

~ BENCHCRAFTED CRISSCROSS SOLO & RETRO ~

Install a Crisscross with any vise hardware, begin on page 2

~ BENCHCRAFTED GLIDE CRISSCROSS SOLO & RETRO ~

Install a Crisscross with a Glide, begin on page 12

Assembly and Installation Instructions

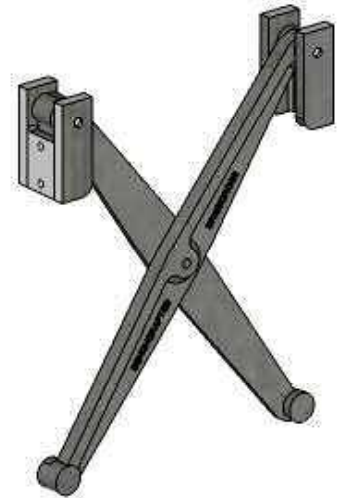
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Crisscross Contents:

Quantity	Description
2	Crisscross arms
1	pivot pin
3	snap rings (one extra)
2	8" mounting pins (Solo only)
2	2-1/2" mounting pins (Retro only)
2	iron mounting brackets (Retro only)
4	5/16" x 1-1/4" cap screws (Retro only)
2	1-3/4" steel bearing plates
2	#8 wood screws



CRISSCROSS SOLO



CRISSCROSS RETRO

Unpacking your Crisscross:

Some parts are heavy. Be careful as you unpack and handle them. Also be aware that although we make every effort to ease all edges, being cast and machined parts you may encounter a sharp edge or burr. If you do, ease it with some fine abrasive paper or a fine file. Some components may have a rust preventative oil applied. You may want to remove this oil before installing the vise. Wipe it off with a paper towel. This will leave a light film of oil on the parts that will help prevent rust and keep the parts moving smoothly.

ATTENTION!

Read and understand these instructions COMPLETELY AND THOROUGHLY before starting the installation or cutting into your bench. This includes installation of both Crisscross Solo and Retro, and the Troubleshooting sections.

We highly recommend that you NOT begin installation without the Crisscross and all vise hardware in your possession.

History

A popular mechanism for maintaining parallelism in vise jaws began to surface in the American patent record in the mid 19th century. There are also documented sources of this mechanism in the La Forge Royale catalog, Paris, late 19th to early 20th c. This device is basically two pieces or "arms" of metal or wood, equal in length, joined in the middle to create a pivot. The upper ends of the arms (also on pivots) are joined to the bench's leg and the chop. The resulting mechanism not only maintains a parallel opening, but also supports the weight of itself, the vise screw, and the chop. The beauty of the mechanism is its simplicity. In modern times this mechanism has become known as the "St. Peter's Cross", taken from an early 20th c. publication describing it as such. To our knowledge, this is the only reference to this device by name. There has been some discussion about the history of this moniker, and the possible misnomer, since it was the Apostle Andrew that was crucified on an "X"-shaped cross, St. Peter being crucified on a "T"-shaped cross, albeit upside down. We eventually acquired a 19th century version of the St. Peter's Cross, and used it to prototype our version, the Benchcrafted Crisscross.

The Crisscross is built with a small amount of toe-in. In other words, the chop will contact the bench top at the upper end of the vise slightly before it contacts the bottom. This helps hold thin or irregular stock. You will need to follow the specific installation sequence in order to install the Crisscross to best effect.

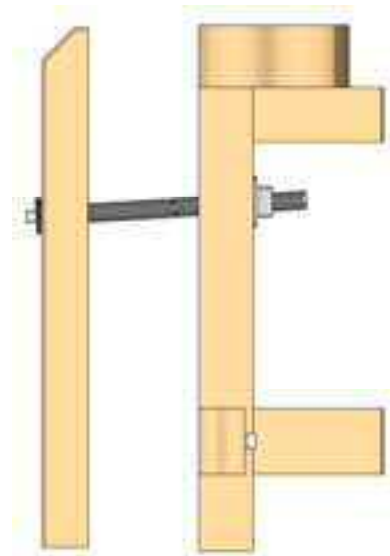
About these instructions

We don't like to be wordy, and we don't like complexity. The length of these instructions is such as to convey the information you need to install the Crisscross intelligently. If it's superfluous, we won't include it, if its useful for the installation, you bet we're going to include it. We know you don't want any surprises, and we know the Crisscross is going into some beautiful benches. This is the info you need to get it right straightway. It's an easy install, but you can screw it up if you dive in without reading this.

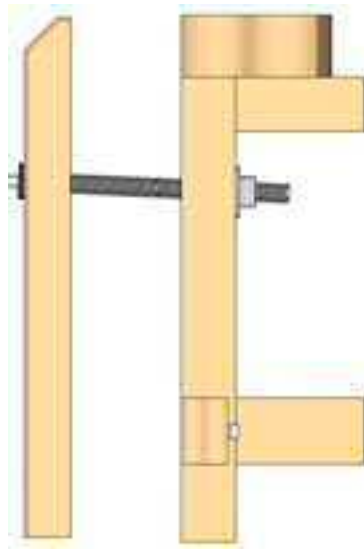
1. Retrofitting to an existing leg vise

If you're retrofitting a Crisscross Retro to an existing leg vise first study the drawings to make sure you have enough space, and your screw's position is compatible. If your chop isn't thick enough, or long enough (Our Glide vises with roller brackets will require a new, longer chop) make a new one, or laminate material onto the inside face to house the Crisscross. If you have a mortise for your parallel guide, you may want to patch that just for looks. If you're retrofitting a Glide, remove the roller brackets and patch the screw holes if you wish.

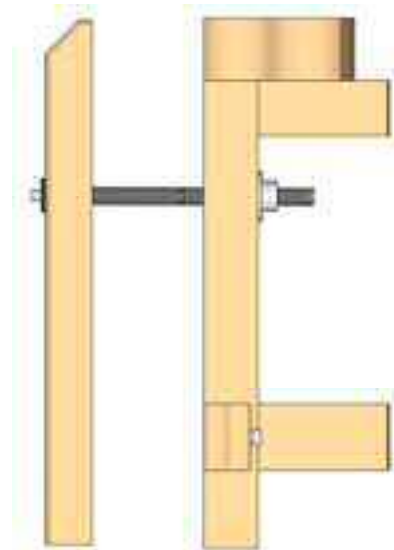
Next, you'll need to vertically center the vise's screw (and more importantly, the chop its attached to) in its nut. Its easier to simply find this location by shifting the chop up and down than relocking the nut. Once the Crisscross is installed, the vise screw needs to be travelling parallel to the action of the Crisscross. If your screw is off a few degrees (tilted up or down in its nut) your vise may at worst bind, or at least not work smoothly. The Crisscross completely supports the weight of the vise and chop, so the screw should turn freely in its nut, and travel in a straight line, parallel to the in-out travel of the Crisscross. If you're installing a new vise, install the Crisscross first, to establish the movement of the chop, then install the vise screw.



screw too low



screw too high



screw vertically centered

Here's how to find vertical center. Close the vise almost all the way by turning the screw clockwise, leaving it open just enough so the chop isn't tight. Mark the back of the chop and the side of the leg with a short, horizontal line--mark both the chop and the leg at the same spot. It doesn't matter where vertically, somewhere close to the top is fine for convenience. The weight of the chop should be pulling down on the screw. This represents the lower position. (if your vise has a parallel guide, make sure you remove it from the chop before this procedure.) Now, pull up on the screw's handle and watch the mark you made on the chop--it should move up from the corresponding mark on the leg. Transfer this upper position to the leg by drawing a short line. It should fall just above the lower line on the leg. The leg should now have two marks on it. Now tighten the vise slightly so it will hold its position as you make the third mark. Depending on where the chop tightened up, adjust the vertical position of the chop (tap down or lift up) until the mark on the back of the chop is centered between the two marks on the leg. The screw is now vertically centered in the nut. It's important that during this process the screw does not contact wood as it passes through the clearance hole in the leg. If it does, enlarge the hole in the leg. You DO NOT want the screw to rub on the inside of the hole.

With the chop tight and screw centered in the nut, draw a single horizontal line across the side of both the chop and leg, open the vise, then continue this line across the inside face of both the chop and leg. This is your datum, or reference line. When marking out the position of the Crisscross mortise, always measure and mark from this line equally on the chop and leg. This will ensure your Crisscross is perfectly aligned with your vise screw. Do not measure or reference off the ends of the chop or leg. And equally important, DO NOT change the position of the nut on the back of the leg. If you do, you'll have to find vertical center again. Continue on in section 3, next page.

2. Note on New Installations

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Installing a Crisscross Retro or Crisscross Solo in a new bench

In new installations (Retro or Solo) simply layout your main screw and Crisscross locations carefully, keeping everything properly aligned using the templates at the end the instructions as a guide. You do not need to find vertical center, as long as you drill your holes and mount the screw precisely. Your accurate layout and milling will all but guarantee your screw running in line with the Crisscross. However, do not fasten the main screw's nut to the back of the leg until the Crisscross and vise is mounted.

3. Mortise Layout

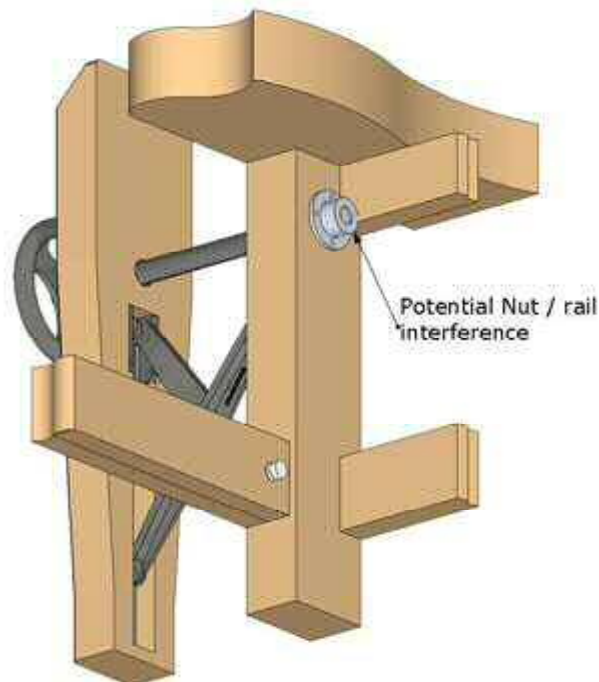
The Crisscross occupies 19-1/2" of vertical space in your bench leg and chop. You can position the Crisscross anywhere you like vertically (it should be centered left-to-right in the leg and chop) with a minimum of 1" of material left below the Crisscross mortise in the leg. It will open to a maximum of about 16", but this is governed by the length of the vise screw. You should not mount the Crisscross Solo in a bench leg that's narrower than 3", or the Retro in a leg narrower than 4". Bench leg and chop each need to be at least 2-1/2" thick. You don't need thick stock, you can laminate 8/4 stock onto 4/4 stock to achieve that thickness. Position the glue lines towards the inside face so the mortise floor falls within solid stock (not a glue line.) The chop can be as narrow as 5", but you'll get better holding if you make it around 8" wide at the top. You can cut any design you like onto the sides of the chop--tombstone shape, coves and curves-whatever. Just save that step for the very end.

To layout the Crisscross mortises, refer to the measured drawings at the end of these instructions. It is not necessary for the Crisscross to be a specific distance below the vise screw. The location on the drawing is simply a lowest position of both the Crisscross and vise screw together in a given bench height. You can shift both the Crisscross and your vise screw locations up or down to suit your bench (Dimension "X") Layout everything in full size before you cut anything.

There are four things to keep in mind when determining where to vertically position your Crisscross:

1. The distance below the Crisscross: ideally, you don't want the mortise to be open at the bottom of the leg. Best to keep some material here. 1" minimum. Although if you have a wide and thick leg (5" or more) an open mortise won't pose any problems.
2. The distance between the top of the Crisscross mortise and the vise screw: leave a little material between the screw and the mortise for strength. You can get a bit closer with the Solo. If you're installing a Glide Leg Vise, the drawings show the ideal distance below the acetal bushing.
3. Height of the bench: If you have a tallish bench 36" or so, you might want to move everything up a little. The drawings show, again, lowest possible position. This makes for a lot of room above the screw, but you might want to reduce this so you're not bending over too much to grab the vise handle.
4. Possible interference with an upper rail and/or the benchtop. If you position your vise and Crisscross without regard to the upper rails running between your front and rear legs, or the benchtop itself, you

might find either part ending up where the vise's nut needs to be, especially if your nut has a large flange, or you're using a thick wooden nut. This especially important in very short benches. If you are retrofitting a Crisscross and have less than about 20" below the screw, you may need to move the entire vise up to accommodate the Crisscross. Again, layout in full size before cutting or drilling. If you're installing a Crisscross Retro, skip ahead to section 5.



4. Solo Installation ***for installation in new, unassembled benches***

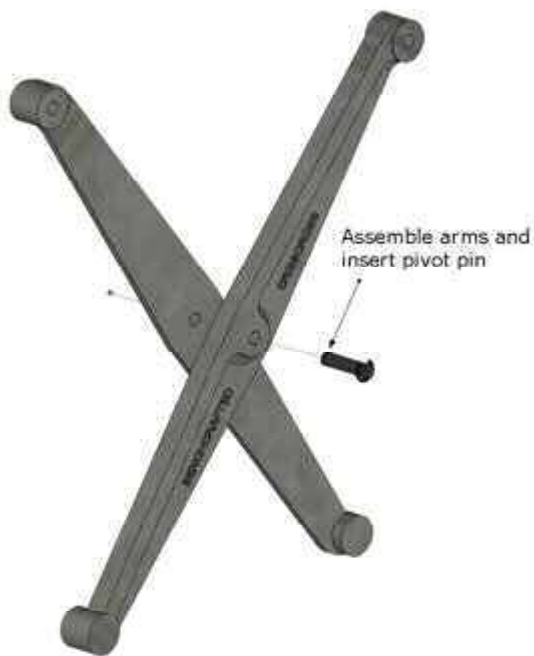
NOTE: DO NOT install your leg vise hardware before installing the Crisscross Solo. But DO layout for it. Accomplish all vise and Crisscross installation work on the chop and leg with the leg itself not yet permanently joined to the bench. You can layout and cut joinery, but its easiest to install your vise before final bench assembly.

Refer to the drawings for the Crisscross Solo installation. Make sure you leave your chop a little long at the top, you'll cut it flush with the top surface of the bench after the Crisscross is completely mounted.

Drill the holes for the mounting pins on a drill press. This is where the Solo is best used. If you don't have a drill press, or aren't confident in drilling deep, straight holes, you should use the Crisscross Retro. Tip: when drilling deep holes use a sharp, high quality bit and back the bit out frequently (every 3/4" or so) to clear chips. You should drill clear through the leg and chop to make installation easier should you need to tap the pins out from the opposite side.

Once the holes are drilled, cut the mortises with your method of choice. You're just getting wood out of the way here, the mortises don't have to be perfect, although the bottom portions do need to be flat for the bearing plates to seat flatly.

After the mortises are cut, install the two bearing plates with the included screws at the bottom of each mortise.



Next, assemble the Crisscross arms, with the flat backs together and the ends with holes on the same end (up). Align the center hole and insert the pivot pin with **ONLY ONE** snap ring installed. Leaving one snap ring off lets you test fit and disassemble easily during the installation process. The pin might shift around a little during the install, but that won't affect anything. Once your leg vise and Crisscross are completely finished, you can snap the other ring into place. To get a ring off, pry it open slightly with a small, flat head screwdriver placed in one of the small openings in the perimeter of the snap ring.

Now drive the mounting pins into the holes in the chop and leg until they just come into the mortise. Place one half of the assembled Crisscross into the leg mortise and tap the pin until it passes through the hole in the arm, and into the opposite hole in the leg. Now get the chop and repeat the same process for the other half of the Crisscross. Make sure the Crisscross isn't rubbing on the sides of the mortise. If it is, shift it left or right. Once its in position, it will find its own center and generally stay there. The chop should now "float" in and out quite easily as the Crisscross supports the weight of the chop. Cut to the width of your chop and leg, polish the ends of the mounting pins for a finished look.

Next, drill the necessary holes in the chop and leg for your leg vise hardware and install the screw only.

Here's a critical step: You need to position the vise's nut and fasten it to the bench leg so its in line with the movement of the Crisscross. Here's how you do it:

With the chop completely closed and the screw 's flange/handle (T-casting, Glide handwheel, wooden screw hub, etc.) mounted to the chop, and with the Crisscross mounted, thread the nut onto the screw until it gets close to the back of the leg. Make sure the chop is centered left-to-right on the leg. Now with one hand, press hard on the vise's handle directly in line with the screw. This will push the chop closed, forcing the inner surface of the vise handle to seat flat on the outside of the chop, flange or casting, positioning the screw into a parallel orientation with the Crisscross (assuming of course that you've made the faces of your chop flat and parallel) As you're pushing in, you can observe the end of the screw raising up and finding its center within the leg's clearance hole. **It must not touch any wood** in the chop or the

leg. While still pushing in, tighten the nut against the back of the leg until snug, then mark for mounting screws (snug the nut enough that the weight of the screw does not drop down and spoil the location of the nut.) Mark the nut so when you install it, its in the same orientation as before. Drill the mounting holes and attach the nut. Thread the screw back through the nut and test the action. The vise should now work sweetly.

5. Retro Installation

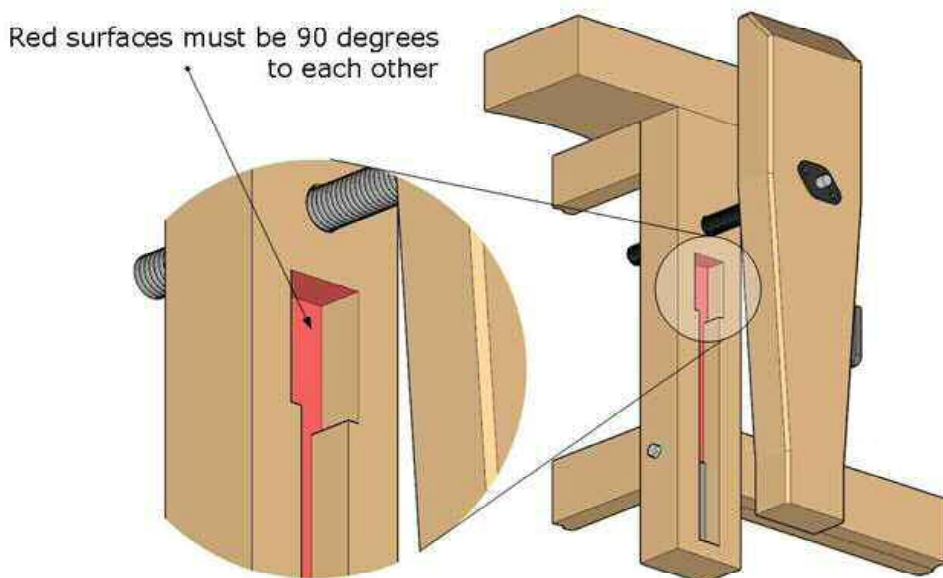
for retrofitting an assembled bench & for new installations in unassembled benches

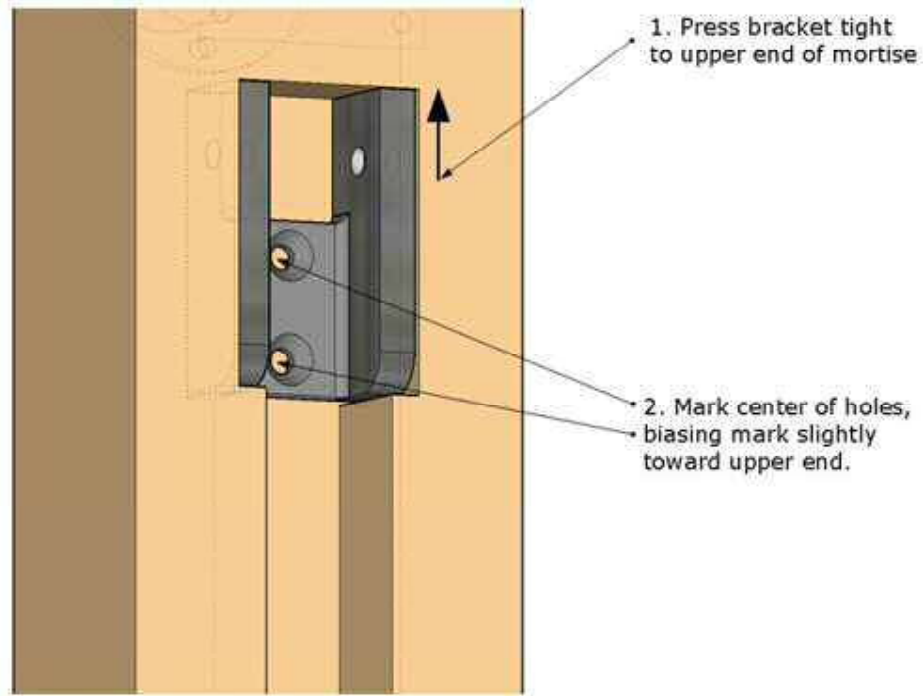
NOTE: For new installations only: DO NOT install your leg vise hardware before installing the Crisscross Retro, but DO layout for it. Accomplish all vise and Crisscross installation work on the chop and leg with the leg itself not yet permanently joined to the bench. You can layout and cut joinery, but its easiest to install your vise completely before final bench assembly.

Refer to the drawings for the Crisscross Retro installation. If you're using a new chop, make sure you leave it a little long at the top, you'll cut it flush with the top surface of the bench after the Crisscross is completely mounted.

If you haven't already, review section 1. "Retrofitting to an existing leg vise" to make sure you've vertically centered the chop. If you're retrofitting to an existing bench, but building a new chop, you'll still need to do this step since the nut is already attached to your bench leg and may be difficult to relocate. That means you'll need to mount the vise hardware to the new chop first, using the existing location of the clearance hole and nut position in the leg as a guide, then find vertical center, then proceed with installing the Crisscross.

Next, cut the stepped mortises for the mounting brackets and arms. At the upper end of each mortise where the two machined surfaces of the mounting bracket bear against the wood, be diligent to chop the end grain of the mortise so it's square to floor of the mortise. The bracket needs to seat firmly and squarely here. See illustration below.





Next, place a bracket in the mortise and press it tight to the upper end of the mortise (where it butts into end grain) and while holding it tight, use a transfer punch to mark for the two mounting screws. Try to bias the location slightly towards the upper end of the mortise, so as you install the screws the bracket will be drawn tight to the end of the mortise. You can see why its important to layout your mortise carefully, since the end of the mortise here, where you chopped it square, determines the vertical position of the Crisscross and the alignment of the arms to each other. Be diligent to get everything correct here. Take your time and work with care and attention.

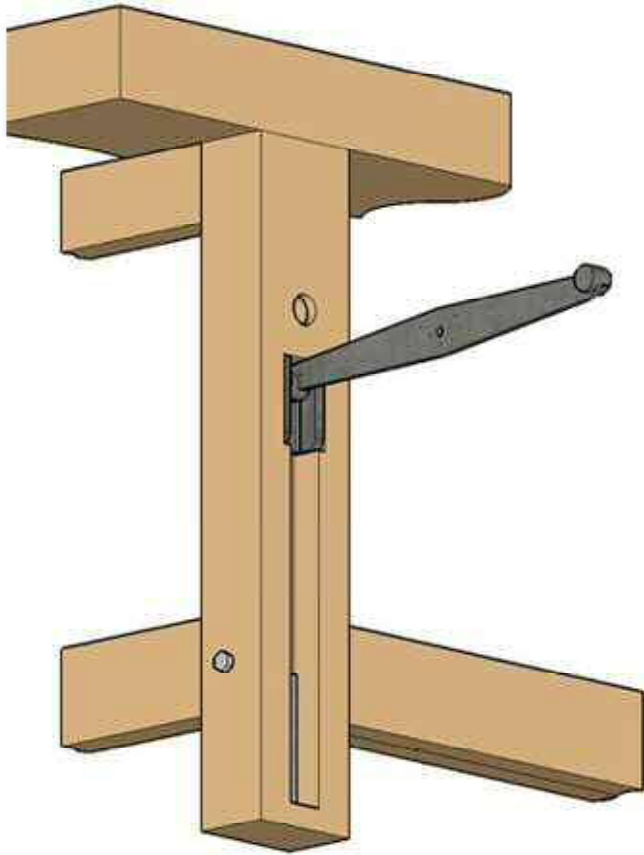


Drill and tap for the 5/16" mounting screws. (See the addendum at the end for info on tapping wood for machine screws) Then test mount both brackets in the leg and chop. After you've determined that they fit properly you'll need to remove them to install the arms.

New installs: Drill the necessary holes in the chop and leg for the vise hardware. DO NOT MOUNT THE NUT.

Install the two bearing plates at the very bottom of each mortise with the included wood screws.

To mount the Crisscross Retro, first join each arm to the brackets with the 2-1/2" mounting pins. See the illustration at left to get the orientation correct. The



pins just slip in place and fit loosely and rotate with no resistance. These are held in place by the walls of the mortise, and once the bracket is installed, they are trapped in place.

Now place the bracket in the mortise and drive the two mounting screws. You'll need to swing the arm up and out of the way to access the mounting holes. Mount both assemblies to the leg and the chop.

New installs: clamp the leg upright to a bench or stationary object to finish the install.

Now mount the screw to the chop and place the screw a couple inches into the leg. This helps support the chop as you join the Crisscross arms. Now place the pivot pin in one of the arms with only one snap ring installed - leaving one snap ring off lets you test fit and disassemble easily during the installation process. The pin might shift around a little during the installation, but that won't affect anything. Once your leg vise and Crisscross are completely finished, you can snap the other ring into place. To get a ring off, pry it open slightly with a small, flat head screwdriver placed in one of the small openings in the perimeter of the snap ring.



Now swing the arms together (flat back to flat back) until the central pivot pin holes align. Push the pin into the other arm.

Retrofitting: thread the main screw into the nut and test the screw and Crisscross for smooth action. The vise should work sweetly.

New installs: Here's a critical part. You'll need to position the vise's nut and fasten it to the bench leg so its in line with the movement of the Crisscross. Here's how you do it:

With the chop completely closed and the screw's flange/handle (T-casting, Glide handwheel, wooden screw hub, etc.) mounted to the chop, and with the Crisscross mounted, thread the nut onto the screw until it gets close to the back of the leg. Make sure the chop is centered left-to-right on the leg. Now with one hand, press hard on the vise's handle directly in line with the screw. This will push the chop closed, forcing the inner surface of the vise handle to seat flat on the outside of the chop, flange or casting, positioning the screw into a parallel orientation with the Crisscross (assuming of

course that you've made the faces of your chop flat and parallel) As you press in, observe the screw lift up and "find" its center within the leg vise clearance hole. **The screw must not touch any wood** in the chop or the leg. While still pushing in, tighten the nut against the back of the leg until snug, then mark for mounting screws (snug the nut enough that the weight of the screw does not drop down and spoil the location of the nut.) Mark the nut so when you install it, its in the same orientation as before. Drill the mounting holes and attach the nut. Thread the screw back through the nut and test the action. The vise should now work sweetly.

Leg-to-base Joinery

For those who are retrofitting into our Split Top Roubo, or installing into a new Split Top Roubo, or are retrofitting into similar benches, the Crisscross mortise in the leg requires some different joinery between the leg and front rail. In the Split Top Roubo, the typical placement of the mortise and tenon of the front rail, and the bolt and barrel nut falls within the Crisscross mortise. To solve this issue, a thicker front rail (and tenon) is made to allow the bolt and barrel nut to be installed **behind** the Crisscross mortise. See drawings at the end of these instructions.

Troubleshooting

The main causes of potential trouble will be:

1. If the two mounting pins (Solo) or two brackets (Retro) are not mounted at the same height

If the arm mounted to the leg is lower than the one in the chop, this will increase toe-in, but if its extreme enough, it may cause the mechanism to bind. Likewise, if the arm mounted to the chop is lower than the one in the leg, this will decrease toe-in, but if its extreme enough, it may cause the mechanism to bind. Thus, the mounting pin locations of each arm **MUST BE** equidistant from the screw. If you used the Solo, you'll need to redrill the mounting pin holes correctly in a new location higher or lower. You'll have to adjust the length of the mortise as well. You can't plug the holes and redrill--your bit will want to follow the plug. An easier fix may simply be to purchase a pair of Retro brackets and install those. If you mounted a Retro and its off, you may need to adjust the mortise length to shift the bracket up. You may need to replace the machine screws with longer ones and drill clear through the leg and attach the bracket with nuts, since you won't be able to tap a plugged hole. Try to make any adjustments in the leg half of the Crisscross so you don't have to work on the chop where fixes would be more visible.

2. If the screw is not running in line (parallel) with the in-out travel of the Crisscross.

The easiest way to correct an out of alignment screw is to reposition the nut. Repeat the process in the paragraph under section 4. Solo Installation "With the chop completely closed..." You'll need to rotate the nut so you can drive the screws into fresh wood.

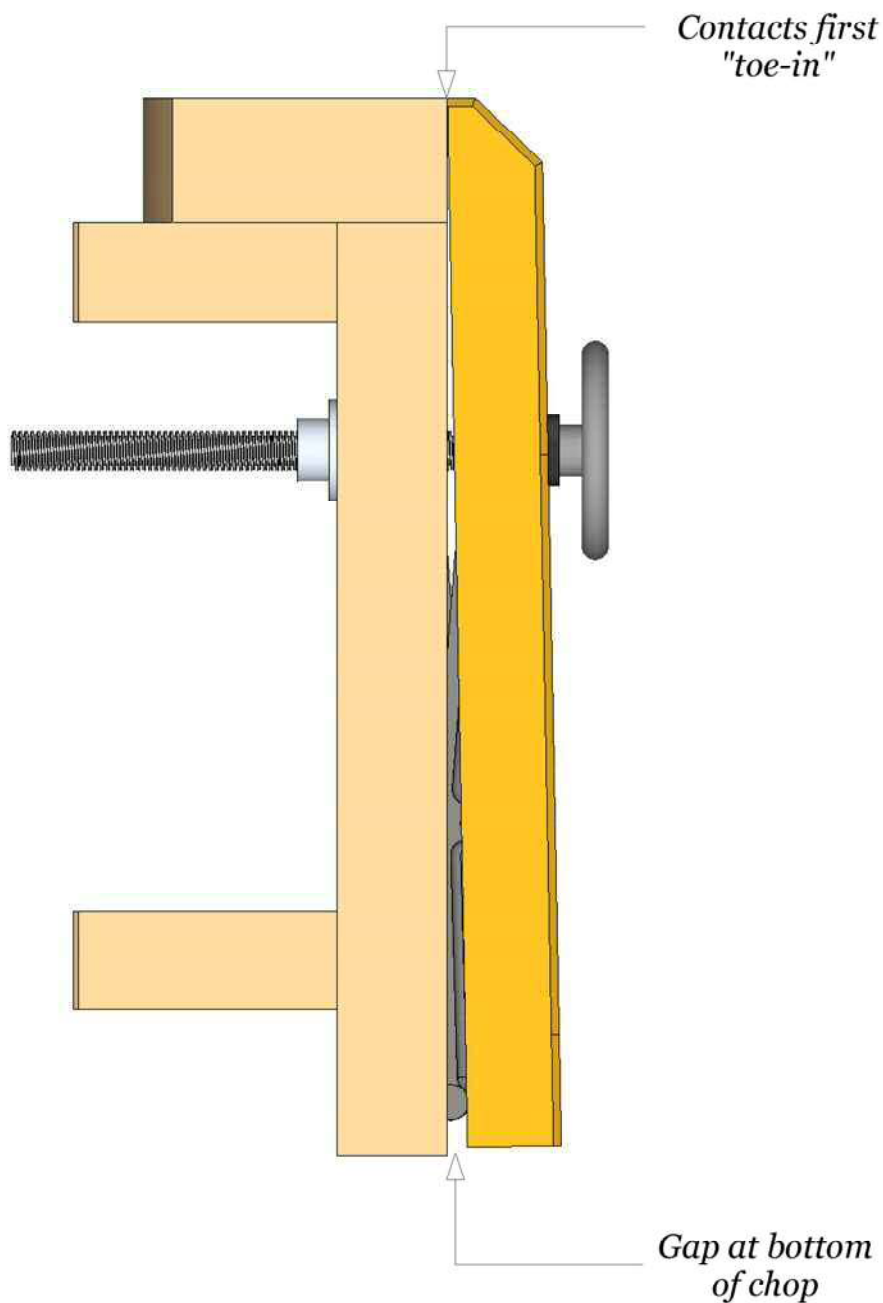
3. The mounting pins are not parallel with each other, either in the Solo or the Retro.

For the Retro, try adjusting the floor of the mortise so the brackets seat parallel to each other. If they are out of parallel the other direction you'll need to adjust the end grain of the mortise and possibly redrill the mounting holes. See instructions in troubleshooting #1. If you used a Solo, you'll have to relocate the holes, or mount Retro brackets. Again, see #1 for instructions.

Toe-in

The Crisscross is built with a small amount of toe-in. This ensures that the very top of the chop contacts the front of your bench first. Normally you can achieve this by planing your inside chop face to a taper. But since this feature is built into the Crisscross, you can keep your chop faces parallel. The amount of toe-in will vary depending on your Crisscross vertical placement and the length of your chop. With the top of the chop just touching the edge of the bench, the gap at the bottom of the chop will be about 1/8"-1/4".

If you would like a little more toe-in at the top, you can remove the bearing plate from the chop and place a layer or two of thin cardboard or veneer beneath it. If you put too much however, you can cause the chop to bind on the screw's shaft, stiffening the action of the vise. A better solution to adding some toe-in would be to simply remove the chop and plane a slight taper on the inside surface of the chop. Obviously you'll want to remove more from the lower end of the chop.



Maintenance

The Crisscross requires no maintenance other than to keep it clean. Being cast iron, it may rust in humid environments. If your shop is not climate controlled, you can rag on a coat of boiled linseed oil, bake on some flax oil, or even paint it. It looks nice with flat black paint. You may want to get a little eager and fill the cast iron surface for a smooth finish and paint it with gloss enamel.

NOTE: If you purchased a Crisscross after February 2013, your Crisscross arms and brackets will arrive with a flat black finish.

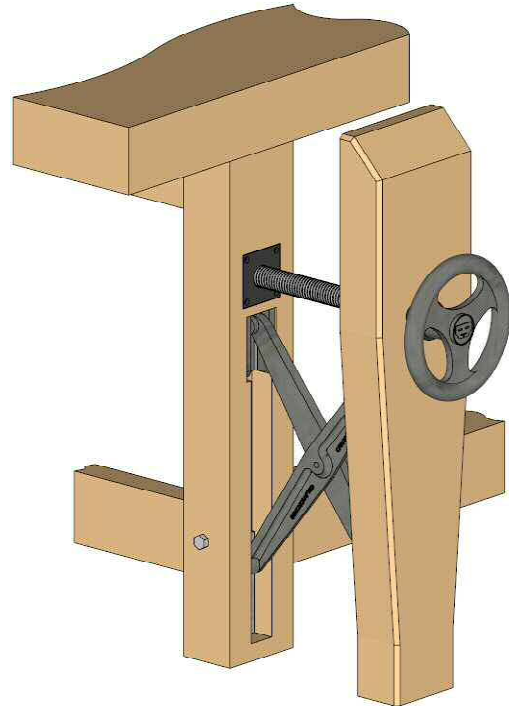




BENCHCRAFTED GLIDE CRISSCROSS

Assembly and Installation Instructions

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Glide Box Contents:

Quantity	Description
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- | | |
|---|--|
| 1 | Handwheel |
| 1 | 1 1/4 precision acme screw |
| 1 | 1 1/4 Acme Nut |
| 1 | Flange |
| 1 | Large washer |
| 1 | Groove pin for attaching handwheel to screw |
| 1 | Acetal bushing |
| 8 | 1/4-20 x 1" button head cap screw |
| 2 | 5/16-18 x 1-1/2 flat head machine screw |
| 1 | Rosewood handwheel knob with shoulder bolt |
| 1 | Thick washer for mounting the knob |
| 1 | Piece suede, enough to cover inside of chop and leg face |

ATTENTION!

Read and understand these instructions COMPLETELY AND THOROUGHLY before starting the installation or cutting into your bench.

We highly recommend that you NOT begin installation without the Crisscross, Glide and all other bench hardware in your possession.

Unpacking your vise:

Some parts, especially the handwheel, are heavy. Be careful as you unpack and handle them. Also be aware that although we make every effort to ease all edges, being machined parts you may encounter a sharp edge or burr. If you do, ease it with some fine abrasive paper or a fine file. Some components will have a rust preventative oil applied. You should remove this oil before installing the vise. Wipe it off with a clean paper towel, followed by a clean towel with a bit of mineral spirits. This will leave a light film of oil on the parts that will help prevent rust and keep the parts moving smoothly.

Assembly Instructions for Benchcrafted Glide Leg Vises

The Benchcrafted Glide Leg Vise ships unassembled. You will need to install three parts onto the 18" acme screw's shaft: the washer, flange, and handwheel. It only takes about a minute. Note: your vise may arrive already assembled.

Tools required:

Small hammer

Pin punch or large nail set

smooth end



fig. 1

1. Remove the handwheel, flange, large washer, 18" acme screw, groove pin and logo from the box and remove the VCI paper.
 2. First, place a couple drops of light machine oil on the shaft end of the acme screw near the shoulder for lubrication, then slide the washer onto the shaft.
 3. Next, slide the flange onto the shaft.
- IMPORTANT :** Face the side with the two countersunk holes away from the screw. The countersinks need to face OUT once the vise is mounted in the bench..
4. Slide the handwheel onto the shaft, lining up the cross hole in the handwheel's hub with the cross hole in the shaft. Peer down into the hole and position the handwheel until the two holes line up precisely.
 5. Get the groove pin, punch and hammer. Examine the groove pin. One end is smoothly round, with virtually no grooves. The grooves get wider as they reach the opposite end of the pin. See fig.1
 6. Insert the SMOOTH END WITH NO GROOVES first into the cross hole in the hub and with finger pressure insert the pin until you feel it engage the hole in the shaft. If you can't insert it far enough with finger pressure, use the hammer to lightly tap the pin to get it moving towards the shaft. Try to keep the hub in line with the cross hole in the shaft as you tap the pin in. Keep tapping the pin in until you feel a little resistance as the pin meets the hole in the shaft. Tap some more until you feel the pin engage the hole in the shaft. Now take the pin punch and place it on the head of the pin and finish driving the pin through the shaft and the opposite side of the hub. Use light taps. The fit is machined precisely, it doesn't take much force. Do not over drive the pin, stop when its centered in the hub's diameter. The flange should spin freely on the shaft and have a little bit of play in the fit.

Because the majority of the installation of a Glide Crisscross lies in the Crisscross itself, we've provided these additional details separately from our Glide Original Instructions, which are centered on building the chop and parallel guide, along with the roller brackets, two elements that are eliminated with the Glide Crisscross.

First, read the Crisscross installation instructions from beginning to end, then layout the locations of the Crisscross mortise and Glide screw locations on your leg and chop following the drawings at the end of these instruction.

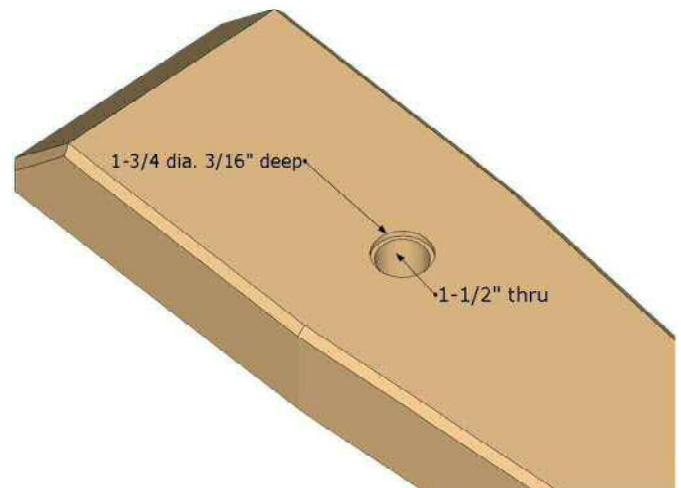
When you come to the section on drilling the holes in the chop and leg (page 8) follow the instructions below. Remember to do all of these operations with your leg free from the bench. Once the Glide is completely finished and installed (except cutting the chop to final height) then you can join the leg vise leg to the bench itself.

Drilling the screw clearance holes

On the outside face of the chop, drill a 1-3/4" counterbore hole at least 3/16" deep. This is to accommodate the large washer between the flange and screw, allowing the mounting flange to seat flat to the chop.

Next, use a 1-1/2" bit and drill completely through the chop. This is a clearance hole for the screw. Once installed, the screw should not touch the hole at all. Drill almost all the way through- then flip the piece and finish at the back face to prevent blowout.

Now using the same 1-1/2" bit, drill the clearance hole through the leg.

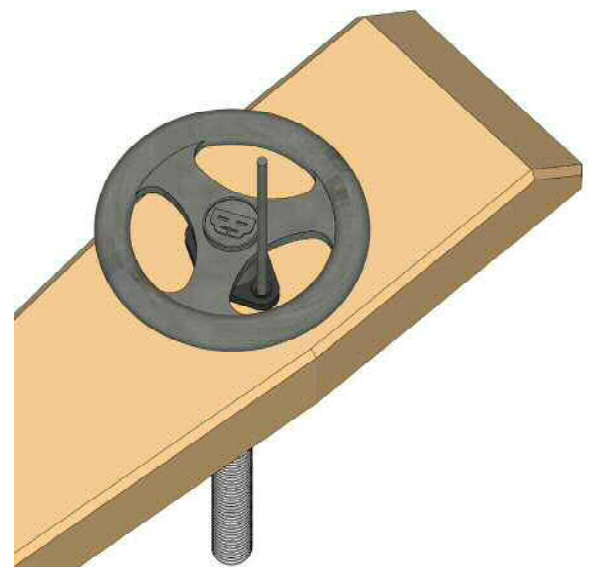


Mounting the screw

To mount the handwheel assembly to the chop, place the screw through the hole and center the screw in the hole. You can use the horizontal line for vertical positioning (center the line in the two holes of the mounting flange). For horizontal positioning shift the flange back and forth marking each position, then center the flange between these two marks.

You MUST be certain the screw is centered in the hole and not touching the chop at all!

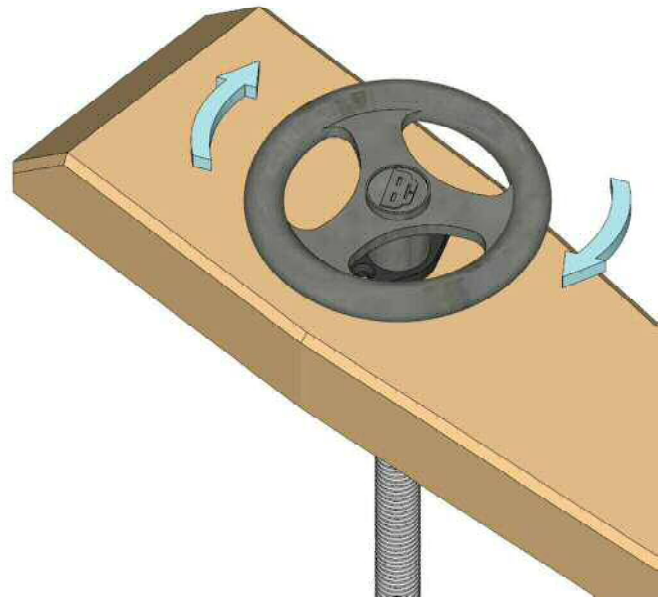
When its in position, mark the hole centers with a transfer punch or awl. Remove the handwheel assembly. Using a 1/4" bit, drill pilot holes for the 5/16-18 tap. See the addendum for tapping techniques in wood. Tap the holes for the 5/16 flat head machine screws.



Once the holes are tapped, screw the flange in place and check to see that the screw spins freely.

The screw should not touch the walls of the hole at all, and the wheel should rotate freely.

Next, continue with the Crisscross installation, page 8. When you've found the position of the vise's nut, you'll then attach the nut by drilling $3/16$ " holes and tapping those holes with a $1/4$ -20 machine screw tap for the four button head cap screws. See Addendum 2 for tips on tapping wood for machine screws.



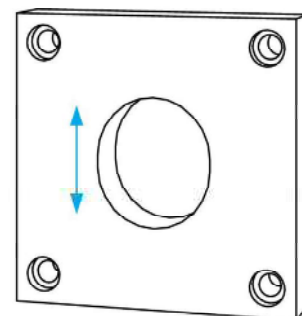
Installing the acetal bushing

A special bushing which stabilizes the lateral movement of the screw, but still allows free movement is installed next. The bushing is made from acetal, a very durable material that is widely used in bearing applications. The bushing is milled to be just a few thousandths larger than the screw's width, thereby guaranteeing good guidance for the screw and thus smooth in-out travel of the chop.

Unthread the screw from the nut, then pull the handwheel/screw assembly out of the leg a couple inches. Slip the bushing over the screw with the counterbores facing out. Then feed the screw back through the leg and engage it in the nut a few turns.

Orient the bushing so the elongated central hole is vertical, since the bushing only provides horizontal (left-right) stabilization.

Use a square to keep the bushing level while tracing around the bushing on four sides.



Orient long axis of hole vertically

Remove the screw assembly and chop (you'll have to separate the two halves of the Crisscross) and widen the outline of the bushing by about 3/32" all the way around. The bushing should not fit tightly in the mortise, it needs to be able to move.

Excavate the mortise to this outer line and to a depth of just over 1/2". You don't want the bushing to be proud of the leg's surface, it should be dead flush or slightly recessed. If you rout the mortise and are left with round corners, you can round the corners of the bushing to match, but not more than a 1/4" radius.

Reinstall the Crisscross and chop/screw assembly along with the bushing and advance the screw a few turns.

Move the chop back and forth (left and right) until the bushing is centered in the mortise. Use a transfer punch (or bradpoint bit) to mark the bottom of the bushing's mortise in all four locations, while keeping the chop still.

Remove the Crisscross pivot pin, chop and bushing and drill and tap for the 1/4-20 button head cap screw.

Reinstall the Crisscross pivot pin and chop/screw assembly along with the bushing and advance the screw a few turns.

Drive the cap screws into the holes you just tapped (keep them all loose), and while repetitively turning the handwheel in and out (about one revolution's worth) gradually tighten one cap screw against the bushing. Make sure the bushing is centered in the mortise.

Once it's tight and the wheel turns smoothly and freely, gradually tightening the remaining screws incrementally while turning the handwheel. If you feel the main screw getting tighter as you turn, loosen the cap screw and start again. The bushing is there to provide stability, it should not hamper the rotation of the vise's screw.

It's also very important that the bottom of the mortise be flat. If it's not, the bushing will be distorted as you tighten the cap screw, possibly binding the main screw. If you need to remove more material from the bottom of the mortise to get it flat, do so. It doesn't matter if the bushing is slightly recessed into the leg a bit.

Once the Glide Crisscross is completely installed and functioning smoothly, mark and cut the chop to final length. Of course you should disassemble the vise to work on the chop.

Now you can bevel the top outside corner of the chop or round it over. This is also a good time to glue on the suede leather. We use water-based contact cement, but any glue will work. The suede leather is an important part of the Glide. It provides incredible holding power with little effort. We line all of our vises with suede, including the faces of our bench dogs.



The final step is to reassemble everything and give the Glide Crisscross a test run. Grab some boards and a hand plane and give it a go. The knob is handy for spinning the vise quickly for rapid and gross adjustments. But for repetitive clamping and unclamping of similar thickness workpieces---edge jointing panels or cutting numerous tenons for door frames for example--grasping the rim of the handwheel and giving the vise about a quarter to half turn is all that's necessary to open the jaw and regrip. Experiment with how much force is really necessary to hold your workpiece securely. You'll find it's much less than you initially think, making workholding even more effortless as you learn to use the Glide Crisscross.

For more tips and techniques, please visit our blog which contains lots of information on using the vise.

<http://benchcrafted.blogspot.com/> Select "Glide Leg Vise" from the "Categories" list at the right of the blog.

If you have any questions about the installation, we're glad to help. Contact us at info@benchcrafted.com.

Thank you for purchasing the Benchcrafted Glide Leg Vise. We hope you enjoy using the vise as much as we do.



Addendum 2

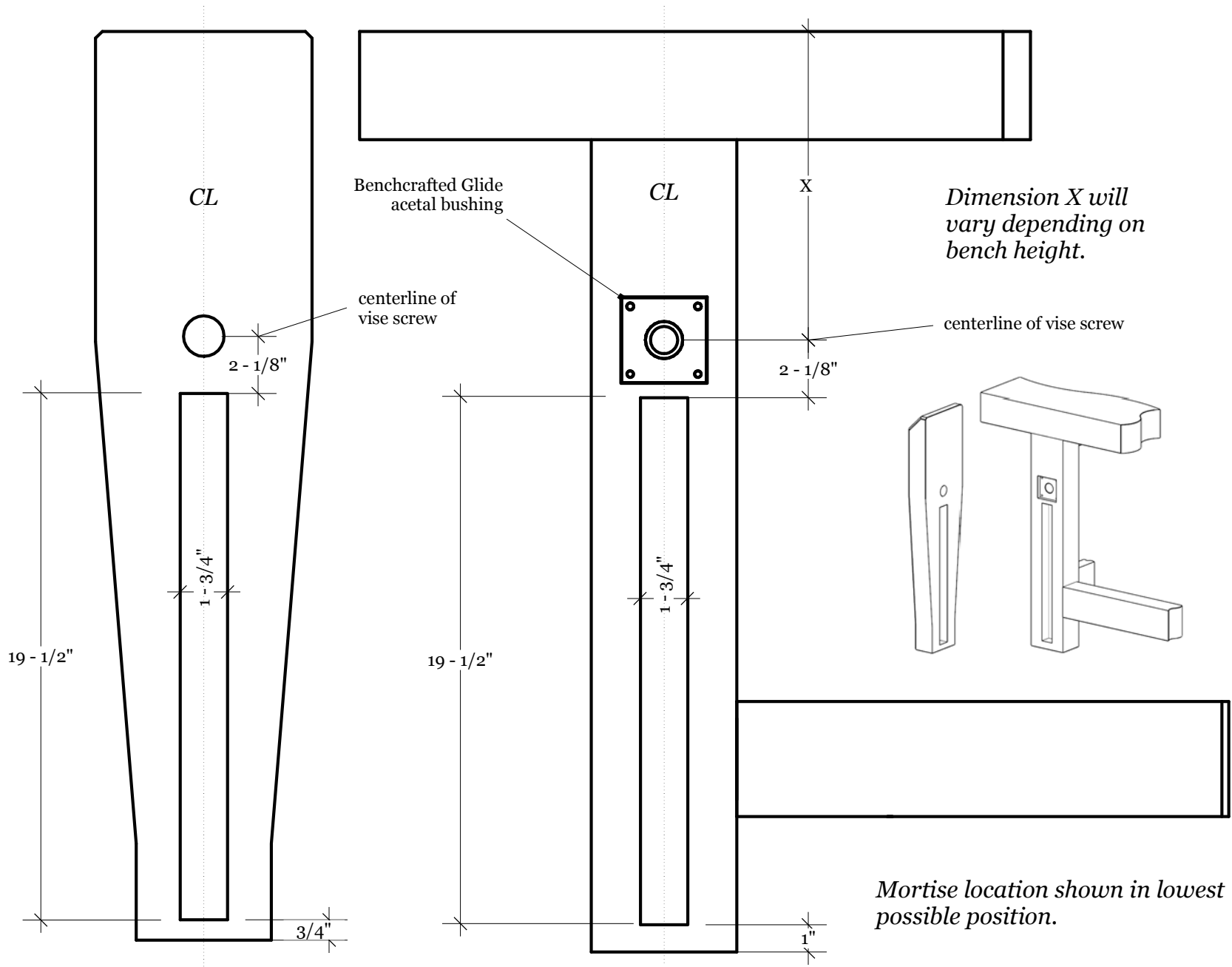
Tapping Holes In Wood For Machine Screws

Aside from the typical woodworking tools required to build the wood components of the vise and install it, you'll need some machine screw taps to install some of the components. Many of you will already have these, and for those who don't, you'll be able to pick them up at any hardware store or home center. Mail order suppliers like Enco or McMaster will also have taps. Taps are inexpensive.


To attach the brackets to the leg and chop you'll need a 5/16-18 tap. Standard plug taps will work fine for all the holes, but bottoming taps (they cut threads almost to the bottom of a hole) will require a shallower hole. Not a huge issue in the leg, but in the thinner chop you'll want to use a bottoming tap, ideally. Pilot hole size for 5/16-18 is 1/4", or a tad less like 15/64 if you have it.

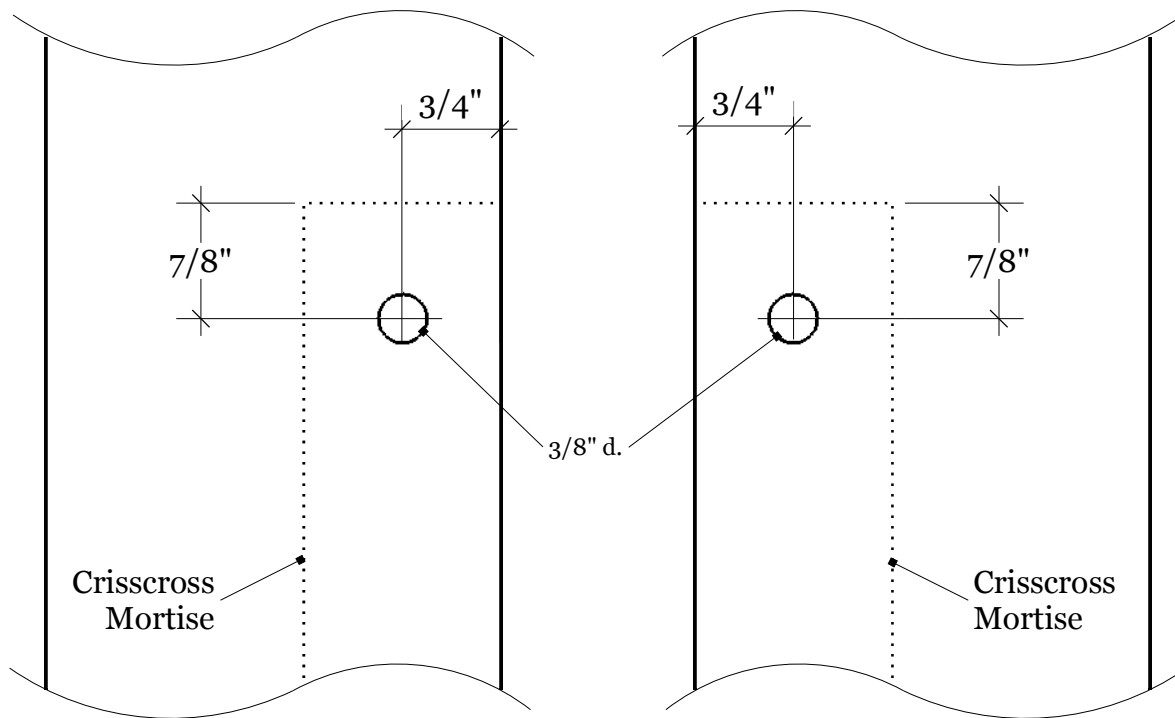
The holding power of machine screws in wood is about the same as using a threaded insert, and you don't have to buy the inserts. It's great for making jigs and knock-down joints.

Once you drill the pilot hole (use a drill press for accuracy if possible) chuck the tap in a small, cordless, variable-speed driver with the torque set for driving screws (the slower setting). Hold the drill perpendicular to the surface and without pushing on the drill (just support its weight while keeping it square) press the trigger and let the tap feed itself into the hole slowly. It helps to cut a small countersink in the pilot hole to help get the tap started. When you feel the tap tighten up a bit and you've reached the depth of threads you're after, release the trigger. Switch the drill into reverse and press the trigger without pulling on the drill. Let the tap thread itself out of the hole slowly. It's important to go slow and feel how the tap is working. If you go too fast you risk binding the tap. At that point the tap becomes a drill bit and you just end up making a larger hole. If you're new to this, practice on some scrap first. You can also tap the holes by hand, but once you get the hang of using the driver it makes tapping quick and easy.



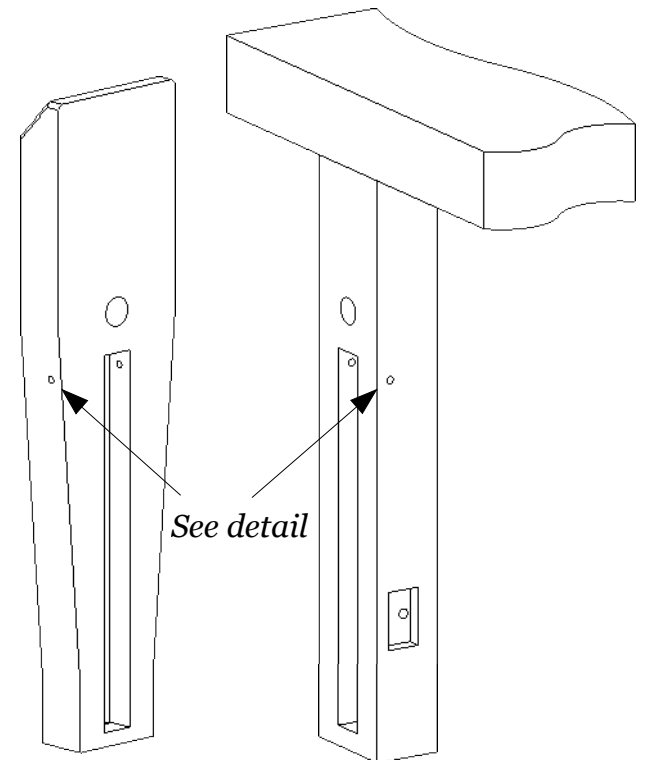
Mortise Depth: 1 - 7/16" chop and leg

Crisscross Solo		Mortise Dimension		
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Chop

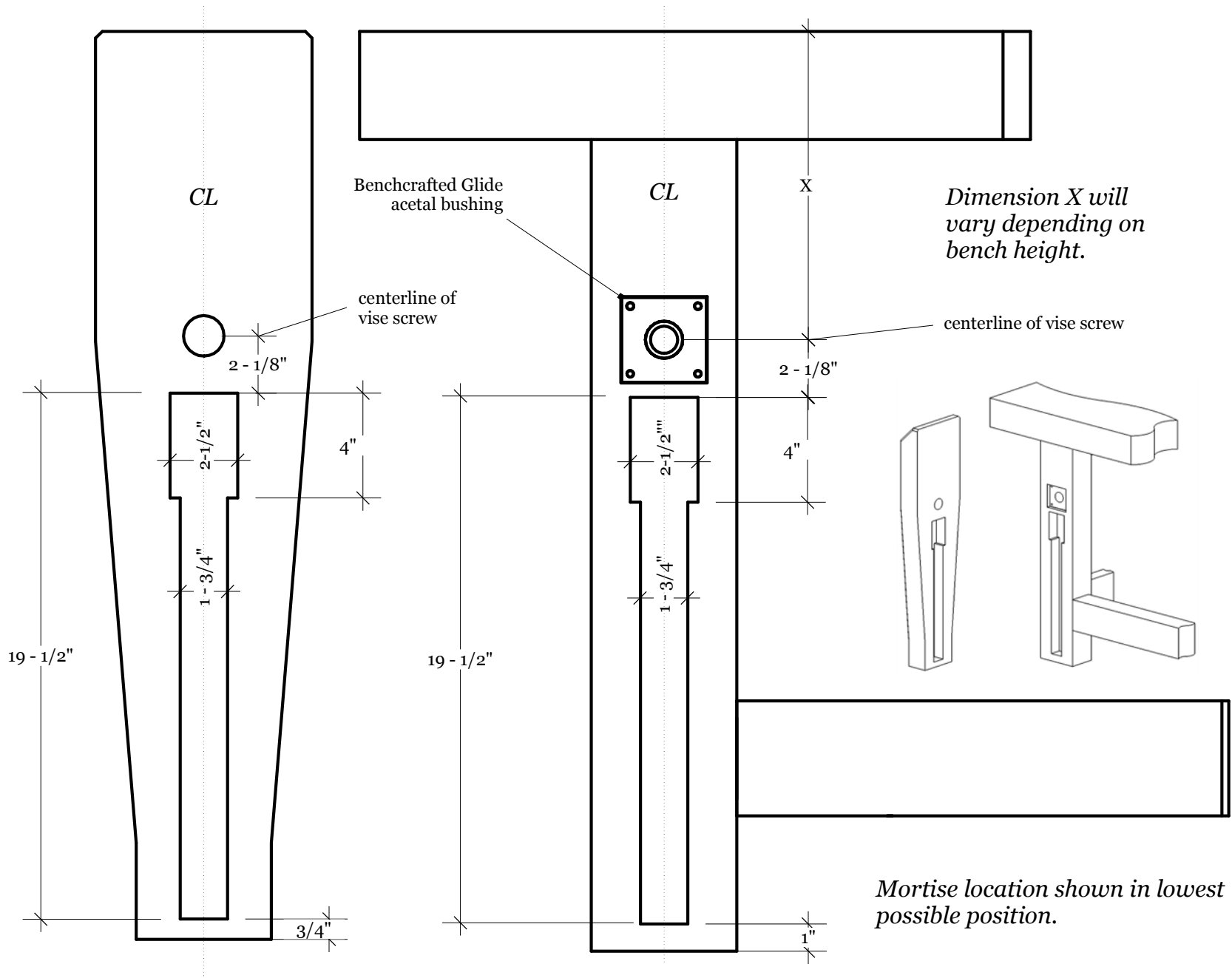
Leg



See detail

Detail

Crisscross Solo		Mounting Pin Location		
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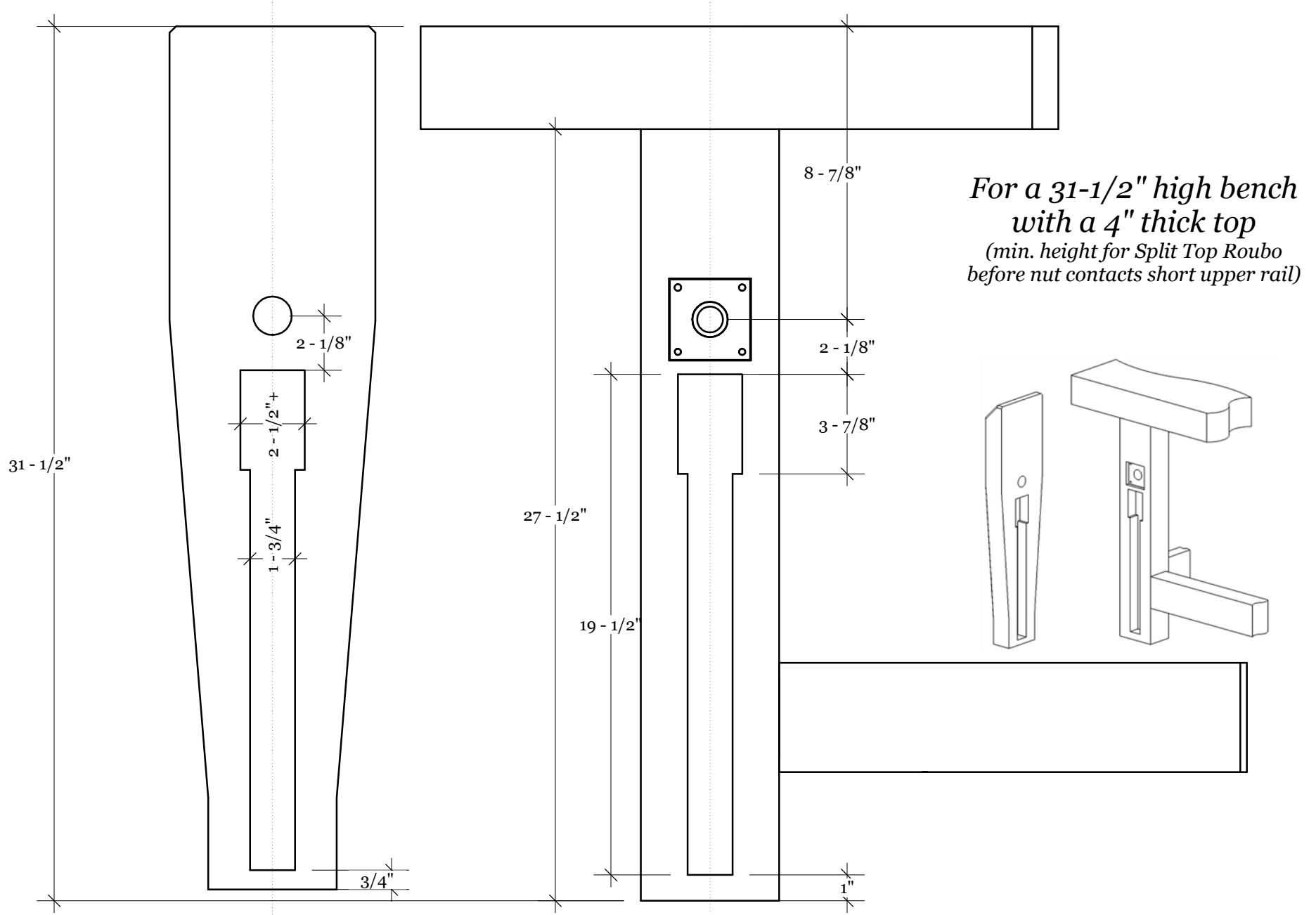


Dimension X will vary depending on bench height.


Mortise location shown in lowest possible position.

Mortise Depth: 1 - 7/16" chop and leg

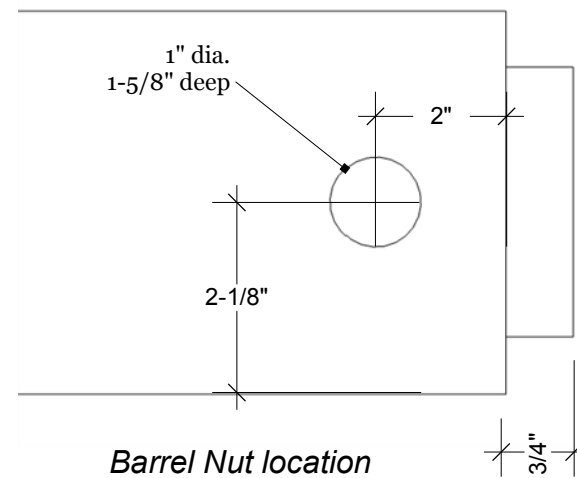
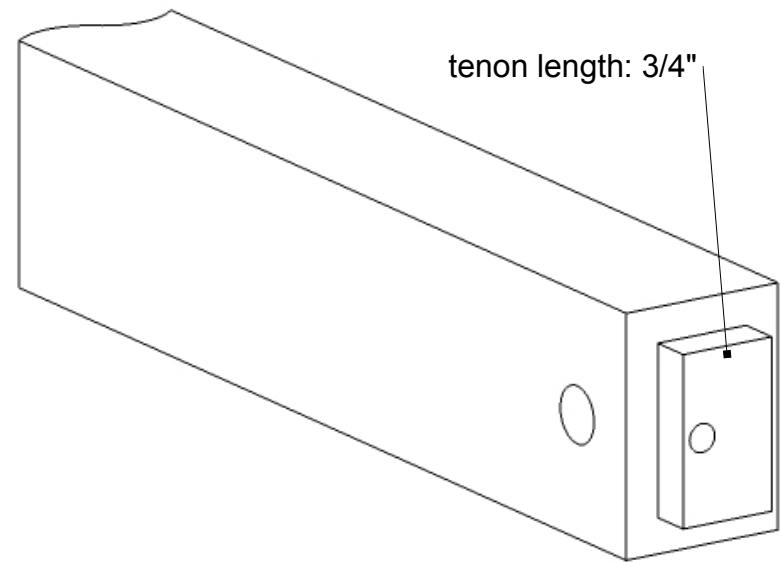
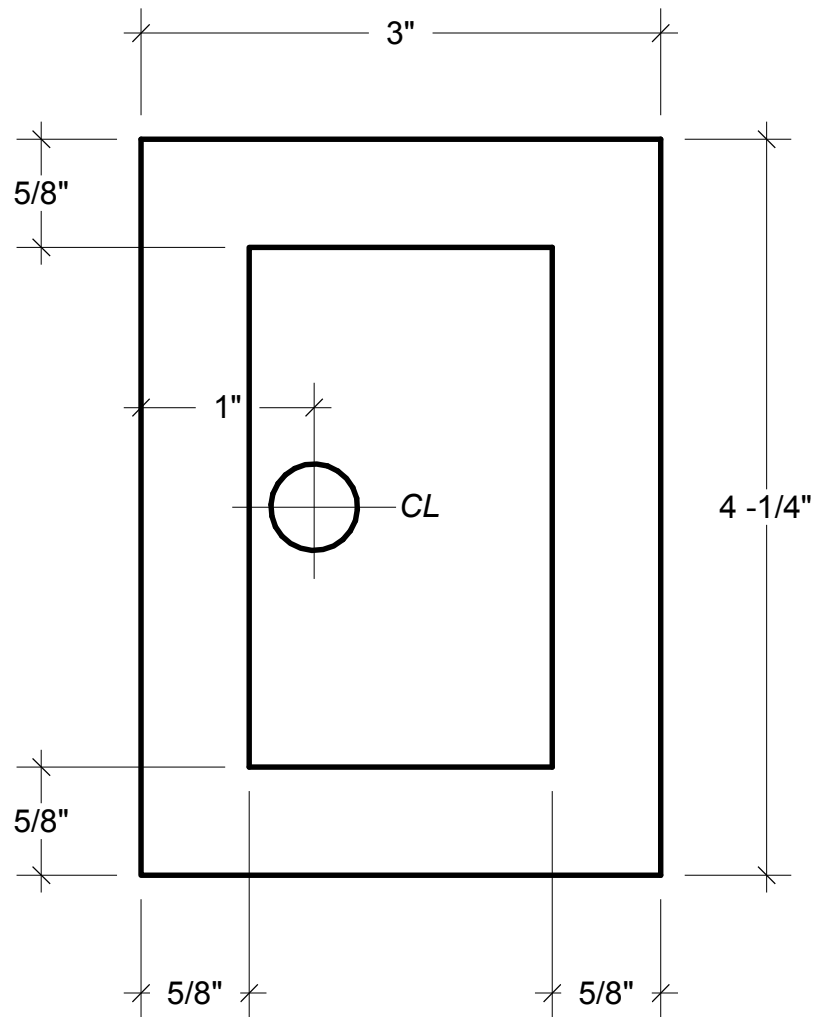
Crisscross Retro		Mortise Dimension		
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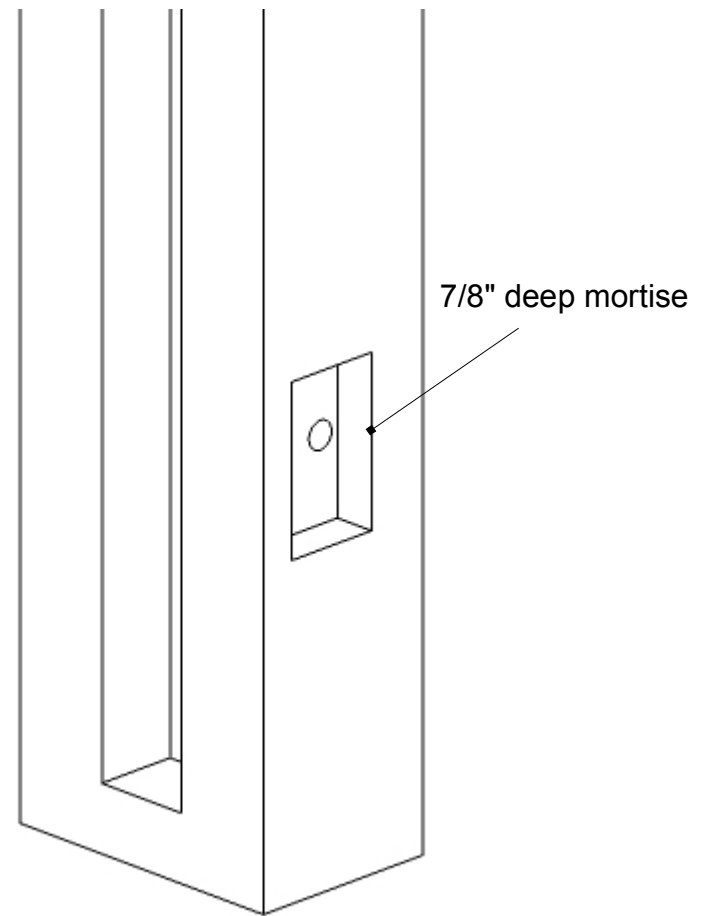
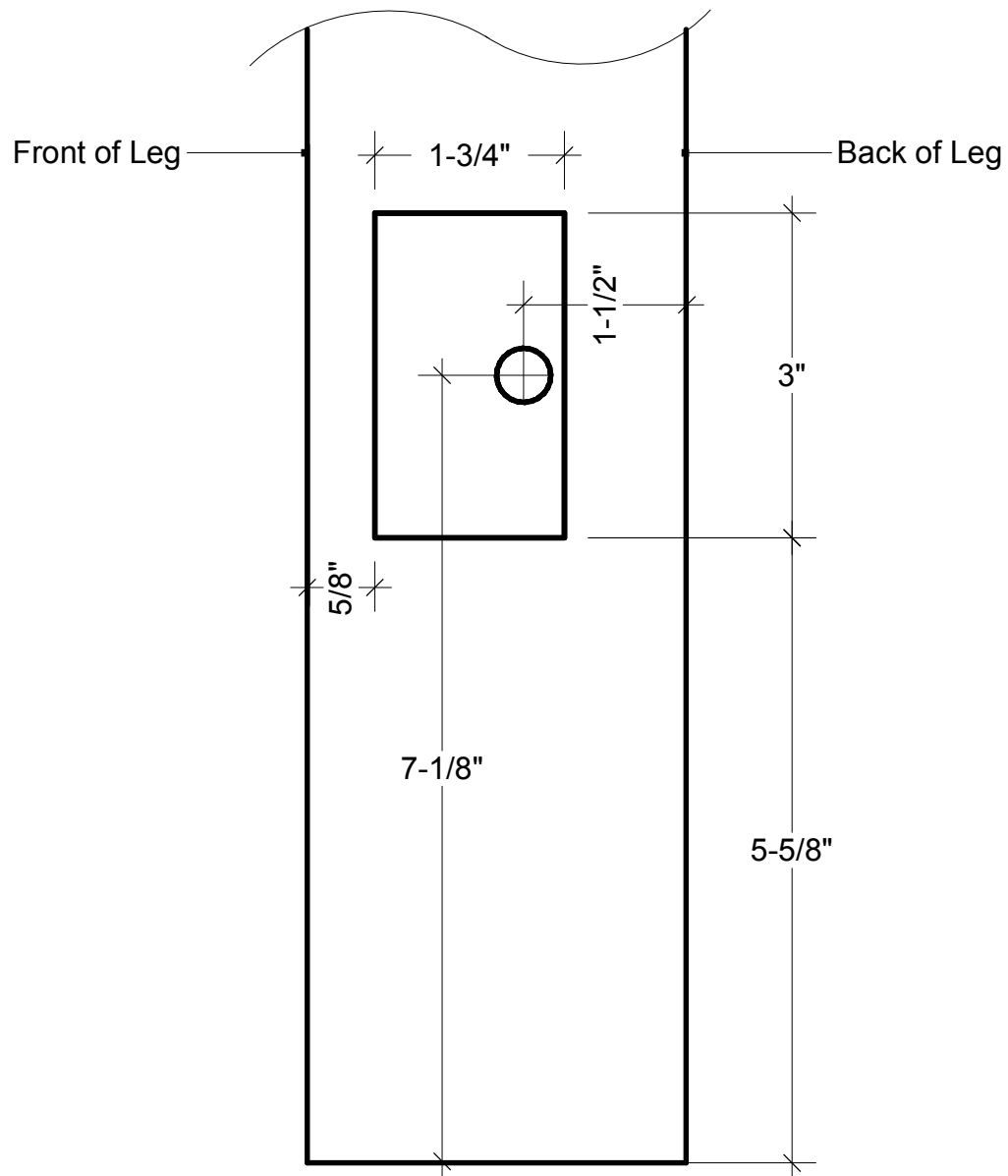
Mortise Depth: 1 - 7/16" chop and leg

Crisscross Retro <small>Copyright 2012 Benchcrafted No unauthorized duplication without permission.</small>	Mortise Dimension Split Top Roubo-Min. Height			
	<i>Scale:</i>	<i>Page:</i>	<i>Version:</i>	


Cut on both ends of front rail.

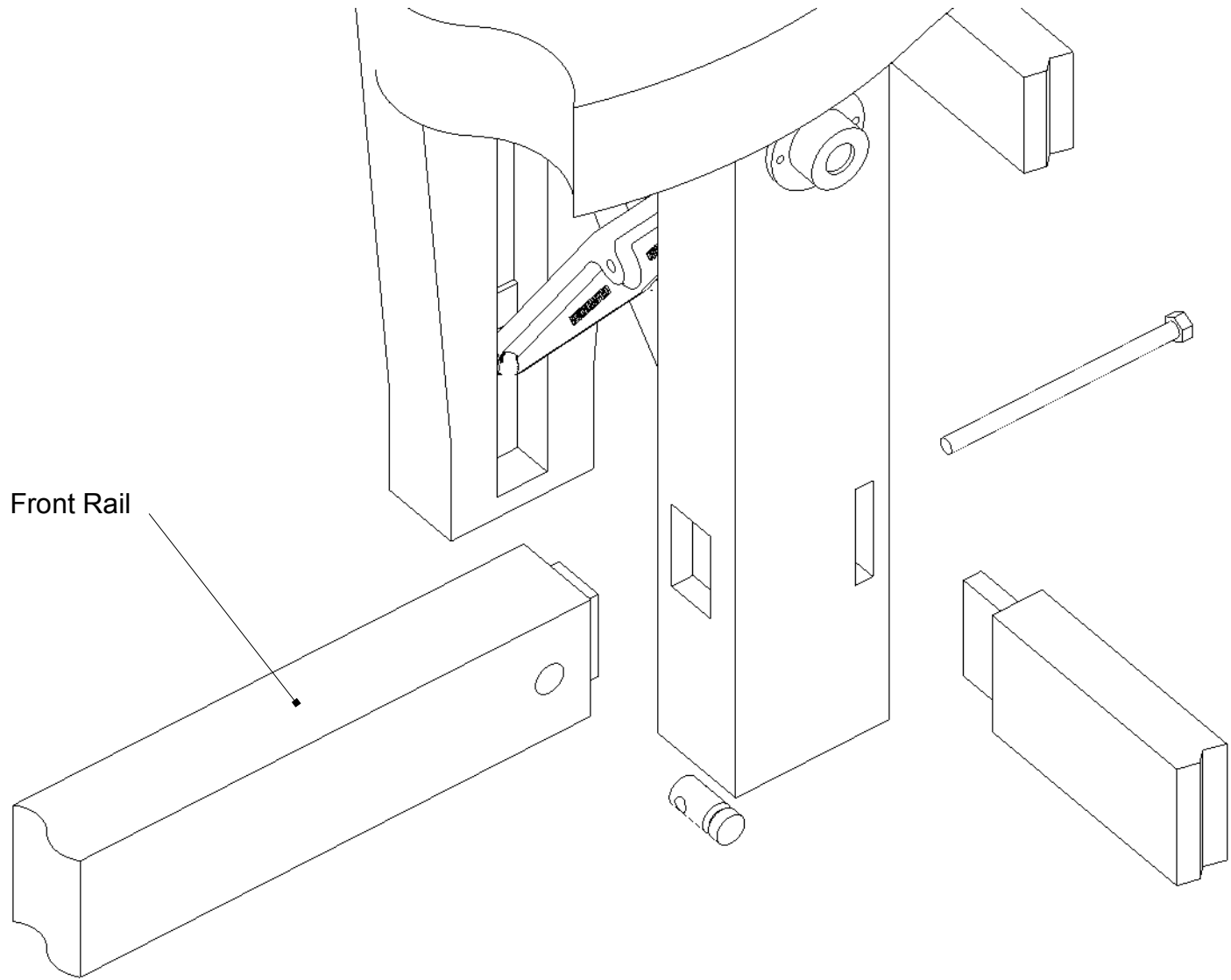


Crisscross		Front Rail Tenon		
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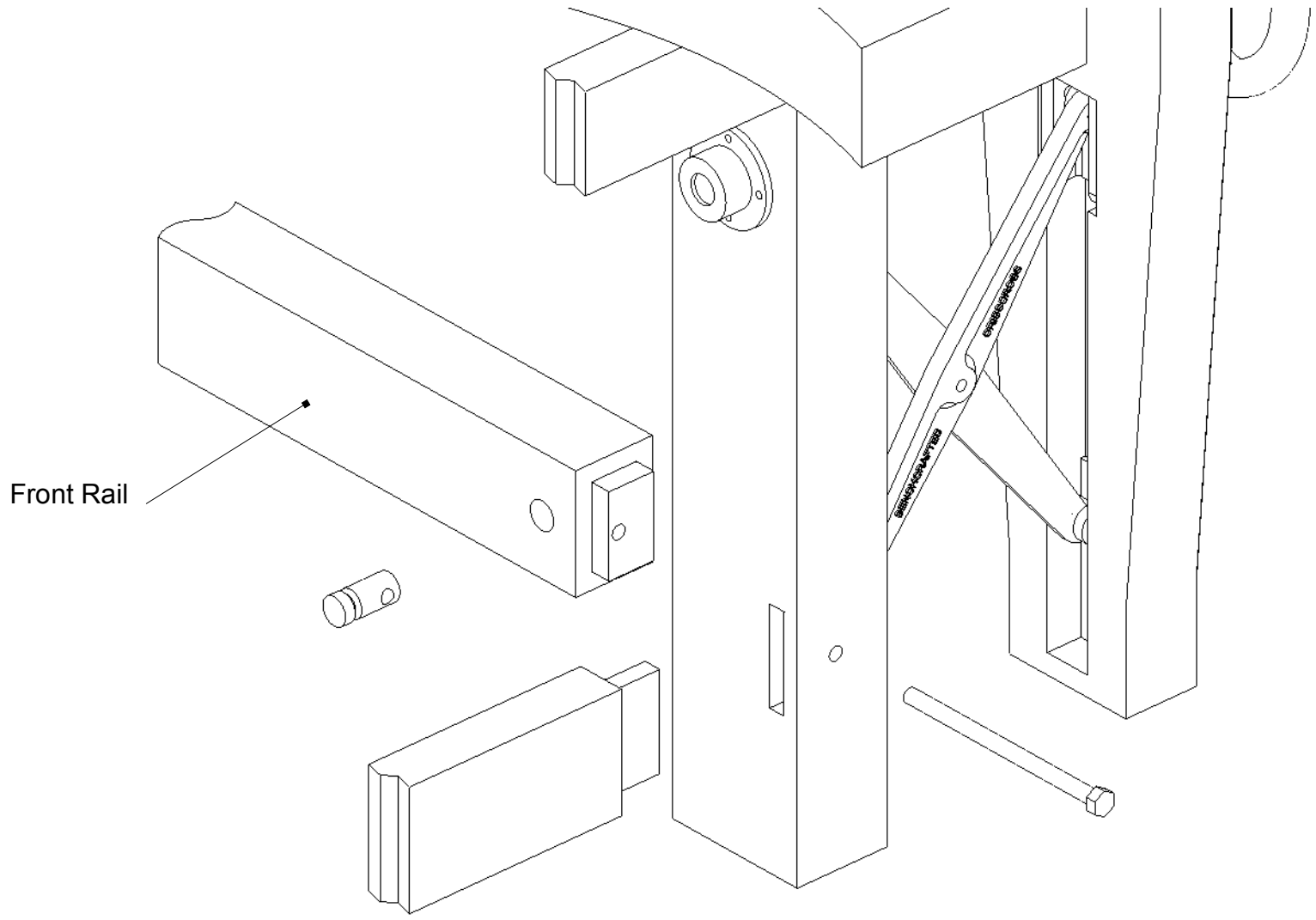
*Leg Vise leg shown (w/ Crisscross mortise.)
Cut mirror-image rail mortise on
opposite front leg.*


Crisscross	Long Rail Mortise			
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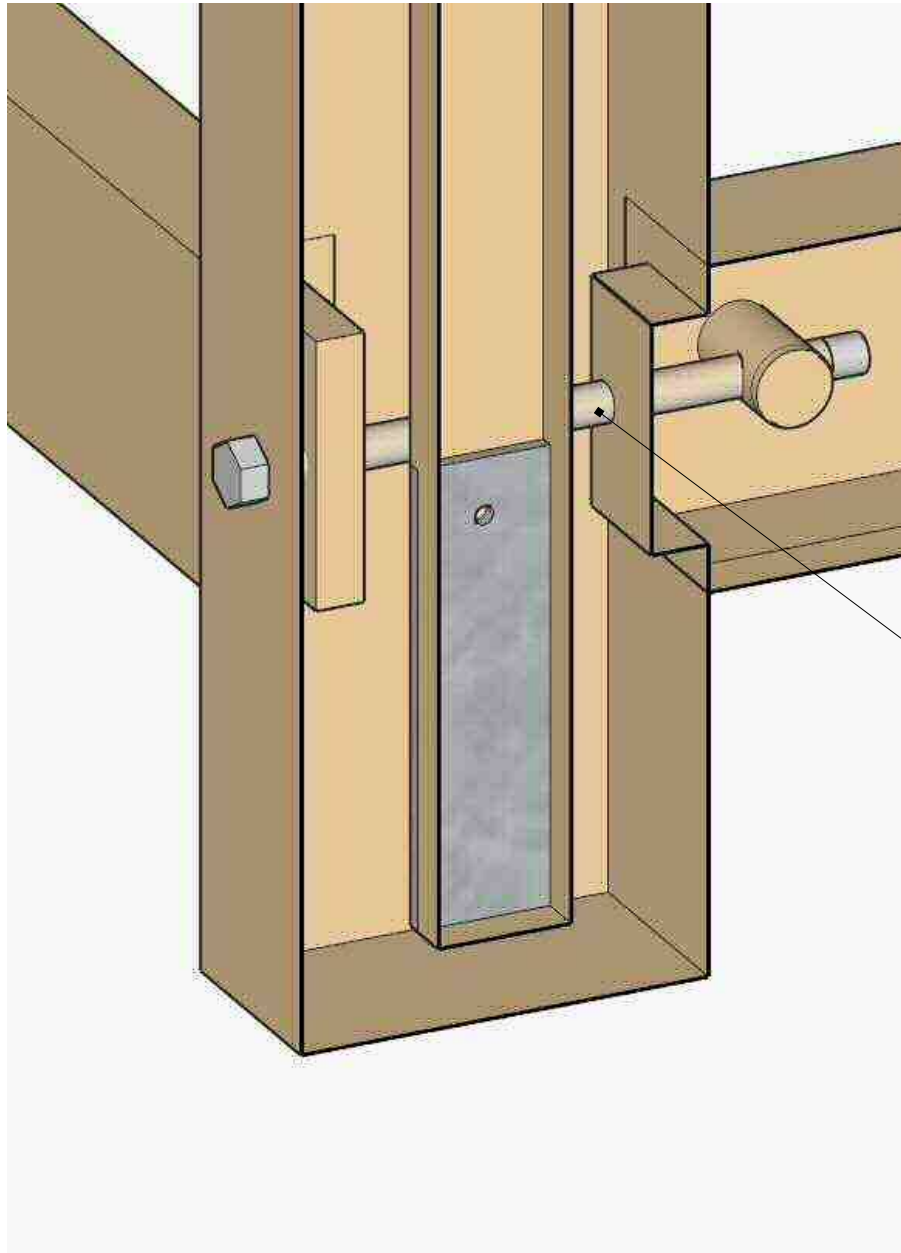


Front Rail

<p>Crisscross</p>	<p>Vise Leg Joinery</p>			
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<p style="text-align: center;">Crisscross</p>	<p style="text-align: center;">Vise Leg Joinery 2</p>			
<p style="text-align: center;"><i>Copyright 2012 Benchcrafted No unauthorized duplication without permission.</i></p>	<p style="text-align: center;"><i>Scale:</i></p>	<p style="text-align: center;"><i>Page:</i></p>	<p style="text-align: center;"><i>Version:</i></p>	



Bolt passes behind Crisscross mortise to engage barrel nut in front rail

Crisscross

Leg Joinery X-Section

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