MP450S Controller

(for Slitting and Cut-to-Length Machines)

Technical Reference & Installation Guide

Copyright © 2008 – AMS Controls, Inc. All rights reserved.

The information contained in this document is proprietary to AMS Controls, Inc., and is not to be reproduced in any form without the specific written authorization of AMS Controls, Inc.

AMS Controls, Inc. reserves the right to change the contents of this manual without customer notice or permission. The procedures described in this handbook must be performed only by trained, certified industrial electricians in accordance with local, state, federal, and NEC codes and regulations. While AMS Controls has taken all reasonable care to develop safe procedures, it accepts no responsibility for misprints, or for injuries, damages, death, or destruction to persons or equipment caused as a result of not closely following these instructions. For specific controller questions, contact AMS Controls Inc.

The most current version of this manual is always available at:
www.amscontrols.com/files/manuals/default.asp

AMS Controls, Inc.
12180 Prichard Farm Road
Maryland Heights, MO 63043

314.344.3144 – 1-800-334-5213 (US & Canada) – fax: 314.344.9996 – info@amscontrols.com

www.amscontrols.com

Table of Contents

TABLE OF CONTENTS ..... **I**
CHAPTER 1: INTRODUCTION **3**
OVERVIEW **3**
Features *3*
CHAPTER 2: INSTALLATION SPECIFICS **4**
MECHANICAL DETAILS **4**
Dimensional Drawing *4*
Cutout Drawing *5*
ELECTRICAL DETAILS **5**
Specifications *5*
Power 5
Inputs 6
Outputs 6
Encoder 6
Environmental 6
Pin Assignments and Descriptions *7*
J301 7
J401 8
SAMPLE INTERFACE DRAWING **9**
SOFTWARE CONFIGURATION **10**
Setup Screen *10*
Navigate the Setup Screen 10
Setup Parameters 11
CHAPTER 3: OPERATIONAL REFERENCE **13**
POSITIONING CONTROL **13**
Speed Logic Table *13*
Speed Diagram for Two-Speed Positioning *14*
Adaptive Stopping Compensation *14*
SCRAP CONTROL **14**
Motion Interlock *15*
E-Stop Input Functionality *15*

Chapter 1: Introduction

Overview

The AMS Controls MP450S is an industrial controller used to control cut-to-length machinery equipped with slitting knives. Figure 1 shows the front panel of the MP450S.

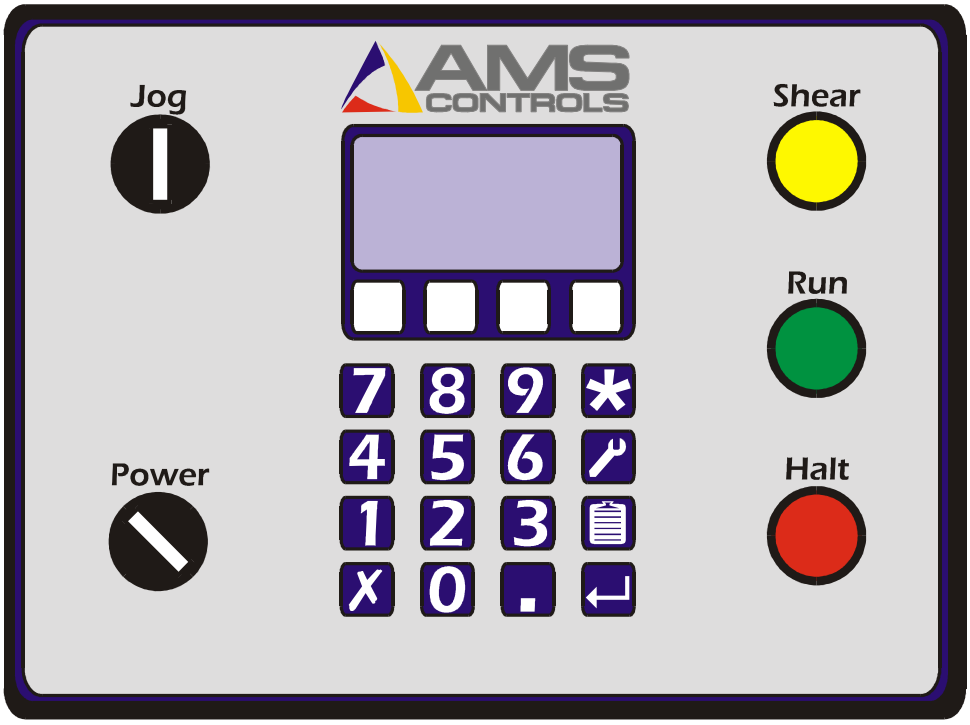

Figure 1: AMS Controls MP450S Controller

Features

The MP450S controller's features include:

- Accurate length control
- Simple programming
- Automatic stops for knife changes
- Easy calibration

Chapter 2: Installation Specifics

Mechanical Details

Dimensional Drawing

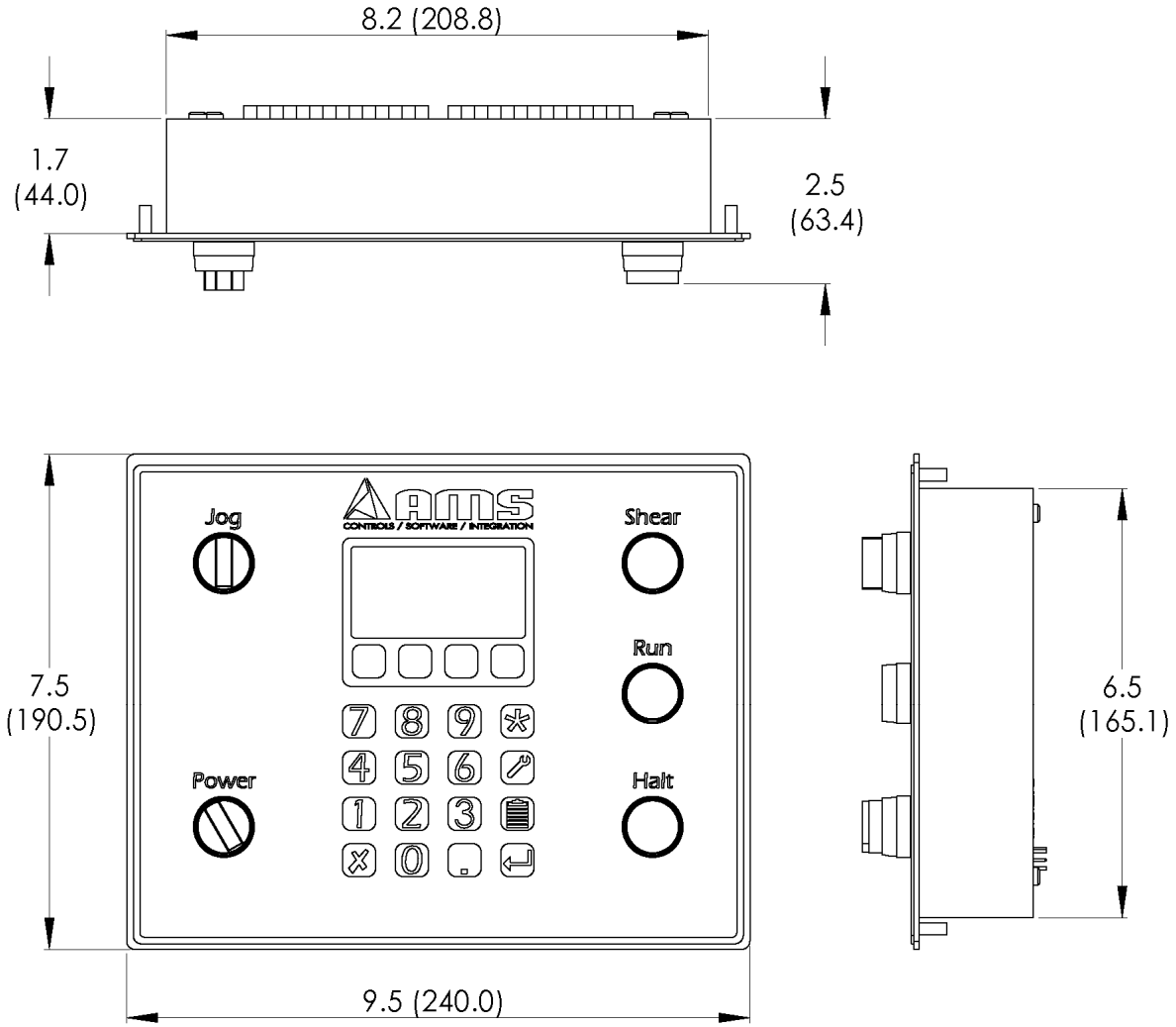

Figure 2: MP450S Dimensional Drawing

Cutout Drawing

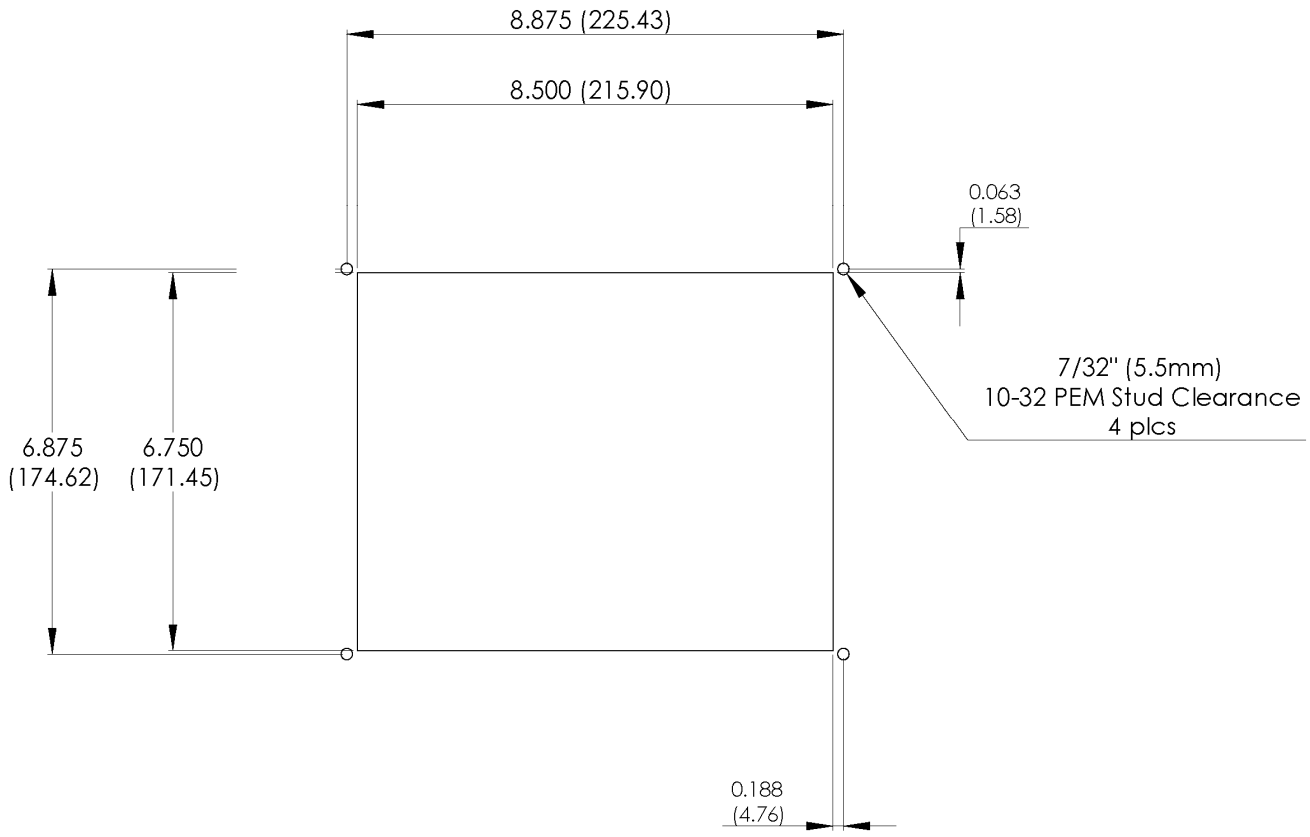

Figure 3: MP450S Cutout Drawing

Electrical Details

Specifications

Power

Supply voltage	24VDC (+/- 20%)
Supply current	400mA + Outputs
Max. inrush current	2A

Inputs

Type	Sourcing
Voltage	24VDC
Input resistance	1.8 KΩ
"ON" voltage	13.4 VDC
Optical Isolation	2500V

Outputs

Type	Sourcing
Voltage	24 VDC
Continuous Current	3A
Optical Isolation	2500V

Encoder

Supply voltage	5 VDC
Supply current	100mA
Type	Quadrature, differential (RS485)
Max. frequency	50 KHz
Optical Isolation	2500V

Environmental

Min. operating temp. (ambient)	-20C (-4F)
Max. operating temp. (ambient)	65C (150F)
Min. storage temp.	-30C (-22F)
Max storage temp.	85C (185F)

Pin Assignments and Descriptions

J301

Pin	Function	Assignment/Notes
1	I/O Ground	6A maximum
2	Output 1	Fast
3	Output 2	Shear
4	Output 3	Reverse
5	Output 4	Unused
6	Output 5	Slow
7	I/O Ground	6A maximum
8	I/O V (+24V)	
9	Input 1	Shear home
10	Input 2	Knives up
11	Input 3	Knives down
12	Input 4	Registration
13	Input 5	E-stop status
14	I/O V (+24V)	

J401

Pin	Function	Notes
1	RS485 2B+	Unused
2	RS485 2A-	
3	RS485 1A+	For firmware updates
4	RS485 1B-	
5	Encoder A+	
6	Encoder A-	
7	Encoder B+	
8	Encoder B-	
9	Encoder +5V	
10	Encoder Ground	
11	Power +VDC	
12	Power Ground	
13	Power switch contact A Panel Switch	20A maximum
14	Power switch contact B Panel Switch	20A maximum

Sample Interface Drawing

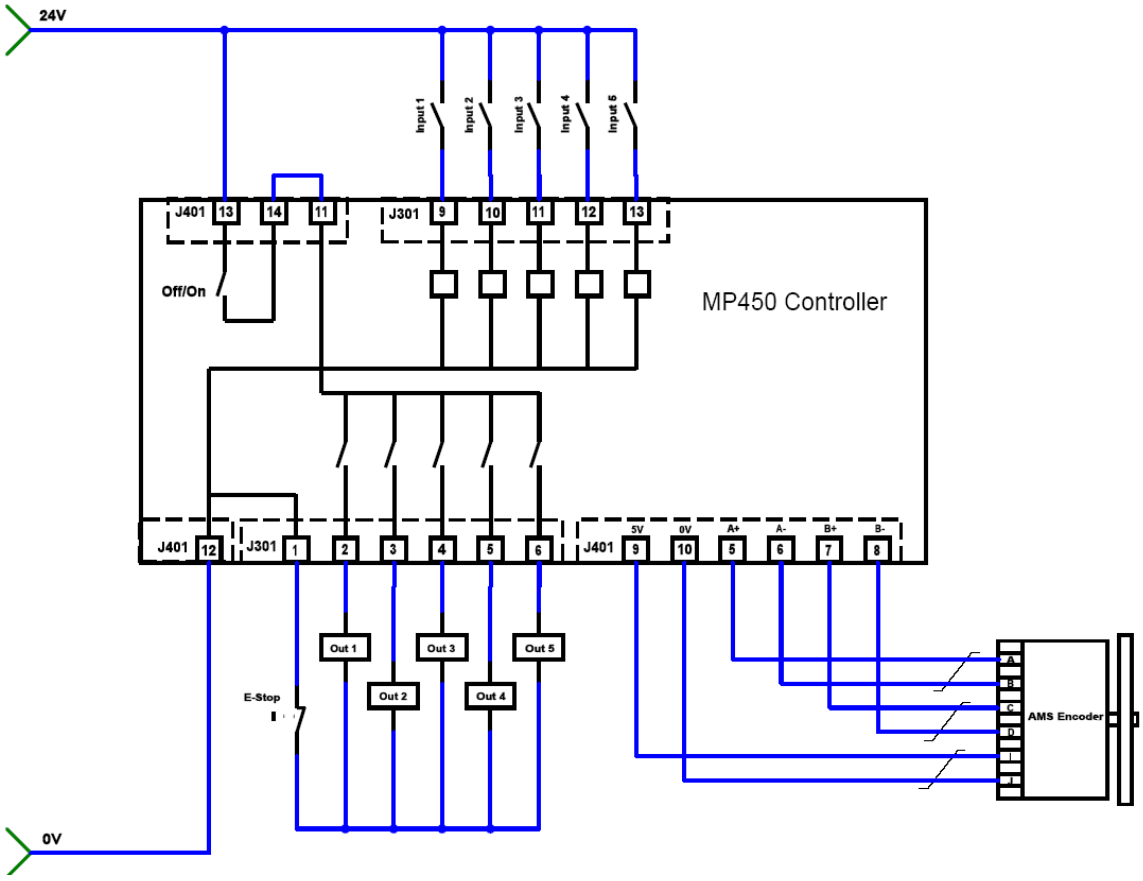

Figure 4: MP450S Sample Interface Drawing

Software Configuration

Setup Screen

Use the Setup screen to change the display units, encoder direction, registration distance, knife distance, and slow distance.

To enter the setup screen,

1. Power up the system.
2. While the startup screen displays, press **[9]**. The Setup screen displays.

Navigate the Setup Screen

- Use the Up and Down soft keys (white keys just below the display, see Figure 5) to navigate from item to item.

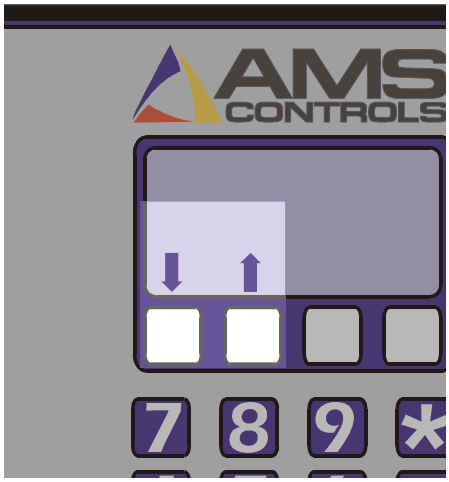

Figure 5: AMS Controls MP450S Controller front panel (Up and Down Soft Keys highlighted)

- Press a number key to change a selected setting temporarily, causing the field to blink.
- Press **[Enter]** to save the new setting and move to the next setup item, or **[Clear]** to restore the value to its original value.
- Press the Up (**[↑]**) or Down (**[↓]**) arrow keys while a field is blinking to restore its original value and move to the next item.

Setup Parameters

Note: These parameters retain their value while the machine is powered off.

Display Units

The display unit setting enables the operator to choose between viewing the part length in either feet and inches or metric millimeters.

Encoder Direction

The encoder direction allows the operator to change the direction of the encoder without modifying the machine wiring.

Changing this setting is necessary, for example, if the material position is shown to be moving backwards on the controller while the material is actually moving forwards. You would use this parameter, then, to reverse the encoder direction for the controller so it can register forward and backward movement correctly.

Registration Distance

Registration Distance is the distance from the registration input sensor to the shear blade, used to locate the leading edge of the material when auto-loading a new coil. Figure 6 illustrates the registration distance on a typical line.

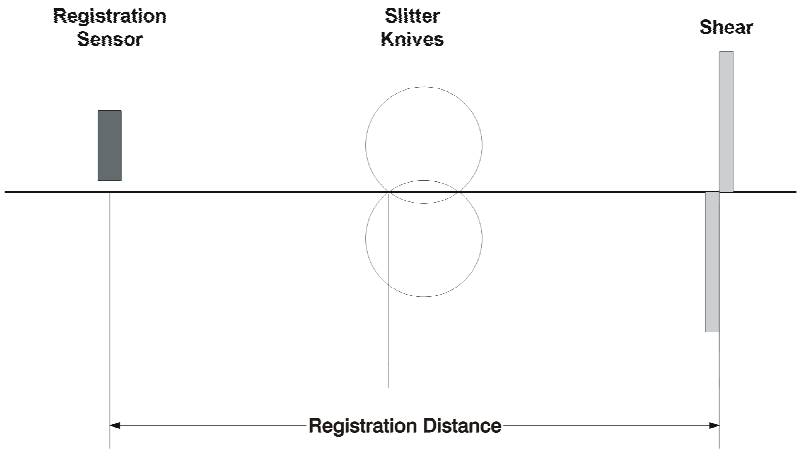

Figure 6: Registration Distance

Knife Distance

Knife Distance is the distance from the leading edge of the knife blades to the shear blade, used to automatically stop the material just before the leading edge of the knife blades when jogging reverse. Figure 7 illustrates the knife distance on a typical line.

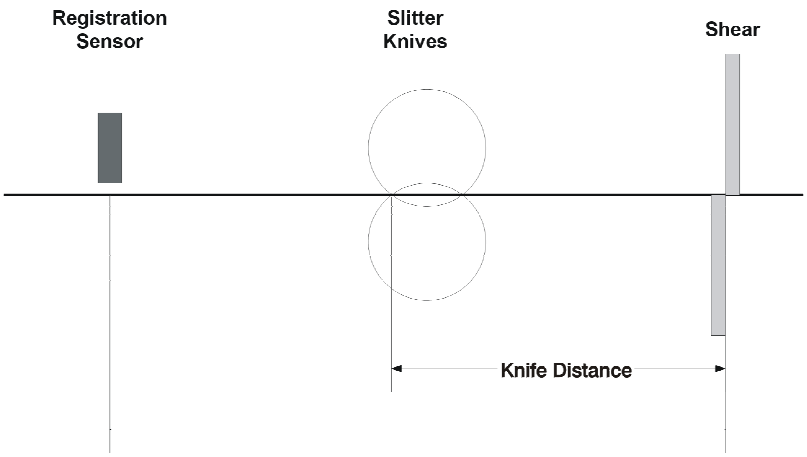

Figure 7: Knife Distance

Slow Distance

The distance that the controller feeds in slow speed before stopping for the cut operation.

The accuracy of a two-speed stopping control system depends on a stable slow speed. Through experimentation, it is possible to find a value that provides a good balance between accuracy and productivity.

If this parameter is set to zero, the controller operates in single speed mode, where it decelerates from fast speed to zero velocity. While this may increase the production of the machine, typically it is difficult to achieve good part length accuracy in this mode.

Chapter 3: Operational Reference

Note: For details on operating a machine with the MP450S Controller, see the **MP450S Operator Manual.**

Positioning Control

Speed Logic Table

Function			Output		
			Slow	***Fast***	***Reverse***
Manual	*Jog Forward*		Off	On	Off
	Jog Reverse		On	Off	On
Automatic	**2-Speed Mode**	*Run Fast*	Off	On	Off
		Run Slow	On	Off	Off
	Single Speed Mode	*Run*	Off	On	Off

Speed Diagram for Two-Speed Positioning

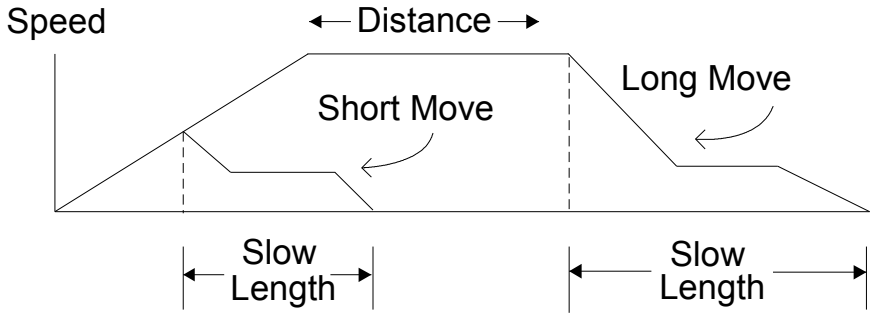

Figure 8: Speed Profile with Adaptive Stopping

Adaptive Stopping Compensation

Adaptive stopping compensation is a feature that enables the controller to account for changes in the amount of time required to bring moving material to a stop.

With a stopping control system, the controller must turn off the motion output before the desired target position is reached. The material then decelerates to a stop and is hopefully within the desired tolerance.

The MP450S constantly monitors the deceleration rate of the machine and makes slight adjustments to the time at which the motion output is turned off. This constant monitoring and adjustment is an important feature for machines that have stopping dynamics that change over time. This is especially an issue with hydraulics-based motion control where the temperature of the oil can affect the stopping behavior of the machine.

Scrap Control

The MP450S was designed to minimize operating scrap caused when the slitting knives must be repositioned.

If a job is programmed to raise the knives after the last part is completed, the controller actually stops the material early so that the old slitting knife configuration does not continue on to the next part. When the material reaches the point where the cut target hits the leading edge of the slitting knives, the controller

stops and displays a message instructing the operator to raise the knives. Once the knives are up, the operator can press the Run button and the last part is cut to the correct length. If no overlap from one knife setup to the next is desired, it may be necessary to jog the material forward and manually shear a short piece.

To set up for the next slitting pattern, the operator must jog the material backwards until the leading edge of the sheet is clear of the knives. The MP450S automatically stops when the material reaches this position. The operator must release the jog switch and activate it again to continue in reverse (when unloading the coil, for example).

Motion Interlock

There are no motion outputs if:

- the knife blades are in an undefined state (i.e., neither an up nor down input is made).

  or

- the last part for a job is being produced and the Raise Knives After Job parameter is set to Yes and the knives are not in the up position.

E-Stop Input Functionality

A warning message displays whenever the OFF to ON transition occurs on this input. The input is not intended to provide any safety functionality and is for informational purposes only.

> ***DANGER! DO NOT RELY on the controller's e-stop for machine safety. An external safety circuit using approved components must be used to provide emergency-stop functionality!***