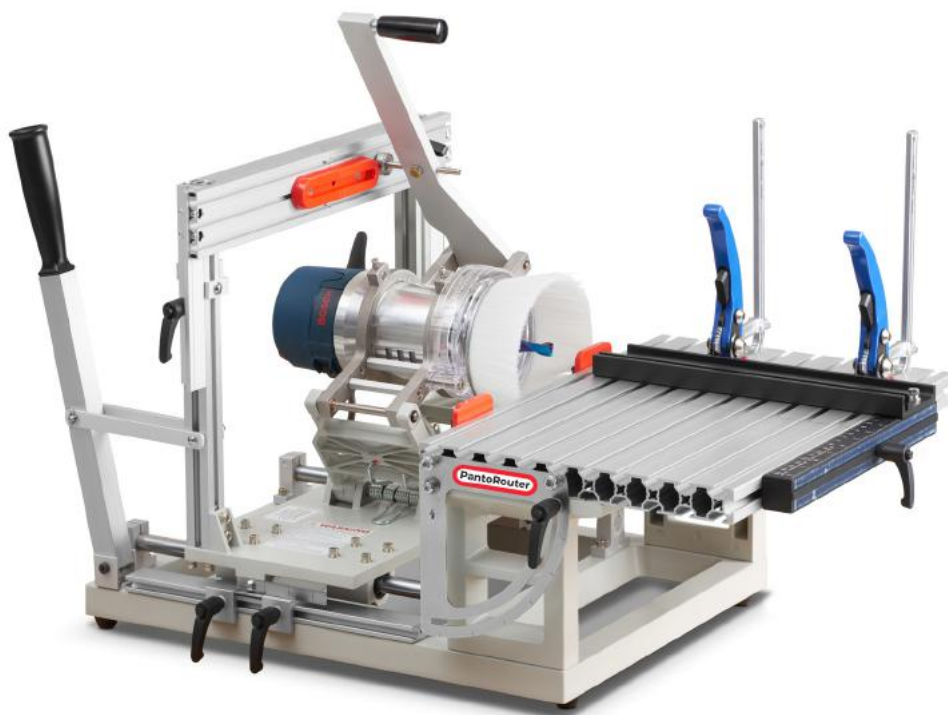


# PantoRouter

## Assembly Guide



[www.PantoRouter.com](http://www.PantoRouter.com)  
[Info@PantoRouter.com](mailto:Info@PantoRouter.com)  
+1-877-333-7150

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# SAFETY:

Woodworking is inherently dangerous. There are hazards inherent to using the PantoRouter® and many other tools in the shop, whether operated by hand or electric power. Some of these hazards are discussed below. Use common sense when operating the PantoRouter® and all woodworking tools, and use this tool in accordance with the instructions. **YOU ARE RESPONSIBLE FOR YOUR OWN SAFETY.**

Read and understand the Assembly Guide, the How-To Guide and the Warning Label on the PantoRouter®. Failure to follow instructions or heed warnings may result in electric shock, fire, serious personal injury or property damage. Save these instructions and refer to them whenever necessary.

Warning: This product can expose you to chemicals including wood dust, which is known to the State of California to cause cancer. The exposure can come from drilling, sawing, sanding or machining wood products. For more information go to [www.P65Warnings.ca.gov/wood](http://www.P65Warnings.ca.gov/wood). In addition, some types of dust created by sawing, sanding, grinding, milling, drilling and other construction and woodworking activities also contain chemicals known to cause cancer, birth defects or other reproductive harm. In addition, wood dust has been listed as a known human carcinogen by the U.S. Government. The risk from exposure to these chemicals and to dust varies depending on how often you do this type of work. To reduce your exposure, work in a well ventilated area and work with approved safety equipment including dust collection, properly fitted dust masks or respirators designed to filter out such dust and chemicals.



**YOU ARE RESPONSIBLE FOR YOUR OWN SAFETY.**

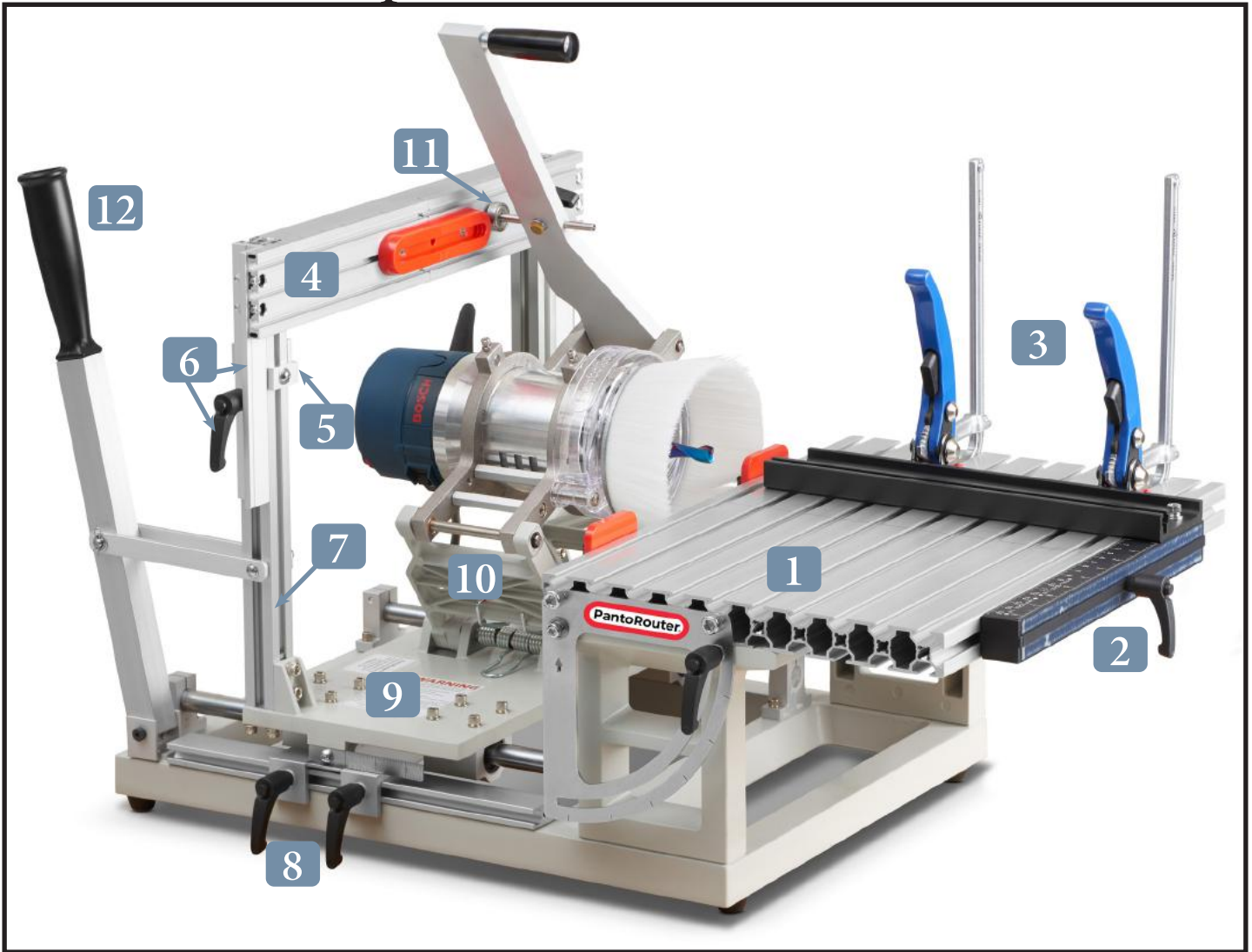
**TO REDUCE THE RISK OF INJURY, THE USER MUST:**

- READ AND UNDERSTAND THE OPERATING GUIDES BEFORE OPERATING PRODUCT.
- WEAR EYE PROTECTION, EARPLUGS AND DUST MASK.
- DO NOT WEAR GLOVES, NECKTIES, JEWELRY OR LOOSE CLOTHING. CONTAIN LONG HAIR.
- KNOW HOW TO SHUT OFF ROUTER IN AN EMERGENCY.
- DISCONNECT ROUTER FROM POWER SOURCE BEFORE SERVICING OR CHANGING ROUTER BIT.
- DO NOT ADJUST THE ROUTER UNTIL IT HAS BEEN DISCONNECTED FROM POWER.
- SECURELY MOUNT THE ROUTER IN MOUNTING BRACKET BEFORE TURNING POWER ON. IF ROUTER MOTOR CANNOT BE SECURELY MOUNTED AS DESCRIBED IN THE ASSEMBLY INSTRUCTIONS, DO NOT USE THE PANTOROUTER®. CHECK ROUTER MOUNT SECURITY PRIOR TO EACH OPERATION.
- CLAMP MATERIAL TO BE CUT SECURELY TO TABLE BEFORE STARTING ROUTER.
- NEVER USE A BIT NOT SPECIFICALLY DESIGNED FOR USE IN A WOODWORKING ROUTER.
- KEEP HANDS AND CLOTHING AWAY FROM SPINNING ROUTER BIT.
- DO NOT OPERATE THIS MACHINE WHILE UNDER THE INFLUENCE OF ALCOHOL OR DRUGS.
- WHEN SERVICING, USE ONLY IDENTICAL PARTS.
- FAILURE TO COMPLY WITH THESE WARNINGS MAY RESULT IN SERIOUS PERSONAL INJURY

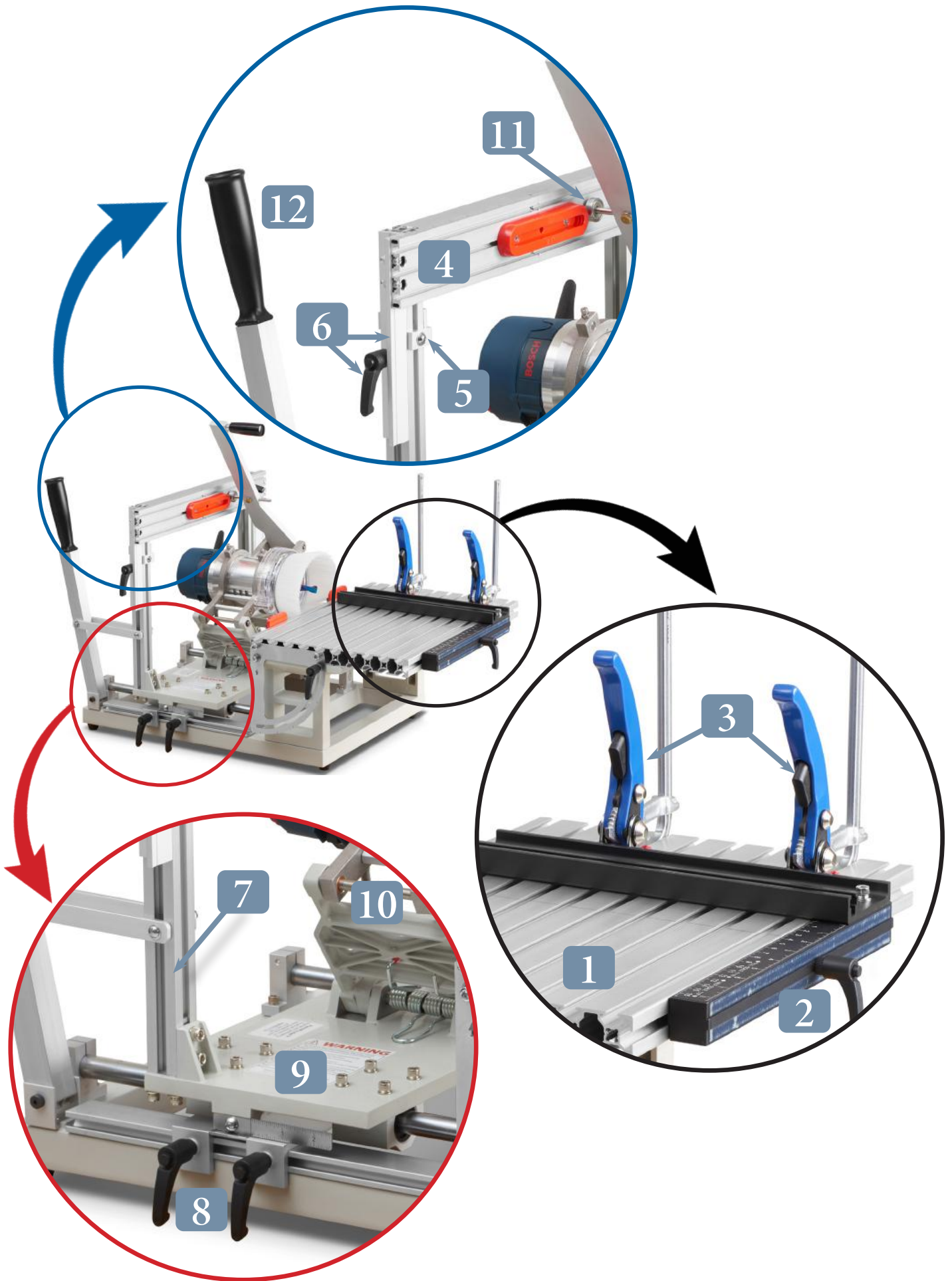
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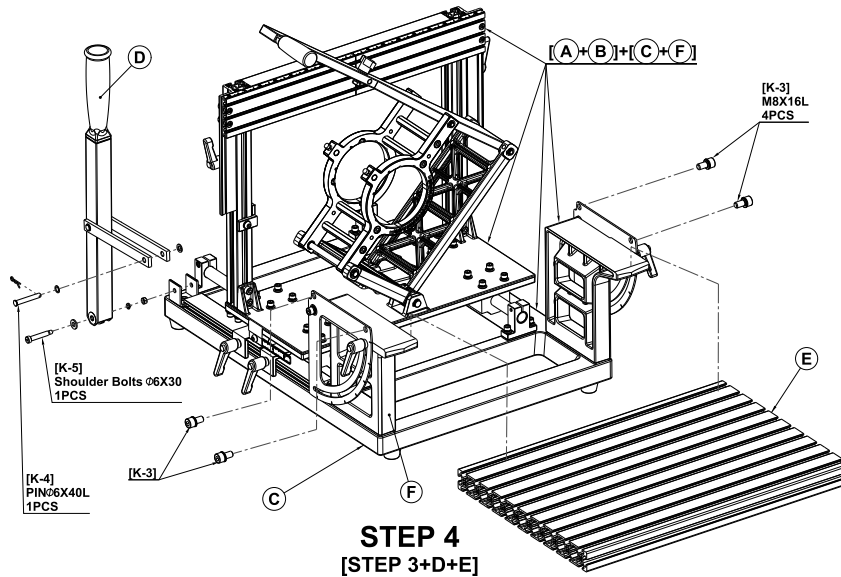
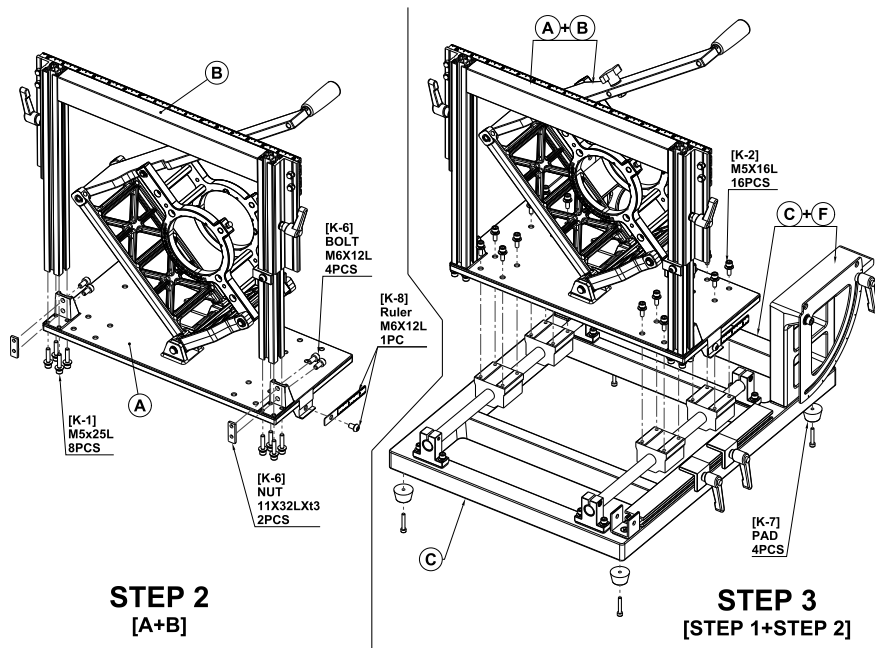
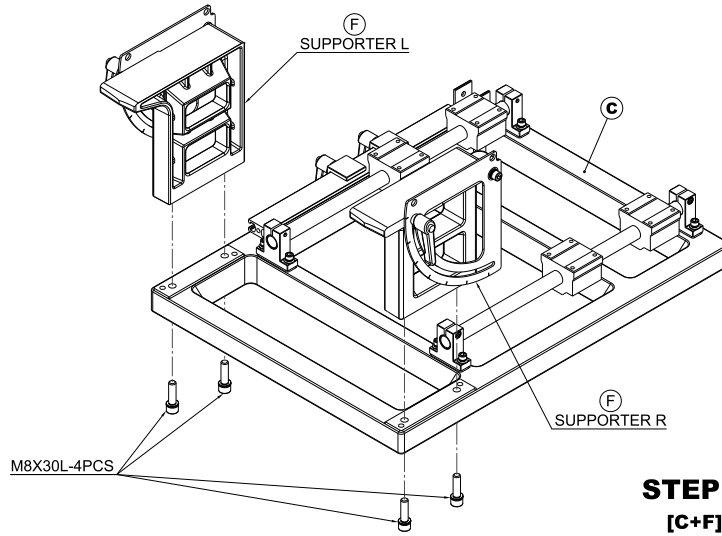
# Basic Components of the PantoRouter®

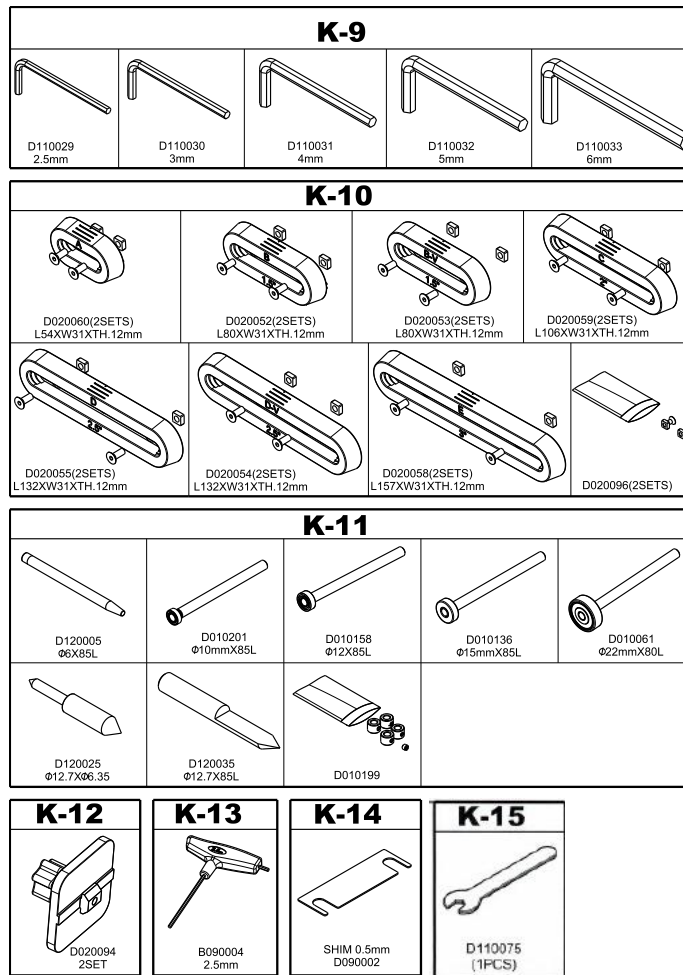


1. Table
2. Centering Scale Fence
3. T-Slot Lever Clamps
4. Template Holder With Template
5. Thickness Gauge
6. Template Holder Slider and Locking Lever
7. Template Holder Support Frame
8. Depth Stops - front and back
9. Pantograph Carriage
10. Pantograph
11. Guide Bearing
12. Plunge Lever



# General Assembly Diagram





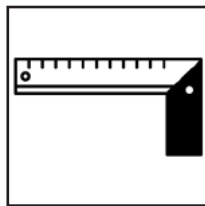
**Recommended additional tools for assembly & setup:**



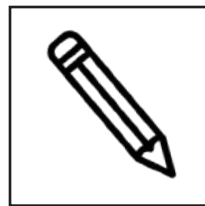
Calipers



Utility Knife



12" square



Sharp pencil



Small combo Square



No drills or Impact drivers

The box marked “Hardware” or “Kits” contains the screws, small parts and hex wrenches needed to assemble the PantoRouter®. You can find this Kits box in the smaller of the two packages the PantoRouter® arrived in. A digital or analog caliper will help to dial-in the Thickness Gauge for ultimate precision. We recommend not using a battery-operated drill or impact driver for assembling the PantoRouter®.

You'll notice we use mostly recycled and recyclable cardboard for packaging and we ask that you re-use or recycle when you're finished with your assembly. We're always available by phone or email if we can help in any way!

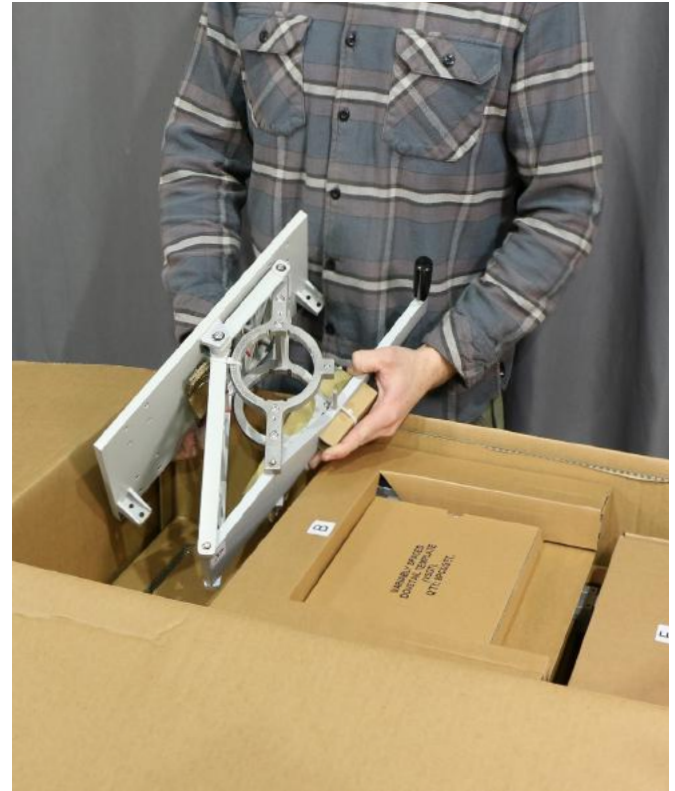


# PantoRouter® Assembly Guide

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We thank you for your PantoRouter® purchase and we hope you find great pleasure in creating all kinds of traditional and innovative joinery. There's no better jig for mortise and tenons, box joints and machine-cut dovetails, but this is just the beginning of the tasks you can master with the PantoRouter®.

Your PantoRouter® experience starts with a few minutes of assembly then grab our How-To Guide for basic instruction and some ideas to help you get started.



Inspect the pieces for any possible shipping damage then lay them out and refer to the diagram to get a good idea of how they'll all fit together.

First, open the box marked Kits or Hardware where you'll find all of the fasteners and hex wrenches. Together with this guide, you should be up and PantoRouting in short order.

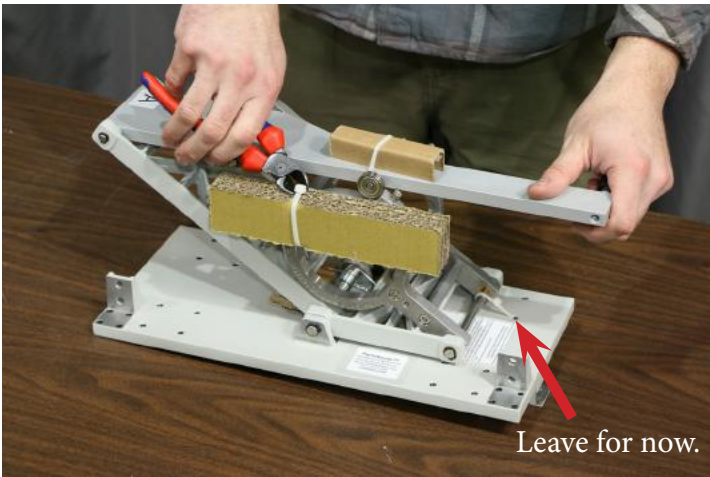
Kits K-1 and K-6 contain the screws for mounting the template holder frame to the pantograph carriage, and K-2 contains the screws to secure the carriage to the glide-shaft bearings.

Open K-1, K-2, K-6 and K-9; the hex wrenches you'll need for assembly. It's helpful to keep the label together with the screws from that bag for easy identification.



We recommend using the supplied hex wrenches or similar hand-held wrenches. Using a drill or impact driver for assembly can over-drive screws or strip threads.





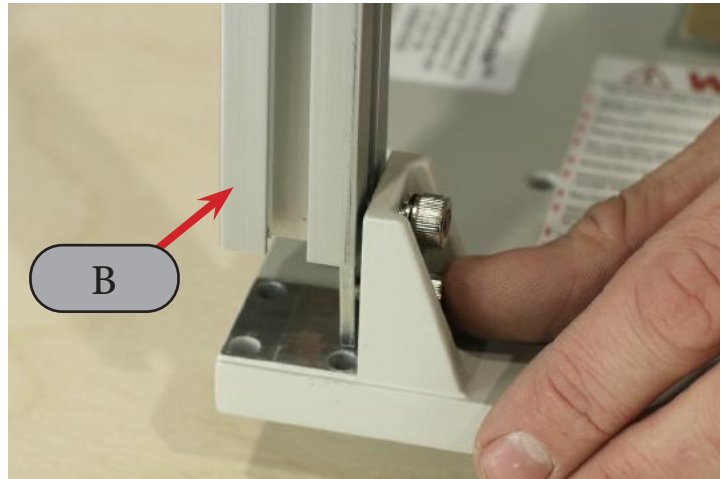
Cut the straps holding the padding material but don't cut the nylon tie straps holding the pantograph to the carriage base yet.



Check the machined surfaces to make sure they're clean and smooth. If needed, remove paint but don't use sand cloth. A sharp blade will clean the surface in a few seconds.



Loosely thread the K-6 cap screws into the nut plates on both sides.

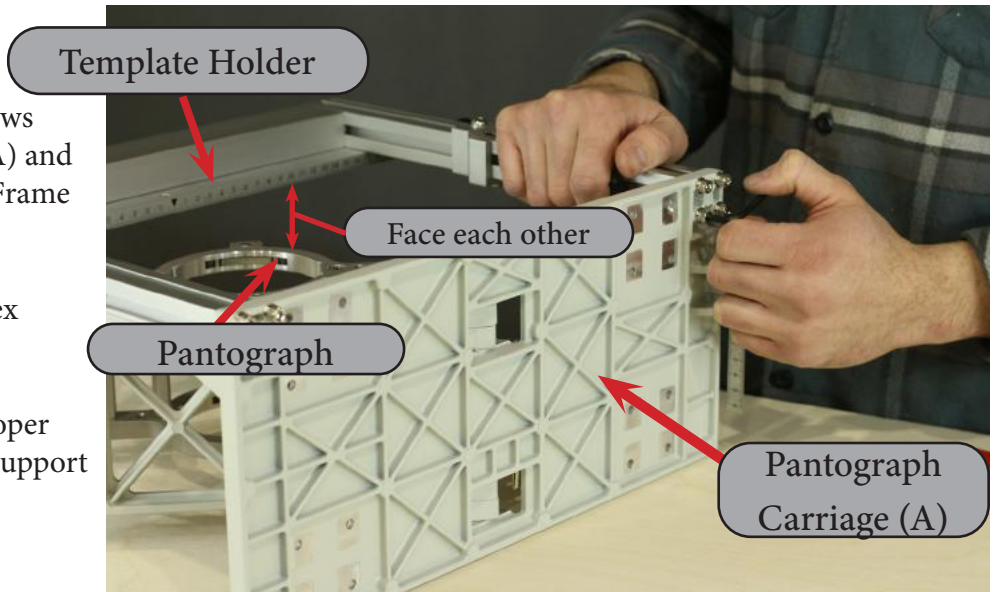


Slide the template holder support frame (B) into place with the nut plates in the slots on both sides then snug but don't tighten the cap screws. Make sure the Template Holder is facing the pantograph.

Hand-thread the eight K-1 cap screws through the pantograph carriage (A) and into the Template Holder Support Frame (B).

Tighten the cap screws using the hex wrench provided.

Refer to the photo on page 4 for proper orientation of the template holder support & template holder assemblies.





Using the hex wrench provided in Kit-9 tighten the cap screws to the plate nuts to secure the template holder frame. Clip the wire ties to access these cap screws.

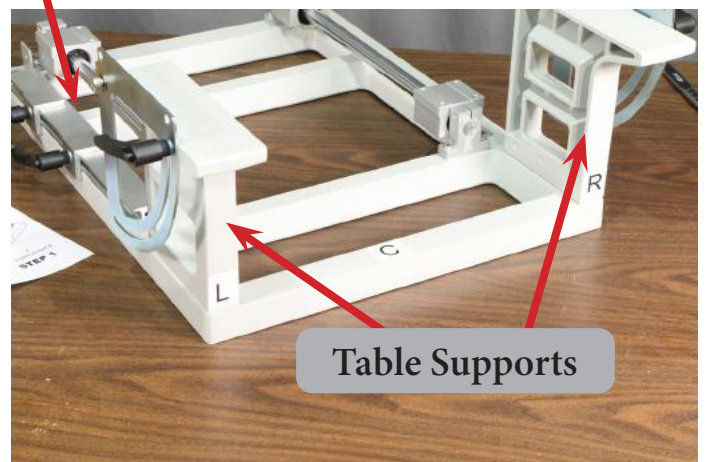
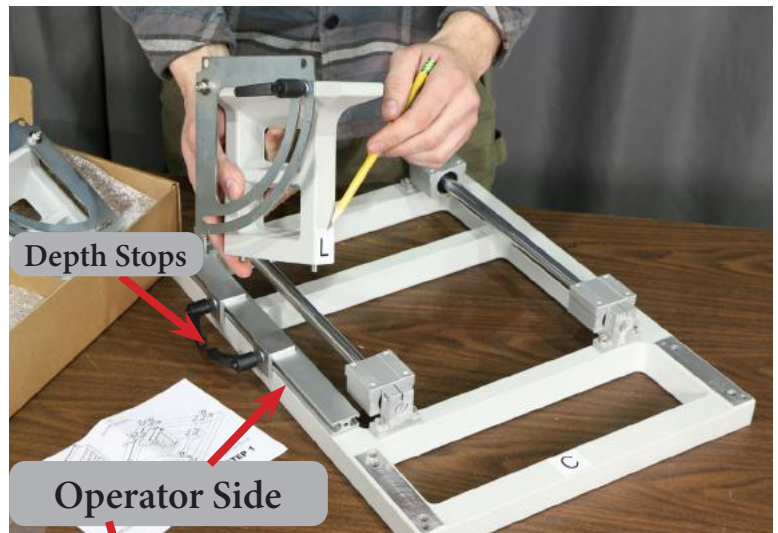


Clean the machined landing pads from the underside of the pantograph carriage if needed.

Set the assembled pantograph carriage aside and work on the base assembly.

## Operator Side

Throughout the Assembly and How-To Guide, the left side of the machine labeled with the “L” sticker will also be referred to as the operator side. This is the side you will be standing on when using the PantoRouter®, you will notice the depth stops and both operating handles of the PantoRouter® are all accessible on the operator side.



Install both table supports from Box-F. The mounting screws for the table supports also come from Box-F.

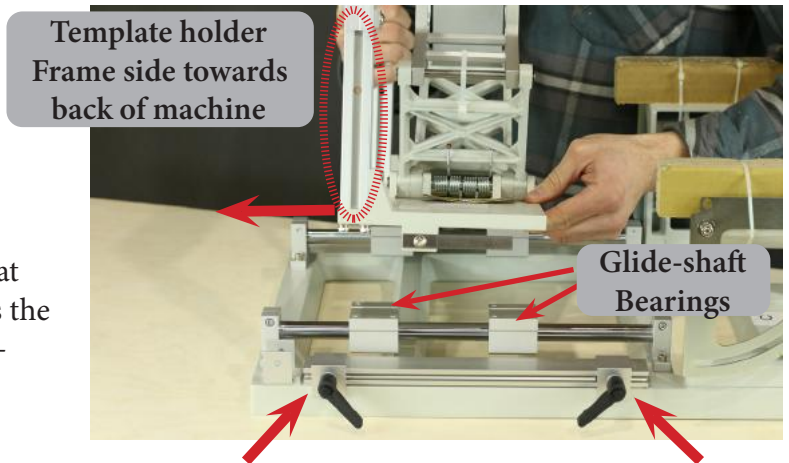
The Left and Right supports are not interchangeable and both have locating pins to align the support to the base frame. The part identification labels can be removed as you complete the assembly.

Install the rubber feet to the bottom of the base frame without over-compressing the rubber.



Relocate the depth stop angles to the ends of their track for the depth stop scale-holder post to clear. Position the pantograph carriage on the glide-shaft bearings and align the screw holes.

Make sure the side of the pantograph carriage that has the template holder support frame is towards the back of the machine and not facing the table supports.

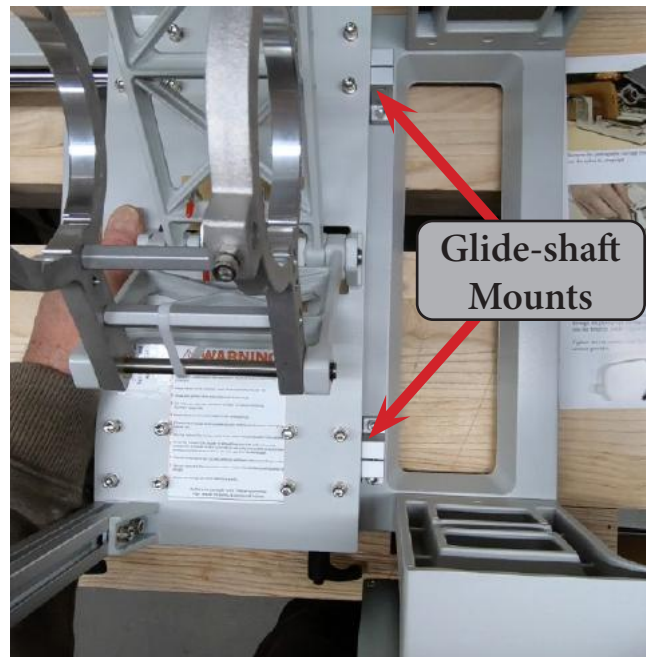


Hand-thread the 16 screws (K-2) through the pantograph carriage into the glide-shaft bearings but leave them loose.

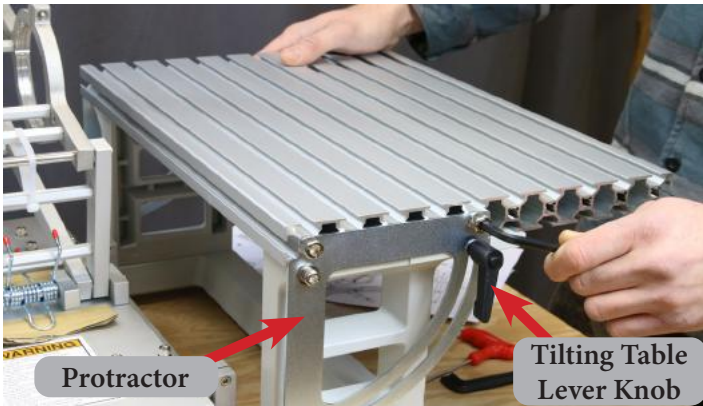
Move the carriage forward until the carriage base contacts both glide shaft mounts. Press forward to align the pantograph carriage, then tighten all 16 screws to secure the pantograph carriage to the glide-shaft bearings.

The pantograph carriage should now move freely on the glide shafts.

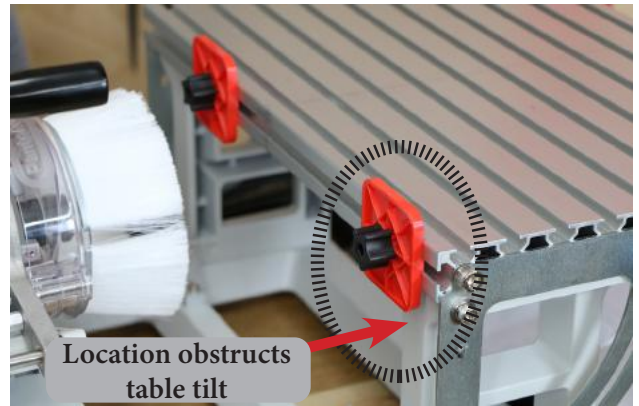
It is normal for the glide-shaft bearings to make some sound when initially moving the PantoRouter® carriage. With normal use, the hundreds of ball bearings will seat during a brief break-in period and the sound will diminish.



You can now clip any remaining tie straps and remove the cardboard cushions from under the springs on the pantograph assembly.



Loosen both Tilting Table Lever Knobs and hand-thread all four table mounting cap screws (K-3). Check the top horizontal surface of the two table supports to be sure they're clean of debris and the table is sitting flat on both sides, then lock the two Tilting Table Lever Knobs. Next, secure the table to the protractor by tightening the four screws with the provided hex wrench (K-9).



You can now loosen the lever knobs and test the tilting table.

Install the front fence/stops to the front of the table. Note, the table will not tilt to a full 90° when the fence/stops are in front of the table supports. Move them inboard to clear the table supports or remove them if they're not needed when the table is tilted fully vertical.



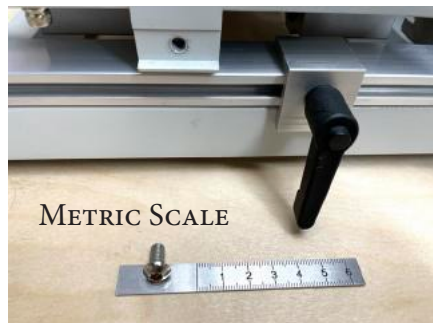
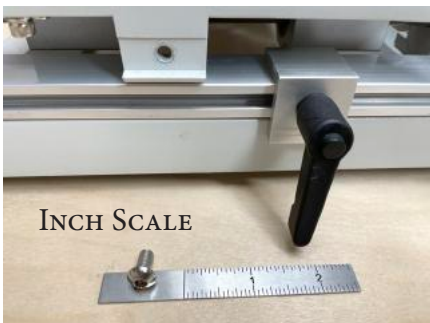
Insert cap screw K-5 through the plunge lever (D) mounting bracket as shown with a washer and nut on the back. Snug the screw to give a small degree of resistance to the plunge. This can be adjusted for more or less friction as you get to know the PantoRouter®.



Insert pin K-4 through the plunge lever arms and template holder support post using a washer on both sides and lock with the clip.



Scan code with your smart phone camera to see video tips on this step



Choose the inch or metric side of the depth stop scale then mount it on the depth stop using a business card or four thicknesses of paper for clearance over the front depth stop angle.

## Bosch 1617EVS Router (other brands will mount differently)

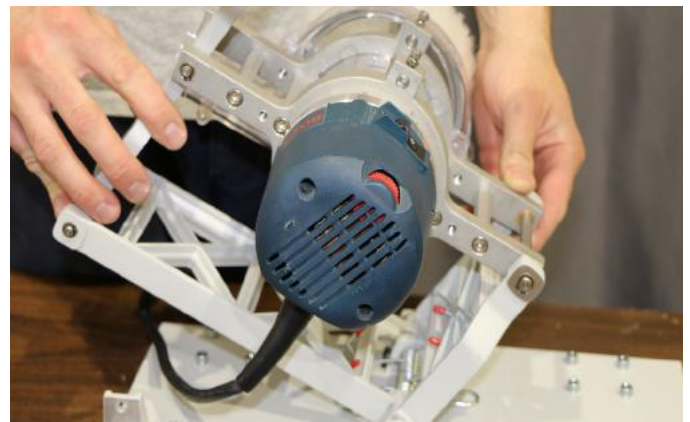
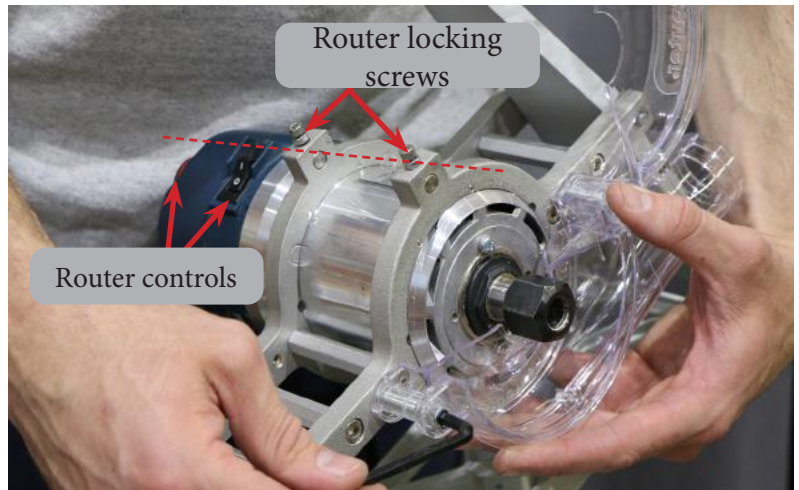
With the router unplugged, insert the Bosch router into the mounts as far as it will go, then rotate so the power switch and variable speed control dial are in-line with the router motor locking screws. The cord should be positioned as in the lower photo. Don't tighten the router mount lock screws yet.

**Note:** The template holder support frame has been removed from these photos for visual clarity, please complete all prior assembly steps before installing the router.

Two screws and two nylon washers are packed along with the dust collection hood and brush. Insert the two screws with their nylon washers through the dust hood and loosely thread them into the tapped holes in the pantograph. Align the dust hood so the collet spins freely and does not contact the hood. Tighten the two dust hood mounting screws.

Tightening these screws will push the router back in the mount. Nudge the router back in the router mount so it clears the dust collection hood by about 1/32" (0.8 mm), then tighten the router mount lock screws. Use the provided wrench (K-15) to tighten the lock nuts.

The last step is to snap on the dust collection hood brush, and you're ready to PantoRoute!



**Tip:** The brush attaches to the dust hood by snapping into place with spring tension. The fit can be made tighter by overlapping the two ends and squeezing it into a slightly smaller circle.

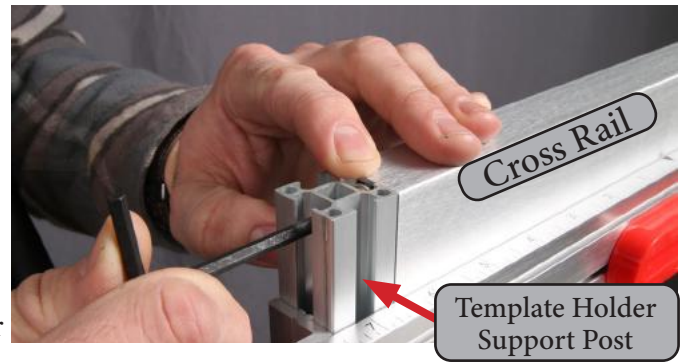


We recommend using a hose that fits over the discharge port, not inside it. We supply an excellent hose with some of our packages and it sometimes helps to soften the hose end cuff by holding it under hot tap water. Once warmed-up it should slip onto the dust collection hood and as it cools it will grip tenaciously.

We prefer to use a dust extractor or Shop-Vac with a cyclone chip separator rather than hooking up to large dust collection ducting. We have found the higher air velocity collects more chips and fine dust particles keeping your shop cleaner and your lungs healthier.

# Align the Template Holder Support Frame

The template holder support frame assembly is aligned at the factory but can shift slightly in transit so the following procedure might be necessary to bring it back into perfect alignment. Many people can feel variation of about a thousandth of an inch (0.025mm), so aligning by touch is often adequate.



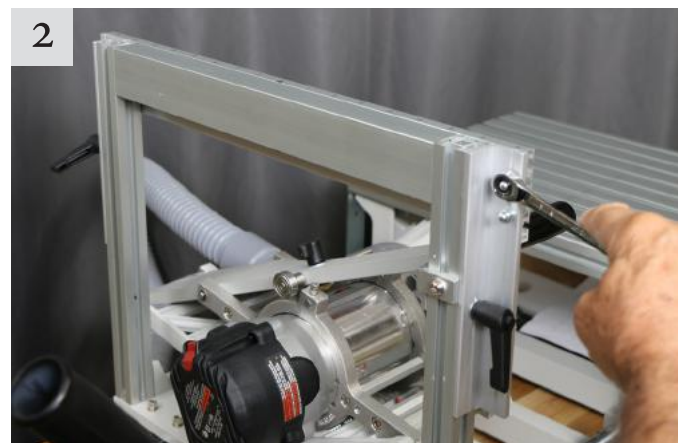
If adjustment is needed, loosen the screws holding the template holder support frame cross rail to the Template Holder Support posts. There are two holes on each side to access these screws. Flush the top, front and back of the cross rail to the posts then re-tighten the screws on both sides.

## Calibrate the Template Holder

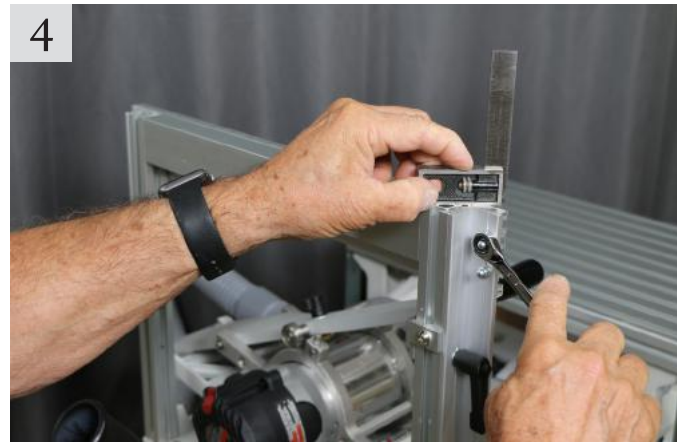
Alignment of the template to the pantograph and table is critical for accurate joinery. The template holder must be perfectly aligned to the frame and must slide freely on the posts. Adjusting it is quick and easy using the following method.

1. Move the operator's side Template Holder Slider so it is flush with the top of the template holder support post then lock the slider with the lever knob. Don't worry about anything else at this point, just the slider and the top of the operator's side template holder support post.
2. Keep the operator's side slider locked in place and use the 8mm wrench provided in your PantoRouter® package to loosen all four acorn nuts holding the template holder to the sliders on both sides. A 5/16" wrench or nut driver will also work for this.
3. Align the slider opposite the operator to the top of the template holder support post and lock the lever knob.

Both sliders should now be flush with the tops of the template holder support posts and the template holder should be slightly loose on the sliders.



4. Align the template holder to the top of both template holder support posts then tighten the four acorn nuts with the 8mm wrench. Be careful to not over-tighten these small nuts.



5. Double check template holder alignment on both sides.



6. The template holder should now slide up and down freely and it should stay aligned to the template holder support frame. It's a good idea to periodically check the template holder alignment by touch or using a straight-edge to make sure it's still accurate.



To watch a video on this process on our website, go to “Dialing in the PantoRouter®” video on the “Videos & Tutorials” page at <https://www.PantoRouter.com/video-library-overview-and-how-to> Or simply scan the QR code on page 23.

## Calibrate the Pantograph

The template and template holder must be coplanar to the table and the workpiece to produce high quality joinery. This can be quickly checked after the template holder support frame and template holder have been calibrated.

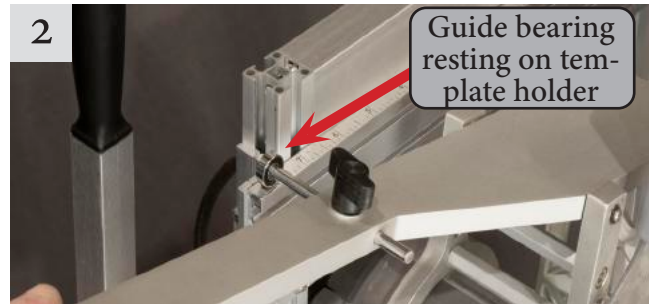
1. Cut a setup block from a piece of fine grain wood so it's square on the end then stand it up on the operator's side of the table. A piece about 1.5" X 1.5" X 3" works well.



2. Mount the centering jig with two pointed ends in the router. Either end is okay.

Insert the 22mm (~7/8") guide bearing in the pantograph handle with the bearing resting on top of the template holder.

Lock the template holder on both sides with the centering jig about an inch (25mm) above the table.



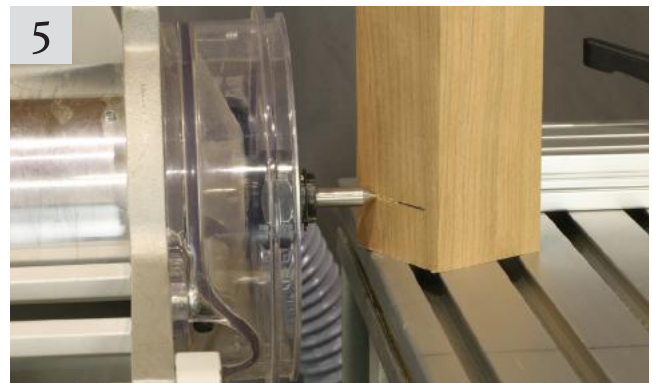
3. Roll the guide bearing across the top of the template holder to scribe a small line (1/2" long or so) in the setup block as shown. It's easiest to see the line when scribing across the side grain, and we highlighted the line with pencil for clarity.



4. Move the guide bearing to the far side of the template holder, which moves the centering jig across the table. Scribe a second line next to the first.

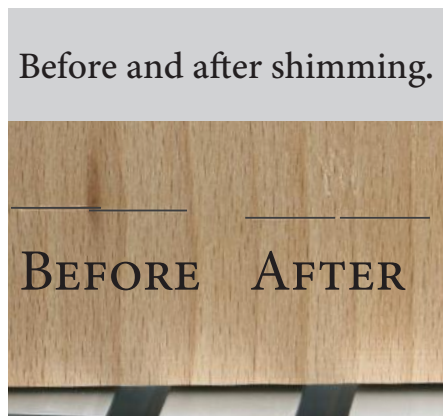


5. The two scribe marks should be identical or very nearly so. If they are off by more than the width of the scribe line, shims will be required under the glide shaft mounts on the low side.



6. Shims are provided in the Kits or hardware box (K-14). Always shim under both glide-shaft needing to be raised. The photo below shows inserting shims under the operator's side glide shaft mounts but it's more likely the side opposite the operator will need to be raised for perfect alignment.

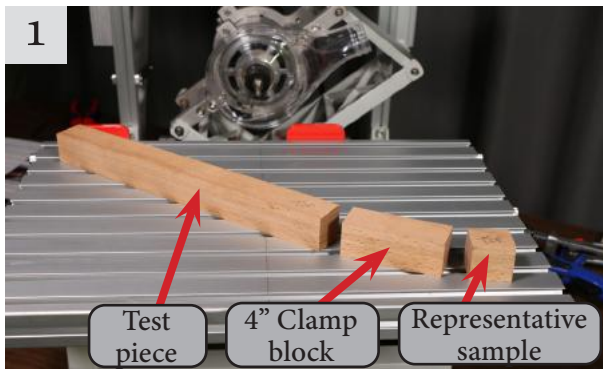
Loosen the Glide Shaft Mounts on the low side and slip a shim under each mount to be sure the pantograph is raised evenly. Retest and it should be dead-on!





# Set the Thickness Gauge

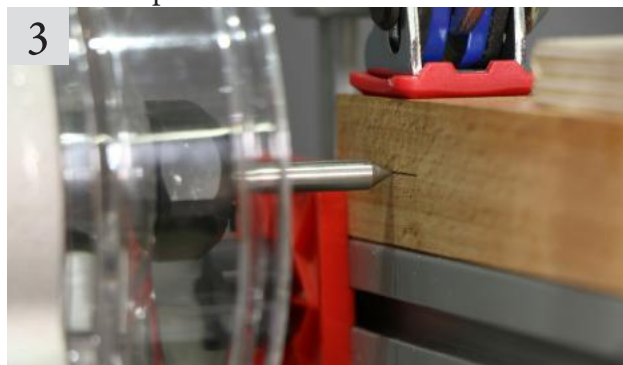
Please read through this section before cutting



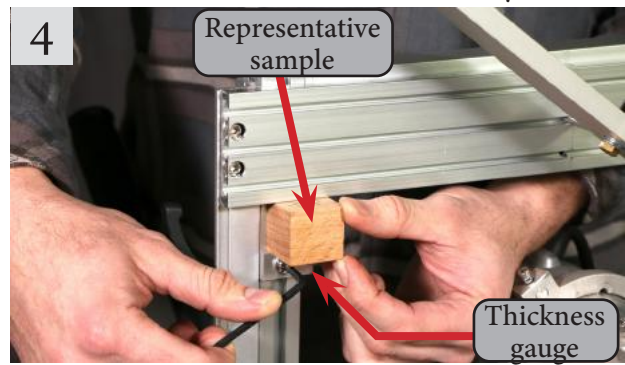
Prepare a sample piece about 1-1/2" square and about 18" long. Make sure the sides are parallel and there is no snipe on the ends. Cut a 1" long section (representative sample) and another section about 4" long that we'll use later for clamping. Mark "TOP" on the same face of each piece.



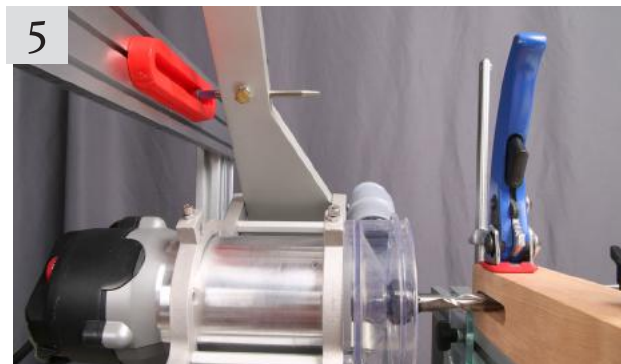
Insert one of the non-tapered 6mm guide bearing shafts into the center hole of the template holder. You can use any horizontal template, as long as the shaft goes all the way through the template into the center hole of the template holder. Do not use a template marked B-V or D-V for this step. The templates marked with V are for vertical M&T only.



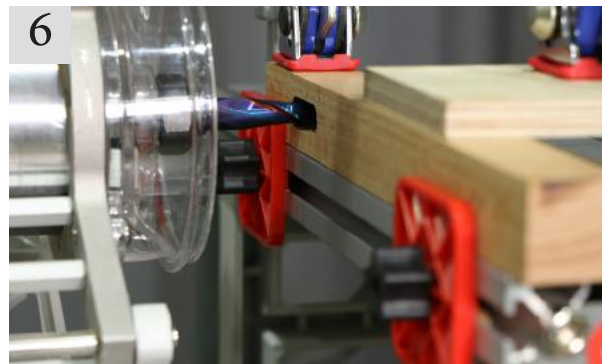
Mark the center of the workpiece then set the pointer at the center mark by adjusting the template holder up or down. Lock the template holder with the lever knobs on both sides.



Hold either the workpiece or the 1" long representative sample of the workpiece up against the template holder with the side marked "Top" up. Move the thickness gauge up to the workpiece and tighten the thickness gauge.

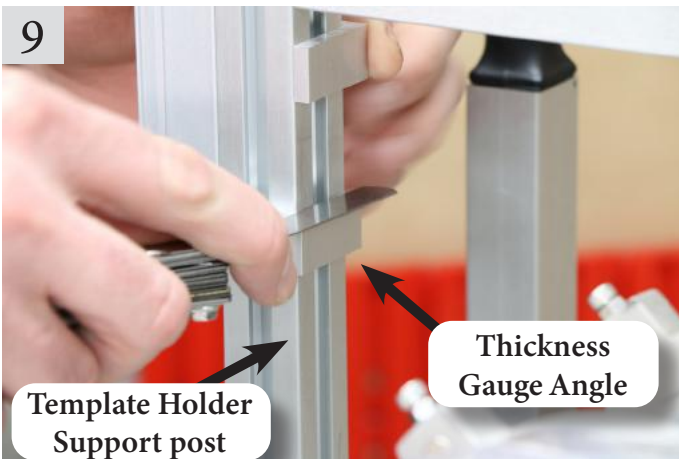


Using the horizontal template and a 1/2" bit, cut a mortise about 3/4" deep. The 10mm guide bearing should be all the way to the back of the mortise slot in the center of the template. Plunge gently as you slowly move the bit back and forth to cut the mortise.

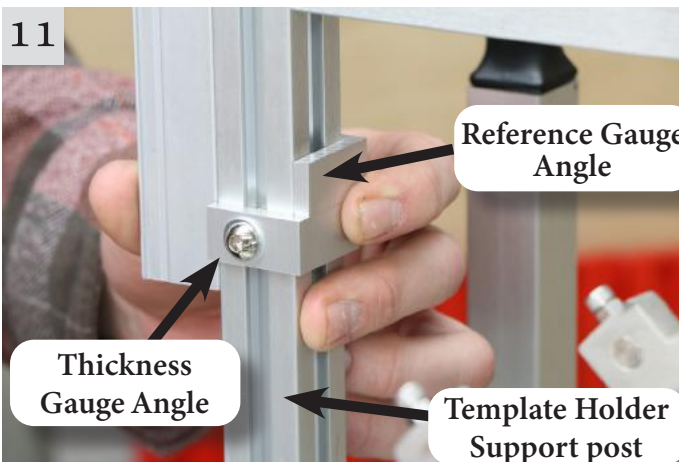




Measure the shoulders of the workpiece and note which is thicker, the top or bottom shoulder. The thickness gauge needs to be moved in the direction of the thicker shoulder by the difference between the two measurements. In this case it's 0.46 mm toward the top.



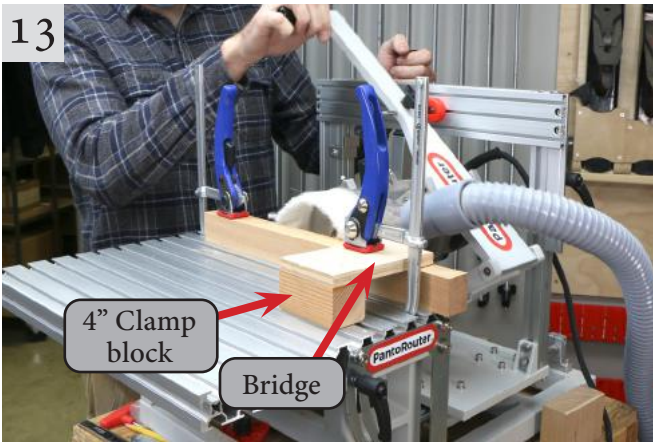
Raise the Reference Gauge Angle on the back of the template holder support post closest to the operator's position and insert feeler gauge(s) as close to the desired move amount as possible. Slide the Reference Gauge (top angle) down to the feeler gauge then lock the Reference Gauge Angle using the hex wrench.



Remove the feeler gauge(s) then loosen and move the Thickness Gauge Angle up to the Reference Gauge Angle and lock it.

Loosen the template holder and move it up. Insert the workpiece or the representative sample with the "Top" up, then lower the template holder to squeeze the workpiece against the thickness gauge and lock the template holder using both lever knobs.

13



Cut another mortise using this new setting. Notice the bridge for clamping during mortise operations. It's made using the 4" off-cut from step 1 of this process and any small scrap piece 1/2" or thicker will work as a bridge.

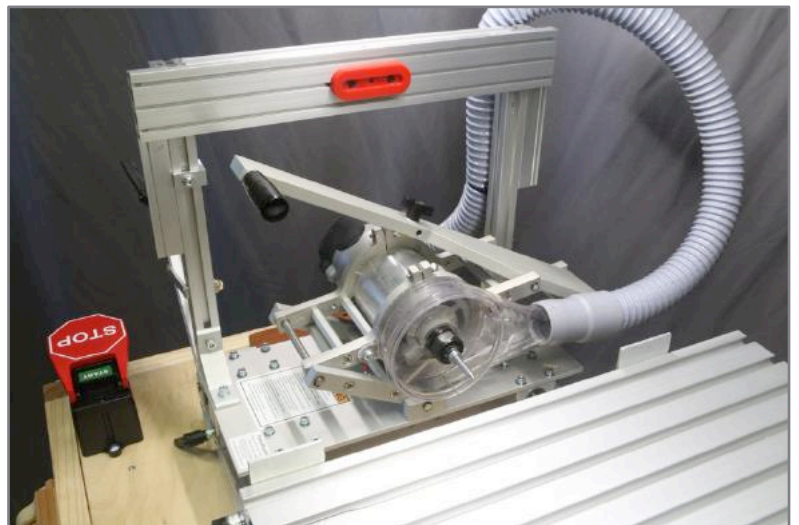
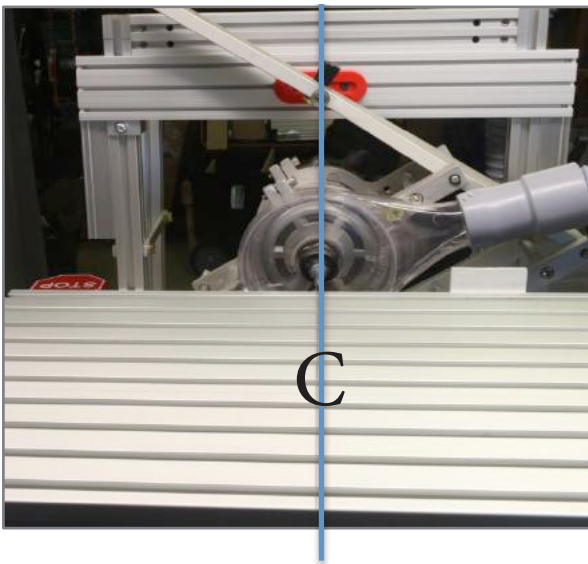
14



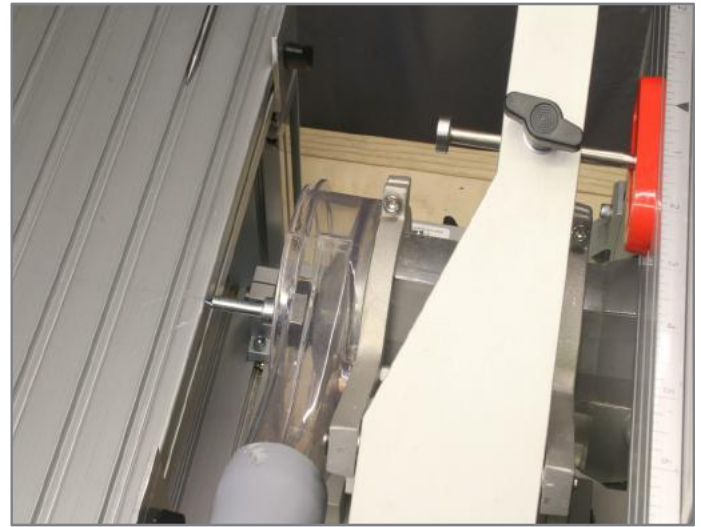
Re-measure and adjust as necessary until you are satisfied with the result. We can typically get it within a tenth of a millimeter, or less than four thousandth of an inch.

It's rare that you would need to move your thickness gauge, but if you do, it will be downward to get it out of the way of a low cut on a dovetail, box joint array or compound angle. If you do move the thickness gauge, do not move the reference gauge. When you're done with the unusual operation, you can slide the thickness gauge back up to the reference gauge and lock it without needing to recalibrate.

## Find and Mark the Table Centerline

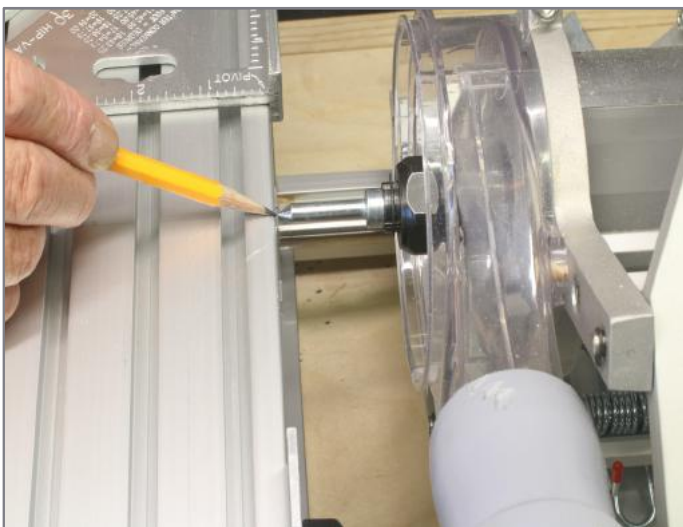


The PantoRouter® transfers the shape of the template mounted on the template holder to the workpiece located on the table. Aligning the template, router bit and workpiece are essential to accurate joinery, and this is made fast and easy using the Centerline and Centering Scale Fence.



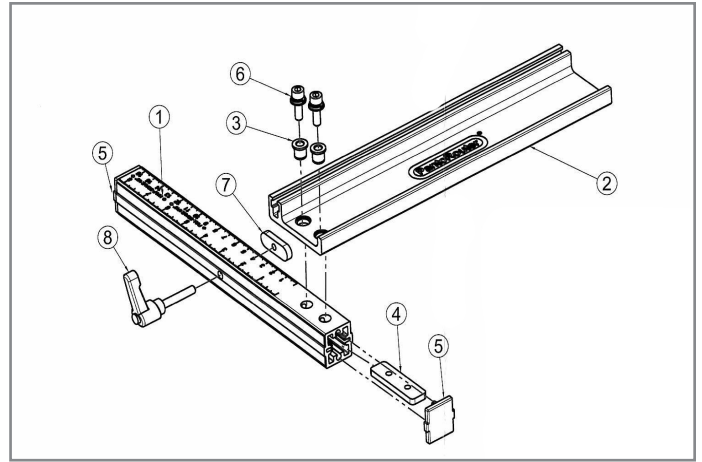
Insert a non-tapered 6mm guide bearing shaft through the center hole of a template and into the centering hole in the template holder then mount either centering jig (full-round pointer or split-shaft) in the router collet. Plunge the pantograph carriage forward and lower the template holder so the tip of the centering jig rests gently on the top edge of the table.

Lock the pantograph carriage using the two depth stops on the operator's side.



This is dead center of the table relative to the center of the template and router, so carefully mark this position and use a square to draw a line from this point across the center of the table. This mark can be in pencil for now until you're confident in your setup, then you can scribe it into the aluminum.

# Set-up the Centering Scale Fence



Setting up the centering scale fence is super easy and due to the precision-machined centering pins, the fence will be dead-on 90° without any adjustment.



Before assembly you'll need to decide which scale to use. We recommend using the metric (CM) scale since you don't really care the size when centering (the size was determined when you milled your wood), you just want to find the middle. It's much easier to find center, or half of 88mm than  $3\frac{7}{16}$  inches.



To center your workpiece on the table, first measure the width using the outer scale then set that value on the inner scale at the centerline. Lock the fence and Boom....You're Centered!

# PantoRouter® Swing-Stop

## Installation and Operation

Insert the lever knob collar through the hole in the PantoRouter® Swing-Stop and install the fender washer and T-track nut.



Locate the T-track nut in the fourth slot from the front of the table for tenons up to 1½” (38mm) long.



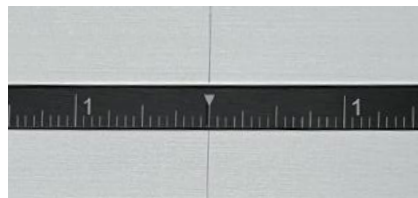
Locate the T-track nut in the third slot from the front of the table for tenons up to 2¾” (70mm) long.

# PantoRouter® Centering Bar

## Installation and Operation



The Centering Bar can be located in any T-slot on your PantoRouter® table. We recommend the front slot of the table remain clear for easy and safe clamping options.



Select the metric or inch side of the bar to face up and make sure the two set screws are also facing up. Align the centerline of the centering bar to the previously scribed centerline of the table and tighten the set screws.



Use your split shaft centering jig that came with your PantoRouter® to accurately locate your centering scale fence.

**See the video link on page 23 for the centering bar and swing stop!**

# Notes:



Dialing-In the  
PantoRouter®  
Joinery Machine



Centering bar  
installation and  
use



Swing stop  
installation and  
use



Get inspired!  
Check out the  
Panto-Project  
gallery



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Patents: 10,639,754 11,351,641 10,016,868 11,517,988 11,524,376 11,524,375 18832971.7-EPO  
And others foreign and domestic pending and applied for.

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