



BANTAM TOOLS®

Bantam Tools ArtFrame™



User Guide

Bantam Tools ArtFrame™

(SKU SC100005, SC100006,
SC100007, SC100008,
SC100018)

0. About This User Guide

0.1 Quick Start

If you're new to the Bantam Tools ArtFrame, and want to get up and running as quickly as possible, here are the most important parts to know about:

- Follow sections "1.1 Introduction to the Bantam Tools ArtFrame™" and "1.2 Safety and safe operation of the ArtFrame" of this guide, which cover important steps to perform during unboxing and how to make your first plot on the machine.
- Install software. Visit the [software download page](#) for the latest downloads and instructions. Bantam Tools Studio Software requires a license key to activate. This license key is sent to your email upon shipping of your ArtFrame from our headquarters.
- "1.4 Running the Welcome Plot". Follow along with this section, which walks you through the steps of making your first plot with the ArtFrame.

If you need support, please reach out! Section "8. Support" has our contact info.

0.2 Welcome to The Bantam Tools ArtFrame!

This is the user guide for the ArtFrame family of drawing machines. This guide is here to help you get started. It covers how you set up and use the machine, tips for operation, details about the software, and pointers to additional resources.

0.3 This guide is updated from time to time.

Both this guide, and the ArtFrame software are updated from time to time. We encourage you to check back occasionally for the latest version of this manual, and to check that you have the latest version of the software. You can use the Settings panel of the Bantam Tools Studio™ software to check online for available updates.

You can download the latest version of this guide at:
<http://bantam.tools/afguide>

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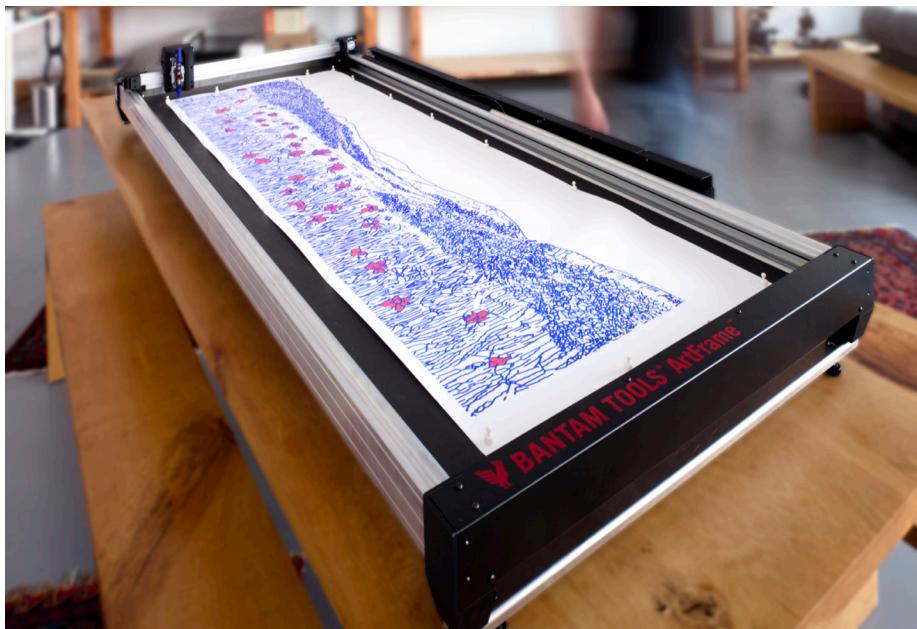
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1. Welcome and Getting Started

1.1 Introduction to the Bantam Tools ArtFrame™

The Bantam Tools ArtFrame™ is a computer-controlled art machine system that provides a large format solution for artists, innovators, and educators to create physical artwork from digital designs with traditional materials. We designed the Bantam Tools ArtFrame to run in the Whitney Museum of American Art during the Harold Cohen: Aaron show and it ran like a champ producing thousands of drawings. Since then, we refined and improved the design and finished building the software. Built to create museum-quality artwork,



we are excited to see the art that you will create with it.

Photo caption: Bantam Tools ArtFrame™ Panorama

The Bantam Tools ArtFrame™ is a powerful tool for a robust plotting experience. You can use it to explore a variety of approaches to machine made art using an array of plotting and mark making implements like pens and brushes on a variety of mediums including paper and canvas.

As compared to our other family of plotters, the Bantam Tools NextDraw™, one of the advantages of the Bantam Tools ArtFrame is that it creates consistent pen over paper height and gives greater control over the vertical location of the marking tool. It is a unique design that allows for reliable and controlled vertical movement and gives flexibility in regards to the type of marking tool

being used.

1.2 Safety and safe operation of the ArtFrame

1.2.1 Safe Handling of the ArtFrame

1. Lifting and Moving: While the ArtFrame is generally not considered too heavy for one person to lift, it can be difficult to handle alone. We strongly recommend that two people work together when unpacking or moving the machine.
2. Heat: The motors of the ArtFrame will get warm during normal operation. This is normal, but it is helpful to be aware of it. They should not get too hot to touch.
3. Moving Parts: The ArtFrame has exposed moving parts. Keep fingers, hair, and other things that could get caught, crushed, or tangled away from the moving parts and pinch points between the moving carriage, pen holder, and rails.
4. Small parts. This product contains small parts that may pose a choking hazard to children under 3 years of age.
5. Magnets. This product includes small magnets, which pose choking and other hazards, and should never be swallowed or inserted into any part



of the body. Keep magnets out of reach of small children.

1.2.2 Electrical Safety

1. Make sure to turn off the ArtFrame before unplugging or plugging back in. Do not unplug by pulling on the power cord.
2. Do not use the ArtFrame if the power cord is damaged.
3. Do not use the ArtFrame with a power supply other than the one that came with the machine.
4. Do not abuse the power cord. Do not twist, bend, scrape, pull, pinch, or put a heavy object on it. Keep the cord away from heat, sharp edges, and oil.
5. Only use the power cord supplied with the machine. To do otherwise may result in electrocution or fire.
6. Always plug the machine into a grounded outlet that matches the plug. Do not modify the power cord or plug in any way.

1.2.3 Modification

Do not modify your ArtFrame. If you do so, it's at your own risk. Doing so may result in abnormal operation that can cause injury to you, colleagues, or damage the Bantam Tools ArtFrame. Making modifications or unsupported repairs will void our warranty policy. If your ArtFrame needs to be repaired, reach out to our support team and we will work with you to get you back up and running as quickly as possible.

1.2.4 ESD Sensitivity

The Bantam Tools ArtFrame has been tested against electrostatic discharge to ensure that the machine and its components are not damaged by such discharges. However, large discharges on the ribbon cables during operation can cause malfunctions including loss of position that require a power cycling of the machine to restore normal operation.

1.3 Unboxing the ArtFrame

The Bantam Tools ArtFrame 1824 and the Bantam Tools ArtFrame 2436 both ship in a box with foam padding and immobilization brackets that protect the rails and components during shipping. The Bantam Tools ArtFrame Panorama ships in a custom crate. It is recommended that you have a large table surface cleared and ready before unpacking the ArtFrame, so that it can be placed immediately in a stable and protected location. This will prevent accidental damage. Please refer to footprint dimensions below to properly prepare for this.

Bantam Tools ArtFrame1824:

Overall Dimensions: 34 × 29.87" (864 × 758.7 mm)
Footprint: 31.4 × 27.9" (797 × 708 mm)

Bantam Tools ArtFrame 2436:

Overall Dimensions: 34 × 47.86" (864 × 1215.7 mm)
Footprint: 31.4 × 45.9" (797 × 1165 mm)

Bantam Tools ArtFrame Panorama:

Overall Dimensions: 34 × 83.07" (864 × 2110 mm)
Footprint: 31.4 × 81.26" (797 × 2064 mm)

1.3.1 Remove the ArtFrame from the box

Bantam Tools ArtFrame Panorama owners should refer to information directly from our support team for uncrating. For all other models, please follow the instructions below. Like a flat-screen TV, the ArtFrame is lightweight but wide. For safety and convenience, we **strongly advise** having a **second person** help you with the initial unboxing and setup.

Remove the Top of the Box

The ArtFrame is shipped in a top-opening box. Lay the box flat on the ground, cut the straps and lift the outer top off the box.



Remove the Accessory Box

The accessory box is a separate box that ships inside the main ArtFrame box, located on the side of the ArtFrame. Set this aside; you'll need the 2.5 mm hex key from it in a later step.



Remove the ArtFrame

- Have one person stand on each side of the box.
- Have each person grab and lift one of the exposed silver-colored aluminum rails on either side of the machine.

- You may need to apply pressure down on the box as you lift the machine out. Take caution as you lift, as the side of the ArtFrame with the gantry (the side with the tool head) weighs more than the other side.



- Carefully slide the ArtFrame up out of the box while keeping it level.



Remove the Foam Pieces

With the ArtFrame now out of the box, remove the foam piece pieces.



If you ordered the ArtFrame Table Rails accessory along with the ArtFrame, they are normally attached to the inside bottom of the box, under the ArtFrame. If you are planning to install them when you set up the machine, we highly recommend that you install them at this stage, while the immobilization brackets are still attached. To do so, skip ahead to “1.6.1 Installing Table Rails” and then return here to continue the unboxing process.



Position the ArtFrame

Place the ArtFrame on the ground or, if you're comfortable and ready to do so, move it directly to the table where it will be set up. Once out of the box, the ArtFrame's gantry is immobilized with large orange-colored brackets, proceeding onto the next section on how to remove these.



1.3.2 Remove the shipping brackets and ties

Place your ArtFrame on the ground or in its working location.

Ensure it has been removed from its outer box and foam.

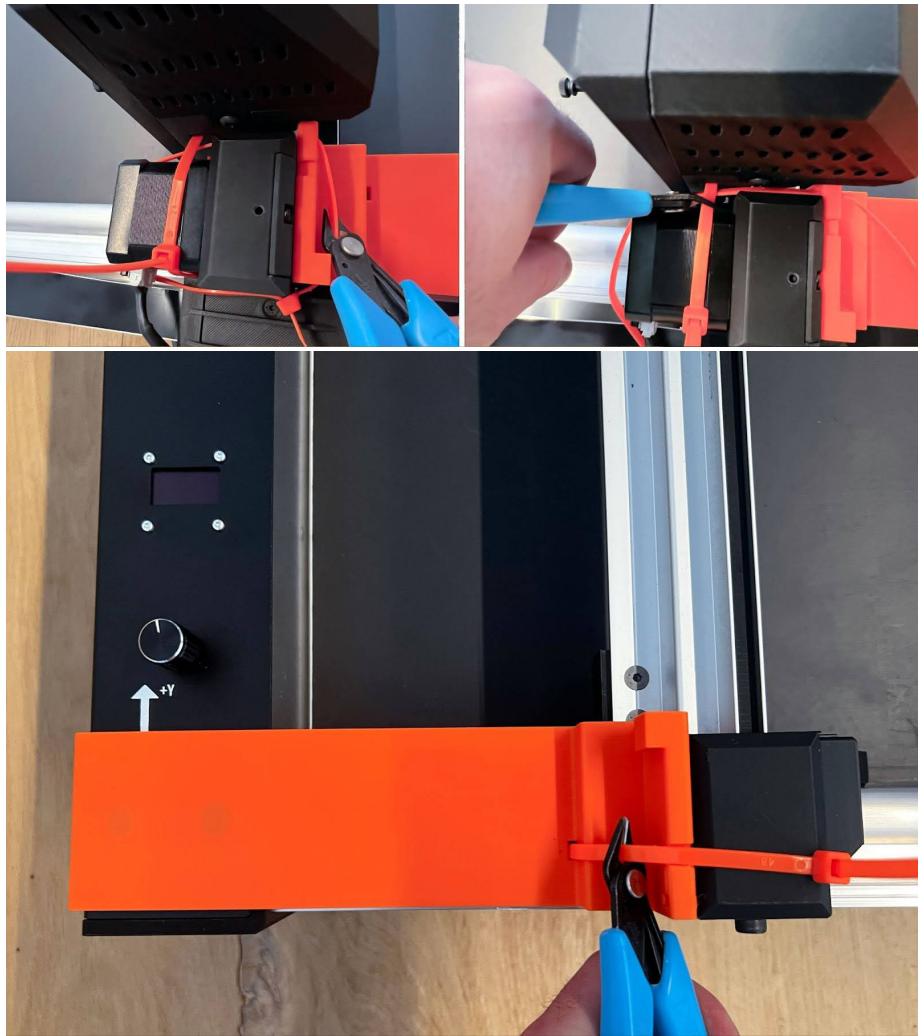
Identify the shipping components on the machine

On the machine itself, notice two orange brackets (see image below) and several orange cable ties securing the components.

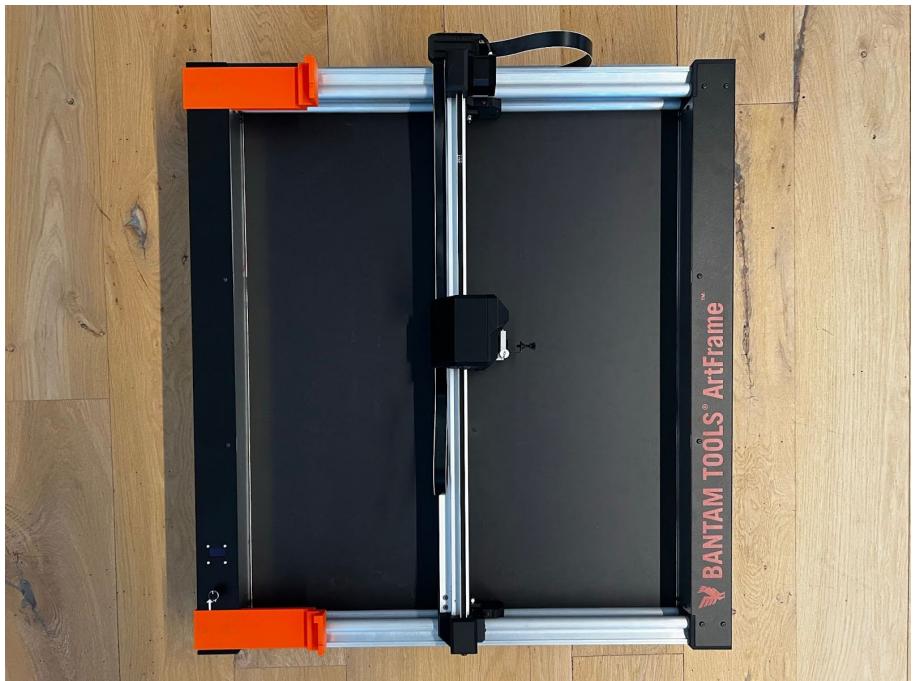


Remove cable ties

There are several orange cable ties that together secure the gantries during shipping. Carefully identify the orange cable ties and clip each of them. Take care not to cut any of the nearby cables or other items besides the orange cable ties.



The carriage is now free to move. You can move it gently away from the brackets. Do not move it rapidly or with significant force.

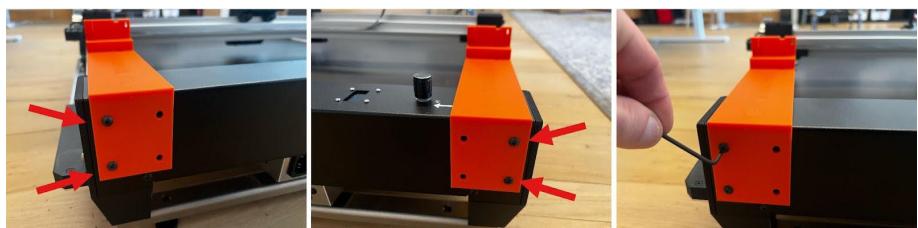


Remove shipping brackets

Now that you have removed the cable ties that hold the carriage to the orange shipping brackets in place, it is time to remove the orange shipping brackets, which are attached to immobilize the carriage during shipping.

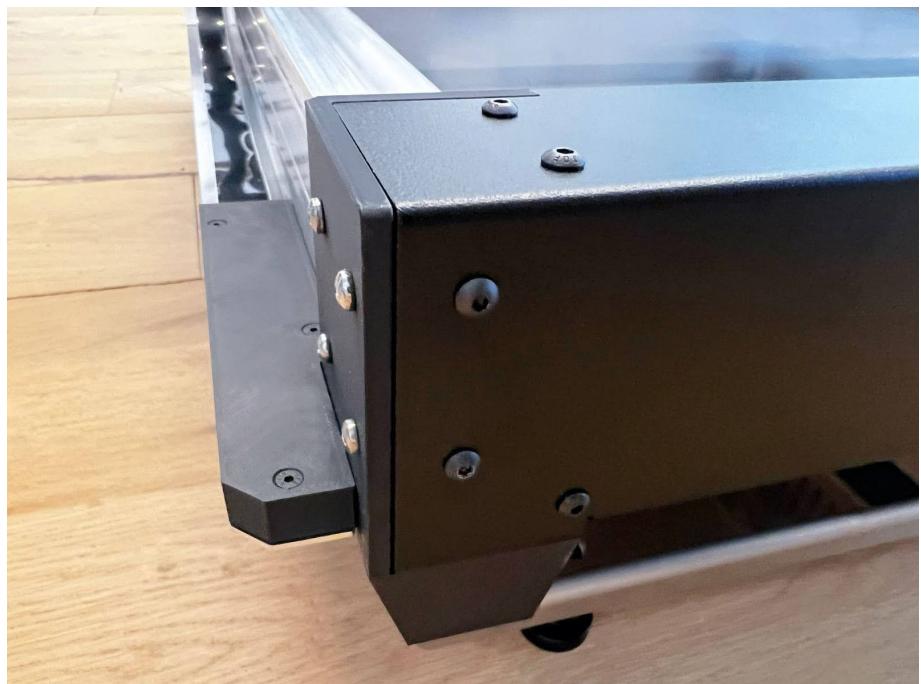
Open the accessory box and locate the 2.5 mm Hex L-Wrench. (Since there are several similar looking wrenches in the provided tool set, it may be easiest to identify this as the medium-sized one that fits the screws on the shipping brackets.)

Use the 2.5 mm hex L-wrench to remove the two screws each, as shown, from the two orange shipping brackets.



Reinstall screws

After removing the orange shipping brackets, we recommend that you reinstall the screws in their original holes for safekeeping. It's also a good idea to save these brackets, as they will be very useful if you want to move ArtFrame to a different location.



Store brackets

We recommend saving the two orange shipping brackets in case you need to ship, transport, or move your machine in the future.

1.4 Running the Welcome Plot

After unboxing, the first step in getting started with your Bantam Tools Art-Frame is to run the included welcome plot file. Here, we will walk you through the steps to do so.

Step 1: Insert the microSD card

Locate the microSD card from the accessory box and insert it into the machine as shown.



The microSD slot is a “friction fit” slot. (To remove a microSD, pull it out, rather than pressing it in further.)

Step 2: Plug in and power on the machine.

The Bantam Tools ArtFrame takes power input through a standard IEC320 C13 power cord. Plug the power cord into a wall outlet and into the power receptacle on the machine. Then, turn on the machine using the power switch, which is located next to the power receptacle.



WARNING: The Bantam Tools ArtFrame ships in US and International versions that have different input voltage requirements, either 100 - 127 VAC or 200 - 240 VAC. If you are not sure which your machine is configured for, consult the label on the machine. If your machine is the wrong voltage for your locale please reach out to support@bantamtools.com for assistance.

Step 3: Select your file and begin the plotting process

Note: this should be done before installing the pen.

Turn the display knob to navigate to the file folder icon ("Browse SD"), and press (click) the knob to select it. This brings you into the list where you can browse files on the microSD card.

Rotate to highlight the example File named welcome.gcode that comes pre-loaded on your microSD card.

Press the knob down to select and begin running the welcome.gcode file.

ArtFrame2234



Browse SD

Idle

< Back

welcome.gcode

When you do so, the machine will begin to move, performing its automatic homing sequence. After homing, it will vertically move the pen holder to the "pen loading" position.

Home

Homing before file run...

Hold:0 00:00:00 1%

welcome.gcode



Install Tool: 1. Color:

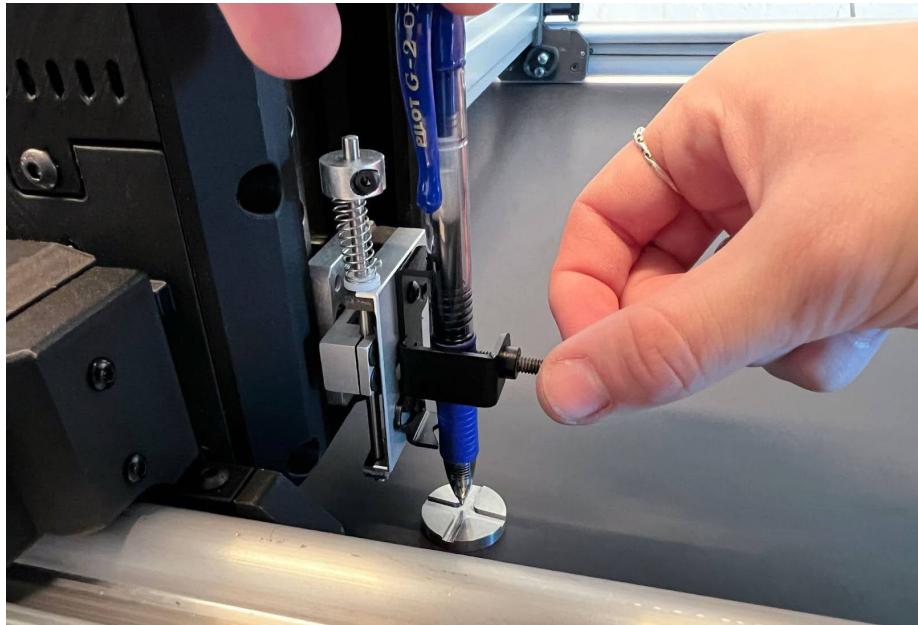
Black

Step 4: Installing the Pen

Place the Pen Height Setup Tool under the pen holder, with the "cross" (X-shaped) side facing up.



Insert your pen into the pen clip, with its tip resting in the grooves at the center of the Pen Height Setup Tool. Gently tighten the thumbscrew on the pen clip to secure the pen. Do not over-tighten it; only tighten it just enough to securely hold the pen in place.

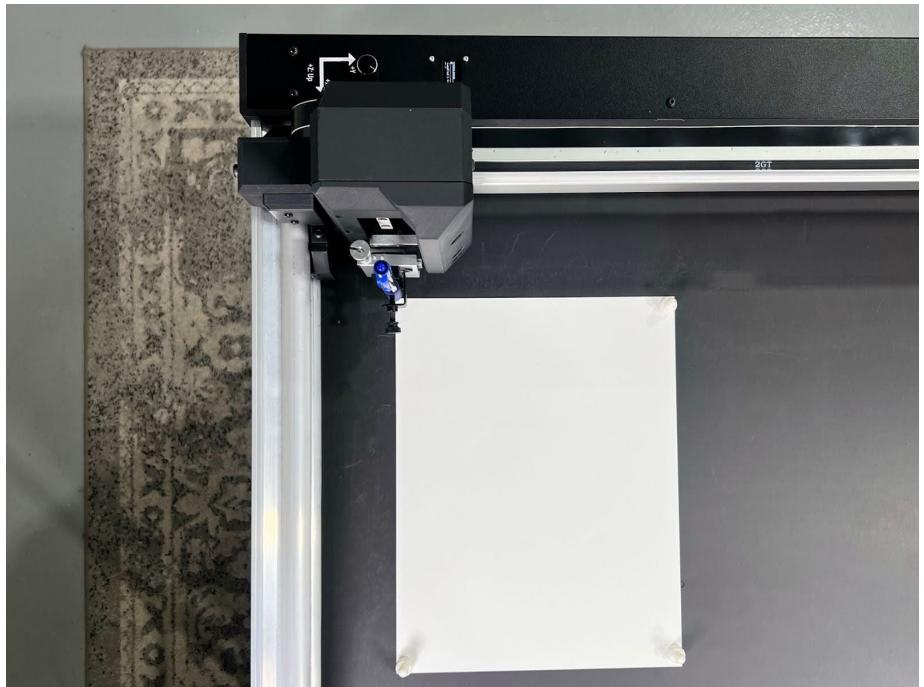


Then, remove the Pen Height Setup Tool. You will need to slightly lift the pen holder in order to do so.



Step 5: Insert Paper

Place a sheet of 8.5" x 11" or A4 size paper onto the ArtFrame's writing surface.



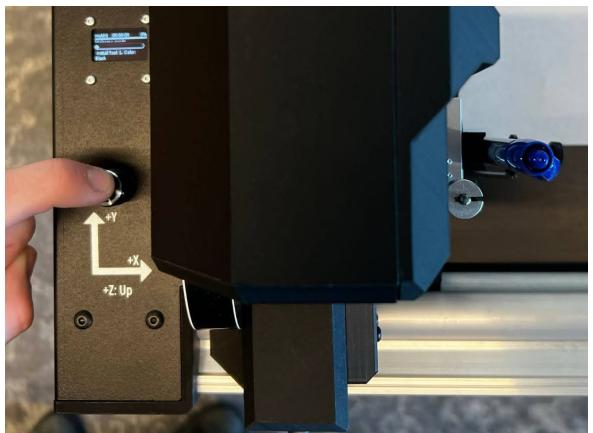
We have designed this file such that it can run with either portrait or landscape paper orientation; the image above shows the sheet in landscape orientation, longer in the "X" direction than in the "Y" direction.

Align the paper so that its lower-left corner is directly below the tip of the pen.

Secure the paper in place with the magnets, such as the "Chess pawn" magnets that are included with the ArtFrame.

Step 6: Start the drawing
Make sure that the drawing area (around the paper, and elsewhere in the bed of the ArtFrame, including in the rails) is free of obstructions.

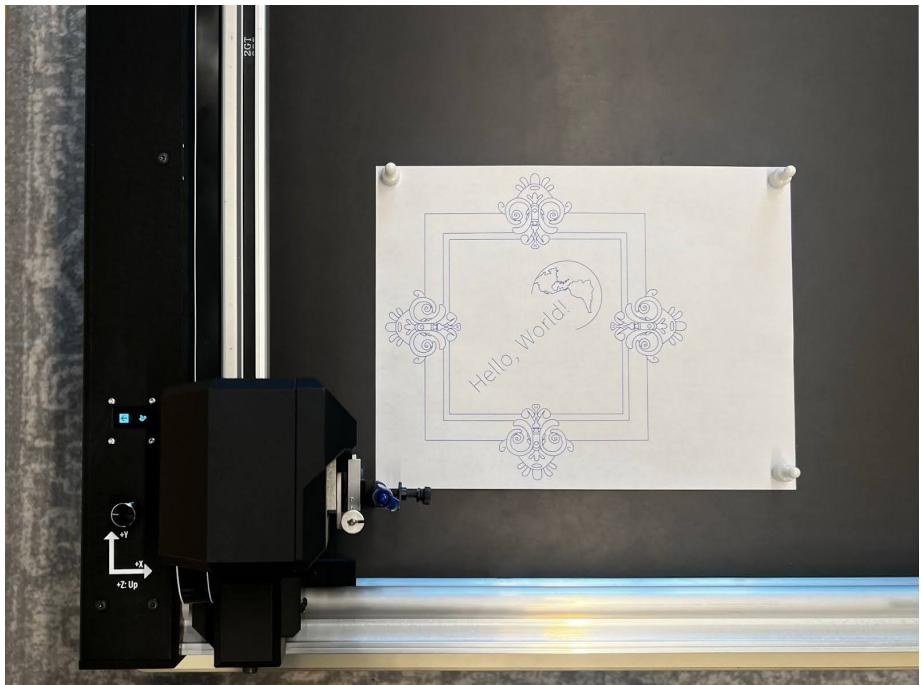
Then, press the Control Knob to begin the plot.



When the plot completes, it will display a message about having completed the plot:



When the plot is complete, remove the paper. If everything has gone correctly, you should now have your first drawing created with the Bantam Tools ArtFrame™!



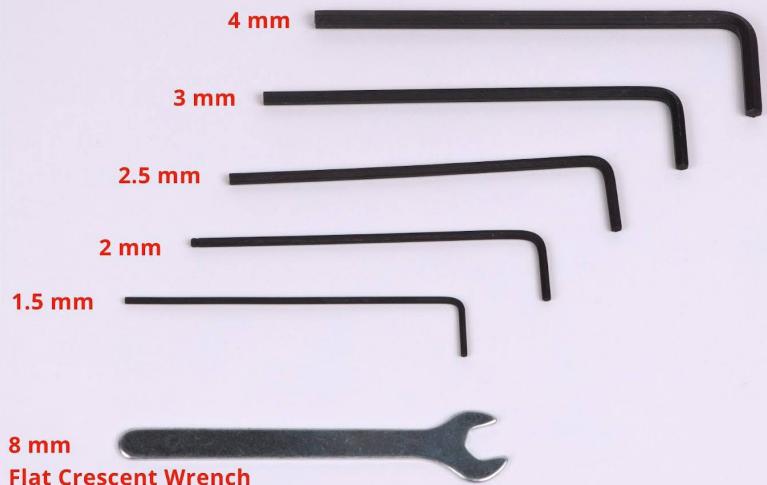
In case of difficulty:

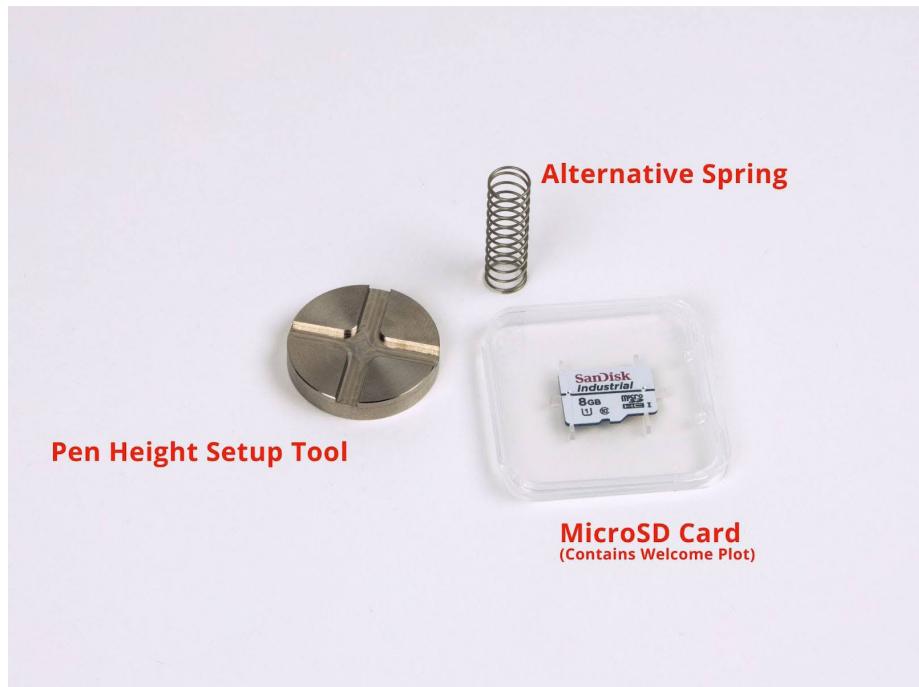
If you run into issues while making your first plot please refer to the support section at the end of this document and reach out for support at:
support@bantamtools.com

1.5 Included parts and accessories



Hex L-Wrench





- Bantam Tools ArtFrame
- Pilot G2 Pen
- Power cord
- USB Cable
- Tool set:
 - 1.5 mm hex L-wrench
 - 2 mm hex L-wrench
 - 2.5 mm hex L-wrench
 - 3 mm hex L-wrench
 - 4 mm hex L-wrench
 - 8 mm flat crescent wrench
- Mini Accessories Bag:
 - Bantam Tools Pen Height Setup Tool
 - microSD card
 - Alternate (stronger) spring for additional pen pressure
- 4 "Chess pawn" magnets for holding paper down to the surface ([more available](#))

Additional magnets and Pen Height Setup Tools are available to purchase. To learn more about these and other ArtFrame accessories, please visit [Bantam Tools ArtFrame Accessories](#)

1.6 Table Size / Table Rails accessory

All models of Bantam Tools ArtFrame have a footprint that is larger than typical desks.

Bantam Tools ArtFrame 1824:

Overall Dimensions: 34 × 29.87" (864 × 758.7 mm)

Footprint: 31.4 × 27.9" (797 × 708 mm)

Bantam Tools ArtFrame 2436:

Overall Dimensions: 34 × 47.86" (864 × 1215.7 mm)

Footprint: 31.4 × 45.9" (797 × 1165 mm)

Bantam Tools ArtFrame Panorama:

Overall Dimensions: 34 × 83.07" (864 × 2110 mm)

Footprint: 31.4 × 81.26" (797 × 2064 mm)

If you would like to use it on a smaller desk, we sell an accessory, [The Bantam Tools ArtFrame Table Rails](#), so that the feet of the machine will fit on a standard desk.

1.6.1 Installing Table Rails

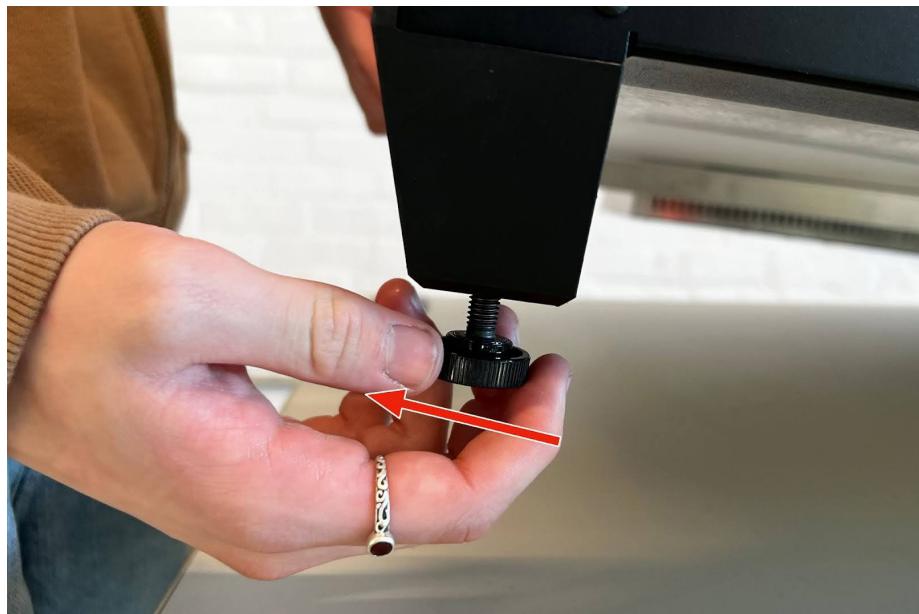
Locate the Included Hardware

Your Table Rails kit includes four M8x8 mm screws. If you ordered them with the ArtFrame, they will be contained in a foam roll secured inside the same box the ArtFrame was shipped in.



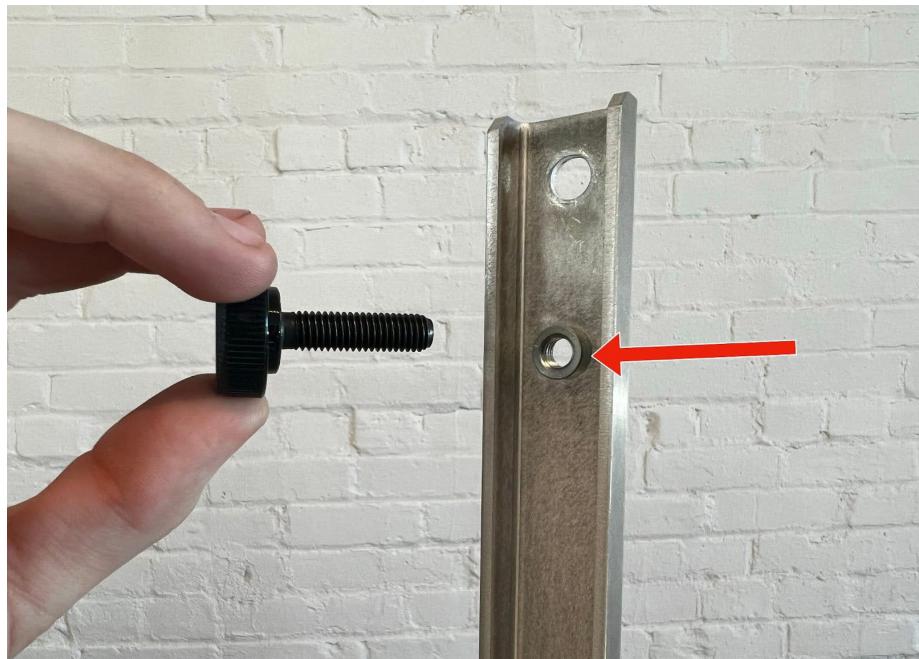
Remove the Feet

Unscrew the feet from the ArtFrame twisting the legs the left..

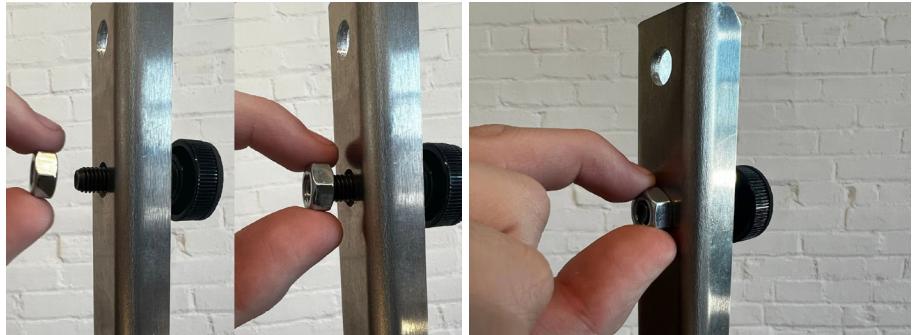


Attach the Feet to the Rails

Screw the feet removed from the ArtFrame into the inner side of the Table Rails on the underside (as shown below).

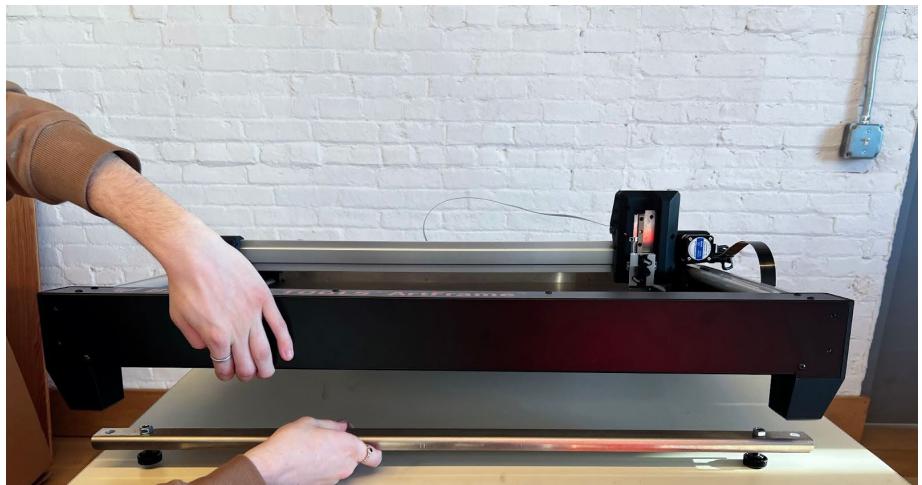


Use the provided hex nuts to secure each leg into place. Hand-tighten the hex nuts to ensure stability. Repeat the process for all four legs.



1.6.2 Installing the table legs

Carefully lift the ArtFrame along one of the black sides and place one of the table legs below.



Secure each leg into its original position on the ArtFrame using the included M8x8 mm screws. Hand-tighten to avoid over-tightening. Repeat on both sides, securing all four M8x8 screws by hand.

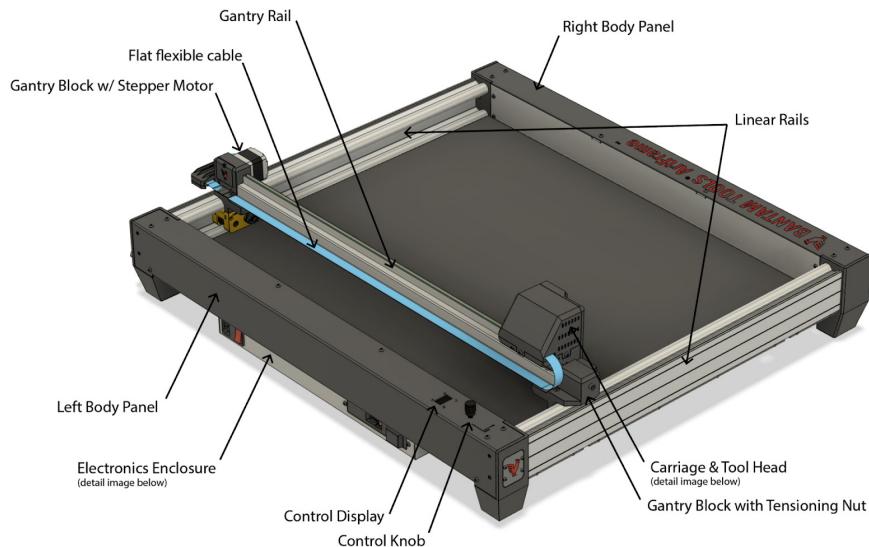


1.7 Bantam Tools ArtFrame™ Anatomy

We will refer to parts by name throughout this guide. The details and appearance of parts vary slightly between models, but are the same in function.

- Power button
- Power Connection
- Electronics Enclosure
- USB Connection
- microSD Card socket
- Control Knob
- Control Display
- Main Carriage
- Cable Guide/s
- Y Motor
- X Motor

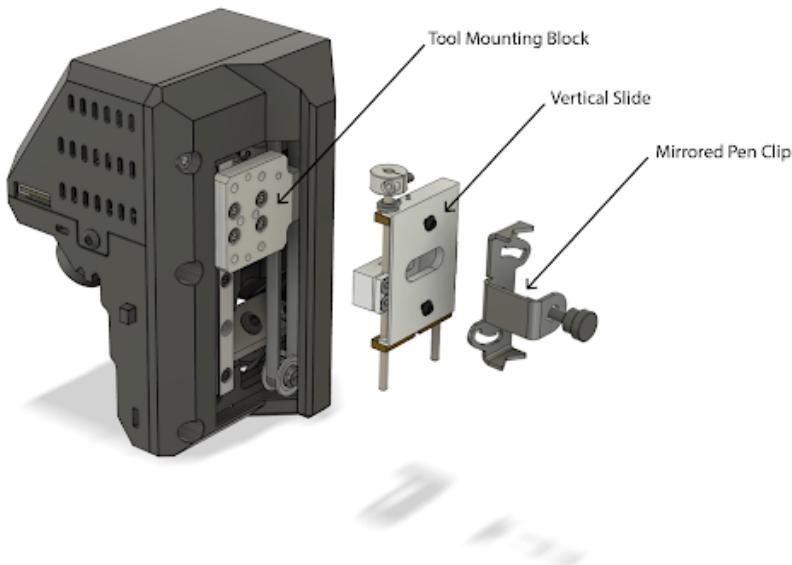
Bantam Tools ArtFrame™



Anatomy of the ArtFrame carriage:

- Carriage: Rides along the gantry and connects to the wiring.
- Toolhead: Houses the Z motor, endstop, and Tool Mounting Block. This is customizable, and we plan to release future implementations of Toolheads that will be compatible with and fit onto the carriage below.
- Tool Mounting Block: The primary mounting point for tool holders and stages.
- Vertical Slide Stage: Similar to the one on the Bantam Tools NextDraw™. When mounted to the Tool Mounting Block of the Bantam Tools Art-Frame™, it converts direct pressure from the Tool Mounting Block into spring tension for mark-making implements.
- Tool Holders: Includes accessories like Pen Clips or Strap Clamps, which hold mark-making implements. These attach to the Tool Mounting Block, Vertical Slide Stage, or the optional Rotation Stage.

Carriage & Tool Head Detail

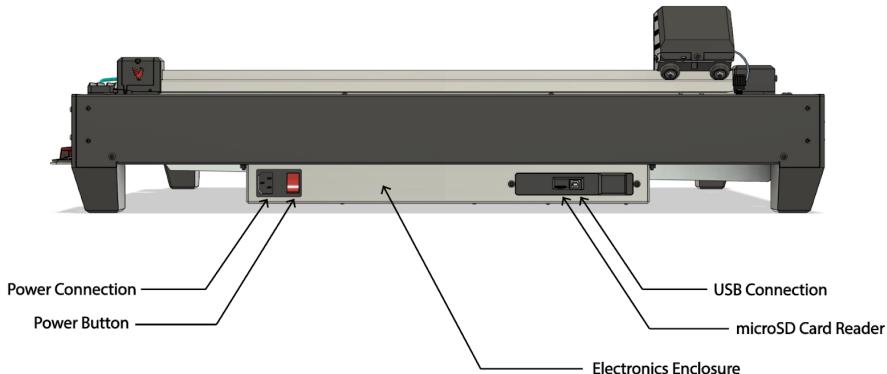


1.8 Electronics Enclosure

The Bantam Tools ArtFrame™ has an electronics enclosure that houses the USB port, power connection port, power switch, and microSD card slot. (refer to image below)

Electronics Enclosure Detail

Left View



1.8.1 About the power supply

The Bantam Tools ArtFrame ships in US and International versions that have different input voltage requirements, either 100 - 127 VAC or 200 - 240 VAC. If you are not sure which your machine is configured for, or which power setting is needed in your region, please consult the label on the machine or contact sales@bantamtools.com.

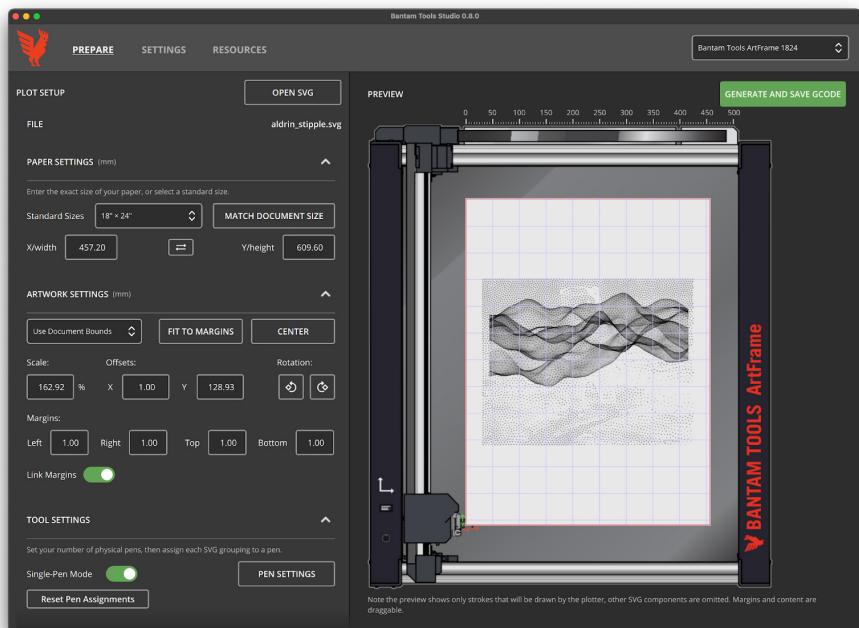
1.8.2 About the USB cable

All Bantam Tools ArtFrame models currently ship with a USB A to USB B cable. This cable is not currently used in day to day operation of the machine, but is provided in case it is needed for troubleshooting.

2. Plotting with Bantam Tools Studio

Bantam Tools Studio™ software is designed to generate G-Code configured to run on any Bantam Tools ArtFrame plotter. It allows you to manage SVG files, select paper sizes and configure pen settings. Once created, these G-code files can be saved to your computer and transferred to the Bantam Tools ArtFrame™ via a microSD card for plotting.

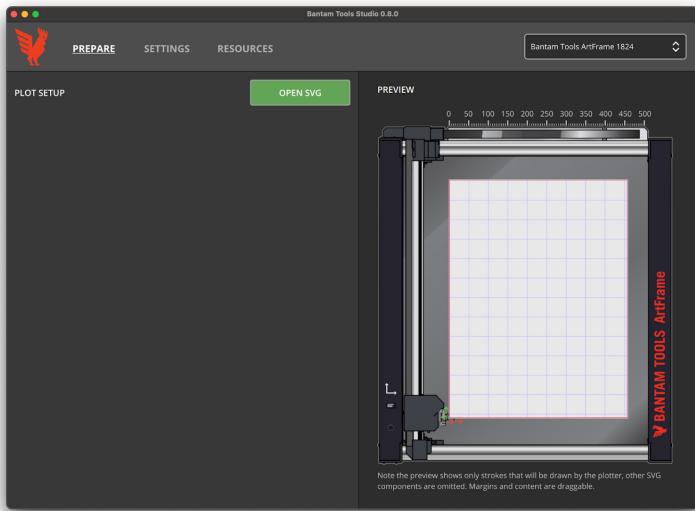
For further detail, Bantam Tools Studio has its own user guide available for download at: <http://bantam.tools/btsguide>



2.1 Install Software

To get started, download and install Bantam Tools Studio™ and activate the license. See The Bantam Tools Studio User guide for a thorough walk through of the install process.

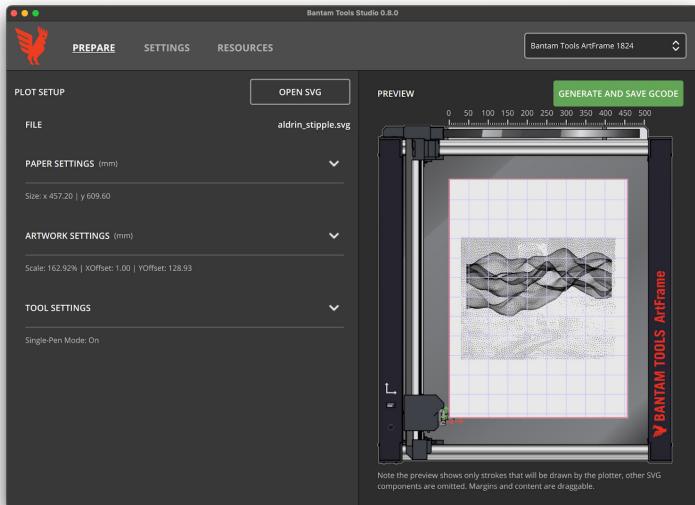
2.2 Opening and Preparing an SVG file



- Select your machine from the top right corner dropdown menu.
- Click the 'Open SVG' button to import an SVG you would like to convert to G-code.
- The SVG will appear in the Preview area. You will notice the Plot Setup populate.

2.2.1 Plot Setup

The "Plot Setup" panel will populate once you've uploaded a usable SVG. For more detailed information on these options see the Bantam Tools Studio user guide.



2.3 Quick Start for single and multi-color plots

This section provides walkthroughs of how to make single-color and multicolor plots, starting with your own SVG artwork.

Before starting these tutorials, we highly recommend that you:

- Go through the first section of this user guide, from Unboxing
- Ensure you have already run the test plot using the included microSD card (see Section “1.4 Running the Welcome Plot”).
- For a more detailed explanation of the tools and settings see the Bantam Tools Studio User Guide

Overview

Start with a single pen plot to familiarize yourself with Paper and Artwork settings. Once comfortable, you can explore multi-pen setups.

1. Launch Bantam Tools Studio

- Open Bantam Tools Studio.
- Click Open SVG and navigate to your file to open it.

2. Paper Settings

Go to Paper Settings and select the size of your paper.

3. Artwork Settings

Adjust the artwork settings until the visualization on the right appears as desired for plotting.

4.A Tool Settings (Single Pen)

- Ensure Single Pen Mode is turned on.
- Open Pen Settings.
- Defaults are set up for draft mode, if you want higher quality set the acceleration presets to precision.
- Close the settings popup by clicking the X in the top right.

4.B Tool Settings (Multi-Color)

- Enable Multi Pen Mode.
- In the Sort Strokes By dropdown, select how you want to organize your pens:
 - Colors: Assign pen slots based on the color of strokes in your SVG file according to its Hex value.
 - Layers: Assign pen slots based on the layers in your SVG file, as created in your design software (e.g., Illustrator, Inkscape).
 - Groups: Assign pen slots based on the structural grouping of elements in your SVG file.

Note: Layers in design software often translate to groups in SVG files. Groups allow you to cluster multiple elements into one assignable tool slot.

- Select the number of pens you want to use and assign each color, layer, or group to a specific tool slot.
Note: Use distinct colors or clear layer/group organization in your design software to make this process smoother.

5. Preview and Save G-Code

- Review the plot visualization on the right. If everything looks good:
- Click the Generate and Save G-Code button (big green button).
- Move the G-Code file to your microSD card and insert the card into the plotter.

6. Select your file and Bring Your Plot to Its Starting Position

- Use the plotter knob to navigate to the folder icon labeled Browse SD.
- Press the knob to select a file to plot.
- This action will move home the machine if it has not been homed since powering up and will send the tool head to the top starting position of the plot. Clicking on the file makes sure that the machine has been homed and sends the pen clip to the loading position and it will not start drawing.

7. Insert Paper

- Insert your paper, ensuring its corner starts directly under the pen tip. Use the orientation as selected in the software.
- Align the paper so that it is parallel to the rails of the machine.
- Secure the paper using the included magnets. (See Section 5 Pen Set-up and Workholding for more information.)

8. Install the Pen

- Use the Pen Height Setup Tool to install your pen by placing the Pen Height Setup Tool under the tip of the pen and make sure the pen is centered over the tool. The location of the pen tip at this time is at X = 0, Y = 0 and Z at 3.5 mm above the paper because the Pen Height Setup Tool is 3.5mm thick at its center.
- Remember to remove the Pen Height Setup Tool after setup.

9. Start the Drawing

- Double-check your setup.
- Remove the Pen Height Setup Tool if you have not done so already.
- Ensure your hands are clear of the rails.
- Push the knob to initiate drawing.
- If at any time you want to pause the movement of the machine, click the knob down briefly and your plot will pause at the end of its currently queued motion commands.
- Click the knob again to resume.
- If you want to end a plot after pausing, click and hold the knob for a few seconds until the display says “file canceled”.

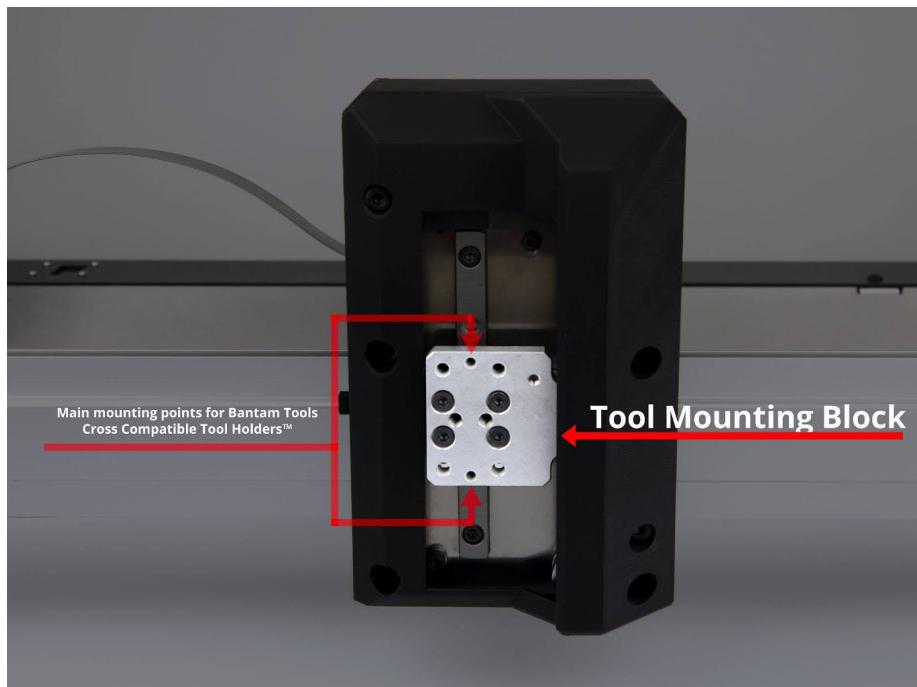
9.B Next Color (Multi-Color)

- When the first pen has finished the plotter will return to the home position.
- Repeat steps of inserting the pen above the Pen Height Setup Tool and click the knob to restart the plot with the new color. Repeat until all the pens in your plot have been plotted.

3. Mounting and Using Tool Holders

The Bantam Tools ArtFrame is designed to work with any number of different tool holder configurations, and offers flexible mounting stages for supporting them.

3.1 The Tool Mounting Block



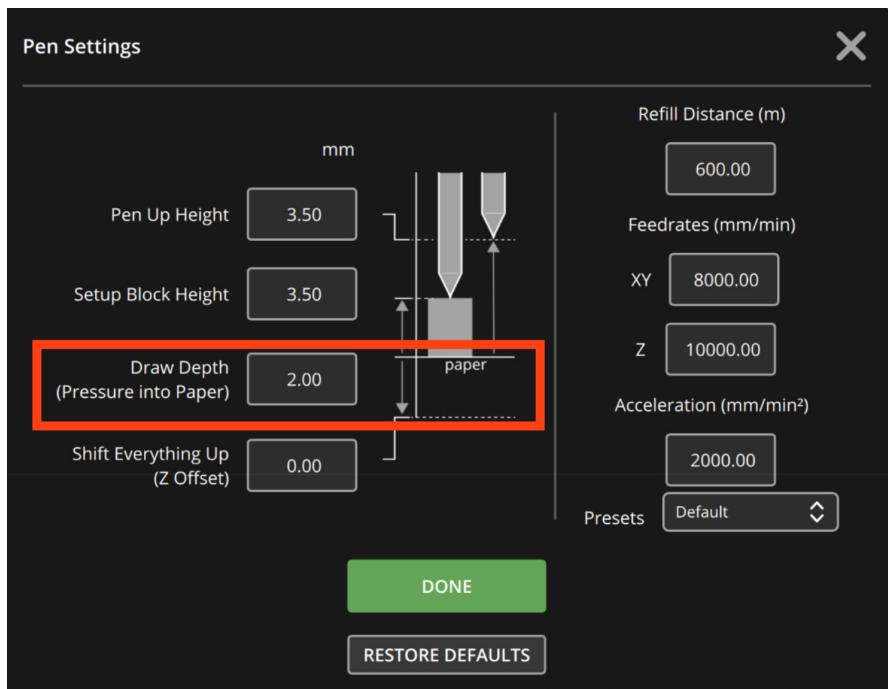
The Tool mounting block is intended for direct pressure from the Z-Stage, and is recommended with tools that require some level of compression, such as brushes and soft felt tip markers or consumables like oil pastels, oil sticks or charcoal.

The ArtFrame ships with the Vertical Slide Stage installed, and is recommended for general pen plotting. To fully understand the effect of the Vertical Slide Stage, we first must understand the effect of the Tool Mounting Block on its own.

One can mount any of our Bantam Tools Cross-Compatible Tool Holders directly to the Tool Mounting Block as seen in the image below with a Pen Clip.

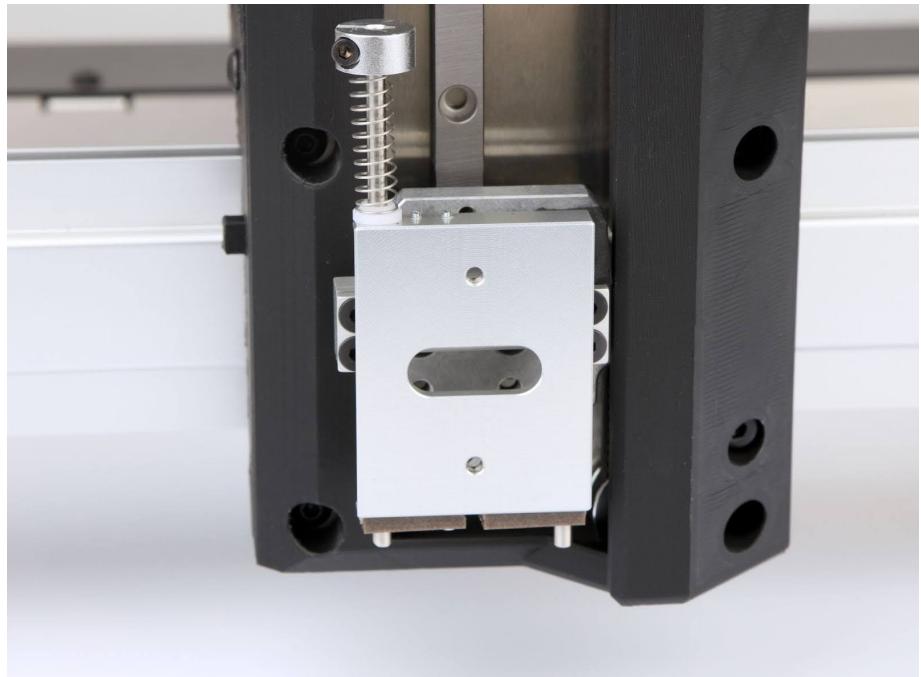


To understand how Draw Depth works with the Tool Mounting Block, set the brush height to 3.5 mm using the Pen Height Setup Tool. In Bantam Tools Studio, match this with a Setup Block Height of 3.5 mm in the pen settings. Then, set the Draw Depth to 2 mm. This setup presses the tool 2 mm into the surface, demonstrating how the Draw Depth parameter compresses the tool relative to the mounting block height. (Refer to the image of the Pen Settings below.)



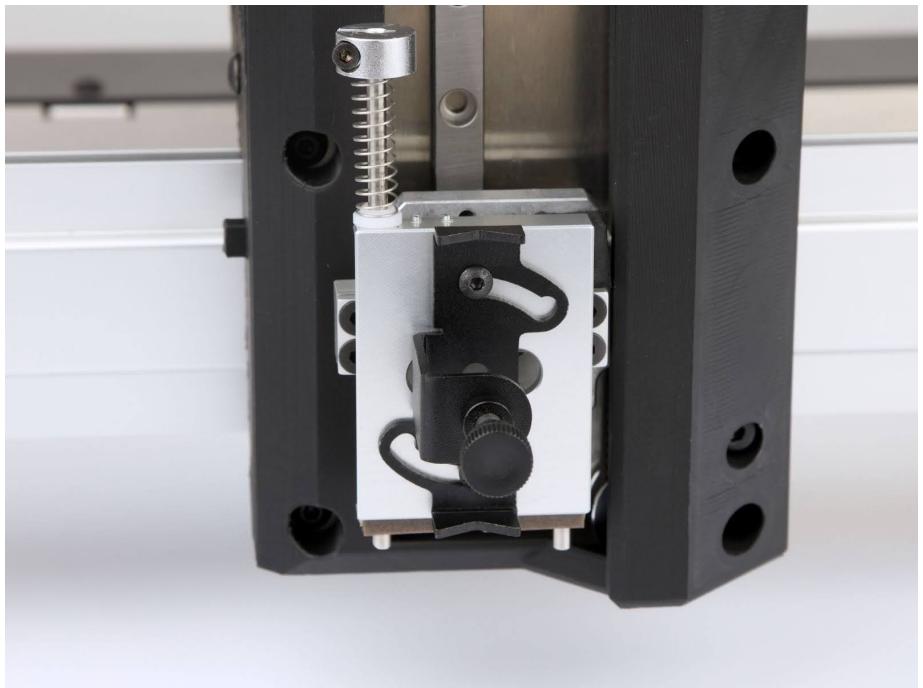
3.1.1 The Vertical Slide Stage

The Vertical Slide Stage comes pre-attached to the tool mounting block and is ideal for general pen plotting applications. When a regular pen is installed into a pen clip mounted on the Vertical Slide Stage with the spring, the Draw Depth is translated into spring tension instead of direct pressure.



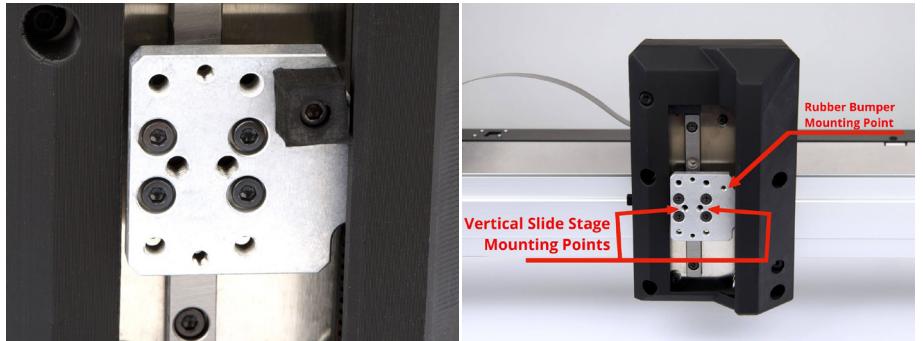
Since the spring can be adjusted by raising or lowering the shaft collar and choosing between light or heavy springs, we refer to spring tension in terms of Draw Depth. Instead of compressing the brush bristles, the pen stops at the surface, and the spring compresses by the Draw Depth distance, applying additional pressure to the pen tip. This setup is particularly useful for certain ballpoint and gel pens.

Using the default setup height of 3.5 mm, which matches the Pen Height Setup Tool, and setting the Draw Depth in Bantam Tools Studio to 2 mm, the spring compresses by 2 mm after the tool block travels a total of 5.5 mm. Similar to the tool mounting block, any of Bantam Tools' Cross-Compatible Tool Holders™ can be mounted to the Vertical Slide Stage, as demonstrated in the following image shown with a Pen Clip.

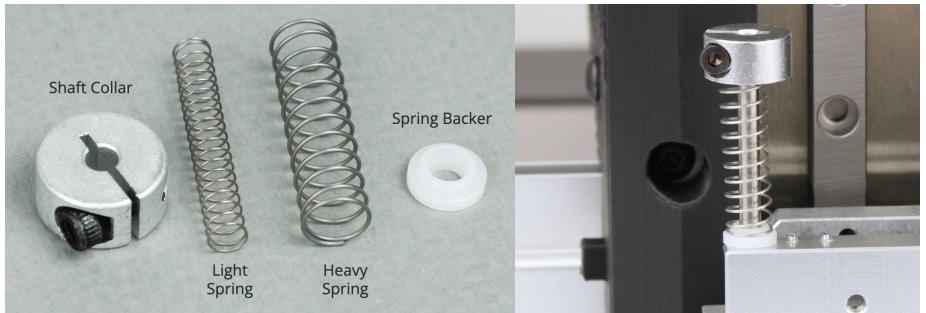


Installing or Removing the Vertical Slide Stage:

When installing or removing the Vertical Slide Stage, ensure you keep track of the rubber bumper and reattach it before reinstalling the stage.



3.1.2 Spring Kit



The vertical slide stage with the Spring Kit converts draw depth into spring tension. See the section above on the Vertical Slide Stage. When installed, the Spring Kit applies downward pressure on the pen as it writes. Instead of forcing the pen through the surface, the spring compresses, making it ideal for writing implements that require consistent force.

There are four parts to the Spring Kit: A Shaft Collar, a Light Spring, a Heavy Spring, and a machined plastic piece called the Spring Backer. Springs can wear out over time; replacements are available from Bantam Tools.

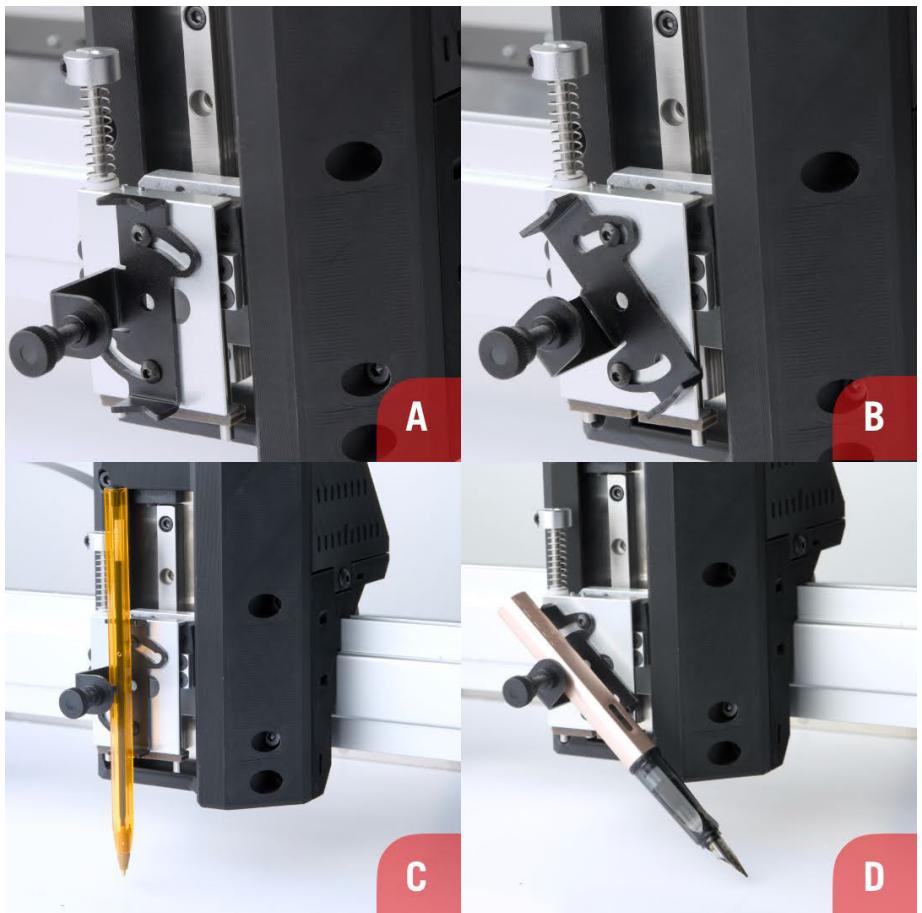
The heavy spring gives about twice the force of the light spring, and is intended for pens that require increased force, such as traditional ballpoint pens. The light spring does not add as much pressure. This is useful when working with gel pens and other types that benefit from a relatively low amount of pressure. If you're just getting started, either spring is a reasonable choice. You can always switch later if you want less or more downforce.

3.2 Pen Clip Orientation

The pen clip can be attached in two different orientations: Vertical, which points the pen straight down, or diagonal, which holds the pen at a 45° angle to the paper. Which to use mostly depends on what type of pen you are using.

To switch between the orientations, loosen (but do not remove) the two small screws. Lift the pen clip slightly, then rotate it to the other position. Lower it back down and tighten the two screws back into place.

Note: The Bantam Tools ArtFrame pen clip (mirrored) that is included with the ArtFrame is designed differently than Bantam Tools NextDraw pen clips. It is mirrored so that if you put the pen clip into an angled position which is ideal for fountain pens, the pen will angle away from the home position.



The vertical pen position (A) is generally the best choice for technical pens, pens that require pressure, such as ball-point pens (C), or multi-color plots. The diagonal position (B) is generally the best choice with fountain pens (D) or other pens that write better at an angle.

Take care to only apply gentle force with the thumbscrew; do not tighten it more than necessary.

3.3 Alternate Tool Holders for the ArtFrame

The design of the belt driven vertical Z-stage offers stability, control, and flexibility. Due to the robust build of the ArtFrame, you can use large tools and apply significant pressure. The following accessories, initially developed for the Bantam Tools NextDraw are also functional on the Bantam Tools NextDraw with the caveat that the XL Pen Clip in its angled position may be impeded in the home position.

3.3.1 XL Pen Clip



3.3.2 Italic Pen Adapter



3.3.3 Strap clamp

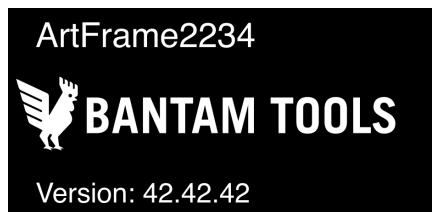


4. The Bantam Tools ArtFrame Interface

4.1 The display and menu system

4.1.1 Startup Screen

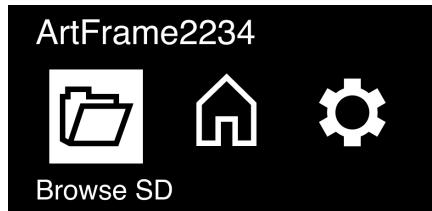
The startup screen appears when you power on the machine. It displays the Bantam Tools logo and the firmware version currently installed on your machine.



4.2 Home Screen

On the home screen, you'll see three icons. In this and other screens that present icons, use the encoder knob to navigate left and right.

There are three items in the menu: **Browse SD**, **Home**, and **Settings**



4.2.1 Browse SD

Select **Browse SD** and press the knob in order to browse files on your microSD card.

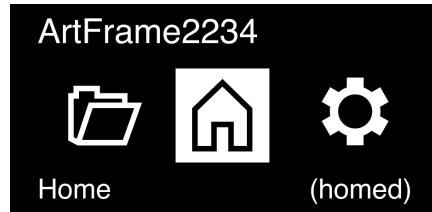
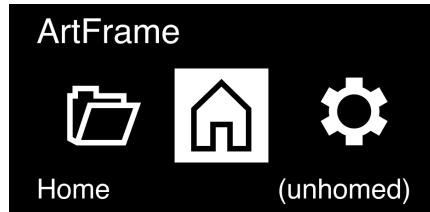
In menus like the file browser in **Browse SD**, turn the encoder knob to move up and down. Press the knob to make a selection. If the selection is a folder, you can then browse the contents of that folder.

To begin a plot, select a file from this list and press the knob in order to start the file.

Select < Back and press the knob to return to the previous page.



4.2.2 Home



Select **Home** and press the knob in order to manually initiate the homing sequence for the machine.

The ArtFrame will also automatically perform its homing sequence when beginning a plot, but this option is also provided here in case you would like to manually initiate homing.

The text at the bottom of the screen will also indicate if the machine is presently homed or not.

4.2.3 Settings

Select Settings and press the knob in order to open the Settings menu. The settings menu lists a number of options available, including options for updating the machine's firmware and configuration files.

ArtFrame2234



Settings

Idle

< Back

Version

Reset Factory Settings

Jogging

Idle

Reset Factory Settings

Jogging

Update Config File

Update Firmware

In menus like Settings, turn the encoder knob to move up and down. Press the knob to make a selection.

4.2.3A Version

Displays detailed information about the plotter, including:

Idle

< Back

FW Version: 1.0.00

FluidNC: v3.7.4

Config: 1.0.00

Idle

Machine: ArtFrame2234

Board: Serama Rooster

- FW Version: Firmware version
- FluidNC: FluidNC version
- Config: Configuration file version
- Machine: Machine Type
- Board: Name of control board

4.2.3B Reset Factory Settings

Resets the firmware to all its initial default settings and reboots.

4.2.3C Jogging

The encoder is used to select the axis which you wish to jog. Once the desired axis is highlighted, press the encoder and rotate the knob to jog the position of the selected axis. Clockwise moves in the positive direction, counterclockwise in the negative. To select a different axis, press the encoder again to deselect the currently selected axis, and rotate the encoder to select the desired axis.

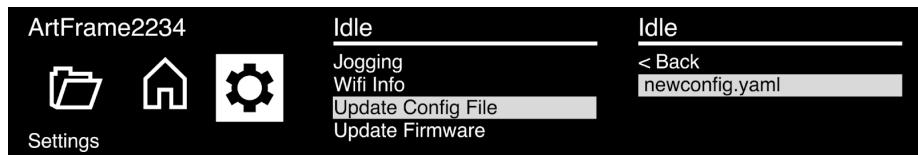
Idle	
< Back	M Pos
Jog X	X: 42.000
Jog Y	Y: 42.000
Jog Z	Z: 42.000

4.2.3D Update Config File

Used to update the configuration file via the microSD card.

To update the config file, place the new config file (specified with a .yaml file type) on a microSD and insert it into the machine. Then, under the settings menu, select Update Config File, and navigate to the desired configuration file so that the file is highlighted.

Press the encoder and the machine will install the new configuration, rebooting once the process has successfully completed.



4.2.3E Update Firmware and Configuration File

Used to update the firmware binary via the microSD card.

To update the firmware, place the new binary (specified with a .bin file type) on a microSD and insert it into the machine. Then, under the settings menu, select Update Firmware, and navigate to the desired firmware version file so that the file is highlighted.

Press the encoder and the machine will install the new firmware, rebooting once the process has successfully completed.



If there is a firmware and configuration update available we recommend updating the firmware first and then the config to avoid any incompatibility issues with the firmware and config. Flashing firmware or configs other than those released may cause your machine to become non-functional.

The latest Firmware and config files are available at [Bantam Tools ArtFrame™](#)

Firmware and config

Download the latest config (.yaml) and firmware (.bin) from the Bantam Tools Website.

Place the files on an SD card.

Insert the SD card into the SD card slot on the Bantam Tools ArtFrame.

Navigate to and select the Gear image on the home screen of the OLED.

To update your firmware:

1. Scroll down to the “Update Firmware” option and select.
2. Select the firmware binary you placed on the SD card.
3. The Machine will Reboot after updating the firmware.

To update your config file:

1. Scroll down to the “Update Config File” option and select.
2. Select the config you placed on the SD card.
3. The Machine will Reboot after updating the config.

4.3 Formatting microSD cards

If and when you want to use your own microSD card, it needs to be formatted using a FAT32 filesystem.

[Guide for MacOS/Windows](#)

5 Pen Setup & Workholding

For pen setup please follow the instructions in “Step 4: Installing the Pen” of the getting started section.

For other toolholding applications please see the support documentation for those accessories.

5.1 Pen Height Setup Tool

The [Pen Height Setup Tool](#) ensures consistent positioning of pens, markers, brushes, and more at 3.5 mm above your paper.



This tool is a disk of 300-series stainless steel, 25.4 mm in diameter and 4.5 mm overall thickness. One side features a milled X-shaped guide to help you align your page. The other side offers an alternative round, flat surface, perfect for larger mark-making implements.

5.2 Positioning paper or other medium

As a general rule, when the pen is in the home position, directly underneath the pen’s tip is where you can place the lower left corner of the paper. Because pens and mark making implements vary in size/dimensions/diameter, each type of mark making device may have a different effective home location. Take care as you place your paper to keep it parallel to the edge of the writing surface to ensure that your drawing isn’t skewed on the paper.

5.3 Fixturing work on the magnetic surface

The Bantam Tools ArtFrame has a metalized rubber surface that magnets stick to. Be sure magnet placement is outside of the area of the plotting.

You can also use alternative means of holding-based on your preference. You can use artist tape or blue tape, a clipboard, or other means that position and secure the plotting medium in a reliable manner. We have tested 3M blue painters tape to be compatible with the surface but others may not be, use tape with caution.

Warning: DO NOT USE MASKING TAPE. Regular masking tape has a chemical in it that will mar the surface of the metalized rubber. Other tapes or adhesives may have this issue as well.

5.3.1 Using the magnetic surface

The Bantam Tools ArtFrame ships with a magnetic plotting surface that allows you to position paper (or your preferred media) in place.

Take care to choose locations that will not interfere with the travel of the pen. A typical approach is to place the magnets in the corners of the paper, slightly offset from the corner by the Home position to avoid collision when the pen travels to the Home position.

We have multiple magnet products

- [Chess Pawn Magnets](#) (bantam.tools/cpm)
- [Hold Down Magnet and Clip Set](#) (bantam.tools/hdmc)

It is very important to keep any magnets away from small children.

5.3.2 Flexible Set Up Magnets accessory

The optional Flexible Set Up Magnets accessory is another tool for helping to align paper in place. Two of these magnetic strips can be placed against the corners of your paper to achieve consistent and reproducible alignment. The magnets include a notch to fit the Pen Height setup tool at the very corner of the paper.



5.4 Using various sizes of paper with the ArtFrame

There is no minimum size of paper that you can use on the ArtFrame, but the maximum paper size is in practice typically limited by the overall size of the writing surface.

- The Bantam Tools ArtFrame 1824 has a plotting area (travel area) of 18 x 24". The magnetic writing surface can accommodate paper up to 25 x 29".
- The Bantam Tools ArtFrame 2436 has a plotting area (travel area) of 24 x 36". The magnetic writing surface can accommodate paper up to 29 x 43"
- The Bantam Tools ArtFrame Panorama has a plotting area (travel area) of 24 x 72". The magnetic writing surface can accommodate paper up to 29 x 78"

When using paper larger than the plotting area, you may need to take into account the margins around the outside of the plotting area to properly center the paper.

6. Using your own G-Code

The Bantam Tools ArtFrame™ is a machine that reads and interprets G-code, a CNC language used for machining applications.

Bantam Tools Studio™ allows you to configure SVG to G-Code conversion in order to accommodate a wide range of mark making implements. The software is also set up to minimize the possibility that you can generate code that crashes the machine. While the machine can run generic G-Code created manually or with third-party software, using external programs increases the risk of commanding the machine to move outside its boundaries. Although the firmware includes safety stops to prevent this, we strongly recommend creating your own G-Code only if you are confident in keeping all movement commands within the machine's working area.

Tip: You can use the Bantam Tools Studio software to generate G-Code and then open that in a text editor to learn more about what the software does, what commands are frequently used, and about their syntax.

6.1 The ArtFrame Coordinate System

The ArtFrame uses a right-handed coordinate system, where the horizontal (X and Y) axis directions are labeled with printed arrows on the frame of the machine, and the Z axis points up from the work surface.



The label is in the "Home" corner of the machine, where the X and Y coordinates have their zero. The exact zero position is not fully in the mechanical corner of the machine, but is defined to be the position directly underneath the tip of your pen, at its contact point with your paper (or other media surface) after the homing sequence is completed.

In most cases, G-code commands to control the carriage position are issued in with respect to the **G53** Machine coordinate system, which is the default coordinate system, and the coordinate system selected at bootup of the machine.

All allowed positions for movement of the X, Y, and Z axes have coordinate values that are greater than or equal to zero; negative-value positions are out of travel bounds in all three axes.

6.2 Homing sequence

The ArtFrame will automatically perform its homing sequence when you start a plot, if the machine is not already homed. You can also manually begin the homing sequence by selecting the "Home" icon from the main screen.

The homing sequence first homes the Z position by raising the pen position up, away from the bed of the ArtFrame. The Y carriage is homed next by moving it towards the Home position, followed by the X axis which also moves towards the Home position.

While the X and Y carriage movements during the Homing sequence are both generally towards the Home position, the Z movement is away from the page, which is away from Home. Part of the reason for this is so that your pen (or other marking tool) does not make any marks on your paper (or other media surface) during the homing sequence. After contacting its limit switch, the tool mounting block (the part of the Z carriage that moves up and down) is returned to the Z=0 position, which is 60 mm below the top of its travel. Allowed Z positions are in the range 0 to 60 mm.

6.3 G-Code supported by the controller:

About the Controller and firmware

The control board in the ArtFrame is the Bantam Tools Serama Rooster, a custom platform that runs a fork of the open source FluidNC firmware. The repository for our fork can be found [here](#). (This is a custom fork that supports our hardware; Unmodified FluidNC firmware is not supported on the ArtFrame platform.)

Supported and tested G-Code/Custom commands

This list of commands are ones we use actively as output from the Bantam Tools Studio software and that have been extensively tested on production machines.

Parameters:

X Y Z A B Axes

N for line numbers

G-Code Words:

F for feed rate

G codes:

G0 Rapid motion

G1 Motion at feed rate

G2, G3 Arc motion at feedrate

I J K R for arc parameters

G4 Dwell

G20 Specify units in mm

G53 Use machine coordinates

G90 Absolute distance mode

M codes:

M0, M2, M30 for pausing and program end

Comment-syntax commands

These commands are implemented only on the Bantam Tools branch of FluidNC

Install tool: Prompt's ArtFrame OLED to display toolchange

Clear: Reset OLED display after toolchange is completed

Accel (X/Y): Set per-axis feedrate acceleration values

Additional G-Code commands

These commands are supported by FluidNC but since they are not actively used by our own software's output we have not tested them all on production machines, and do not have the same level of tested confidence.

Parameters:

E for output pin numbers with M67

L and P for G10 parameters

Q for analog level with M67

T for tool numbers with M6

G-Code Words:

S for spindle speed or laser power

G codes:

G10 for setting coordinate system offset

G17, G18, G19 for plane selection

G21 Specify units in inches

G28, G30 for predefined position

G38 for probing

G40, G43, G49 for tool length offset

G54 through G59 for selecting work offset

G91 Relative distance mode

G92 for coordinate system offset

G93, G94 for feed rate modes

M codes:

M3, **M4**, **M5** for spindle control.

M6 for tool change.

M7, **M8**, **M8** for coolant control.

M62 through **M65** for digital output control.

M67 for analog output.

Comment-syntax commands

The Bantam Tools fork of FluidNC firmware running on the ArtFrame plotters supports some additional commands via G-Code comments. A G-Code comment is an entire line enclosed in parentheses, with a space before and after, like so: (Comment). A comment command cannot be added after other commands on the same line. Our custom comment commands have the format (Command: value), and are case-sensitive.

Acceleration: The maximum acceleration values used by the X and Y axes can be adjusted dynamically. These values are in mm/min² and must be less than 4000 and greater than 10. If the axis is not specified, the value will be applied to both the X and Y axes.

(AccelX: 2000)

(AccelY: 2000)

(Accel: 2000)

Install Height: The target position of the Z axis when an M0 feed-hold is used for tool changing. This value is specified in mm above the bottom of Z travel and must be greater than zero and less than 60 (the max Z travel height).

(Install Height: 5.25)

Tool Comments: We provide the ability to specify tool install comments that become visible on the ArtFrame Display to remind the user which tool to install next. The text specified will appear when the comment line is parsed, and be cleared when a following CLEAR comment is parsed. The install text does not need to follow any particular formatting, but only about 40 characters can be displayed. The typical order of commands is to send an install tool comment, then an M0 feed-hold for the tool change, and then a clear comment.

(Install Tool: 2, Color Blue)

(CLEAR)

Typical Startup routine:

Below we have provided a breakdown of what you might find at the start of a new plot generated in Bantam Tools Studio breaking down the typical startup routine of lowering the the-lift stage to the desired initial position for inserting the pen above the paper.

Example:

```
G90  
G0 Z3  
( Install Tool: 1. Layer: Neutral Gray )  
G0 X0 Y0  
M0
```

Breakdown:

#G90 set the machine to absolute positioning mode
G90

#G0: Rapid Positioning
#Z3: Moves the Z-axis (tool or pen lift) to 3 mm above the surface so the user can load the pen in
G0 Z3

Displays tool information for the operator to install the first tool. You can edit this to display different text.
(Install Tool: 1. Layer: Neutral Gray)

#G0: Rapid Positioning
#X0: Moves toolhead to x = 0
#Y0: Moves toolhead to y = 0
Note: Z-coordinate remains at 3 mm from above, no need to redeclare here
G0 X0 Y0

M0: Program stop (pause until operator takes action - to start the plot)
M0

7. Maintenance and Troubleshooting

Maintenance on the ArtFrame is largely dependent on the type and amount of use. An occasional wipe down the magnetic surface as well as the rails to remove any dust and buildup will be enough to ensure continued usage over long periods of time.

7.1 Maintaining the magnetic work surface

The magnetic surface should be wiped down periodically with a clean dry cloth or one lightly dampened. Do not use any cleaners on the work surface as it may damage or degrade the surface over time.

7.2 Print quality & speed

Speed & Acceleration

7.2.1 Rapidrate vs Feedrate

There are two separate speed settings that are considered when running G-Code, rapid and feedrate. Rapid rate is the maximum velocity of G0 moves, where the tool is not engaging with the drawing surface. Feedrate is the maximum velocity of G1-3 moves, where the tool is engaged with the writing surface while drawing. These two settings are independent of each other in order to allow the machine to travel as quickly as possible whether drawing or traveling between moves. On the Bantam Tools ArtFrame, rapid speeds are set at a preconfigured 40000 mm/min, while the feedrate is configurable in the range of [0 - 15000] mm/min in the Bantam Tools Studio software when generating your G-Code.

7.2.2 Quality

Feedrates

XY: Maximum feedrate is 15,000 mm/min.

Z: Maximum feedrate Z axis. Maximum value: 50,000 mm/min.

Acceleration

Maximum acceleration during drawing for the X and Y axes. Maximum value: 4,000 mm/min².

Presets: select from precision, default or speed to help you get acquainted with these values. Lower acceleration will provide greater precision at the cost of an increased plot time.

Achieving good line quality is a combination of tool quality, paper quality and the settings you use in the machine. High acceleration and high speeds will affect precision.

Each pen has a maximum speed at which it can consistently deploy ink. For ball point pens, a good rule of thumb is a feedrate of 10,000 mm/min. For more unique toolheads, experimentation is key in determining the best speed for your desired result.

The software comes with three Quality presets which manage the acceleration for the file. This value can also be experimented with and manually configured within the “Pen Settings”.

Testing and Iteration

Although we have laid out some suggested settings for speed and acceleration, it's important to remember that the optimal configuration depends on various factors, including the pen, surface, and desired output. Generally speaking, the best approach is to test and iterate.

For example, you might run test passes to evaluate the results and identify areas for improvement. Adjust speed and acceleration values by perhaps ±500

at a time, as small changes often yield the most clear and visible outcomes. Testing not only helps fine-tune the settings but also provides valuable insights into how different variables interact, allowing you to achieve optimal performance for your specific application.

Line Length and Acceleration

The best settings depend on the nature of the artwork. For files composed of many short moves, high acceleration will be more impactful on performance than a high feed rate will be. Finding the best settings for your drawing is a matter of experimentation and tuning.

Curves and Smoothness

The Bantam Tool Artframe uses G0-3 commands for motion. G2 and G3 define arcs to be executed by the machine. Use arcs where appropriate, as this can improve file size and machine performance in extreme cases.

Media

Different materials (e.g., paper, fabric, or other mediums) can affect performance. A rough surface might require slower speeds to maintain accuracy, while smooth surfaces can tolerate higher speeds.

Pen Type and Ink Flow

Each pen type behaves differently at various speeds. Brush pens, for instance, may struggle with high speeds as ink flow might lag behind, causing uneven lines. Adjust speed and acceleration to accommodate the specific characteristics of your pen.

8. Support

Please reach out to us if you hit a roadblock or have a question; we can help!

- In Bantam Tools Studio the support resources tab links to our support.
- Most email is answered in a business day: support@bantamtools.com
- We have a Discord server with a channel for support. Keep in mind that sometimes members of the community respond faster than we can. Here is the [invite link](#) for the Discord Server
- Call us at +1-347-422-6826 and If someone is not available to answer your question, we'll take your number and email and get back to you.

Once you've completed a plot, we encourage you to post a picture of it to Instagram or your favorite social media channels. Seeing the work of our customers inspires us to be obsessive and caring about the work that we do. If you are so inclined, please tag your image with #bantamtools so that we can check it out and be inspired by your work.

Online Resources

Extended online documentation
& resources for ArtFrame:

bantam.tools/afdocs



Store: store.bantamtools.com

Docs: bantam.tools/afdocs

Support chat: bantam.tools/chat

Contact resources: bantam.tools/afcontact
