

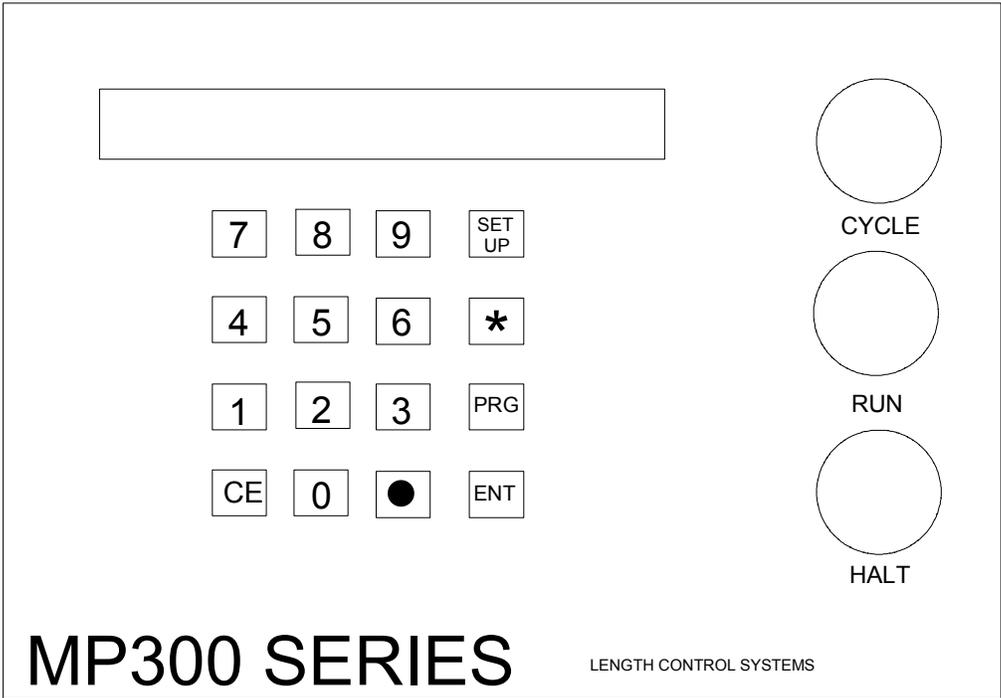
Model
MP342
Notcher Controller
Reference Manual

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Introduction

AMS Controls has been supplying length control systems to the metal fabricating industry since 1978 and has built a reputation of producing high quality and reliable controllers.

The **MP342** controller is used to run a notching device for HVAC ductwork. The controller has the capability to run the conveyor system feeding the material through the NOTCHER. Once the **MP342** is placed in RUN, the forward output turns on and stays on. The NOTCHER controller can be used on one speed or two speed lines.



Specification

Parameter	Panel Mount	AC Console
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Mechanical

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

Electrical

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

Outputs

Forward/Fast	Std DC	Std DC, AC Relay
Slow	Std DC	Std DC, AC Relay
Reverse	Std DC	Std DC, AC Relay
Run	Std DC	Std DC, AC Relay
End Notch	Std DC	Std DC, AC Relay
Vee Notch	Std DC	Std DC, AC Relay
End Notch Up/Boost	Std DC	Std DC, AC Relay
Vee Notch Up/Boost	Std DC	Std DC, AC Relay
Analog	0 to +10VDC	0 to +10VDC

Inputs

Jog Forward	Yes	Yes
Jog Reverse	Yes	Yes
Sheet Detect	Yes	Yes
Run Enable	Yes	Yes
Security	External	Internal
Not Used		
Manual End Notch	Yes	Yes
Manual Vee Notch	Yes	Yes

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

Output Characteristics

Standard DC

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

AC Relay

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

Solenoid Driver

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

Encoder Input

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

Operation

Maximum Part Length	9999.999 inches 254,000 millimeters
Units of Measurement	inches, centimeters, or millimeters

Features

Display	48 characters in 2 rows
Keys	16
Controls	3 (CYCLE, RUN, HALT)

Product Description

Front Panel Components and Description

The Model **MP342** front panel has three push button switches, a 16 key keypad, and a two line 48 character liquid crystal display.

The three push buttons provide the following functions:

- **CYCLE** Press to fire the Notch press when not in the Run mode
- **RUN** Press to initiate an automatic move sequence
- **HALT** Press to manually stop the guide movement

The keys provide the following functions:

- **SETUP** Press to enter the setup mode. The setup mode is used to enter specific parameters about the Notcher.
- ***** Press the asterisk key to exit the setup or programming modes.
- **PRG** Press to program a new notch pattern
- **ENT** Press to store the values entered in the setup and program modes.
- **CE** Press to clear an incorrect entry value before the "ENT" key is pressed. Also used to clear any errors reported by the controller.

Installation

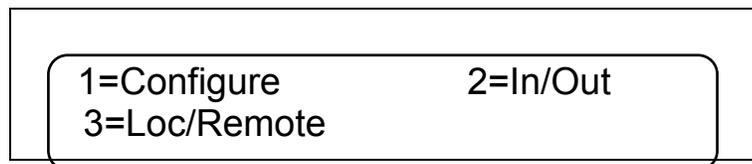
Setup Mode

Note: The following descriptions include all possible **SETUP PARAMETERS** and there are some parameters that are not used for every application. Only use the ones that apply for your particular machine. Make sure that the proper “dip switches” are set prior to entering setups. Refer to page A-1 for the proper dip switch settings.

The **SETUP** mode is used when the **MP342** is initially installed to configure it to the particular characteristics of the Notcher. The **SETUP** mode is entered by pressing the “Set Up” key and the mode can be exited by pressing the “*” key. When power is applied to the controller, the built-in diagnostics check the memory for data retention.

If an error is detected, the memory is automatically cleared and the **SETUP** mode is entered to indicate that this data should be reentered. The setup values are entered in the order shown below and an explanation of each parameter is given. A form is provided in the back of this manual for recording the setup parameters of your machine. This form should be completed after your machine has been installed and properly adjusted.

To enter the **SETUP** mode, press the “Set Up” key. The following display will appear.



Selecting 1 will allow the operator to adjust the following parameters:

End Dwell Dn

The END DWELL DOWN time is the time it takes for the press to go from the top of its stroke to the bottom. The range of time allowed is 0.001 to 9.999 seconds which can be set to the nearest millisecond.

End Dwell Up

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

Vee Dwell Dn

The VEE DWELL DOWN time is the time it takes for the press to go from the top of its stroke to the bottom. The range of time allowed is 0.001 to 9.999 seconds which can be set to the nearest millisecond.

Vee Dwell Up

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

LE End-Detect

The LE END-DETECT is the physical distance from the detect switch to the leading edge of the End Notch die.

TE End-Detect

The TE END-DETECT is the physical distance from the detect switch to the trailing edge of the End Notch die.

Vee-Detect

The VEE-DETECT is the physical distance from the detect switch to the center of the Vee Notch die.

Tolerance

On feed-to-stop machines, the controller can check for the material to be within a specified TOLERANCE before activating the shear or punch press. If the machine has not stopped within this TOLERANCE, the controller will halt and an error will be displayed. If the TOLERANCE is set at 0.03 inches, the length past the press operation must be greater than the programmed length plus or minus 0.03 before the press will be cycled. The TOLERANCE should be set small enough to get acceptable parts but wide enough to avoid production interruptions. The controller allows values from 0.0005 inches to 10.0000 inches. The default value for TOLERANCE is 1.0000 inches.

Stopping Mode

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

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

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

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

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

Stop Reaction

The STOP REACTION is the time it takes for the line to come to a stop after the outputs are turned off (measured in seconds). It is adjusted automatically after every stop by the **MP342** if the STOPPING MODE has been set to AUTO.

NOTE:

STOPPING REACTION should be adjusted prior to attempting to set the CORRECTION FACTOR.

Decel Factor Mode

On two-speed machines, a DECELERATION (DECEL) FACTOR is used by the **MP342** controller when changing from fast to slow speeds. The user has the option to select from three DECEL FACTOR MODES: AUTO, MANUAL, or OFF.

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

MANUAL: A DECEL FACTOR may be manually entered into the **MP342** controller. The value is used in the Adaptive Slowdown calculation. Some trial and error may be necessary when in the MANUAL mode to find a DECEL FACTOR which works properly. Ideally, the machine should shift from fast to slow at some distance prior to the target long enough so that it reaches a constant slow velocity before the movement outputs are turned off.

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

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

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

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

Decel Factor

This parameter is expressed in inches-per-second-per-second (In/Sec^2) and is used in the Adaptive Slowdown calculation discussed in the DECEL FACTOR MODE above. There is no

exact formula for this value so experimentation is necessary. Ideally the machine should shift from fast to slow at some distance prior to the target so that it reaches a constant slow velocity before the movement outputs are turned off. This value is automatically calculated by the controller if the DECEL FACTOR MODE is set to AUTO.

Press #1 Reaction (End Notch)

The PRESS REACTION time is the time delay between the time that the press signal occurs and the time that the die punches the material. This factor is used on flying die machines only, and has a maximum value of 5.0000 seconds.

Calculate the PRESS REACTION time using the following steps:

1. Set the SHEAR-PRESS DISTANCE and the PRESS REACTION time to zero.
2. Program a 120" part with

Press #2 Reaction (Vee Notch)

The PRESS REACTION time is the time delay between the time that the press signal occurs and the time that the die punches the material. This factor is used on flying die machines only, and has a maximum value of 5.0000 seconds.

Calculate the PRESS REACTION time using the following steps:

1. Set the SHEAR-PRESS DISTANCE and the PRESS REACTION time to zero.
2. Program a 120" part with

Encoder Direction

Pressing any number key or the PICK key toggles between CW (Clockwise) and CCW (Counter-Clockwise) for the direction of the encoder(s). If you run the line and the display counts negative, change the ENCODER DIRECTION. If two encoders are used, both encoders must rotate in the same direction.

Resolution

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

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

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

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

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

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

Correction

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

NOTE:

The STOPPING REACTION must be adjusted prior to attempting to calculate the CORRECTION FACTOR.

Calculate the CORRECTION FACTOR using the following steps:
 1) Use a long part for the test, (144" for example).
 2) Use a notch pattern to place a notch near both ends of the part, (at 12" and 132", for example).
 3) Measure the actual distance between the two notches.
 4) Use the following formula for the new CORRECTION FACTOR, using the programmed distance between the notches (in this case 132" - 12" = 120") for the "Programmed Length" and the measured distance between the notches as the "Actual Measured Length".

New CORR. FACTOR = Programmed Length ÷ Actual Measured Length x Old CORR. FACTOR

Filter Constant

The FILTER CONSTANT can be adjusted in order to improve accuracy. A low value should be used on machines with very stable line speeds. A high value (greater than 50 Hz) should be used when rapid fluctuations in line speeds occur. Some trial may be necessary to achieve an accurate value. The default value is 32 Hz, which is considered to be on the high side of the low values. The controller will allow values from 1.0 Hz to 200.0 Hz.

Units

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

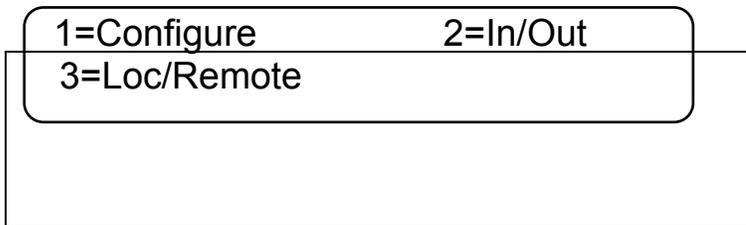
To exit the NOTCHER SETUP screen push the SETUP key.

Status Screen

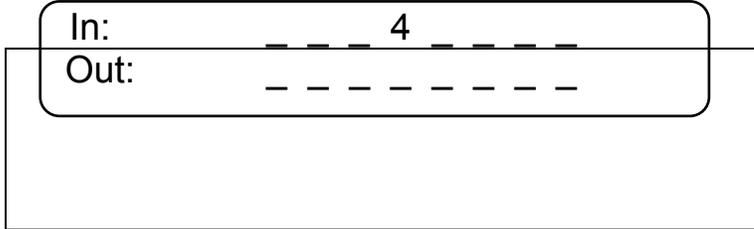
Pressing the "*" key will show the current velocity, current position, type of part, part height and part width.



If the "Set Up" key is pressed again other options are available.



If 2 is pressed, the INPUT/OUTPUT screen can be viewed. This can be helpful as a troubleshooting aid if the machine is not working properly.

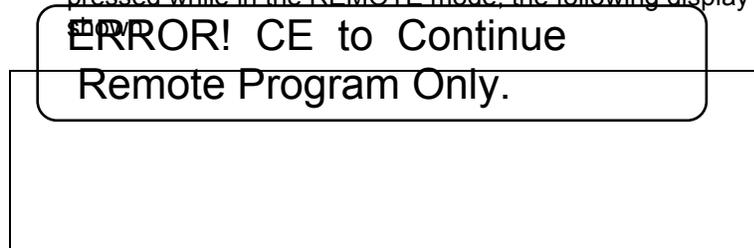


Pressing the "Set Up" key will allow you to exit this screen.

Pressing 3 while viewing the SETUP screen places the machine into the REMOTE mode. If the controller is in the REMOTE mode and 3 is pressed, the controller will toggle back to the LOCAL mode. The controller defaults to the LOCAL mode on the first power up and if the memory is cleared.

In the LOCAL mode, the line can be manually jogged and calibrated when the "Run Enable" input is on. The programming function of the controller is also accessible.

In the REMOTE mode, jogging and calibration can only be performed if the "Run Enable" input is turned off. The programming function is not accessible. If the "PRG" key is pressed while in the REMOTE mode, the following display will be shown.



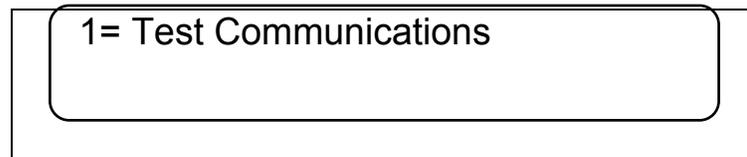
The top line will be flashing, and the "CE" key will return the controller to the STATUS screen.

If the "Run Enable" input is on, the line may be activated anytime by the Master Controller.

Operating Procedure

Communications Screen

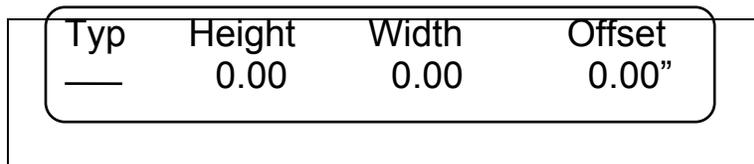
If the "Set Up" key is pressed twice, the following screen appears:



While in the second SETUP screen, pressing 1 will test the communications with another controller if they are interfaced together. If there is no communications, the messages "No Data Received" and "No Data Sent" will be seen.

Program Mode

The program mode is entered by pressing the "PRG" key.



The Type Part should be flashing steadily. This is the controller's way of informing the operator that it is waiting for the operator to enter information.

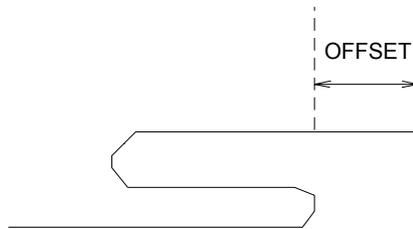
TYP (T) Part Type - One of four options:

- Single piece: End Notch is performed at each end.
- L - "L" shaped: Will have 1 Vee Notch
- U - "U" shaped: Will have 2 Vee Notches
- 0 - Full wrapper: Will have 3 Vee Notches.

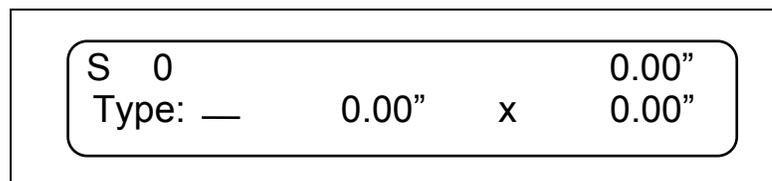
Height The height of the duct .

Width The width of the duct.

Offset The lip that is added to some sheets and is not counted toward the length of the part.



When the part programming has been completed, press the "*" key to enter the STATUS screen.



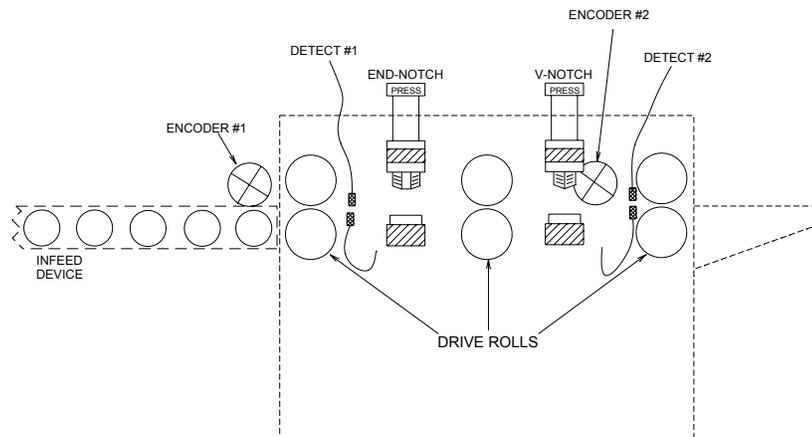
The status screen will show the line speed, the current position, Type of part, part Height, and part Width.

To start the controller moving, the operator simply presses the "RUN" button. If the controller is already in the RUN mode, the Notcher will move to the new position as soon as you press the "ENT key.

Modes of Operation

Two Encoder Operation

At the entrance to the machine, encoder one is mounted so that it rides on the material with the sheet detect limit switch directly behind it. Encoder two should be mounted on the exit side of the machine so that it rides on the material with sheet detect two directly following it.

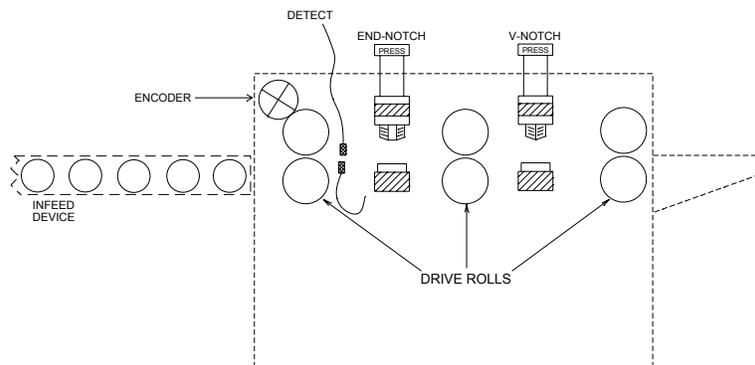


When the **MP342** enters the run mode, the pre-cut sheet enters the machine and closes sheet detect one. All material movement is accounted for by encoder one (as long as sheet detect one remains closed), until the leading edge closes sheet detect two. At this point, all material movement is accounted for by encoder two. The trailing edge of the material then falls off sheet detect one but movement is still accounted for by encoder two as long as sheet detect two is closed. As another pre-cut piece of material enters the machine, sheet detect one is closed again and all material movement is accounted for by encoder one.

When using two encoder operation, the part lengths must be long enough so that when material is under the press(es), sheet detect two closes before sheet detect one is allowed to open.

One Encoder Operation

Encoder one is mounted so that it is continuously turning as long as the machine is running (i.e. encoder one mounted directly on the feed rolls which drive the material). At the entrance to the machine, the sheet detect one limit switch is mounted so that the material's leading edge closes it at some distance before press one. Encoder two and sheet detect two are not needed, but sheet detect two must be wired as a closed input.



Once the **MP342** enters the run mode, the encoder will begin to spin on the rolls, but the controller will not begin counting (measuring length) until sheet detect 1 closes. It continues to count while material is on the switch, and even after the trailing edge falls off sheet detect 1. The controller will count positive length until the line is halted, or until another leading edge closes sheet detect 1 again. When this happens, the positive length is reset and another part is queued up.

Front Panel Run/ Remote Run Mode

If using the FRONT PANEL RUN button, jumper input 4 (Run/Enable) to DC common. Doing this will enable the Jog Forward and Jog Reverse inputs as well as the Auto Calibrate function.

If using a REMOTE RUN/ HALT circuit, Input 4 can be wired as the Run input. The Run output (#4), should be used to latch the input, refer to the enclosed Electrical Interface Diagram for wiring. When using a REMOTE RUN, the HALT button on the front panel will still halt the operation. If the Run Enable (Input 4), is ON, Jog Forward, Jog Reverse, and Calibration are disabled.

In Case of a Problem

The **MP342** is a very reliable product, but things can go wrong.

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

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

- **Machine problems** (most common)
- **Operator mistakes**
- **Incorrect Setup data**
- **Corrupted controller memory**
- **Cable damage**
- **Controller fault** (least common)

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

This guide helps the user to help himself. Follow these suggestions in the order listed.

Troubleshooting Guide

When did the Problem Start?

Did the machine work properly at one time? If not, have you done the **Calibration** procedure?

If the machine **did** work properly at one time, what has changed since then?

Did the problem start after routine maintenance? After electrical panel work? After a material change? After an operator change? Trace backwards in time to find out what's different.

Check the Machine

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

Re-run the length **Calibration** 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.

Re-run the length **Calibration** procedure after any changes to the drive system.

Visually check **other** parts of the machine for loose fasteners, excessive wear, proper lubrication, proper material placement, and proper operation of the Guide.

Re-run the length **Calibration** 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.

Write down these measurements for possible later reference.

If length and notch 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** procedure.

Re-check Setups

Re-check Setup values with originally recorded values. When you installed the **MP342** controller, you should have recorded the Setup values on the form provided in the manual for your machine TYPE. Make sure that none of these values has changed.

Run the Calibration mode

When you do the **Calibration**, 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 **MP342** has a display mode (press SETUP, then press 2 for the Input/Output Status) that allows you to monitor the controller's inputs and outputs. Watch this display while the machine is running to check for enables and press actuation points.

On the main Status display, you can watch line speed and notch targets. 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 indicator on an old-fashioned analog meter to see if they show up.

Fancier line monitors are available for stubborn cases that you can't see on 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 **MP342's** memory.

Clear Memory

Clearing memory will erase all Setups and Order information in the **MP342**'s memory.

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

Don't try clearing memory unless you have tried everything else above.

You can clear all storage in the controller (including Setup and Order data) by following this sequence: **(1)** Make sure that the Security switch is unlocked; **(2)** Turn off power to the controller; **(3)** Wait five seconds; **(4)** Turn the controller back on; **(5)** Wait until the AMS Controls Inc. screen has disappeared and the words "**EPROM TEST**" appears on the screen, and a bar at the bottom of the screen starts moving from left to right; **(6)** Hold down the "5" key for at least two seconds and release the "5" key when you see the unit reset (the AMS Controls Inc. will reappear on the screen).

NOTE:

If the bar at the bottom of the screen makes it all the way across the screen, it may be too late to hit the "5" key. If this happens the memory was NOT cleared and you must return to step one of the clearing sequence.

Electrical Noise

The **MP342** 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.

Call AMS

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

Appendix

MP342 Switch Settings

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

The proper Unit ID switch setting for the **MP342** is: switch 7 ON. Some systems have the capability of having 2 **MP342s**, and the Unit ID switch setting for the second controller is: switches 1 and 7 ON.

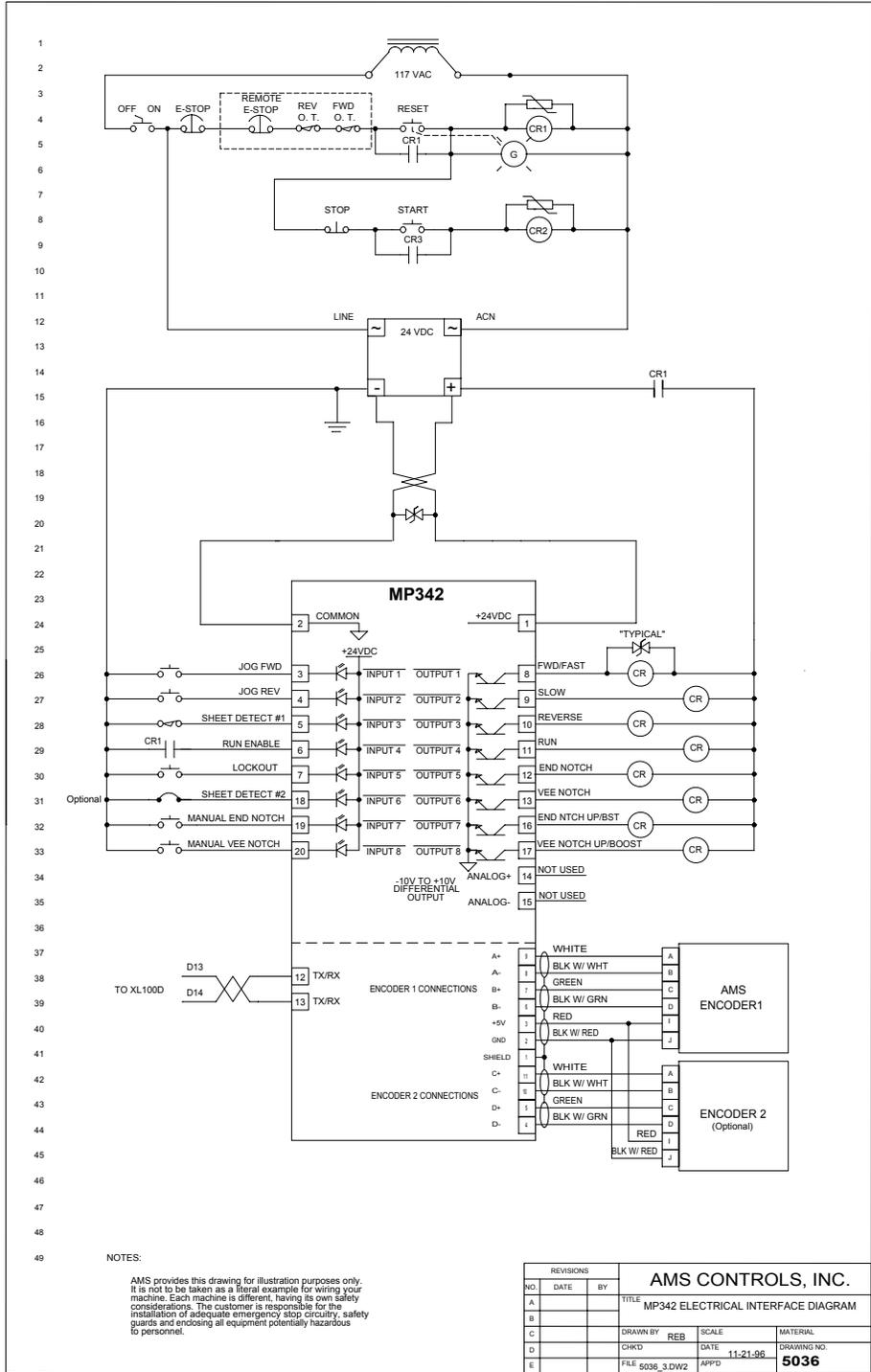
SW1	SW2	SW3	SW7	Unit ID
OFF	OFF	OFF	ON	48
ON	OFF	OFF	ON	49

MP342 Inputs

Inputs	Description
1	Jog Forward
2	Jog Reverse
3	Sheet Detect
4	Run Enable
5	Setup/Lockout
6	Sheet Detect # 2
7	Manual End Notch
8	Manual Vee Notch

MP342 Outputs

Outputs	Description
1	Forward/Fast
2	Slow
3	Reverse
4	Run
5	End Notch
6	Vee Notch
7	End Notch Up/Boost
8	Vee Notch Up/Boost



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	TITLE	MATERIAL
A			MP342 ELECTRICAL INTERFACE DIAGRAM	
B				
C			DRAWN BY REB	SCALE
D			CHKD	DATE 11-21-98
E			FILE 5036_3_DW2	APPD
				DRAWING NO. 5036