



PATHFINDER™

Operator Manual

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Chapter 1: Introduction

The Pathfinder controller is designed for operating a metal folding machine to produce programmed parts. Its functions include:


- Maintaining a library of parts.
- Tracking operation steps.
- Stopping the machine when the correct bend has been achieved.
- Indicating when an operation step is complete.
- Alerting the operator of procedure errors and machine malfunctions.
- Providing built-in help messages and diagnostics.
- Programming in finished part dimensions.

Once designed, part patterns can be stored and recalled for redesign or production as needed.

Interface

For interfacing with users, the Pathfinder™ controller uses

- **LCD (Liquid Crystal Display) touch screen** – Dropdown-lists, menus, and buttons displayed on the LCD touch screen operate the controller.
- **Status Lights** – Status lights illuminate to indicate when appropriate clamp pressure is reached, when a piece in progress must be rotated, and when it must be turned over.
- **Foot pedals** – Optional foot pedals engage and disengage the material clamp and to initiate a part cycle.

 **Note:** A VGA monitor, PS2 keyboard, mouse, or a secondary touch screen can also be used on the controller for data entry and navigation. They can also all function as a remote terminal as well.

Log in to Pathfinder

To log in to the Pathfinder controller,

1. Turn on power to the Pathfinder console.
2. Pathfinder will automatically start and bring you to the login screen.

3. In the Login field, choose the appropriate user type.
4. In the Password field, enter the password for that user type. (See your system administrator for the appropriate passwords.) The Pathfinder main screen displays.

The Display

Use the dropdown-lists, menus, and buttons displayed on the LCD touchscreen, to select most non-numeric data.

Parts of the Pathfinder Main Screen

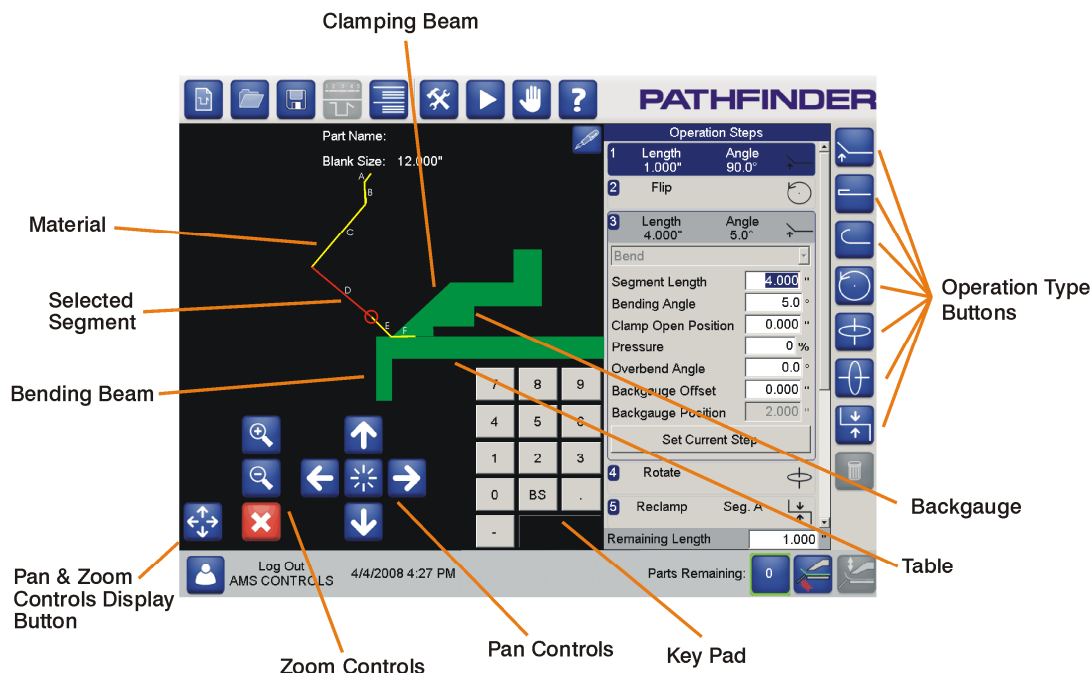


Figure 1: The Display

Note: The display varies depending on which mode (Status, Setup, Program, Prod. Data, Inc. Qty., Diagnostics, or Help) the controller is in.

Pathfinder Buttons

Use the buttons displayed at the top of the Pathfinder Main screen to open the various Pathfinder windows and control Pathfinder operation.



New Part - Select this button to open the Part Editor window to create a new part.



Open a Part from the Part Library - Select this button to open the Part Library window to select a part.



Save Part to the Part Library - Select this button to save a part after making modifications to it.



(This button represents a future enhancement to Pathfinder and is not currently available.)



(This button represents a future enhancement to Pathfinder and is not currently available.)

Tools - Select this button to open the Tools Menu to:



- Adjust Controller settings
- Perform system diagnostics
- Create material definitions
- View lists of machine parameters
- Reference the machine
- Calibrate the machine
- View System Information
- Use Administrator tools



Run a Part - Select this button to run a part in Automatic Mode.



Manual Jog - Select this button to jog the machine's axes.




Help - Select this button to open Pathfinder Online Help.


Chapter 2: Program a Part

Once the controller is calibrated and set up, it can be used to program parts. Parts can be programmed either by creating completely new parts “from scratch: or by selecting an existing part and modifying it.

Create a New Part

 **Note:** You can program any part your machine is capable of creating. Once programmed, the steps and sequence can be stored in the Part Library

To create a new part,

1. On the Pathfinder™ main screen, select . The New Part Editor screen displays.
2. In the **Part Name** field, enter a name for the part you’re creating.
3. In the **Description** field, enter a description of the part.
4. In the remaining fields, enter any additional information, including:
 - Category
 - Sub-Category
 - Material Type
 - Material Thickness
 - Blank Size
 - Painted Side Up / Painted Side Down
 - Graphical Part / Non-Graphical Part
5. Select [**Define Machine Operations**]. The screen re-displays, showing a part blank.
 - Use the panning arrows and zoom buttons to adjust the view as needed.
6. Select the **operations step button** for the type of step you’re defining. The step is added to the operation step list.
7. Edit the operation step characteristics as needed.

8. Repeat steps 6-7 for each step in the sequence to create the part.
9. Select **[Save]** to save the part and its operation steps.


Modify an Existing Part

To modify an existing part,

1. Select and load a part from the part library.
2. Modify the part's characteristics.

Select and Load a Part from the Part Library

To select and load a part from the Part Library,

1. On the Pathfinder™ main screen, select . The Part Library screen displays.
2. Use the search boxes to narrow the number of parts displayed. You can search by
 - Part name
 - Category
 - Sub-category
3. Once you've narrowed the list, use the scroll buttons to page through the remaining displayed parts.
4. When you find the part you want,
 - Tap the part once to view details on the part
 - or*
 - Tap the part twice to display the part on the main screen, where you can modify the part's characteristics.
 - or*
 - Highlight the part, then select **[Load]** to display the part on the main screen.

Modify a Part

To modify a part's characteristics (such as shape or material),

1. Select and load a part from the part library. The part displays on the Pathfinder Main screen.

2. Modify the Operation Steps:


A. Select the operation step to modify. You can:

- Tap the step in the operation step list to expand the step for editing
or
- Tap the segment on the part graphical display

The corresponding step in the operation step list expands.

B. Modify the operation step as needed.

C. Repeat steps A-B for each operation step you need to modify.

 **Note:** You cannot delete steps from the middle of the operation step list. Only the last step currently displayed on the list can be deleted. You can, however, continue deleting each remaining last step, deleting the steps from the bottom of the list on up.

3. Edit the part's details:

A. Select . The Edit Part Details window displays.

B. Make any necessary changes to the part's

- Name
- Description
- Category
- Sub-Category
- Material Type
- Material Thickness
- Blank Size
- Painted Side Up / Painted Side Down
- Graphical Part / Non-Graphical Part

And select **[OK]**. The Pathfinder Main screen re-displays.

4. Select . The Save Part window displays.

- *If you are creating a new part from an existing part, in the **Part Name** field, enter a new name for the new part and select **[OK]**. The new part, under the new name, is added to the Part Library.*
- *If you are modifying a part's characteristics to permanently change the part, simply select **[OK]**. The changes will be saved using the original name.*

Chapter 3: Run a Part


 **DANGER:** You must be trained and qualified on any metal folding machine in order to operate it.

Parts can be run in either Automatic or Manual mode.

Run a Part – Automatic Mode


In **Automatic Mode**, the Pathfinder™ controller cues the operator for each operation step the folding machine must perform to produce a part; however, the operator must initiate each step once prompted.

To run a part in Automatic Mode,

1. Select and load a part from the Part Library. The Pathfinder Main screen displays, showing the selected part.
2. Select . The backgauge moves into the start position
3. Load the material the part specifies.
4. Press the foot pedal. The clamp lowers.
5. Follow Pathfinder™'s instructions for each step to produce the part.

Run a Part – Manual Mode

In **Manual Mode** the operator uses the Pathfinder™ controller to direct the folding machine at each step.

 **Note:** Manual Mode represents a future Pathfinder™ enhancement and is not currently available.

Part Counter

The part counter keeps track of the parts that have been made. It displays the parts in one of two ways:

- In part count mode, the counter starts at 0 and increases by one for each part produced in the run.
- In batching mode, the counter starts at the number of parts in the batch and decreases by one until it reaches 0 and the batch is finished.

You set the mode using the Batching Mode Enabled parameter in Operator Preferences.

Appendix A: Glossary

Air-gap Adjustment

See *Radius Adjustment*.

Backgauge

Movable set of stops that a part is pushed against at the beginning of a bend operation. Some backgauges include multiple rows of fingers that can be electrically raised (to increase the effective range of the backgauge). The position of the backgauge is referred to as the **X** value or dimension.

Bend Allowance

The compensation for the fact that no bend has a radius of zero (perfect 90 degree bend). Because there is a radius to each bend, the amount of metal required to make a part is slightly less. The amount of material saved will depend mainly on the thickness of the metal. There are a few methods to adjust for bend allowance.

Bending Beam

The surface that swings up and bends the part to the specified angle. The angle of the bending beam is referred to as the **B** value or dimension.

Bending Cheek

See *Bending Beam*.

Clamping Beam

The surface that is lowered to clamp the part for the bending process and raised so the part can be removed or repositioned. On some machines with automatic radius or thickness adjustments, the clamping beam can also be moved back and forth relative to the zero point of the backgauge. The vertical position of the clamping beam is referred to as the **Z** value or dimension.

Coining

See *Stamping*.

Fold

See *Hem*.

Hem

A feature of a part where the metal is bent back onto itself. The hem can either be open (to accept another part), completely flattened, or in a tear-drop shape.

Overbend

The defined amount, in degrees, that a particular material must be bent past a specified angle in order to achieve that angle in the final part.

Part Library

A collection of programmed parts stored in the controller.

Radius Adjustment

When dealing with heavier gauges, it becomes necessary to change the geometry of the clamping beam and bending beam in order to get a proper bend. This is done by moving the clamping beam back and forth horizontally on some machines and by moving the bending beam vertically (when at the zero position) on others.

Safety Stop

The distance where, during a clamping operation, the clamp stops and requires the operator to release and then press the foot pedal again to continue clamping or closing.

Springback

The tendency of some materials to rebound partially after being bent.

Stamping

An alternate machine process to produce a radius bend on a part (multiple small bends). This is accomplished by leaving the bending beam at the correct angle and then using the clamping beam to create the bend. This is much faster than the standard method (clamping the part, swinging the bending beam up and back, unclamping the part, etc.) but typically does not do as good of a job.


Upper Cheek

See *Clamping Beam*.

Upper Jaw

See *Clamping Beam*.

Appendix B: Setup Parameters

Use the setup parameters to configure the Pathfinder™ controller for your specific needs. Select the Tools button  to view and edit parameters. The basic setup parameters are:

- Machine parameters
- Controller settings
- Material definitions

Machine Parameters

You can set the machine's

- Backgauge parameters
- Bending Beam parameters
- Clamping Beam parameters


Backgauge Parameters

ID	Name	Description	Value
121	Hem Adjustment	The forward or backward adjustment of the backgauge before closing a hem. This will cause the clamp to lower and complete the hem at a location other than directly over the bend. This adjustment can determine the shape of hems.	0-99.999"
122	Backgauge Home Position	The position of the farthest backgauge finger?? when the home switch is activated.	0-99.999"
124	Backgauge Fast Speed	The percentage of the system's maximum speed to be used when positioning the backgauge at fast speed.	0-100%
126	Backgauge Slow Speed	The percentage of the system's maximum speed to be used when positioning the backgauge at creep speed.	0-100%
125	Backgauge Reference Speed	The percentage of the maximum speed to use when calibrating the backgauge.	0-100%
127	Backgauge Slow Distance	The minimum travel distance of the backgauge motor when it shifts from fast speed to slow before stopping at the target.	0-99.999"
128	Backgauge Stopping	Sets whether the controller	Select Automatic

ID	Name	Description	Value
	Mode	should automatically monitor and adjust the stopping reaction time.	or Manual
130	Backgauge Stopping Reaction	The amount of time required for the motor to stop at slow speed.	0-8.000 seconds
131	Backgauge Resolution	The distance the backgauge moves for each increment of the backgauge encoder.	.0004 -.04"
134	Finger 1 Offset	The distance from the finger 1 stop to the fixed back stop.	0 - 32.000"
140	Backgauge Min Position	The closest distance the backgauge can be to the clamping beam.	0 - 99.000"
141	Backgauge Max Position	The farthest distance the backgauge can be from the clamping beam.	0 - 99.999"
146	Finger Distance	The distance from the backgauge to the front of the fingers.	0 - 30.000"
147	Backgauge Crisis Distance	<p>The distance from the clamping beam that the backgauge must stop when jogging toward the clamping beam, if it has not been raised above the Clamp Crisis Distance.</p> <p>In Automatic Mode, the clamping beam raises to the Clamp Crisis Distance automatically when the backgauge moves nearer than this distance.</p>	0 - 10.000"
148	Backgauge Fwd Accel Time	The amount of time to allow for the backgauge to move from slow speed to fast speed when moving forward.	10 seconds
149	Backgauge Fwd Decel Time	The amount of time to allow for the backgauge to shift from fast speed to slow speed when	10 seconds


ID	Name	Description	Value
		moving forward.	
150	Backgauge Rev Accel Time	The amount of time to allow for the backgauge to shift from slow speed to fast speed when moving backward.	10 seconds
151	Backgauge Rev Decel Time	The amount of time to allow for the backgauge to shift from fast speed to slow speed when moving backward.	10 seconds

Bending Beam Parameters

ID	Name	Description	Value
202	Bending Beam Max Angle	<p>The maximum angle (in degrees) the bending beam can be positioned without damaging the machine.</p> <p> Note: This limit applies to the sum of all bending angle offsets (nominal angle + individual correction angle + part-wide correction + material correction); maximum angle depends on the clamping beam tooling installed.</p>	0-180°
207	Bending Beam Slow Distance	The minimum travel (in degrees) of the bending beam when it shifts from fast speed to slow before stopping on the target.	0-180°
208	Bending Beam Stopping Slow Start	The angle at which the bending beam shifts to Slow Speed when returning to the home position.	0-180°
209	Bending Beam Stopping Mode	Selects whether the controller automatically monitors and adjusts the Bending beam's stopping reaction time.	Select Automatic or Manual.
210	Bending Beam Stop Reaction	The amount of time required for the motor to stop at slow speed.	0-8.000 seconds
211	Bending Beam Resolution	The distance (in degrees) the bending beam moves for each increment of the bending beam encoder.	.0004° -.04°
212	Bending Beam Switchover Time	The time delay between the bending beam's end of movement and the next operation.	0-99.999 seconds

214	Max Radius Angle	The maximum angle for a radius operation. If a radius operation specifies an angle, it will be formed using the normal bending mode, not the stamping mode.	0-180.000°
215	Delay Deadpoint	The time delay before the clamping beam opens following a completed bending cycle.	0-10.000 seconds

Clamping Beam Parameters

ID	Name	Description	Value
303	Clamping Beam Home Position	The position clamping beam when the home switch is activated.	0-8.000 seconds
306	Clamping Beam Slow Distance	The minimum travel of the backgauge motor when it shifts from fast speed to slow before stopping on the target.  Note: This parameter is valid only for mechanical models with speed-controlled clamping beams.	0-99.999”
307	Clamping Beam Slow Start	The position at which the clamping beam shifts to Slow Speed when returning to the home position.	0-8.000 seconds
308	Clamping Beam Stopping Mode	Selects whether the controller automatically monitors and adjusts the clamping beam’s stopping reaction time.	Select Automatic or Manual.
310	Clamping Beam Stopping Reaction	The amount of time required for the motor to stop.	0-8.000 seconds
311	Clamping Beam Resolution	The distance (in degrees) the clamping beam moves for each increment of the bending beam encoder.	.0004° -.04°
312	Minimum Opening Height	The minimum distance the clamping beam should open between operation steps.	.25 - 5.000”
313	Maximum Opening Height	The maximum distance the clamping beam should open between operation steps.	.25 - 99.999”

ID	Name	Description	Value
315	Raise on E-Stop	Selects whether the clamping beam should raise on a E-stop or remain where it is.	Select: <ul style="list-style-type: none"> • Disabled • 1 Sec • 2 Sec • 3 Sec
316	Pressure Relief Time	The amount of time the pressure relief valve is activated before the clamping beam raises.	0 - 10.000 seconds
317	Safety Stop Height	The distance the clamping beam is open at a Safety Stop.	0 - 10.000"
318	Zero Pressure Offset	The amount of offset in system pressure to compensate for when the pressure analog value is not zero at 0% pressure.	-99999 - 99999°
319	Clamp Pressure Resolution	The scaling factor used to calculate the clamping pressure percentage. This value is multiplied by the analog value returned from the pressure transducer, and the result is then adjusted by the Zero Pressure Offset to calculate the Clamping Pressure percentage.	.00004 - 0.5%
325	Clamp Crisis Distance	The distance the clamping beam must be raised before the backgauge can be jogged toward it. In Automatic Mode, the clamping beam raises to this distance automatically when the backgauge moves nearer than the Backgauge Crisis Distance.	0 - 10.000"
401	Radius Min Position	The minimum position for the automatic radius adjustment.	0 - 0.25"
402	Radius Max Position	The maximum position for the automatic radius adjustment.	0 - 0.25"

ID	Name	Description	Value
403	Radius Stopping Mode	Selects whether the controller automatically monitors and adjusts the stopping distance for the radius adjustment axis.	Select Automatic or Manual
404	Radius Stopping Reaction	The amount of time required for the radius adjustment to stop.	0 - 8 seconds
405	Radius Resolution	The distance the radius adjustment axis moves for each increment of the encoder.	0.00004 - 0.5"
406	Radius Zero Offset	The amount of offset in radius adjustment position to compensate for when the pressure analog value is not zero at 0% pressure.	-99999 - 99999"

Controller Settings

You can set the controller's

- Clock/Calendar
- Operator Preferences

Clock/Calendar

ID	Name	Description	Value
600	Time Format	Selects the format the controller displays time in: 12- hour (8:00 AM, 8:00 PM) or 24 hour (8:00, 20:00)	Select AM/PM or 24-hr
601	Date Format	Selects the format the controller displays the date in.	Select: <ul style="list-style-type: none"> • MM-DD-YY • DD-MM-YY • YY-MM-DD

Operator Preferences

ID	Name	Description	Value
700	Language	Select the language to use when displaying Pathfinder™ screens.	Select: <ul style="list-style-type: none"> • English • Spanish • French-Canadian
701	Numeric Display Format	Select the format to display numbers in.	Select decimal inches or millimeters
702	Operator Mode	Enables 1-man, 2-man, or key switch lockout of the machine.	Select 1-Man, 2-Man, or Key Switch
704	Allow Virtual Keyboard	Enables a virtual keyboard	Select Yes or No
805	SERCOS	Enables SERCOS.	Select Yes or No
800	RS485 Converter Port Name	Defines the value for the RS485 Converter Port	Com Port Value
705	Auto Hyd Pump Shutoff	Shuts off the hydraulic pump	0-60

Material Definitions

Material Definitions define characteristics for materials of a specified thickness. Begin Material Definitions by selecting a material and setting a default overbend for it.

Default Overbend Angles

Most metals spring back slightly after they are bent. Because of this, a bend must be bent further than the finished part requires, preventing the finished part from having wider-than-specified angles when the material springs back.

Overbend is the defined amount, in degrees, that a particular material must be bent past a specified angle in order to achieve the specified angle in the finished part.

Material	Overbend
Aluminum	Enter the number of degrees aluminum must be overbent to compensate for the material's springback.
Copper	Enter the number of degrees copper must be overbent to compensate for the material's springback.
Stainless	Enter the number of degrees stainless must be overbent to compensate for the material's springback.
Steel	Enter the number of degrees steel must be overbent to compensate for the material's springback.
Zinc	Enter the number of degrees zinc must be overbent to compensate for the material's springback.

Additional Material Information

Once a material is selected, you can define additional information for specific thicknesses of that material:

Name	Description	Value
Material Thickness	The thickness of the selected material.	0.018" - 0.060"
Clamp Closing Distance	The distance to which the clamp closes when working with the specified thickness of the specified material. Defaults to the value set in Material Thickness.	0.000" - 1.000"
Clamping Pressure – Normal Bends	The percentage of full pressure the clamp applies for normal bending operations when working with the specified thickness of the specified material. Defaults to 50%.	0-99%
Clamping Pressure – Closed Hems	The percentage of full pressure the clamp applies for closed hem operations when working with the specified thickness of the specified material. Defaults to 90%.	0-99%
Additional Overbend Angle	The overbend amount to be added automatically to the Default Overbend Angle set for the material type when working with the specified thickness of the specified material. Defaults to 0.0°	-100° - 100°
Radius Adjustment Position	Defaults to the value specified in Material Thickness.	0.000" - 5.000"

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