

MP338DH
Dual
Backgauge
Controller

MP338DH Dual BackGauge

The **MP338DH** Backgauge controller is a cost effective controller designed to position a guide (or a stop) on a press brake, or as an edge forming tool. The unit controls a variable speed electric drive or hydraulic system that turns a lead screw. The position of the gauge is sensed by an optical shaft encoder that is coupled to the lead screw. The **MP338DH** controls the drive unit and counts the pulses from the encoder until the desired position is sensed.

The **MP338DH** can also be used as a Backgauge Positioner for a single or a multi-bend brake. The Unit ID number configured by the dip switches will give the **MP338DH** its specific identity.

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

3:07PM	9/05/96	0FPM
0.000"		
ORDER		
0Ft		
MATERIAL		N/A%
COMP.		
Parameters		Value
Ref. Mode		
Near		
Ref. Pos.		0.000"
OverShoot Dist		
10.0000"		
Tolerance		
1.0000"		
Stopping Mode		
Auto		
Stop Reaction		0.0000sec
Move Delay		
0.0000sec		
Resolution		
0.0117187529"		
Correction		
100.000%		
Filter Const		
32.0HZ		
Units		
English		

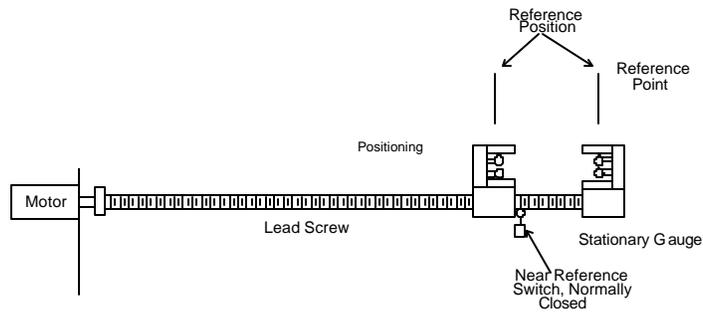
Figure 6c-1. Dual BackGauge Setup Screen

Ref. Mode

The REFERENCE MODE parameter tells the **MP338DH** where the reference switch or physical stop is located. The reference point is the center of the brake where the bend occurs, or the inside limit of the stationary tools. If the switch is close to the reference point and most of the moves of the backgauge occur "behind" the switch or physical stop, the REFERENCE MODE is NEAR. If the switch is behind the backgauge and most of the moves are in

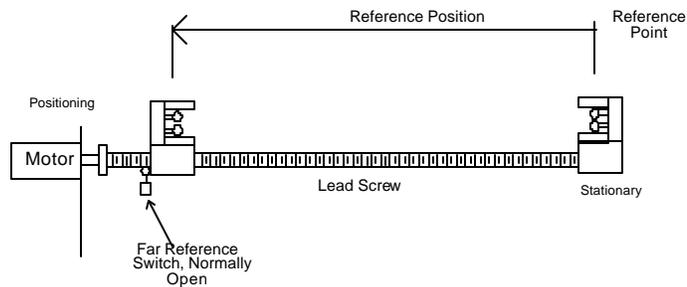
“front” of the switch or physical stop, the REFERENCE MODE is FAR. Use any number key to toggle the choices.

Near Reference Mode



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

Far Reference Mode



If the controller is not already referenced, the controller will automatically reference itself when it is placed in the RUN mode. The reference is always achieved when the controller is moving in the forward direction. If a physical stop and a NEAR REFERENCE is used, the controller will reference itself when the gauge hits the stop going forward. If a physical stop and a FAR REFERENCE is used the gauge will hit the stop in the reverse

direction, and then reference when the first forward encoder count is seen.

Ref. Pos.

The REFERENCE POSITION is the distance from the reference point to the metal positioner after it has reached the physical stop or caused a transition of the HOME SWITCH.

Speed Logic

The **MP338DH** controller has four outputs that control the speed and direction of the machine. To accommodate more than one wiring possibility, the controller may be run with one of two different SPEED LOGIC settings: FORWARD/SLOW or FAST/SLOW. The controller outputs are defined differently for each logic setting. The outputs, their definitions, and their states in various conditions are shown in tables 6c-1 and 6c-2. Any number key toggles between FORWARD/SLOW and FAST/SLOW. Select the appropriate SPEED LOGIC to match your machine wiring configuration.

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

Table 6c-1. Status of Outputs in Forward-Slow

Note: All Jogging and Referencing is performed at fast speed

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

Table 6c-2. Status of Outputs in Fast-Slow

Note: All Jogging and Referencing is performed at fast speed

Min Slow Distance

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

A minimum amount of slow distance can be manually set by this parameter. It is added to the calculated slow distance to extend the time spent in slow speed (if the DECEL FACTOR is set to AUTO). The **MP338DH** controller can calculate the distance from the programmed position that the machine should shift into slow speed. This is based on the speed of the material and the deceleration characteristics of the machine.

When the DECEL FACTOR AUTO setting is used, it is best to set this parameter to a few inches initially until the system has been calibrated and the controller has had a chance to get accustomed to the behavior of the machine. When the machine is running good parts repeatedly, reduce the MINIMUM SLOW DISTANCE as much as possible to increase the production rate, making sure that the material is at a constant velocity (slow speed) before stopping.

Overshoot Dist

The **MP338DH** will always move the backgauge toward the target in a forward direction (toward the reference point). When moving away from the reference point to make a bend, or a FAR REFERENCE, the backgauge will overshoot the target by the OVERSHOOT DISTANCE and approach the target in a forward direction. This is done to keep any machine “slop” behind the backgauge.

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

Tolerance

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

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

Stopping Mode

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

AUTO: The controller turns off the movement outputs prior to the actual brake point to allow for the momentum and inertia of the

machine. A new STOP REACTION time is calculated after each stop based on the average stopping time for several cycles. This parameter may be overridden, but the value will be modified on the next part that is run. The maximum value is 9.9999 seconds.

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

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

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

Stop Reaction

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

Decel Factor Mode

On two-speed machines, a DECELERATION (DECEL) FACTOR is used by the **MP338DH** 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 **MP338DH** 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 that 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 prior to the movement outputs are turned off. This value is automatically calculated by the controller if the DECEL FACTOR MODE is set to AUTO.

Move Delay

When the RUN input of the **MP338DH** is enabled, there should be a delay entered before the backgauge starts to move to its new position. This delay is included for safety purposes and allows for notification of personnel of the intended move. The delay can be programmed under the MOVE DELAY parameter. The acceptable range of this parameter is 0.0 to 5.0 seconds.

Resolution

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

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

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.

Common lead screws have a 1/4" lead, so for this lead screw, the RESOLUTION would be as follows:

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

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

Slow Volts

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

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

Fast Volts

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

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

Correction

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

Calculate the CORRECTION FACTOR using the following steps:
1) Make the backgauge move to the same position ten times and take an accurate measurement of this value. 2) Find the average length by adding up all ten measurements and dividing by ten. 3) Use the following formula for the new CORRECTION FACTOR, using the average of the ten moves for "actual measured position."

New CORR. FACTOR = (Programmed Position ÷ Actual Measured Position) x Old CORR. FACTOR

Filter Constant

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

Units

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

To exit the DUAL BACKGAUGE SETUP screen push the SETUP key.

Dual BackGauge Status

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

```
3:14PM 9/05/96 0FPM
0.000"
ORDER
0Ft
MATERIAL N/A%
COMP.
MP338DH Version:13.01 Unit:50
Type: 66
Position: 0.000" Status:S Error:
0
Inputs:----- Outputs:-2----
--
Device On
Line
Position
0.00"
Command Send
Program
```

Figure 6c-2. Dual BackGauge Status Screen

If no parts are programmed, the screen will have the information shown in figure 6c-2. When parts are programmed, this screen will show the characteristics of the programmed part.

The Command line allows the operator to send a new set of dimensions to the **MP338DH** controller for pinning sheets not made by the **XL120** controller. The Command line may also be used to clear the **MP338DH's** memory, if necessary. By

highlighting the Command line and pressing the PICK key, the Clear Memory command will be shown on the display. Pressing ENTER will send the Clear Memory command to the **MP338DH**.

To exit this screen hit the SETUP button.

Operating Procedure

Referencing

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

Near Referencing With A Home Switch:

NOTE: Referencing is performed at fast speed.

1. The **MP338DH** determines the state of the Home Switch. If the switch is CLOSED, the **MP338DH** moves the gauge in the forward direction until the Home Switch is OPEN. It then skips to step # 6.
2. If the Home Switch is OPEN, the **MP338DH** moves the gauge in the reverse direction until the Home Switch is CLOSED.
3. It continues the reverse move for the Overshoot Distance.
4. Wait for the gauge to stop.
5. The **MP338DH** moves the gauge in the forward direction until the Home Switch is OPEN.
6. At the CLOSED -> OPEN transition of the Home Switch, the encoder interrupt captures the encoder count and sets it equal to the reference position.

Near Referencing With A Positive Stop:

NOTE: Referencing is performed at fast speed.

1. The **MP338DH** moves the gauge in the forward direction until it hits the positive stop (Velocity < 1 count/sec).
2. The encoder interrupt captures the encoder count and sets it equal to the reference position.

Far Referencing With A Home Switch:

NOTE: Referencing is performed at fast speed.

1. The **MP338DH** determines the state of the Home Switch. If the switch is OPEN, skip to step # 3.
2. If the switch is closed, the controller moves the gauge in the forward direction until the Home Switch is OPEN, and waits for the gauge to stop.
3. The **MP338DH** moves the gauge in the reverse direction until the Home Switch is CLOSED.
4. The controller continues the reverse move for the Overshoot Distance.
5. It waits for the gauge to stop (Velocity < 1 count/sec).
6. The **MP338DH** moves the gauge in the forward direction until the Home Switch is OPEN.
7. At the CLOSED -> OPEN transition of the Home Switch, the encoder interrupt captures the encoder count and sets it equal to the reference position.

Far Referencing With A Positive Stop:

NOTE: Referencing is performed at fast speed.

1. The **MP338DH** moves the gauge in the reverse direction until it hits the positive stop (Velocity < 1 count/sec).
2. It then moves the gauge in the forward direction until 1 encoder count is generated.
3. The encoder position is then set to the reference position distance.

NOTES:

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

Programming

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

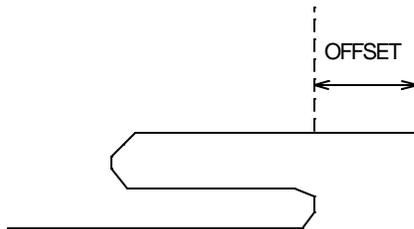
A second method of programming the parts for the the MP343 is by using the Pin Spotter Status Screen, figure 5b-2 on page 5b-11.

<input type="checkbox"/>	Type	Part Type - One of four options: Single sheets that will not cause the Backgauge to move
L		“L” shaped, single bend duct
U		“U” shaped, double bend duct
0		Wraparound, triple bend duct
		Shear only sheets which will not cause the Backgauge to move

Height The height of the duct .

Width The width of the duct.

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



The status screen will also show the **MP338DH** version, unit, and type number, the part position, the controller status, input and output status, and command option.

The codes for the controller status are:

S = Stopped
M = Moving
C = Calibrating
F = Jogging Forward
R = Jogging Reverse
P = Program (Run Enable)

The command options are "Send Program" and "Clear Memory".

Run Operation

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

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

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

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

Front Panel Run/ Remote Run Mode

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

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

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
Not Used		
Analog (Optional)	0 to +10VDC	0 to +10VDC

Inputs

Jog Forward	Yes	Yes
Jog Reverse	Yes	Yes
Home	Yes	Yes
Run Enable	Yes	Yes
Setup/Lockout	External	Internal
Not Used		
Brake/Clamp Complete	Yes	Yes

Not Used

(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

MP338DH Switch Settings

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

The proper Unit ID switch setting for the **MP338DH** is switches 2 and 7 ON. Some systems have the capability of having 2 **MP338DHs**, and the Unit ID switch setting for the second controller is switches 1, 2, and 7 ON.

SW1	SW2	SW3	SW7	UNIT ID
OFF	ON	OFF	ON	50
ON	ON	OFF	ON	51

MP338DH Inputs

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

MP338DH Outputs

Outputs	Description
1	Forward/Fast
2	Slow
3	Reverse
4	Run
5	Not Used
6	Not Used
7	Not Used
8	Not Used
Optional	
Pin 14	Analog +
Pin 15	Analog -

SETUP DATA SHEET

MODEL MP338DH CONTROLLER

Down Stream Machines



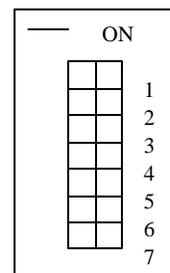
For assistance call 1-800-334-5213 and ask for customer service

Dual Backgauge

- Ref. Mode _____
- Ref. Pos. _____
- Speed Logic _____
- Min Slow Dist _____
- OverShoot Dist _____
- Tolerance _____
- Stopping Mode _____
- Stop Reaction _____
- Decel Factor Mode _____
- Decel Factor _____
- Move Delay _____
- Resolution _____
- Slow Volts _____
- Fast Volts _____
- Correction _____
- Filter Constant _____
- Units _____

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

TYPE



Serial Number _____

Version Number _____

Setup Data Sheet