- Loop Gain
- Jog Select Mode? (Die Accelerator Only)
- Jog Velocity
- Min Velocity (Die Accelerator Only)
- Max Velocity
- Velocity At Maximum Analog
- Acceleration
- Return Acceleration
- Min Die Dist
- Max Die Dist
- Die Home Offset
- Advance After Cut
- On Tol Error?

- Tolerance
- Offset Volts (Auto)
- Offset Integral Lag Comp. (Auto)
- Lag Integral Derivative
- Line Resolution
- Die Resolution
- Correction
- Filter Constant
- Tool Select
- Press Dwell (When There Is More Than One Press)

XL112CLF

General Description

The **XL112CLF** is specifically designed to control a gagged, single press flying die machine. The **XL112CLF** will continually monitor position, speed, and velocity, while automatically compensating for any changes that occur on the line.

Switch Settings And I/O

SW1	Sets the Direction of the Line Encoder
SW2	Sets the Analog output voltage polarity $+ / -$
SW3	Sets the Direction of the Die Accelerator Encoder
SW4-SW7	Two Speed Die Accelerator

NO.	INPUTS	OUTPUT
1	Jog Forward	Run
2	Jog Reverse	Forward
3	Run	Reverse
4	Shear Complete	Shear (Press1)
5	Setup/Lockout	Drive Enable
6	Manual Shear	Gag 2
7	Manual Punch	Gag 3
8	Sheet Detect	Gag 4
9	E-Stop	Gag 5
10	Die Retract	Gag 6
11	Not Used	Gag 7
12	Not Used	Gag 8
13	Not Used	Gag 9
14	Not Used	Gag 10
15	Not Used	Gag 11
16	Not Used	Gag 12 / Print Initiate ∗

∗ If Print-on-Part printer is used, output 12 will be Print Initiate and Gag 12 is lost.

General Parameters

The following is a list of the machine setup parameters for the **XL112CLF**. For detailed description of the parameters see section 3 "Machine Configuration."

- Halt Mode
- Format
- Set Done Items to Ready?
- Auto-Delete Done Orders
- Halt No More Item?
- Use Order Numbers?
- Halt Delay Minimum (With XL Link Only)
- Minimum Footage to Request Order (With XL-Link Only)
- Manual Shear Scrap Length (With XL-Link Only)
- Shear Dwell Down
- Shear Dwell Up
- Shear Kerf
- Shear Reaction
- Minimum Part
- Delay After Shear
- Shear-Encoder Distance
- Coil End Point
- Coil End Offset
- Line Movement Select (single speed, Die Accelerator only)
- Scrap Length
- Loop Gain
- Jog Select Mode? (Die Accelerator Only)
- Jog Velocity
- Min Velocity (Die Accelerator Only)
- Max Velocity
- Velocity At Maximum Analog
- Acceleration
- Return Acceleration
- Min Die Dist
- Max Die Dist
- Die Home Offset
- Advance After Cut
- On Tol Error?

- Tolerance
- Offset Volts (Auto)Offset Integral Lag Comp. (Auto)
- Lag Integral
- Derivative
- Line Resolution
- Die Resolution
- Correction
- Filter Constant
- Tool Select
- Press Dwell (When There Is More Than One Press)

Specification

Mechanical

Size	11" high x 12" wide x 5" deep including cable
Weight	7lbs

Electrical

Input Voltage	24VDC ±5%
Power Consumption plus output load	10 Watts

Input Characteristics

Type	Current Sinking

Output Characteristics

Type	Open Collector Transistor
Maximum Current	4 Amperes DC

Encoder Input

Type	Quadrature with Complements
Voltage	5VDC
Maximum Encoder Load	200 milliamperes
Maximum Pulse Rate	10,000 pulses/second

Operation

Number of Order Items	999
Maximum number of Patterns	999
Maximum Operations per part per press	Limited by Available Memory
Maximum Part Length	3500.000 inches
	(88900.01 millimeters)
Maximum Quantity / Item	9999
Units of Measurement	4 English, 3 Metric modes
Coil Footage Totalizers	32
Maximum Footage/Totalizer	1,000,000 feet
	1,000,000 meters

Features

Display	40 characters by 15 rows
Keys	39

Options

XL-Link

Protocol	RS-485
Baud Rate	300-38400
Data Bits	7 or 8
Parity	Even, Odd, & None
Stop Bits	1 or 2

Computer Requirements

Processor	Pentium -66 MHZ minimum
Memory (Windows 95, 98, NT, or 2000)	12 M of RAM
Hard Drive	540 MB or more
Serial Ports	1 "available" port
Printer	Windows Compatible
	(such as an ink-jet or laser)
CD-ROM drive	Required
Mouse	Recommended

Printer Specs

Bundle Tag Printer

Label

Standard	6" X 4"
Width Range	0.75" to 4.1"
Length Range	0.5" to 20.25"

Print Head

Life	2 million inches (over 300,000 6" X 4" labels)

Label Capacity

Per roll	1000 labels

Ribbon

Life	2000 6" X 4" labels per ribbon (single pass printing)

Resolution

Dots per inch (DPI)	203

Bar Codes

Code 3 of 9 (Code 39), UPC-A, UPC-E, Interleave 2 of 5, Code 128, EAND (JAN 8), EANB (JAN 13), HIBC, CODABAR, Interleaved 2 of 5 with mod 10 checksum, PLESSEY, UPC 2-digit supplementary code, UPC 5-digit supplementary code, CODE 9

Inkjet Print on Part Printer

Power Requirements

Voltage	90 - 130 and 190 - 250 VAC
Frequency	50 - 60 HZ
Power	50 Watts

Output

Character Size	Approximately 10 to 35 mm (0.3" to 1.3") depending upon printhead used
Printheads	14, 14 - 35, or 28 mm printheads
Printable Characters	64 (Swedish/Norwegian), US ASCII, or European versions optional

Ambient Requirements

Operating Temperature	5 to 40° C (41 to 104° F)
Humidity	95% non condensing

Weight

Excluding Printhead	1.96kg (4.3 lbs)

Bar Code Scanner

Power Requirements

Voltage   4.75 to 14 VDC
Current   185 mA

Scan Repetition Rate

Rate   Approximately 36 ($\pm$ 3) scans/sec (bidirectional)

Start-up Time

Time   <50 mSec from scan enable

Data Acquisition Time

Time   <110 mSec from scan enable

Skew Tolerance

Degrees $\pm$ 60° from normal

Pitch Angle

Degrees   45° from normal

Decode Capability

An LS 3020HV can be programmed to decode one or any combinations of the following code types: UPC/EAN, Code 39, Codabar, Interleaved 2 of 5, Code 128, Discrete 2 of 5, and Code 93. Set code length(s) for any 2 of 5 code type

Element Width

Minimum Width   0.0075 inches (.190 mm)
Maximum Width   0.1 inches (2.54 mm)

Print Contrast

Minimum   25% absolute dark/light reflectance differential measured at 675 nm

Ambient Light Immunity

Incandescent   400 ft. candles, 4306 lux
Fluorescent   450 ft. candles, 4844 lux
Sodium Vapor   450 ft. candles, 4844 lux
Mercury Vapor   450 ft. candles, 4844 lux
Sunlight   10,000 ft candles, 107,640 lux

Durability

Drop to Concrete   6 ft. (183 cm)

Operating Temperature

Degrees   0 to 40° C   (32 to 104° F)

Humidity

Per Cent   5 to 95 % (non-condensing)

Height

6.3 inches (16 cm)

Length

5 inches (12.7 cm)

Width

2.8 inches (7.1 cm)

Wiring Diagrams

XL Series Controller Diagrams

XL100CL Mounting Dimensions Dwg# 4316

XL100CL Dwg# 4346

XL102CL Dwg# 4349

XL106CL Dwg# 4352

XL112CL Dwg# 4420

XL102CLF Dwg# 4348

XL106CLF Dwg# 4351

XL112CLF Dwg# 4350

XL112CLE Dwg# 4353

Expansion module Diagrams

Expansion Module (Single) Dwg# 4353

Expansion Module (Multiple) Dwg# 4357

Auxiliary Controller Diagrams

SL301HCL Auxiliary Controller Dwg# 4461

Printer Interface Diagrams

Typical Communications Diagram Dwg# 4425

Matthews 2001 Inkjet Printer Cable Dwg# 4426

Matthews 2001 Inkjet Printer Connections Dwg# 4368CL-25

Inkjet Installation (Local to console) Dwg# 4369-1

Inkjet Installation (Remote from console) Dwg# 4369-2

Bundle Tag Installation (Local to console) Dwg# 4371-1

Bundle Tag Installation (Remote from console) Dwg# 4371-2

Fox IV Standard Installation Diagram Dwg# 4469

4370 Printer Interface Connections Dwg# 4370

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

1/2"   1/2"

3/8"

3/8"

5"

9 1/4"

11"

5"

10 1/4"

11 1/4"

12"

2 7/8"

⊕ DRILL 1/4" HOLE

REVISIONS			AMS CONTROLS, INC.		
NO.	DATE	BY			
A	12-30-96	DFK	TITLE		
B			XL100 SERIES MOUNTING DIMENSIONS		
C			DRAWN BY MJA	SCALE	MATERIAL
D			CHK'D	DATE 10-8-91	DRAWING NO.
E			FILE 4316.dw2	APPD	4316

117 VAC

MAIN POWER OFF ON

SEE NOTE BELOW

E-STOP E-STOP DIE OVER TRAVEL

PROTECTIVE DEVICES

RESET

CR1

CR1

STOP START

CR2

CR3

G

G

24 VDC POWER SUPPLY

I/O COMMON

I/O POWER (+24)

XL100CL

GND CPU +24V I/O

+24V CPU

"TYPICAL"

CR1

A2	GND CPU	+24V CPU	A1
JOG FORWARD	A3 INPUT 1	OUTPUT 1 A8	FAST
JOG REVERSE	A4 INPUT 2	OUTPUT 2 A9	SLOW
RUN	A5 INPUT 3	OUTPUT 3 A10	REVERSE
SHEAR COMPLETE	A6 INPUT 4	OUTPUT 4 A11	SHEAR
SETUP LOCKOUT	A7 INPUT 5	OUTPUT 5 A12	DRIVE ENABLE
MANUAL SHEAR	B2 INPUT 6	OUTPUT 6 A13	SHEAR UP / PUNCH
MANUAL PUNCH	B3 INPUT 7	OUTPUT 7 A16	
SHEET DETECT	B4 INPUT 8	OUTPUT 8 B1	RUN
(E-STOP) DRIVE READY	C11 INPUT 9	OUTPUT 9 C3	
FEED OK/ DIE RETRACT	C12 INPUT 10	OUTPUT 10 C4	ITEM COMPLETE
	C13 INPUT 11	OUTPUT 11 C5	
	C14 INPUT 12	OUTPUT 12 C6	
	C16 INPUT 13	OUTPUT 13 C7	
(OPTIONAL) ASYNCRONOUS PRINT DETECT	D1 INPUT 14	OUTPUT 14 C8	
	D2 INPUT 15	OUTPUT 15 C9	(OPTIONAL)
SLOW RUN/ ALTERNATE LIST	D3 INPUT 16	OUTPUT 16 C10	PRINTER INITIATE

24VDC (FAST, SLOW, REVERSE, SHEAR, DRIVE ENABLE, SHEAR UP/PUNCH)

CR3 (RUN)

24VDC ITEM COMPLETE

24VDC PRINTER INITIATE

C2 GND I/O
C15
D4
D5

+24V I/O C1

RS485-B D6
RS485-A D7
SHIELD D11

OFFICE PC WITH XL-LINK

COMM. 1

REMOTE TERMINAL & KEYBOARD

RED D8 RS232 TX
BLACK D10 RS232 RX
WHITE D15 RS232 GND
D12 SHIELD

COMM. 2

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

ENCODER # 1 Input

AMS ENCODER1

LINE ENCODER (DAC) MOTOR ENCODER (F-T-S)

SHIELDED TWISTED PAIR

A14 ANALOG+ -10V TO +10V DIFFERENTIAL OUTPUT
A15 ANALOG-

TO AUXILIARY DEVICES

D13 RS485-B
D14 RS485-A
D16 CHASSIS CONNECTION

C+	B15		A
C-	B10		B
D+	B16		C
D-	B9		D

ENCODER # 2 Input (OPTIONAL ON FEED-TO-STOP)

ENCODER 2

LINE ENCODER (F-T-S) MOTOR ENCODER (DAC)

NOTES:
* May or may not be used for drive encoder feedback, see drive manual.
The Fast, Slow, and Reverse outputs are only avalible in the Die Accelerator mode
The "Slow Run" input is only avalible in the Feed - to - Stop mode.
† Twisted Pair
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		
NO.	DATE	BY
A	1-30-96	KWC
B	11-21-97	TMG
C	7-02-01	rcb
D		
E		

AMS CONTROLS, INC.

TITLE XL100CL ELECTRICAL INTERFACE DIAGRAM WITH TERMINAL CONNECTIONS (GENERIC)

DRAWN BY RAA SCALE MATERIAL

CHK'D DATE 3-13-95 DRAWING NO.

FILE 4346.DW2 APP'D **4346**

The XL102CL Electrical Interface Diagram with Terminal Connections, showing the main power circuit (117 VAC), E-STOP, RESET, STOP, START controls, 24 VDC power supply, and the XL102CL controller with its inputs and outputs.

Inputs:
- INPUT 1 (A3) — JOG FORWARD
- INPUT 2 (A4) — JOG REVERSE
- INPUT 3 (A5) — RUN
- INPUT 4 (A6) — SHEAR COMPLETE
- INPUT 5 (A7) — SETUP LOCKOUT
- INPUT 6 (B2) — MANUAL SHEAR
- INPUT 7 (B3) — MANUAL PUNCH
- INPUT 8 (B4) — SHEET DETECT
- INPUT 9 (C11) — E-STOP
- INPUT 10 (C12) — FEED OK
- INPUT 11 (C13) — PUNCH 2 COMPLETE
- INPUT 12 (C14)
- INPUT 13 (C16)
- INPUT 14 (D1) — (OPTIONAL) ASYNCRONOUS PRINT DETECT
- INPUT 15 (D2)
- INPUT 16 (D3) — SLOW RUN

Outputs:
- OUTPUT 1 (A8) — RUN
- OUTPUT 2 (A9)
- OUTPUT 3 (A10)
- OUTPUT 4 (A11) — SHEAR (PRESS1)
- OUTPUT 5 (A12) — DRIVE ENABLE
- OUTPUT 6 (A13) — PRESS (GAG) 2 *
- OUTPUT 7 (A16) — (GAG) 3
- OUTPUT 8 (B1)
- OUTPUT 9 (C3)
- OUTPUT 10 (C4)
- OUTPUT 11 (C5)
- OUTPUT 12 (C6)
- OUTPUT 13 (C7)
- OUTPUT 14 (C8)
- OUTPUT 15 (C9)
- OUTPUT 16 (C10)

REMOTE TERMINAL & KEYBOARD — RED D9 RS232 TX, BLACK D10 RS232 RX, WHITE D15 RS232 GND, D12 SHIELD — COMM. 2

OFFICE PC WITH XL-LINK — RS485-B D6, RS485-A D7, SHIELD D11 — COMM. 1

TO AUXILIARY CONTROLLERS — D13 RS485-B, D14 RS485-A — COMM. 3

SHIELDED TWISTED PAIR — A14 ANALOG+, A15 ANALOG- , -10V TO +10V DIFFERENTIAL OUTPUT, D16 CHASSIS CONNECTION

MOTOR ENCODER — A+ B14, A- B13, B+ B12, B- B11, +5V B8 RED, COMMON B7 BLK W/RED, SHIELD B6 WHT — ENCODER1

LINE ENCODER (OPTIONAL) — C+ B16 WHT, C- B15 BLK W/WHT, D+ B10 GRN, D- B9 BLK W/ GRN — AMS ENCODER 2

NOTES:
◇ GAG IS AVALLIBLE ONLY WITH PRINTER OPTION.
† Twisted Pair

Slow run is only avalible in the feed - to - stop mode.
*Print Initiate (optional) will be the next available press output.
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	11-21-97	TMG	TITLE XL102CL ELECTRICAL INTERFACE DIAGRAM		
B	7-02-01	RCB	WITH TERMINAL CONNECTIONS		
C			DRAWN BY DOL	SCALE	MATERIAL
D			CHK'D	DATE 11-7-94	DRAWING NO.
E			FILE 4349.DW2	APP'D	4349

1
2
3
117 VAC

MAIN POWER
OFF   ON   E-STOP   SEE NOTE BELOW
4   E-STOP   CRx   RESET
5   CR1
6   PROTECTIVE DEVICES   CR1   G
7
8   STOP   START   CR2
9   CR3   G
10
11
12   24 VDC
            POWER
13   SUPPLY
14
15
16   XL106CL   CR1
            A2 GND CPU   +24V I/O   +24V CPU A1

17 JOG FORWARD   A3 INPUT 1   OUTPUT 1   A8 RUN   CR3
18 JOG REVERSE   A4 INPUT 2   OUTPUT 2   A9
    CR2
19 RUN   A5 INPUT 3   OUTPUT 3   A10
20 SHEAR COMPLETE A6 INPUT 4   OUTPUT 4   A11 SHEAR (PRESS1)   24VDC
21 SETUP LOCKOUT A7 INPUT 5   OUTPUT 5   A12 DRIVE ENABLE   24VDC
22 MANUAL SHEAR B2 INPUT 6   OUTPUT 6   A13 PRESS 2 (GAG) 2* 24VDC
23 MANUAL PUNCH B3 INPUT 7   OUTPUT 7   A16 PRESS 3 (GAG) 3* 24VDC
24 SHEET DETECT B4 INPUT 8   OUTPUT 8   B1 PRESS 4 (GAG) 4* 24VDC
    CR1
25 E-STOP   C11 INPUT 9   OUTPUT 9   C3 PRESS 5 (GAG) 5* 24VDC
26 FEED OK   C12 INPUT 10   OUTPUT 10 C4 PRESS 6 (GAG) 6* 24VDC
27 PRESS 2 COMPLETE C13 INPUT 11 OUTPUT 11 C5 (GAG) 7
28   C14 INPUT 12   OUTPUT 12 C6
29   C16 INPUT 13   OUTPUT 13 C7
30 (OPTIONAL)   D1 INPUT 14   OUTPUT 14 C8
    ASYNCRONOUS
31 PRINT DETECT D2 INPUT 15   OUTPUT 15 C9
32 SLOW RUN   D3 INPUT 16   OUTPUT 16 C10
33   C2   GND I/O   +24V I/O C1
34   C15
                  D4
35   B5   RS485-B D6 B   OFFICE
36   RS485-A D7 A   PC WITH
                                        COMM. 1   XL-LINK
37 REMOTE   RED   D9 RS232 TX   COMMON   D5
    TERMINAL &   COMM.2
38 KEYBOARD   BLACK D10 RS232 RX
39   WHITE D11 RS232 GND   SHIELD   D8
40   SHIELD D11
                                        A+ B14   A
41   A- B13   B
    TO AUXILIARY D13   B+ B12   C   ENCODER1
42 CONTROLLERS   COMM. 3   B- B11   D
43   D14   +5V B8   RED   I
                                        COMMON B7 BLKW/RED J
44 SHIELDED   SHIELD B6
    TWISTED   A14 ANALOG+   C+ B16   WHT   A
45 PAIR   -10V TO +10V   C- B15   BLKW/WHT   B
                  A15 ANALOG- DIFFERATIAL   GRN   C   AMS
46   OUTPUT LINE D+ B10 BLK W/ GRN D   ENCODER 2
                                    ENCODER D- B9   I
47   D16 CHASSIS   J
                      CONNECTION

NOTES:
48 † Twisted Pair
49 ◇ GAG IS AVALLIBLE ONLY WITH PRINTER OPTION.
    Slow run is only avalible in the feed - to - stop mode.
    * Print Initiate (optional) will be the next avallable press output.
    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.

MOTOR ENCODER

REVISIONS			AMS CONTROLS, INC.		
NO	DATE	BY			
A	11-21-97	TMG	TITLE	XL106CL ELECTRICAL INTERFACE DIAGRAM	
B	7-02-01	RCB		WITH TERMINAL CONNECTIONS	
C			DRAWN BY DOL	SCALE	MATERIAL
D			CHK'D	DATE 11-7-94	DRAWING NO.
E			FILE 4352.DW2	APP'D	4352

XL112CL

NOTES:
  * Print Initiate (optional) will be the next avalible oress output.
  ◇ GAG IS AVALLIBLE ONLY WITH PRINTER OPTION.
  † Twisted Pair
  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	02-14-96	REB	TITLE	XL106CLF ELECTRICAL INTERFACE DIAGRAM	
B	11-24-97	TMG		WITH TERMINAL CONNECTIONS	
C	7-02-01	RCB	DRAWN BY DOL	SCALE	MATERIAL
D			CHK'D	DATE 10-26-94	DRAWING NO.
E			FILE 4351.DW2	APP'D	4351

117 VAC

OFF ON   E-STOP   E-STOP   DIE OVERTRAVEL   SEE NOTE BELOW   RESET   CR1

PROTECTIVE DEVICES

CR1

G

STOP   START   CR2

CR3   G

LINE   ACN

24 VDC POWER SUPPLY

I/O COMMON

I/O/POWER (+24)

XL112CLF

"TYPICAL"   CR3   CR1

Terminal	Input		Output	Terminal	Function
A2	GND CPU				
	+24V I/O		+24V CPU	A1	
A3	INPUT 1	JOG FORWARD	OUTPUT 1	A8	RUN
A4	INPUT 2	JOG REVERSE	OUTPUT 2	A9	FORWARD
A6	INPUT 3	RUN / CR2	OUTPUT 3	A10	REVERSE
A6	INPUT 4	SHEAR COMPLETE	OUTPUT 4	A11	SHEAR (PRESS1)
A7	INPUT 5	SETUP LOCKOUT	OUTPUT 5	A12	DRIVE ENABLE
B2	INPUT 6	MANUAL SHEAR	OUTPUT 6	A13	GAG 2 *
B3	INPUT 7	MANUAL PUNCH	OUTPUT 7	A16	GAG 3 *
B4	INPUT 8	SHEET DETECT	OUTPUT 8	B1	GAG 4 *
C11	INPUT 9	E-STOP / CR1	OUTPUT 9	C3	GAG 5 *
C12	INPUT 10	DIE RETRACT	OUTPUT 10	C4	GAG 6 *
C13	INPUT 11		OUTPUT 11	C5	GAG 7 *
C14	INPUT 12		OUTPUT 12	C6	GAG 8 *
C16	INPUT 13		OUTPUT 13	C7	GAG 9 *
D1	INPUT 14	(OPTIONAL) ASYNCRONOUS PRINT DETECT	OUTPUT 14	C8	GAG 10 *
D2	INPUT 15		OUTPUT 15	C9	GAG 11 *
D3	INPUT 16		OUTPUT 16	C10	GAG 12 *
C2	GND I/O		+24V I/O	C1	

24VDC

C15
D4
B5

REMOTE TERMINAL & KEYBOARD

RED   D9 RS232 TX   COMM. 2
BLACK   D10 RS232 RX
WHITE   D15 RS232 GND
D12 SHIELD

RS485-B   D6   B
RS485-A   D7   A   OFFICE PC WITH XL-LINK
COMM. 1
SHIELD   D12

TO AUXILIARY CONTROLLERS
D13
D14

LINE ENCODER
A+   B14   WHT   A
A-   B13   BLKW/WHT   B
B+   B12   GRN   C
B-   B11   BLK W/ GRN   D   AMS ENCODER1
+5V   B8   RED   I
COMMON   B7   BLKW/RED   J
SHIELD   B6

SHIELDED TWISTED PAIR
A14 ANALOG+   -10V TO +10V DIFFERENTIAL OUTPUT
A15 ANALOG-

MOTOR ENCODER
C+   B16   A
C-   B15   B
D+   B10   C
D-   B9   D   ENCODER 2
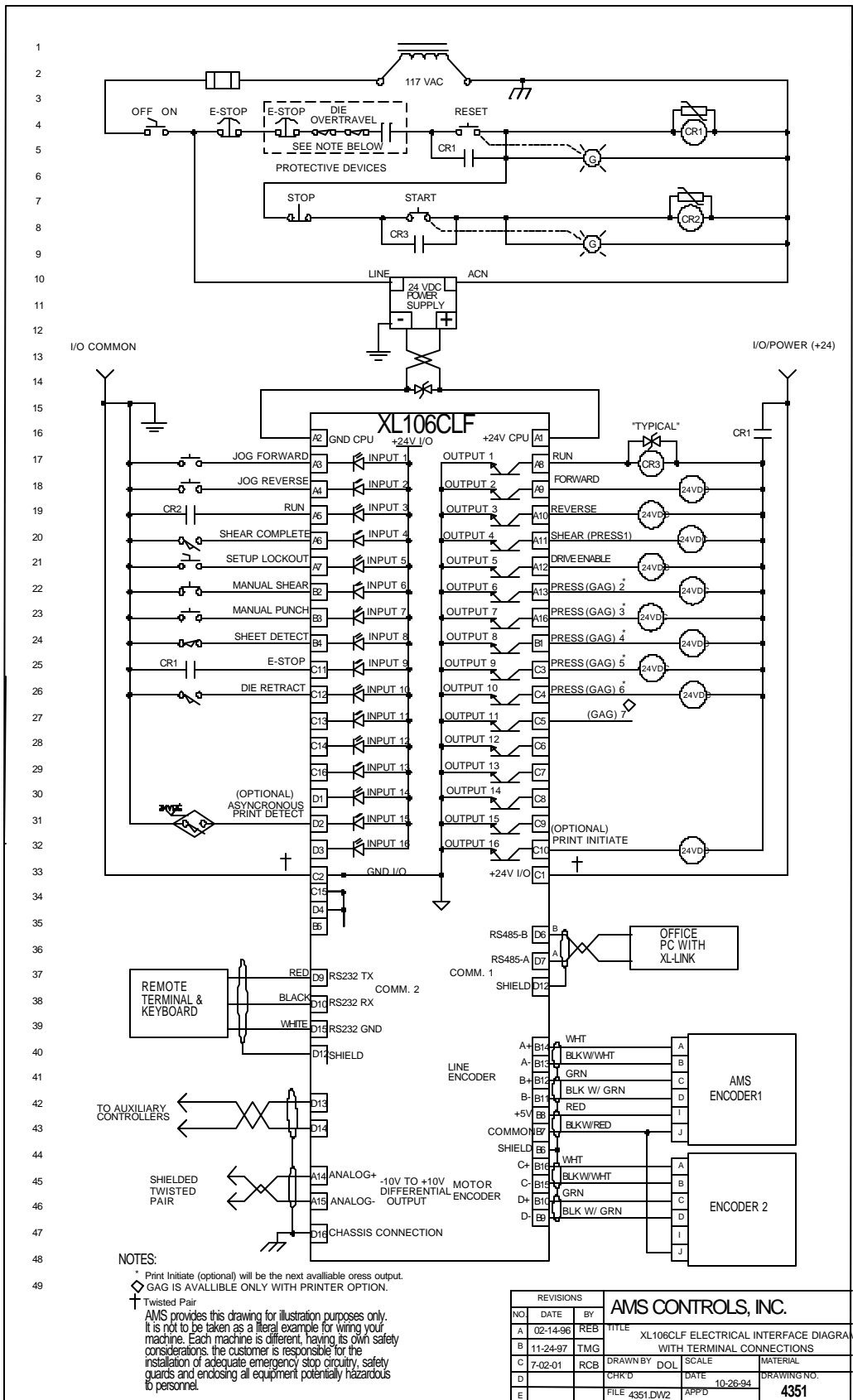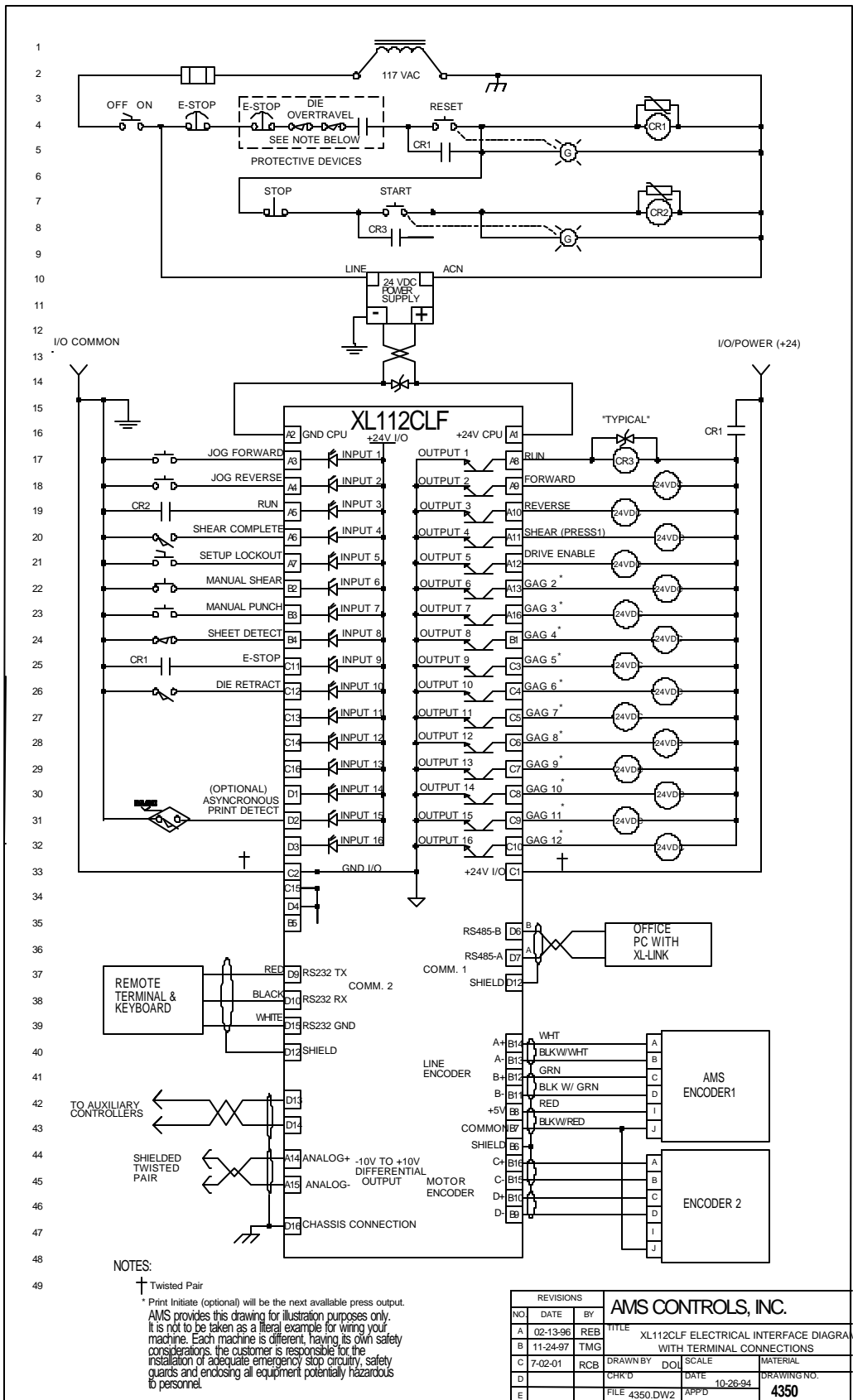I
J

D16 CHASSIS CONNECTION

NOTES:

† Twisted Pair

* Print Initiate (optional) will be the next available press output.

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.
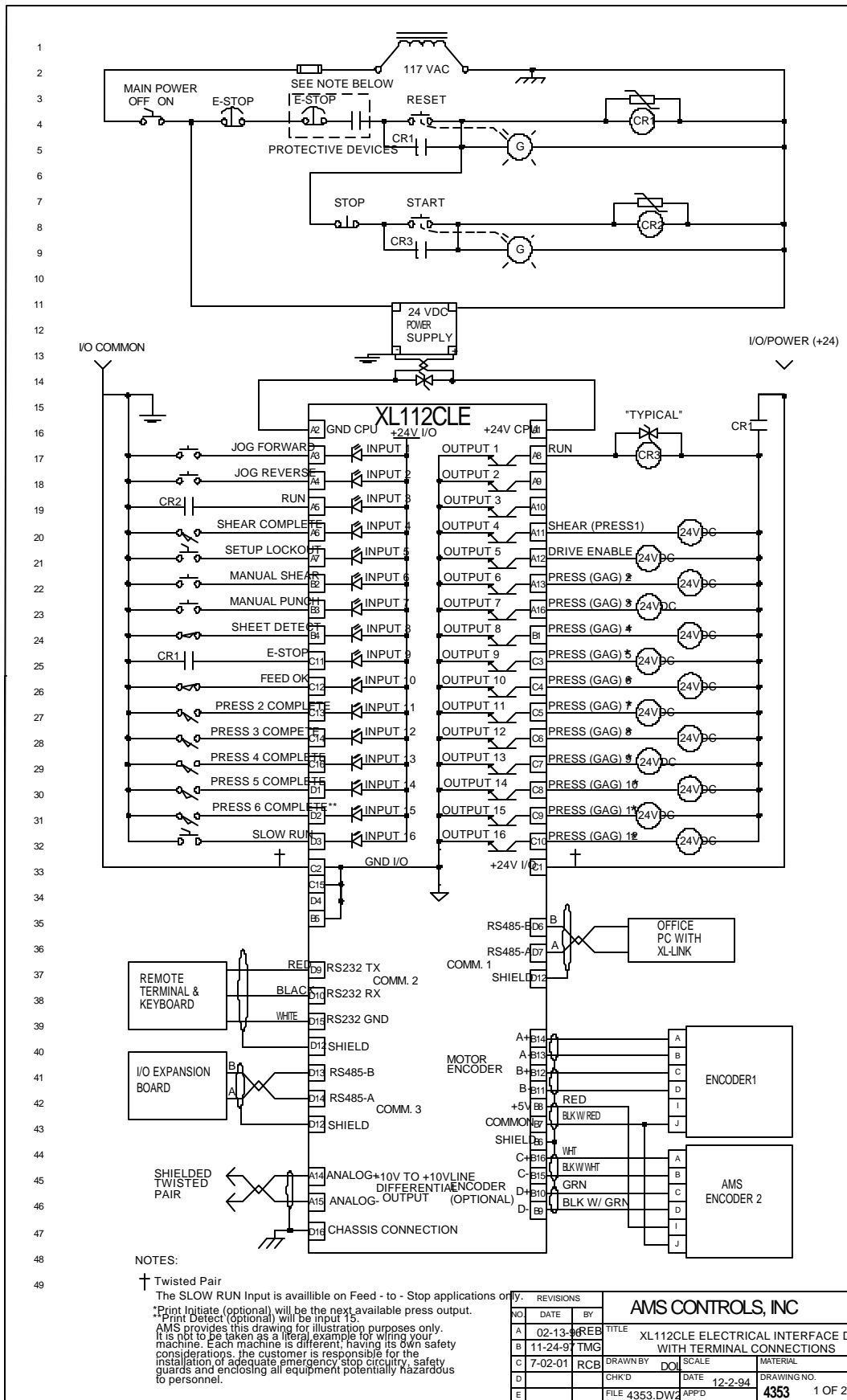
REVISIONS			AMS CONTROLS, INC.
NO.	DATE	BY	
A	02-13-96	REB	TITLE XL112CLF ELECTRICAL INTERFACE DIAGRAM
B	11-24-97	TMG	WITH TERMINAL CONNECTIONS
C	7-02-01	RCB	DRAWN BY DOL SCALE MATERIAL
D			CHK'D DATE 10-26-94 DRAWING NO.
E			FILE 4350.DW2 APP'D **4350**

117 VAC

SEE NOTE BELOW

MAIN POWER
OFF ON   E-STOP   E-STOP   RESET

CR1
PROTECTIVE DEVICES   G   CR3

STOP   START   CR2
CR3   G

24 VDC
POWER
SUPPLY

I/O COMMON

I/O/POWER (+24)

XL112CLE

GND CPU   +24V I/O   +24V CPU

"TYPICAL"   CR1
CR3

Input		Output	
JOG FORWARD	INPUT 1	OUTPUT 1	RUN
JOG REVERSE	INPUT 2	OUTPUT 2	
RUN	INPUT 3	OUTPUT 3	
SHEAR COMPLETE	INPUT 4	OUTPUT 4	SHEAR (PRESS1)
SETUP LOCKOUT	INPUT 5	OUTPUT 5	DRIVE ENABLE
MANUAL SHEAR	INPUT 6	OUTPUT 6	PRESS (GAG) 2
MANUAL PUNCH	INPUT 7	OUTPUT 7	PRESS (GAG) 3
SHEET DETECT	INPUT 8	OUTPUT 8	PRESS (GAG) 4
E-STOP	INPUT 9	OUTPUT 9	PRESS (GAG) 5
FEED OK	INPUT 10	OUTPUT 10	PRESS (GAG) 6
PRESS 2 COMPLETE	INPUT 11	OUTPUT 11	PRESS (GAG) 7
PRESS 3 COMPLETE	INPUT 12	OUTPUT 12	PRESS (GAG) 8
PRESS 4 COMPLETE	INPUT 13	OUTPUT 13	PRESS (GAG) 9
PRESS 5 COMPLETE	INPUT 14	OUTPUT 14	PRESS (GAG) 10
PRESS 6 COMPLETE**	INPUT 15	OUTPUT 15	PRESS (GAG) 11*
SLOW RUN	INPUT 16	OUTPUT 16	PRESS (GAG) 12

CR2   CR1

24VDC (×12)

GND I/O   +24V I/O

RS485-B   B
RS485-A   A

OFFICE
PC WITH
XL-LINK

SHIELD   COMM. 1

REMOTE
TERMINAL &
KEYBOARD
RED   RS232 TX
BLACK RS232 RX   COMM. 2
WHITE RS232 GND
SHIELD

I/O EXPANSION
BOARD
B RS485-B
A RS485-A   COMM. 3
SHIELD

MOTOR
ENCODER
A+   RED
A-
B+
B-
+5V   RED
COMMON BLK W/ RED
SHIELD

ENCODER 1

C+   WHT
C-   BLK W WHT
D+   GRN
D-   BLK W/ GRN

AMS
ENCODER 2

SHIELDED
TWISTED
PAIR

ANALOG+   +10V TO +10V LINE
ANALOG-   OUTPUT   DIFFERENTIAL
ENCODER
(OPTIONAL)
CHASSIS CONNECTION

NOTES:

† Twisted Pair

The SLOW RUN Input is availlible on Feed - to - Stop applications only.
*Print Initiate (optional) will be the next available press output.
**Print Detect (optional) will be input 15.
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	TITLE		
A	02-13-96	REB	XL112CLE ELECTRICAL INTERFACE DIAGRAM		
B	11-24-97	TMG	WITH TERMINAL CONNECTIONS		
C	7-02-01	RCB	DRAWN BY DOI	SCALE	MATERIAL
D			CHK'D	DATE 12-2-94	DRAWING NO.
E			FILE 4353.DW2	APP'D	4353 1 OF 2

5 VDC POWER SUPPLY

COMMON +24VDC

560 560

TO: CONTROLLER

D14 FH-(A)
D13 FH+(B)
     TH-(A)
     TH+(B)

GAG 13 to 28

OPTO-22   B1   Unit 1

JUMPER A
0 1 2 3 4 5 6 7 8 9 10

+5

GND

JUMPER B
0 1 2 3 4 5 6 7 8 9 10 11

I/O
EXPANSION BOARD

GAG 13   1
          2   COM   +24
GAG 14   3
          4   COM   +24
GAG 15   5
          6   COM   +24
GAG 16   7
          8   COM   +24
GAG 17   9
          10   COM   +24
GAG 18   11
          12   COM   +24
GAG 19   13
          14   COM   +24
GAG 20   15
          16   COM   +24
GAG 21   17
          18   COM   +24
GAG 22   19
          20   COM   +24
GAG 23   21
          22   COM   +24
GAG 24   23
          24   COM   +24
GAG 25   25
          26   COM   +24
GAG 26   27
          28   COM   +24
GAG 27   29
          30   COM   +24
GAG 28   31
          32   COM   +24

NOTES:

ALL ITEMS IN BOXES
ARE SUPPLIED BY CUSTOMER

REVISIONS			AMS CONTROLS, INC.		
NO.	DATE	BY			
A			TITLE		
B			XL112CLE ELECTRICAL INTERFACE DIAGRAM		
C			DRAWN BY TMG	SCALE	MATERIAL
D			CHK'D	DATE 12-01-97	DRAWING NO.
E			FILE 4353-2.DW2	APP'D	4353

2 OF 2

1
2
3
4
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14
15
16
17
18
19
20
21
22
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39
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41
42
43
44
45
46
47
48
49

+5 V   GND

GAG 61 to 76

OPTO-22   B1   Unit 4

(A) (+) D14
(B) (-) D13

FH-   JUMPER A
FH+   0 1 2 3 4 5 6 7 8 9 10   +5
TH-
TH+   JUMPER B
Com   0 1 2 3 4 5 6 7 8 9 10 11   GND

GAG 45 to 60

OPTO-22   B1   Unit 3

FH-   JUMPER A
FH+   0 1 2 3 4 5 6 7 8 9 10   +5
TH-
TH+   JUMPER B
Com   0 1 2 3 4 5 6 7 8 9 10 11   GND

GAG 29 to 44

OPTO-22   B1   Unit 2

FH-   JUMPER A
FH+   0 1 2 3 4 5 6 7 8 9 10   +5
TH-
TH+   JUMPER B
Com   0 1 2 3 4 5 6 7 8 9 10 11   GND

GAG 13 to 28

OPTO-22   B1   Unit 1

FH-   JUMPER A
FH+   0 1 2 3 4 5 6 7 8 9 10   +5
TH-
TH+   JUMPER B
Com   0 1 2 3 4 5 6 7 8 9 10 11   GND

560   560

NOTE:
   Jumpers 0 and 6, on Jumper Group A, are
   only used on the last board in the chain
   (300 ohm. load).

REVISIONS			AMS CONTROLS, INC.		
NO	DATE	BY			
A	6-8-95	RAA	TITLE		
B			EXPANSION GAG BOARDS		
C			DRAWN BY RAA	SCALE	MATERIAL
D			CHK'D	DATE 3-31-95	DRAWING NO.
E			FILE 4357.dw2	APP'D	4357

SL 301 HCL ELECTRICAL INTERFACE DIAGRAM

LINE · ACN · I/O COMMON · I/O POWER

I/O 24 VDC POWER SUPPLY

LINE · ACN

CPU GND · CPU POWER

SL 301 HCL

| 2 | COMMON | +24VDC | 1 |

+24VDC

DIE JOG FORWARD	3	INPUT 1	OUTPUT 1	8	NOT USED
DIE JOG REVERSE	4	INPUT 2	OUTPUT 2	9	NOT USED
RUN	5	INPUT 3	OUTPUT 3	10	NOT USED
PRESS COMPLETE	6	INPUT 4	OUTPUT 4	11	PRESS DOWN
MANUAL CYCLE	7	INPUT 5	OUTPUT 5	12	DRIVE ENABLE
DIE RETRACT	18	INPUT 6	OUTPUT 6	13	PRESS UP
HOLE DETECT	19	INPUT 7	OUTPUT 7	16	NOT USED
E-STOP	20	INPUT 8	OUTPUT 8	17	RUN

CR2

XL1XX S PRESS FIRE OUTPUT
E-STOP

"TYPICAL"
CR1 · E-STOP
CR2
CR3
CR4

| 21 | I/O COMMON | +24V I/O | 22 |

DIFF. OUTPUT +/- 10VDC

| ANALOG+ | 14 |
| ANALOG- | 15 |

SHIELDED TWISTED PAIR TO SERVO DRIVE

LINE ENCODER

A+	9	WHT	A
A-	8	BLK W/WHT	B
B+	7	GRN	C
B-	6	BLK W/ GRN	D
+5V	3	RED	I
COMMON	2	BLK W/RED	J
SHIELD	1

AMS ENCODER1

TO XL1XX S

| D13 | 12 | TX / RX E+ (RS485-B) |
| D14 | 13 | TX / RX E- (RS485-A) |

MOTOR ENCODER

C+	11	WHT
C-	10	BLK W/WHT
D+	5	GRN
D-	4	BLK W/ GRN
COMMON	14	BLK W/RED

MOTOR ENCODER POSITION FEEDBACK FROM SERVO DRIVE

NOTES:

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	8/17/00	JER	TITLE SL 301 HCL ELECTRICAL INTERFACE DIAGRAM
B			
C			DRAWN BY DFK · SCALE · MATERIAL
D			CHK'D · DATE 7-25-97 · DRAWING NO.
E			FILE 4461.DC · APP'D · 4461

COMMUNICATIONS CONNECTION BLOCK DIAGRAM
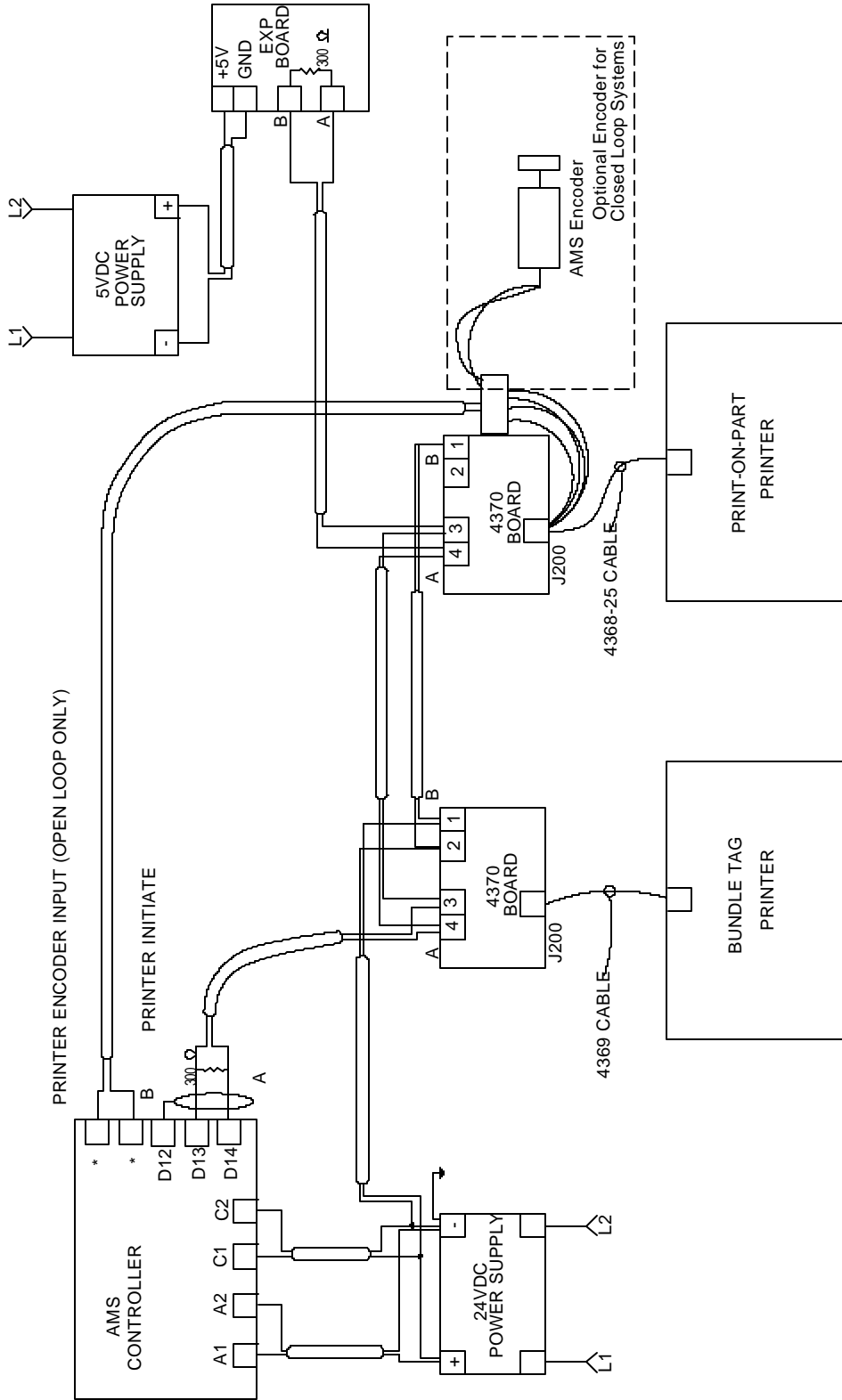
NOTES:

* SEE INSTALLATION OF MATTHEWS 2001 PRINTER DOCUMENT FOR PRINTER INITIATE OUTPUT AND PRINTER ENCODER OUTPUT.

ALL WIRES ARE TWISTED PAIRS

300Ω RESISTORS ARE PLACED AT THE CONTROLLER AND AT THE LAST UNIT IN LINE ON COMMUNICATION LINE

AMS CONTROLS, INC.

TITLE	COMMUNICATIONS CONNECTION		
DRAWN BY	DFK	SCALE	MATERIAL
CHK'D		DATE	12-23-96	DRAWING NO.
FILE	4425.dw2	APP'D		4425

REVISIONS

NO.	DATE	BY
A	5-22-97	DFK
B		
C		
D		
E		

To Matthews 2001
Ink Jet Printer

4368CL-25 CABLE CONNETIONS

To AMS
4370-1 J200

(DB15)

1
2
3
4
6
7
9
10
11

Yellow
Blk with Yellow
Blk with Blue
Blue
Blk with Red
Red
Green
White

5   Blue
7   Blk with Blue
8   Yellow
9   Blk with Yellow

(DB9)

Blk with Red   Common
Red   + 5 VDC
Green   Printer Initiate
White   Printer Encoder Input

Note: In Closed Loop applications, the Printer Encoder input will go directly to the encoder.

AMS CONTROLS, INC.

TITLE 4368CL-25 CABLE CONNECTIONS

Matthews Ink Jet Printer
4368CL-25 Cable Installation
for Closed Loop Controllers

AMS Controller

24VDC Supply

AMS IJP Encoder

3805-X

4368CL-25

4370-1

Ink Jet Printer

Com.
+5VDC
PE
PI

Black from Red
Red
White
Green

Black from Red
Red
White
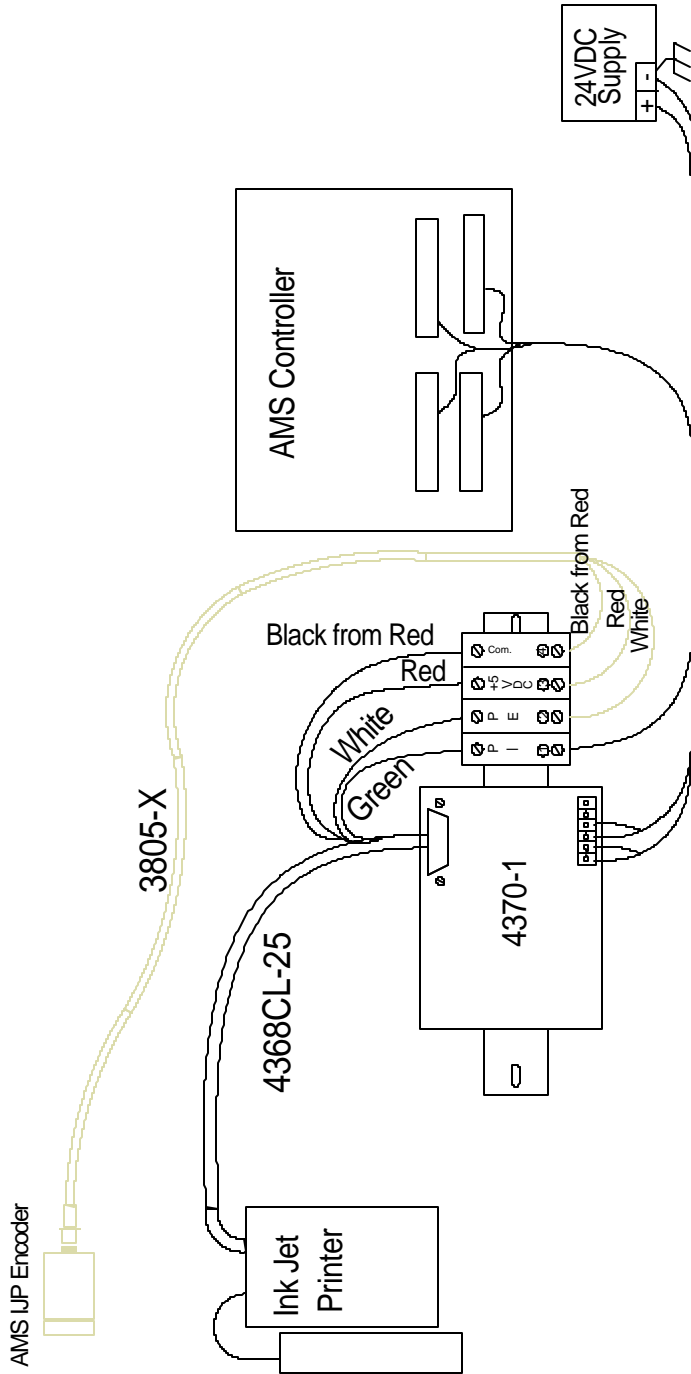
Notes:
① PI = Printer Initiate
② PE = Printer Encoder
③ +5 VDC
④ Common
* The 3805-X cable and the encoder are shown for illustration purposes only. This is not part of the production assembly.

STANDARD INKJET PRINTER INSTALLATION

NOTES:

*   D16, D12 OR CHASSIS

**   SUPPLIED AS PART OF THE INK JET PRINTER PACKAGE

†   THE PRINTER INITIATE OUTPUT IS THE NEXT AVAILABLE
     PRESS OUTPUT FROM THE CONTROLLER.

††   REFER TO MATTHEWS INSTALLATION DOCUMENT
     FOR ENCODER OUTPUT

AMS CONTROLS, INC.

	REVISIONS		TITLE	STANDARD INKJET PRINTER INSTALLATION	
NO.	DATE	BY			
A	5-22-97	DFK	DRAWN BY DFK	SCALE	MATERIAL
B			CHK'D	DATE 12-19-96	DRAWING NO.
C					4369_1
D			FILE 4369_1.dw2	APP'D	
E					

OPTIONAL INKJET REMOTE PRINTER INSTALLATION
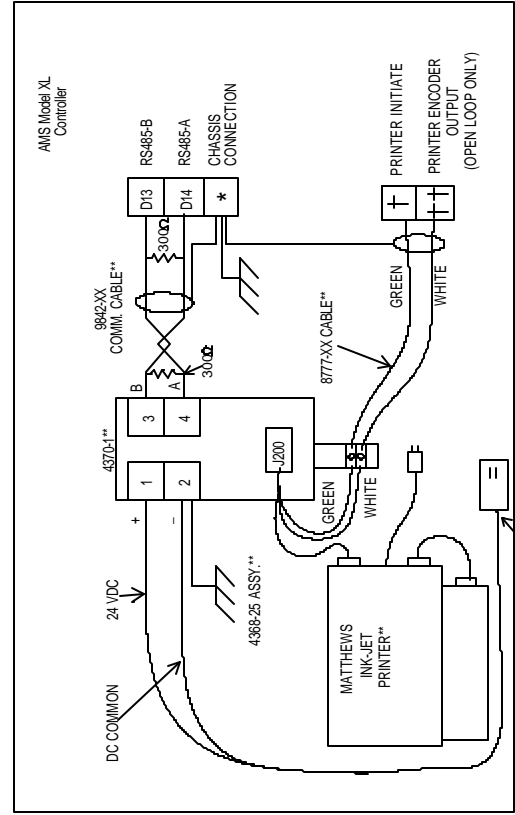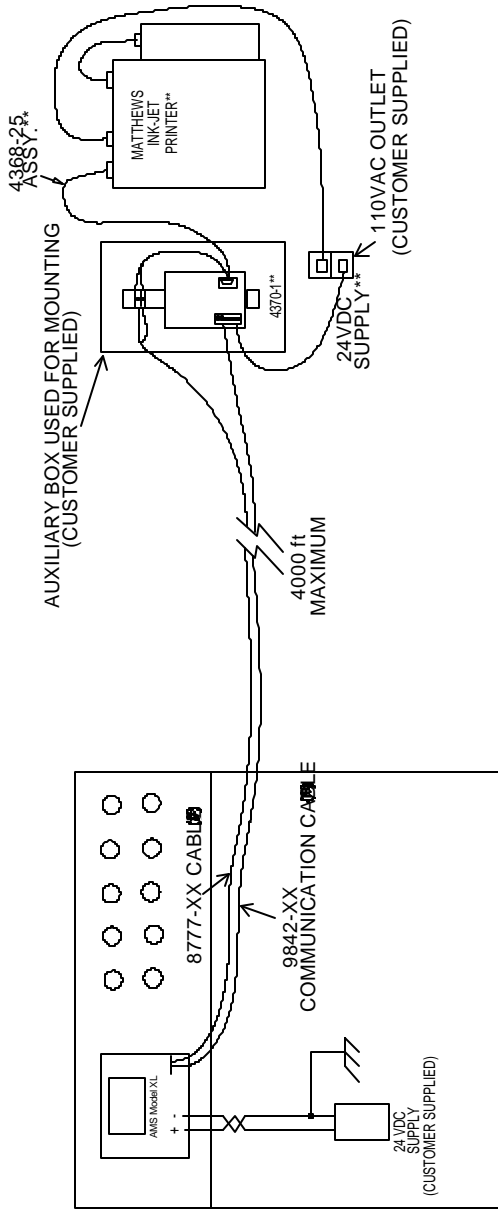
4368-25
ASSY.**

MATTHEWS
INK-JET
PRINTER**

110VAC OUTLET
(CUSTOMER SUPPLIED)

4370-1**

24VDC
SUPPLY**

AUXILIARY BOX USED FOR MOUNTING
(CUSTOMER SUPPLIED)

4000 ft
MAXIMUM

8777-XX CABLE**

9842-XX
COMMUNICATION CABLE

AMS Model XL

24 VDC
SUPPLY
(CUSTOMER SUPPLIED)

Notes:

The DC common of the controller must be chassis grounded

*   D16, D12 or Chassis

**   Supplied as part of the Ink Jet Printer Package

(#) Supplied by customer unless other arrangements are
     made with AMS Controls.

†   The Printer Initiate output is the next available
     press from the controller

††   Refer to the Matthews installation document
     for Printer Encoder output

AMS Model XL
Controller

RS485-B

RS485-A

CHASSIS
CONNECTION

PRINTER INITIATE

PRINTER ENCODER
OUTPUT
(OPEN LOOP ONLY)

D13

D14

*

9842-XX
COMM. CABLE**

30Ω

30Ω

B

A

GREEN

WHITE

8777-XX CABLE**

4370-1**

3

4

1

2

J200

GREEN

WHITE

DC COMMON

24 VDC

4368-25 ASSY.**

MATTHEWS
INK-JET
PRINTER**

AC/DC CONVERTER
24VDC SUPPLY**

STANDARD BUNDLE TAG PRINTER INSTALLATION

AMS Model XL CONTROLLER

RS485-B
RS485-A
CHASSIS CONNECTION

D13
D14
*

9842-10
COMM. CABLE**

300Ω
300Ω

B 3
A 4
1
2

4370-2**

J200

+
-

24VDC
DC COMMON

4369 ASSEMBLY**

C.ITOH T-4
BUNDLE TAG
PRINTER**

Notes:
* D16, D12 or Chassis
** Supplied as part of the Bundle Ticket Printer Package

BUNDLE TICKET PRINTER**

4369-10 CABLE ASSEMBLY**
(10 ft.)

110VAC OUTLET
(CUSTOMER SUPPLIED)

4370-2**

COMMUNICATIONS CABLE**
9842-10

TWISTED-PAIR WIRE**
(10 ft.)

AMS Model XL
+ -

24 VDC
SUPPLY
(CUSTOMER SUPPLIED)

C.ITOH SETUP MODES:

SELF-TEST MODE - Press "FEED" key while turning power on. Turn power off to exit.
SYSTEM MAINTENANCE MODE - Press "PAUSE", "FEED", and "STOP" keys while turning power on. Press "STOP" key to exit.
PRINTER SETTING MODE - Press "PAUSE" and "FEED" keys. Press "STOP" to exit.

For more information on these setup modes see the C.ITOH user's manual.

The C.ITOH works properly with the default setup parameters listed below:

Baud Rate	9600bps
Data Length	8 bits
Parity	Parity N
Flow Control	XON/XOFF
Interface	RS232C
Model	NativeOF
Voltage	PE*.*V

AMS CONTROLS, INC.

TITLE STANDARD BUNDLE TAG PRINTER

DRAWN BY DFK
CHK'D
FILE 4371_1.dw2

SCALE
DATE 12-19-96
APP'D

MATERIAL
DRAWING NO.
4371_1

REVISIONS

NO.	DATE	BY
A	5-22-97	DFK
B		
C		
D		
E		

OPTIONAL BUNDLE TAG PRINTER REMOTE INSTALLATION
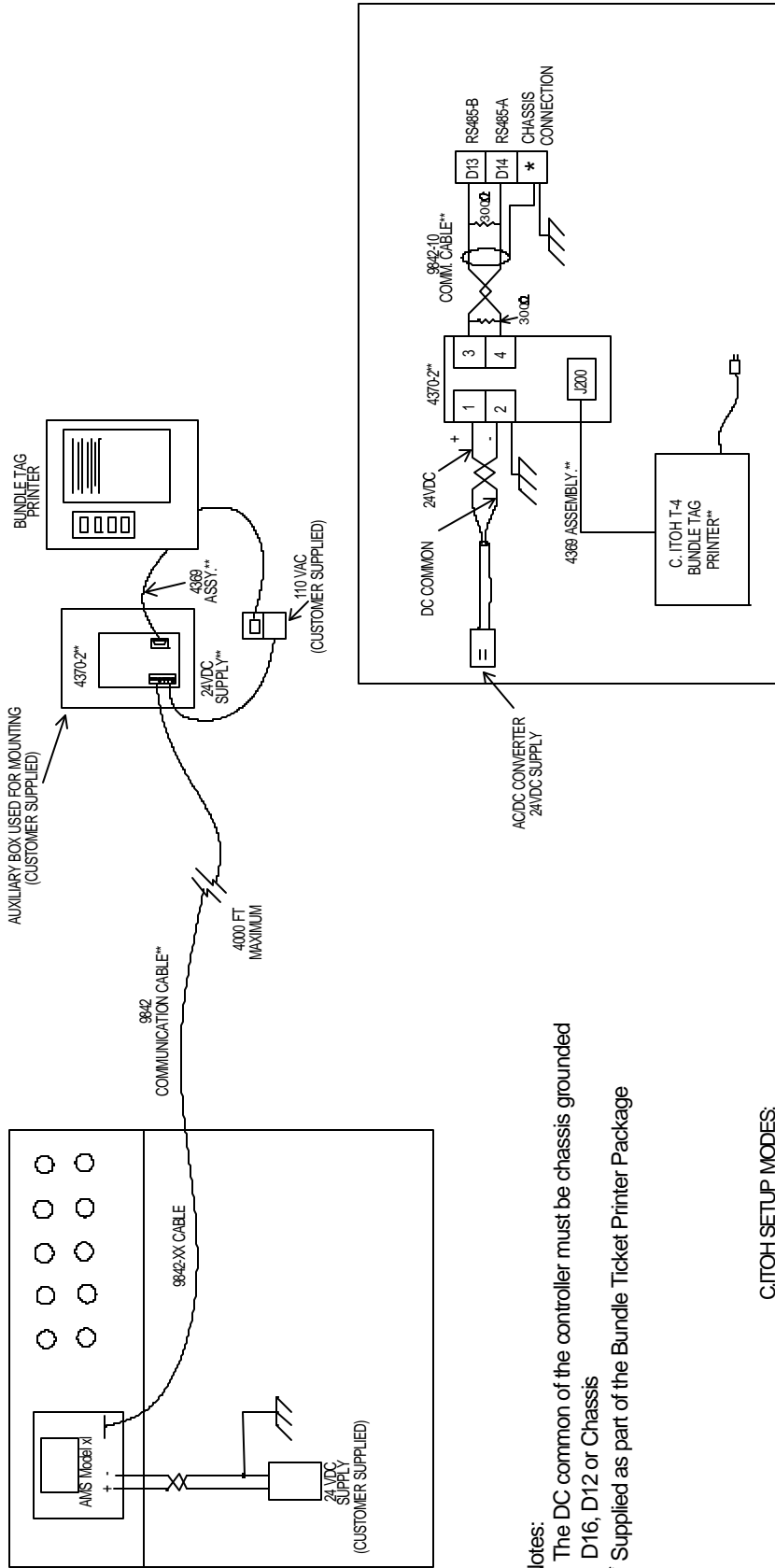
BUNDLE TAG PRINTER

4369 ASSY.**

4370-2**

24VDC SUPPLY**

110 VAC (CUSTOMER SUPPLIED)

AUXILIARY BOX USED FOR MOUNTING (CUSTOMER SUPPLIED)

9842 COMMUNICATION CABLE**

9842-XX CABLE

4000 FT MAXIMUM

AMS Model xl

24 VDC SUPPLY (CUSTOMER SUPPLIED)

D13 RS485-B
D14 RS485-A
*   CHASSIS CONNECTION

300Ω

9842-10 COMM. CABLE**

300Ω

4370-2**
3 4
1 2

J200

24VDC + -

DC COMMON

4369 ASSEMBLY **

C. ITOH T-4 BUNDLE TAG PRINTER**

AC/DC CONVERTER 24VDC SUPPLY

Notes:
The DC common of the controller must be chassis grounded
* D16, D12 or Chassis
** Supplied as part of the Bundle Ticket Printer Package

C.ITOH SETUP MODES:

SELF-TEST MODE - Press "FEED" key while turning power on. Turn power off to exit.
SYSTEM MAINTENANCE MODE - Press "PAUSE", "FEED", and "STOP" keys while turning power on. Press "STOP" key to exit.
PRINTER SETTING MODE - Press "PAUSE" and "FEED" keys. Press "STOP" to exit.

For more information on these setup modes see the C.ITOH user's manual.

The C.ITOH works properly with the default setup parameters listed below:

Baud Rate	9600ps
Data Length	8 bits
Parity	Parity N
Flow Control	XON/XOFF
Interface	RS232C
Model	NativeOF
Voltage	PE * : V

STANDARD PRINTER/APPLICATOR INSTALLATION

AMS Model XL

8232 CABLE ASSEMBLY** (30 FT.)

4369 CABLE ASSEMBLY** (10 FT.)

110VAC OUTLET (CUSTOMER SUPPLIED)

4370-2**

COMMUNICATION CABLE** (9842 CABLE 10 ft.)

TWISTED PAIR WIRE** (10 ft.)

AMS Model XL

24VDC SUPPLY (CUSTOMER SUPPLIED)

AMS Model XL CONTROLLER

RS485-B   D13
RS485-A   D14
CHASSIS CONNECTION   *

9842-10 COMM. CABLE**

30Ω

30Ω

B   3
A   4

4370-1**

1   2

J200

24VDC

DC COMMON

4369 -10**

AC PLUG

25-PIN CONN.

FOX-IV PRINTER

9-PIN CONN.

RED   PRINTER INITIATE

†   B5

BLACK   24VDC COMMON

8232-30**

NOTES:

*   D16, D12 OR CHASSIS

**   SUPPLIED AS PART OF THE PRINTER/APPLICATOR PACKAGE

†   THE PRINTER INITIATE OUTPUT IS THE NEXT AVAILABLE PRESS OUTPUT FROM THE CONTROLLER.
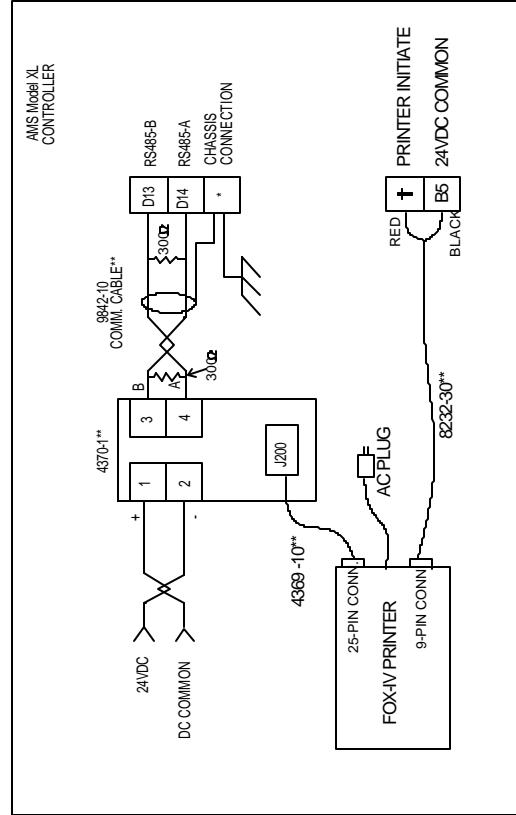
AMS CONTROLS, INC.

REVISIONS

NO.	DATE	BY
A		
B		
C		
D		
E		

TITLE   STANDARD FOX-IV PRINTER INSTALLATION

DRAWN BY KWC   SCALE   MATERIAL

CHKD   DATE 9-30-97   DRAWING NO.   4469

FILE 4469.DW2   APP'D

5.7

J200 ⬭ DB9S ⬭
Printer connection

6mm
terminal blocks

4370-1 / 2

4.4

DIN rail

Power supply and
AMS controller connections

J100 ⬭⬭⬭⬭⬭⬭
1 2 3 4 5 6

① ② ③ ④

OL

CL Systems

10"

1 2 3 4 5 6
◻◻◻◻◻

1.65

DIN Rail Mount
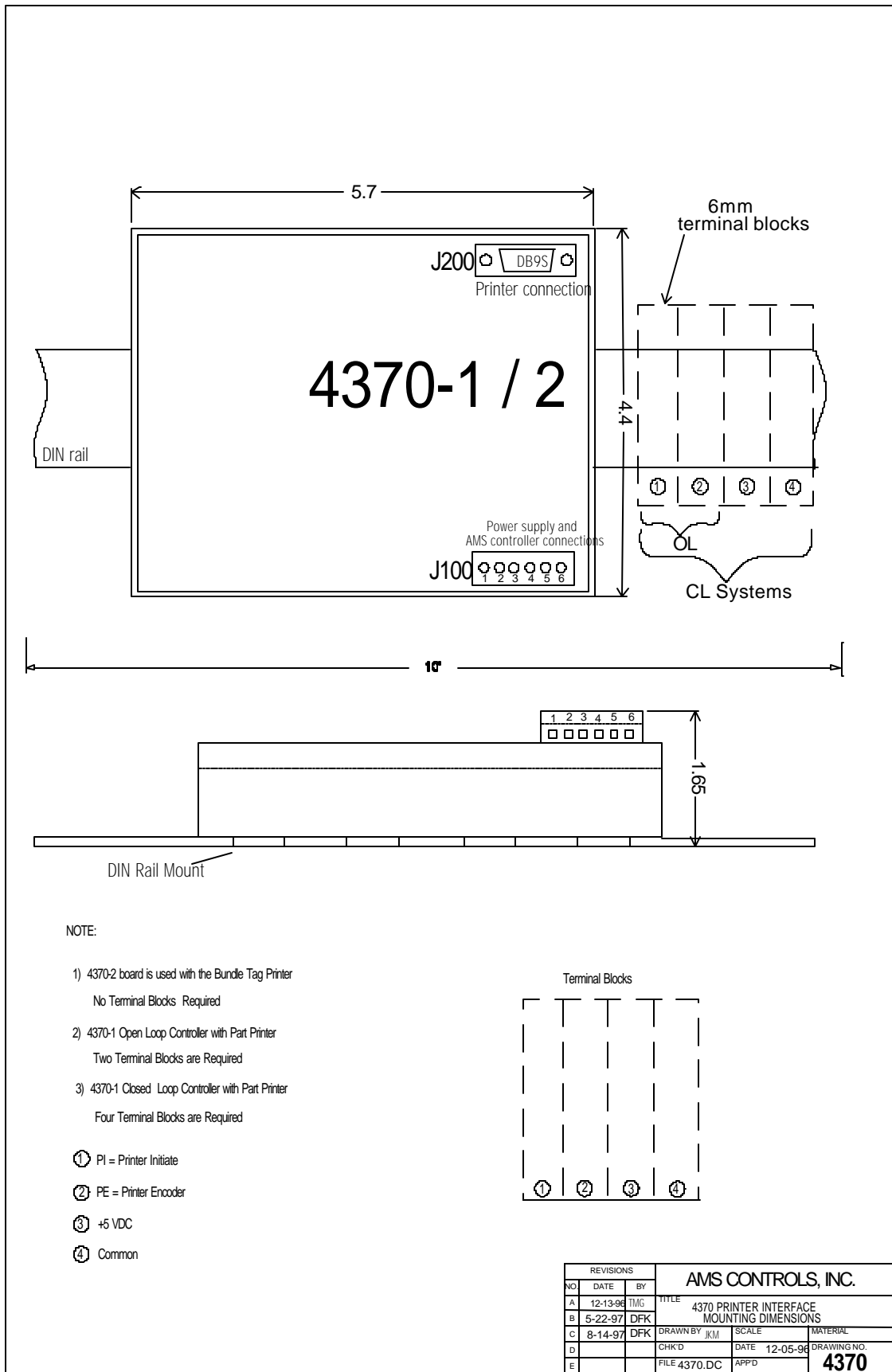
NOTE:

1) 4370-2 board is used with the Bundle Tag Printer
   No Terminal Blocks Required

2) 4370-1 Open Loop Controller with Part Printer
   Two Terminal Blocks are Required

3) 4370-1 Closed Loop Controller with Part Printer
   Four Terminal Blocks are Required

Terminal Blocks

① ② ③ ④

① PI = Printer Initiate

② PE = Printer Encoder

③ +5 VDC

④ Common
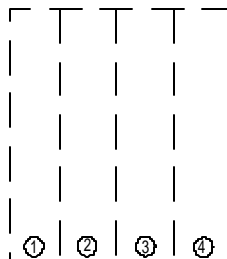
REVISIONS			AMS CONTROLS, INC.		
NO	DATE	BY	TITLE		
A	12-13-96	TMG	4370 PRINTER INTERFACE		
B	5-22-97	DFK	MOUNTING DIMENSIONS		
C	8-14-97	DFK	DRAWN BY JKM	SCALE	MATERIAL
D			CHK'D	DATE 12-05-96	DRAWING NO.
E			FILE 4370.DC	APP'D	**4370**

XL CL Software Changes

The following is a list of the software changes and procedures that have been made to the AMS Controls XL Series Closed Loop controllers. This document will just be a list of the changes that have been made.

Changes From Version 6.0x to 6.55

➢ Calibrate Trim Feature has been added. Used to automatically calculate the current CORRECTION FACTOR (SCN 39).

➢ Coil End Point parameter has been added. This is used to reduce scrap (SCN 49).

➢ Auto-Delete Done Orders parameter added. This will delete "Done" orders after a specified number of days (SCN 51).

➢ Coil End Offset parameter has been added. This is used to reduce scrap (SCN 64).

➢ Clearing the controller memory is provided by using the "5" key (SCN 127).

➢ The Communications Test Baud Rate must be set to machine the office computer. This is not an automatic adjustment.

➢ "Feed-OK Input" is the new name for the old "Feed Inhibit" input (SCN 100).

➢ "E-Stop Input" is the new name for the old "Drive Ready" input (SCN 104).

➢ The Setup Lockout function locks the operator out of important functions but does not lock out "Halt After Item", "Halt No Items to Run", "Delay After Shear", and "Units of Measure" (SCN 151).

➢ Scrap Length parameter has been added. Used on punching lines, it will produce shear only parts when starting a new coil.

➢ Delay Reason defines why a machine was halted if the machine is halted over a specified period of time. This is used on production records (SCN 185).

➢ Employee Numbers identifies the operator of a machine for use on production records (SCN 186, 202).

- ➢ Halt Delay Minimum (with XL Link only) has been added to set the amount of time before an operator is prompted to enter a Delay Reason code (SCN 195).

- ➢ Bundle Printer is now an Option (SCN 216).

- ➢ Lag Integral parameter has been added.   This defines the Integral time constant to remove velocity error (Lag) when tracking a moving target (SCN 225).

- ➢ Offset Integral parameter has been added. Defines the Integral time constant to remove position error (drift) in a servo system (SCN 226).

- ➢ Lag Comp (Auto) parameter has been added. This parameter is set to correct for the position of the die lagging behind the target (SCN 227).

- ➢ Tolerance Error display has been added. Part of the Display Loop Data feature, it shows the error between the encoder and the programmed part length (SCN 230).

- ➢ Offset Volts (Auto) parameter has been added. This is the voltage to hold the feed rolls with no movement in either direction (SCN 234).

- ➢ Display Loop Data feature has been added. This is a new troubleshooting screen on the controller that will display information relating to the closed loop system (SCN 234).

- ➢ Analog Output display has been added. Part of the Display Loop Data feature, it shows the current analog voltage from the controller to the servo positioning motor (SCN 234).

- ➢ Maximum Tolerance display has been added. Part of the Display Loop Data feature, this will show the largest tolerance error since the troubleshooting screen was entered (SCN 235).

- ➢ Scrap Code defines the type of scrap that is being produced by the machine for use on production records (SCN 241).

- ➢ Derivative parameter has been added. It is used on some hydraulic systems (SCN 254).

- ➢ Halt Mode parameter replaces "Halt After Item?" (SCN 285)

- ➢ Item Complete Dwell parameter has been added (XL100CL Only). This parameter sets the time that the ITEM COMPLETE output stays on (SCN 310).

- Delay After Shear maximum limit has been changed to 60 seconds (SCN 314).

- Shear Dwell of zero is now allowed to ensure that a Feed-to-Stop line is not restarted until the Shear Complete switch has closed (SCN 317).

- Tool Data has been changed and will now allow the user to enter more than one tool on a single press (SCN 350).

- If the User attempts to enter a part length which is less than the Minimum Part Length specified in the SETUP DATA, an error message will be displayed (SCN 354).

- Shear Up time can now be set to a different time than the Shear Down time (SCN 355).

- The Enable Output now has a 2 Second delay to allow the drive to react to large motors (SCN 361).

- Format choices are now located in the MACHINE DATA screen instead of the SETUP display (New to 6.5 software).

- Order Field will now accept up to 18 characters (New to 6.5 software).

- Material Field will now accept up to 20 characters (New to 6.5 software).

- Coil Inventory Numbers will now accept up to 16 characters (New to 6.5 software).

- Coil Initial Footage is now eliminated (New to 6.5 software).

- XL Link codes Scrap Code, Delay Reason, and Employee Numbers are now available (New to 6.5 software).

- Macro Programming allows the creation of patterns that can represent multiple operations and can be inserted into other patterns (New to 6.5 software).

- Options are now available for Bundle Tag Printer, Print-On-Part Printer, Bar Code Scanner, and Custom Menus (New to 6.5 software).

- When no good footage is run for a coil when it is loaded, the material that is assigned to be next, is now assigned to the new coil (New to 6.5 software).

- ➤ The gag setup time has been increased from 0.25 seconds to 0.5 seconds to ensure that the gag fires prior to the press (New to 6.5 software).

- ➤ If there is no Sheet Detect input when a new coil is entered the controller, the display will not ask for a new coil to be loaded as it has done in the past (New to 6.5 software).

- ➤ Bar code Scanner changes have been made as a code can now be entered with one scan instead of using the scanner to provide keystrokes (New to 6.5 software).

- ➤ The Manual Shear on Non-Stopping Lines (XL100CL Only) procedure has been changed. A manual shear with the line halted is now disabled with the customizing switch in the proper position (New to 6.5 software).

- ➤ If the Sheet Detect switch is false and a manual shear is performed, the material is not counted as scrap, to keep it from being counted twice (New to 6.5 software).

- ➤ The tracking of the material in a closed loop system has changed when two encoders are used (New to 6.5 software).

- ➤ The line encoder direction for 2 encoder, feed-to-stop that is controlled with the switch settings, is reversed in versions 6.52 through 6.58. It is corrected in versions 6.59.

Changes From Version 6.55 to 6.56

- ➤ Advance After Cut parameter has been added to Die Accelerator machines. This parameter is used to keep the shear blade from scraping against leading edge of the metal as it moves up (SCN 365).

- ➤ The Decrease Quantity procedure allows more than a quantity of one to be decremented at a time (SCN 368).

- ➤ The Increase Quantity procedure allows more than a quantity of one to be incremented at a time (SCN 369).

- ➤ Increment Quantity on a Done Item is now allowed (SCN 369).

- ➤ Minimum Footage to Request Order will now accept up to 4 digits (SCN 374).

- Calibrate Trim now uses the "Last Part Cut" instead of the "Last Programmed Part", which makes the CALIBRATE TRIM feature more accurate (SCN 380).

- Retract After Cut parameter has been added to Feed-to-Stop machines. This parameter is used to keep the shear from scraping the trailing edge of the metal as it moves up (SCN 386).

- Slow Run Input has now been added for Feed-to Stop applications (SCN 386).

- Press Complete Inputs will now appear in the Input/Output Display when appropriate (SCN 386).

Changes From Version 6.56 to 6.57

- "Bad Memory" errors are flagged with an error message when the controller powers up. When the error message is cleared the controller will delete all invalid records (SCN 392).

Changes From Version 6.57 to 6.58

- The Slip Test on Feed-To-Stop, two encoder machines has been changed. This change gives the conditions for the controller to display a MAXIMUM SLIP ERROR (SCN 399).

Changes From Version 6.58 to 6.59

- The line encoder direction for 2 encoder, feed-to-stop that is controlled with the switch settings, is reversed in versions 6.52 through 6.58.   It is corrected in versions 6.59.

- Advance after cut has parameter has been added which allows the user to advance the die during the cut cycle. The advance occurs immediately following the end of the shear dwell down or after the shear complete input. The feature was added to accommodate flying cut saws which need to retract the saw after the material has been cut. It can also be used to prevent the shear blade from "dinging" the edge of the sheet after the previous sheet has been cut on flying die machines (SCN 365).

- The controller will now operate with a Remote Terminal display and keyboard with no LCD. The controller will operate with the Remoter Terminal only, LCD only, or both (SCN 402).

- The Auto Request Order parameter allows the user to down load orders from the XL-Link program. Whenever the total remaining

footage of all orders in memory falls below the Auto Request Order setup parameter, the XL-Link will automatically send more production orders to the controller (SCN 422).

➢ When performing an Increment Quantity, the cursor must be placed on the line containing the part quantity and length before an Increment Quantity is allowed (SCN 435).

➢ The option of having a total of 351 Macros is now available. Pattern numbers 649-999 are reserved for creating Macro patterns that can be sued within a standard pattern. Macro patterns within a Macro will not be allowed and will produce an error message at the controller. When a Macro is programmed, the reference selections are limited to Lead Center and Trail Center only. Any combination of programmed tools and Macro patterns may be used in a standard pattern (SCN 438).

Changes from Version 6.59 to 6.60

➢ None apparent to the user.

Changes from Version 6.60 to 6.61

➢ Tool 0 (the shear tool) may now be programmed inside of a pattern.

➢ The editor will only allow a Leading Edge reference for any Tool 0 operation and the length may be programmed to any value. Only one Tool 0 operation may be used in any one pattern and Tool 0 may not be used in a Macro pattern. If using the Tool 0 inside of a pattern, the Minimum Part Length parameter must be set to zero. If any of these rules are broken, the controller will generate an error message upon exiting the pattern edit screen indicating that invalid operations have been deleted. This feature was added per customer request to allow an operator to define one complete part (length and pattern) by one ID number (the pattern ID). He/she may then program a quantity with a Part Length of 0, specify a pre-defined pattern, and automatically generate a part with the desired length and punch pattern (SCN 456).

Changes from Version 6.61 to 6.62

➢ None apparent to the user.

Changes from Version 6.62 to 6.63

➢ None apparent to the user.

Changes from Version 6.63 to 6.64

> When the XL100CL controller is powered up, the software automatically creates the shear and punch tool records. The names used in the past were "Shear" and "Press 1". The name for the punch tool was inconsistent with the actual press output used to fire the tool and with other references such as press dwell and reaction times. The record name for the automatically created punch tool now reads "Press 2" (SCN 466).

Changes from Version 6.64 to 6.65

> Special Release

Changes from Version 6.65 to 6.67

> The Increment Quantity function has been redefined. The previous definition only allowed one increment quantity to be performed at a time which forced the operator to wait for the part to be sheared before doing another increment quantity. With the change, more than one increment quantity request (up to 9 total), can now be processed at the same time. To cancel a multiple increment quantity request, use the Decrement Quantity key (SCN 470).

> Product Codes are added to the programming sequence. This option is selected in the Footage Totalizer Screen. (SCN 472)

> Communications were made to be more efficient between the XL Series controller and outside devices such as printers and expansion boards. (SCN 473)

> The Matthew's printer setup screen will now include a parameter to select whether the printer gets the print initiate from the XL Series controller or from a photoeye. The Citoh bundle ticket printer will also have an additional selection in it's setup screen that will allow the user to program how many identical tickets will be printed for each bundle print. (SCN 475)

> Mirrored punching will only accept references using the leading edge and lead center. Trailing center and trailing edge references will be ignored when using the mirroring option. (SCN 479)

> A software bug was repaired that involved using a print on part printer. When printed and non-printed items were programmed together, the queue and other locations could be corrupted. (SCN 480)

➢ Footage totalizers would not calculate their totals correctly if the newly adjusted amount grew to over 32,787 feet. This was corrected for. (SCN 481)

➢ Changed the communication interrupts the Remote Terminal and the Barcode Scanner operation. (SCN 485)

➢ Certain series of keystrokes (although a very unlikely series) could cause errors. This was corrected for. (SCN 490)

➢ The Citoh bundle ticket printer print macros were corrected. The Total Footage, Total Weight and Number of Squares were each involved. (SCN 491)

➢ If a Delay reason was entered and the controller was not run again for another amount of time equal to the delay time, a second delay reason prompt would be generated. Doing an INC QTY would also give this prompt. (496)

➢ Improvements were made to the controller's internal timing in order to improve the ability to read bar codes. (SCN 500)

➢ The top three line display routine was edited to insure that the proper information was displayed in the "%complete" section of the display. (SCN502)

➢ A parameter was added called "Manual Shear Scrap Length". This parameter will set a limit for any manual crops made by an operator. If this limit (length) is gone over, the controller will force the operator to input a Scrap Code in respect to the part just cut. A unit ID must be installed and "Scrap Codes" must be enabled to use this feature. (SCN508)

Changes from Version 6.67 to 7.00

➢ The XL-Link automatically updates the controller's clock if it is not correct. An error was corrected that caused the controller not to correct the clock until mid-night if the XL-Link gave it the command any time after 4.00 p.m. (SCN517)

➢ If an Inc. Qty. is performed when a status of fill was displayed, the controller would have to go to the next line item and would set the incremented part to ready for the operator to go back to. The controller was changed so that if this occurs, the controller will stop at the end of the item and prompt the operator with an "Increment Quantity Error". The operator would then have the choice of

continuing on with the upcoming item, or of clearing the queue and finishing the incremented item(s) first. (SCN518)

➤ The "Line Movement" parameter was added. This was added to enable the installer the ability to decide how the motion outputs worked along with the "run" output. With the parameter, the "run" output can be set to work with the forward/fast outputs or to work separately from the forward/fast outputs. (SCN521)

➤ Multiple operational changes were made in this change among them are the following:

➤ A new "Jog Mode Select" parameter that will select whether the jog inputs will move the die on a die-actuator or if it will turn on the jog outputs to jog the line.

➤ A new "Min Velocity" parameter to set the lower speed limit for the die-accelerator as it returns to its' home position.

➤ Increased response time for the hole-detect interrupt.

➤ The lag compensation factor and offset integral will not be updated during periods of line acceleration or deceleration. These items will also revert to their previous values should an E-stop error occur will the die is in operation.

➤ New error message: "E-stop Max Lag"

➤ New error message: "Min die Distance" for when the Minimum Die Distance is not set large enough for the line speed and accelerations that are being run.

➤ The offset volts disable time after the die has stopped was increased from .1 seconds To .5 seconds. (SCN 522)

➤ A correction was made to the controller to correct for the improper calculation of scrap footage if a shear occurs during the deceleration of the line after the line is halted by losing the sheet detect. (SCN 523)

Changes from Version 7.00 to 7.17

Changes from Version 7.00 to 7.12

➤ New Pick Key functions added to Item and Pattern Operation Editor (SCN 565).

Changes from Version 7.12 to 7.13

- New Pick Key search functions added to Program Orders Mode and Program Patterns Mode (SCN 567).

- Data entry fields on certain functions have been increased to handle alpha-numeric characters. This includes Tool Number, Pattern Number, Lift Number, and Scrap Codes (SCN 571).

Changes from Version 7.13 to 7.15

- A print driver has been added for the Zebra Z4000 industrial printer for controller models that support Bundle Tag or Part Printing (SCN 587).

- Two-speed logic feature added to die accelerator mode of operation (SCN 588).

Changes from Version 7.15 to 7.16

- Hole Mode option added (SCN 590).

- Abbreviations for Setup Parameters changed (SCN 599)

- Die Home Offset feature added for running longer lengths at faster line speeds and shorter lengths at slower line speeds. Used to reduce die stroke length when running short parts. With the new "Die Home Offset" setup parameter, the die will not return all the way to the home switch each cycle. Instead it returns to the offset position specified by the parameter. The parameter range for this setting is from zero to the Minimum Die Distance. The setup lockout key will not lock out this parameter. No changes will be allowed while the line is running.   (SCN 600)

Changes from Version 7.16 to 7.17

- Changes made to the memory test. Invalid records will not be deleted during Pass one. Instead they are removed and placed in a new "deleted record" chain. Pass two works as before, validating all data chains including the newly created chain. Pass three checks for records that don't belong and adds them to the deleted record chain. At the end of pass three, if the deleted record chain exists, all records in the chain will be deleted (SCN 614).

- Due to customer request, a new feature has been added to closed loop models of XL controllers. This change provides a simple procedure for changing from long parts running at high speeds to short parts running at a slower speed. This implementation required an alternate list of setup parameters that pertain to the die accelerator. Once the new setup values are entered, the user can

select which list of parameters to use by means of an input selector switch. The new list of setup parameters is included in the Machine Data list and contains the following.

- Enable Alternate Die Parameters

- Alternate Minimum Die Distance

- Alternate Maximum Die Distance

- Alternate Manual Shear Die Distance

- Alternate Die Home Position

- All parameters are locked out by the setup lockout key.

➢ Only the "Enable Alternate Die Parameters" setup appears in the list until the user toggles its selection to "Yes". This causes the four remaining "alternative" parameters to appear. This parameter only enables the other parameters to appear in the list, it does not apply the alternate values to the running operation. This is accomplished by external switching to the controller. The first four parameters define alternate values for the setups they are named after. As with previous versions, the Alt. Die Home Position can not be edited while the line is running. All distances are assumed to be measured from the die home switch.

➢ The alternate parameter list may be selected for use by activating an input while the controller is halted. The input number is input 16. When the input is turned OFF the original values are applied. When the input is turned ON, the alternate values are in effect. The alternate values may be used regardless of the state of the setup parameter "Enable Alternate Die Parameters".

➢ When running the machine with either the standard parameters or when using the alternate parameter list, the Shear Die will perform one of two functions controlled by the AMS Controller. If an unprocessed target lies between the die home switch and the Maximum Die Distance target, the shear will move forward to the target and perform a cut. On earlier versions the shear would return to its respective home position and then move forward. If the target is before the shear, the material will move forward. The Shear Die will perform the cut at the proper location as the target passes by. After both conditions, the Die will return to the appropriate home position as set by the Home Offset Distance parameter. (SCN 622)

Changes from Version 7.17 to 7.18

- ➢ Date Format" and "Date Separator" parameters were added to the format to allow International date formatting. (SCN 627)

- ➢ A "Shear Up" output was added to "XL1XXCLF" models. Previously only a "Shear Dwell" was programmable. Now a "Shear Dwell Down" and a "Shear Dwell Up" are both available. (SCN 628)

Changes from Version 7.18 to 7.19

- ➢ A menu selection was added to initiate an auxiliary Hole Queue to be cleared from the XL controller(SCN 630)

- ➢ The "Unload Queue Reset" was fixed to correct for an infinite loop that was caused by holes coasting past the punch press. (SCN 635)

- ➢ Added VideoJet Excel Print Driver (SCN 638)

- ➢ A correction was made that caused the controller to use the default set of closed loop parameters rather than the alternate parameters. This would typically occur after the unit was powered down and back up twice. (SCN 642)

- ➢ An error with the "Auto Request" for Setup Libraries was corrected. The requesting libraries too often. (SCN 643)

    - ▪ Improvements were made to the motor control routines to create faster material processing and to increase accuracy. The improvements are listed below. (SCN 644)

    - ▪ New algarithm was added to cause the motor feed to decelerate directly to the target instead of stopping short of the target and creeping into position.

    - ▪ Previously, the "Feed OK" input would cause the motor to decelerate to zero velocity, even if the input occurred briefly. Now the motor feed will accelerate back to feed velocity as soon as the "Feed Ok" input is returned, without first going completely to zero speed first.

    - ▪ A new parameter called "Slow Run Velocity" was added. Previously, the "Slow Run" input would cause the line to feed at the "Jog Velocity" setting. Now the line will feed at the rate programmed in the "Slow Run Velocity" parameter.

- The Slow run input can now be activated while in run mode. If while running the "Slow Run" input comes on, the line will decelerate to the velocity as set by the new "Slow Run Velocity" parameter. When the input goes off, the line will accelerate to "Maximum Velocity".

➢ Input fields related to the hole queue were expanded. (SCN 645)

- The Hole queue was increased from 100 holes to 1000 holes

- The limits for the setup parameter "Minimum Hole Spacing" was changed to range from 0.000 to 3500.000 inches.

- The Edit and Status screens were changed to allow 3 digit entries for the hole quantity fields, up to (999).

➢ A change was made to assure that specialized parameters for hydraulic controller models were not displayed on the standard controller. (SCN 646)

Changes from Version 7.19 to 7.20

➢ The "Press 7 complete" input was eliminated on XL112CL models in order to allow the "Slow Run" input exclusive rights to input number 16.

Changes from Version 7.20to 7.21

➢ New internal features were added to the XL Printer Drivers (SCN 651)

➢ Added the PM5100 Print Driver (SCN 652)

➢ The VideoJet Driver was changed to truncate messages longer than 255 characters, previously they were truncated at 32 characters. (SCN 658)

Changes from Version 7.21to 7.22

➢ A correction was made to allow for the correct reporting of "Scrap Codes" from the XL's list. Previously, some records were reporting the wrong code. (SCN 663)

Changes from Version 7.22 to 7.23

➢ Asynchronous Print Mode was added to the PM5100 printer (SCN 664)

➢ A "Missed Punch" would occur in certain circumstances where a single cut-only piece was followed by punched parts.   This was corrected. (SCN 666)

Changes from Version 7.23 to 7.24

➢ Bundle messages or part print messages were not printing if the bundle count was greater than 99. (SCN 667)

➢ A Print Message Bug occurred when the character count was 31 or greater. This was corrected for. (SCN 668)

Changes from Version 7.24 to 7.25

➢ Clear Queue on Shear Count >=2 (SCN 669)

➢ Changes to Initialize Queue Routine (SCN 670)

➢ Multiple changes were made. (SCN 673)

▪ PM5100 Changes will now cause the queue to clear when the controller halts.

▪ The AMSID string is now handled differently when the printer is not detected.

▪ Parameter "Print Delay" was added to allow a delay of 0 to 4000 mm from when the print trigger is activated.

▪ The "Slant Error Percentage" is now shown on the status screen for the printer

▪ The parameter "Enable Automatic Flush" was changed to "Enable Automatic Ink Flush".

➢ The PM5100 performance was improved to increase message turn-around time. (SCN 675)

➢ BMP Printing capabilities were improved in the Citoh T4 and the Zebra Z4000 printer drivers. (SCN 676)

➢ Added a new "Die Home Position" setup to all flying cut closed loop controllers. This has the same functionality as the "Alt. Die Home Position" setup parameter except it is used when the alternate list input is off. (SCN 677)

➢ The "Auxiliary Hole Queue Handling" menu was added with two menu options of "Setup Automatic Hole Queue Clear" and "Send Hole Queue Clear to All". (SCN 678)

➢ Setup & Tool Libraries were corrected, previously they were not being downloaded correctly. (SCN 679)

Changes from Version 7.25 to 7.26

➢ The Initialize Queue routine was Changed to correct for errors that occurred while removing negative targets from the queue. (SCN 686)

➢ "Memory Test" was improved (SCN 691)

➢ Changes were made to allow XL-Link to download "Hole" part data to the controller. (SCN 698)

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