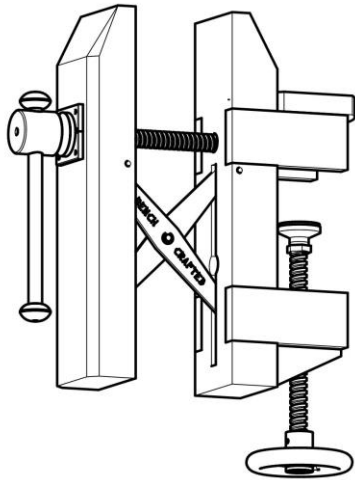


BENCHCRAFTED HI VISE

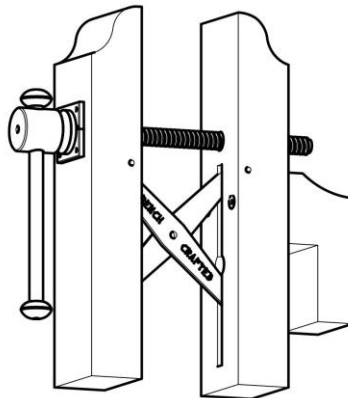
Assembly & Construction Notes

Copyright - Benchcrafted Nov. 2016

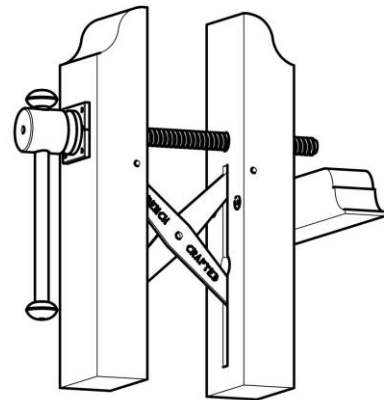
www.benchcrafted.com



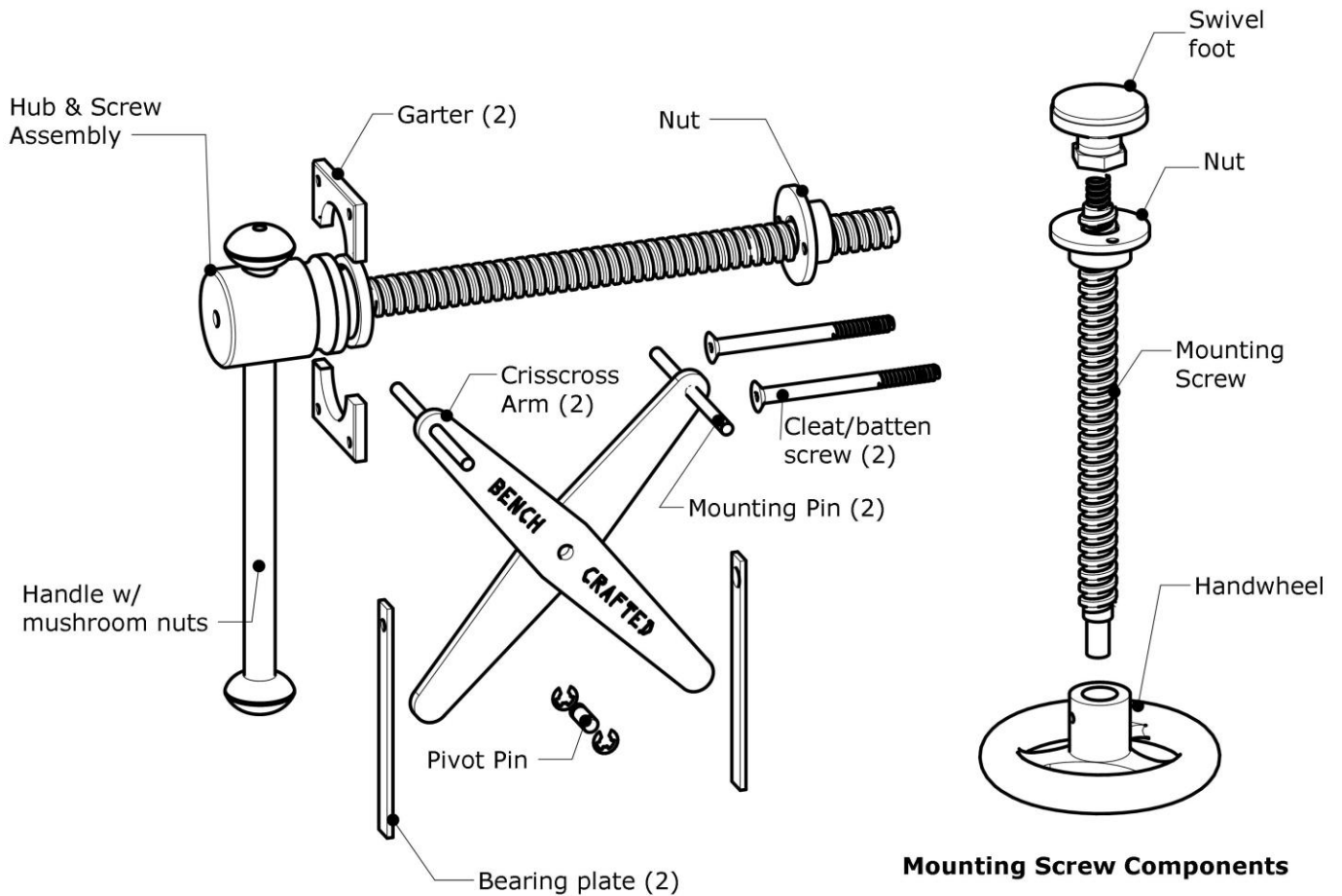
w/ Mounting Screw



w/ Tail Vise cleat



w/ benchtop batten



Package Contents and qty. (see parts explosion above)

Hi Vise:

Hub and screw assembly [1]
 Garter [2]
 Nut [1]
 Handle [1]
 Mushroom Nuts [2]
 Crisscross Arm [2]
 Mounting Pin [2]
 Cleat / batten screw [2]
 Bearing Plate [2]
 Pivot Pin/retaining ring [1, 2]

not pictured:

Round head wood screw, black finish [8]
 Spring plunger [1]
 Crubber [1]
 Groove pin [1] *for mounting screw only*
 Flat head wood screw, bright finish [2] *for mounting screw only*

Mounting Screw:

Handwheel [1]
 Mounting Screw [1]
 Nut [1]
 Swivel Foot [1]

To assemble the Mounting Screw: Slip the smooth end of the screw into the handwheel's hub. Line up the holes and tap in the groove pin until its centered in the hub. The swivel foot threads onto the other end. Cinch it down tight with a wrench only when the vise is completely finished and assembled.

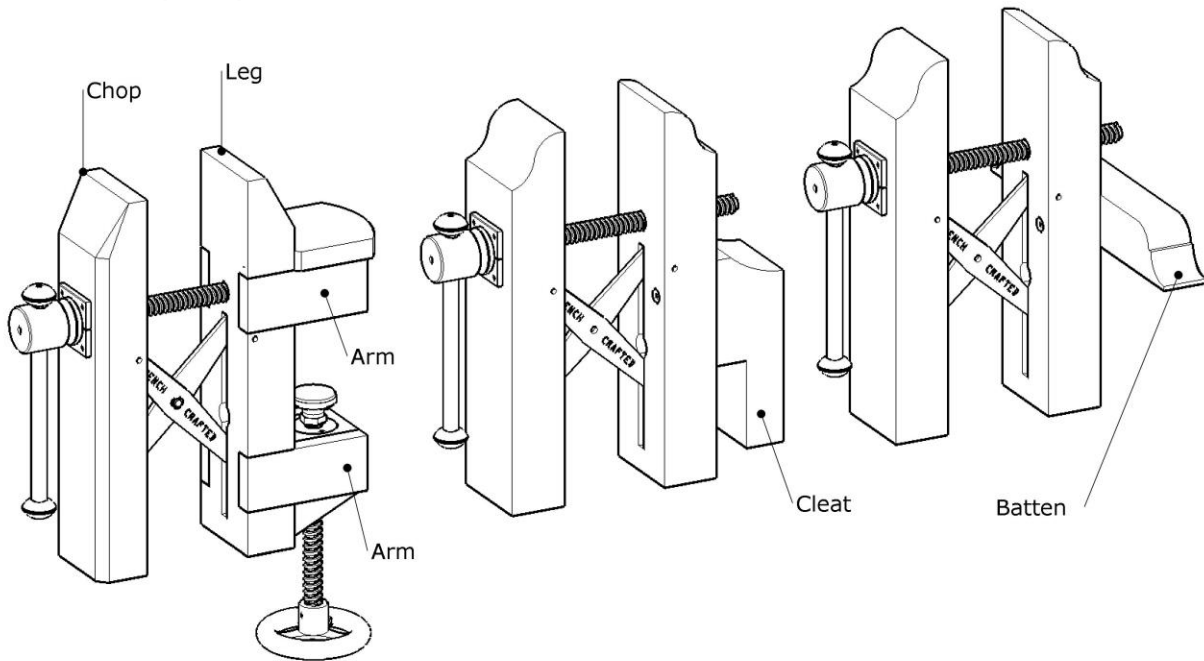
IMPORTANT: READ THESE INSTRUCTIONS THROUGH TO THE END BEFORE BUILDING YOUR VISE !

Note about package contents:

The Hi Vise comes with all the hardware you need to build the vise, except wood. If you've purchased the optional Hi Vise Mounting Screw along with your Hi Vise hardware, the two round-head wood screws for attaching the nut, and the groove pin for joining the handwheel to the mounting screw are included in the hardware pouch that comes with the Hi Vise. ***They are not packaged with the Mounting Screw.*** If you're building the version with the Hi Vise Mounting Screw, you won't use the two 5/16" x 4" flat head machine screws included in the hardware pouch. Those are only for attaching a cleat or batten when building those versions of the vise. Likewise, if you're not using the Mounting Screw, you will not use two of the round head wood screws and the groove pin.

The Name Game

First off, some terminology. The moving jaw of the vise we'll call the "chop." The rear jaw we'll call the "leg." The piece that goes in your Benchcrafted tail vise jaws (if building that version) is the "cleat", and the part that you'll whack your holdfasts down onto will be the "batten." If you're building the Mounting Screw version, we'll call the parts that clamp to your bench the "arms".



Multiple Versions

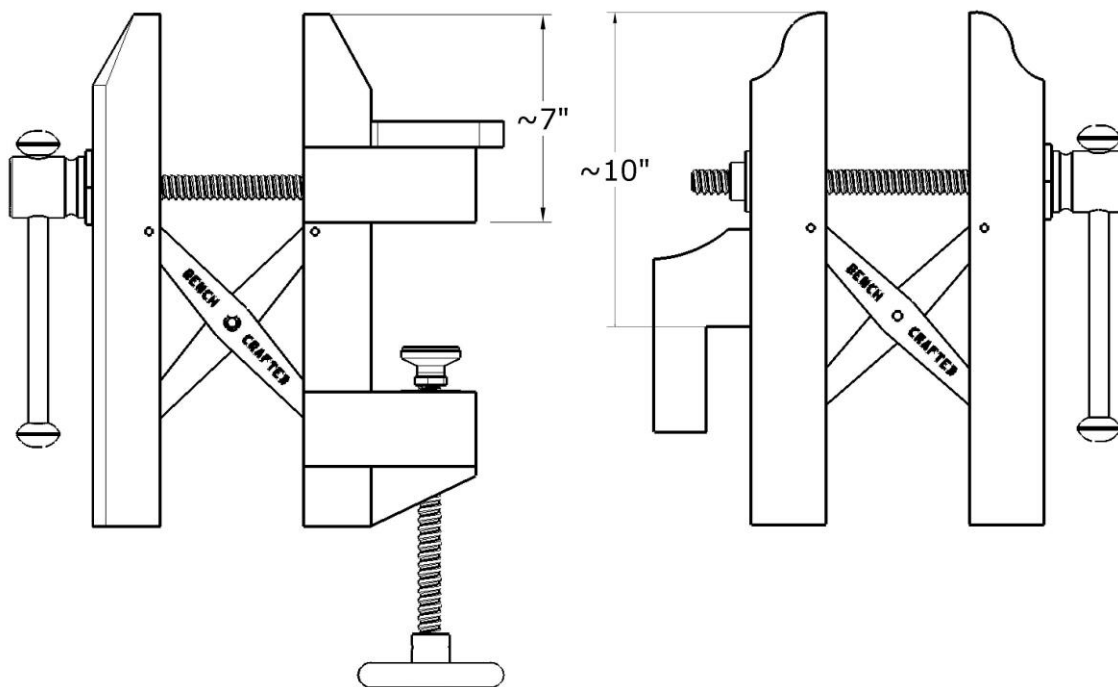
You'll notice in the illustration on page 1 and above, three different versions of the Hi Vise. The first version, with Mounting Screw, can be built to clamp to a broad range of bench or table thicknesses. This is useful if you want to use the Hi Vise as a portable vise. The second version uses a cleat that fits into the jaws of our Benchcrafted Tail Vise. The last version uses a batten which is held to your benchtop, or tabletop, with clamps or holdfasts. Another version, [not pictured] which only uses a leg and chop can be held in the jaws of traditional, moving-block type tail vises. The most versatile version is the one with the Mounting Screw. Below we'll explain some guidelines for building the vise. This will give you the info you need to build it to your requirements instead of following our prints to the letter.

Specs

The chop and leg can be made from 8/4 stock, which finishes out at 1-7/8". Our version [pictured on the Benchcrafted website] has chop and leg at 2-1/4" thick. The Crisscross

arms reside in a mortise that's $7/8$ " deep, so 1" of meat behind these mortises is plenty. There's no reason to go less than this.

The vise can be made in various widths. The Crisscross mounting pins are 4-1/2" long, but you can make your chop and leg wider than this if you wish, up to 6" is fine. Likewise, if you want a narrower vise, you could make it as narrow as 3" [you'll have to cut the mounting pins shorter with a hacksaw.] Wider jaws will give you better grip with less force, but narrow jaws will give you better access to the work. It all depends on how you intend to use the vise. We built our prototype at 4-1/4". It's a good all around width.

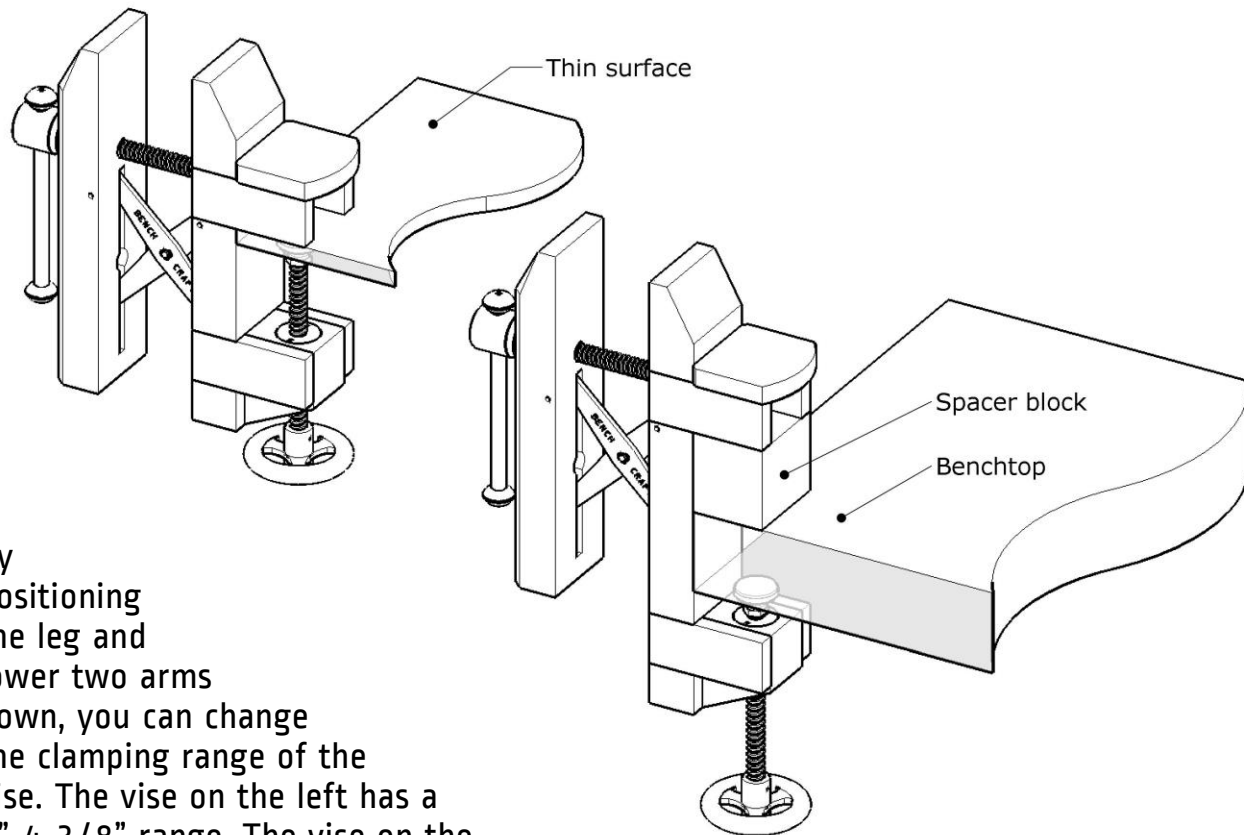


You'll notice in the pictures that the Mounting Screw version has jaws that are not as tall [7" above the benchtop] compared to the other two versions of the vise [about 10" above the benchtop.] That's simply so we could illustrate that the vise can be built to suit the user [within a certain range.] You can make the chop and leg longer/shorter above the screw to dial in the height you prefer. Obviously you don't want to go too high above the bench, or the vise may become unstable during vigorous use.

Mounting Screw Position

The position of the lower set of arms is important when building the Hi Vise with Mounting Screw. It establishes the Mounting Screw position. You need to decide what thicknesses of material you'll be mounting the vise to. The vise pictured in these instructions has a clamping range of 0" to 4-3/8". That means it can be mounted to any surface that's 0" thick, all the way up to 4-3/8" thick. This is a good all-around range

that let's you mount the vise to a $\frac{3}{4}$ " thick banquet table, all the way up to a 4" thick Roubo-style bench.



By positioning the leg and lower two arms down, you can change the clamping range of the vise. The vise on the left has a 0"-4- $\frac{3}{8}$ " range. The vise on the right has a 3- $\frac{3}{8}$ "-8- $\frac{3}{8}$ " range. The actual travel of the Mounting Screw is about 5- $\frac{3}{8}$ ". Keep in mind that the travel of the Mounting Screw only affects the range in thickness you can mount to, not the minimum or maximum thickness. In other words, if you need to mount to something 10" thick, the thinnest surface you can then mount to would be 4- $\frac{5}{8}$ " thick [10" minus 5- $\frac{3}{8}$ "] before you run out of screw. As a general rule, position the lower arms so you can mount the vise to your thickest benchtop, plus about $\frac{1}{4}$ " [to make mounting and dismounting a bit easier.] Chances are, you'll also be able to mount to pretty thin stuff too. If you make the version on the right, you not only have a vise that can mount to thicker benches, but you can also use a filler block between the swivel foot and upper set of arms to raise the vise to a higher working position on the bench. Place the spacer block below the bench and you can mount the vise to thin surfaces too. The disadvantage is, the longer version of the vise is heavier and bulkier. In general, the height of the Hi Vise jaws should be just below your elbow for typical use.

Cleat and Batten Position

The vertical position of the cleat and batten are not critical. Just keep them below the nut on the back of the leg. You can lower them to increase the height of vise above the

benchtop. But again, don't make them too low (thus raising the final height of the vise) or the vise will be unstable during vigorous use. Better to make the jaws taller overall. In general, the height of the Hi Vise jaws should land just below your elbow for typical use.

Chop and Leg Shapeliness

We've shown the Mounting Screw version with a different shape to the top of the chop and leg. This is purely aesthetic. If you prefer chamfers to ogees, the choice is your's. Both serve the purpose of reducing the width of the jaws at the top for better tool access.

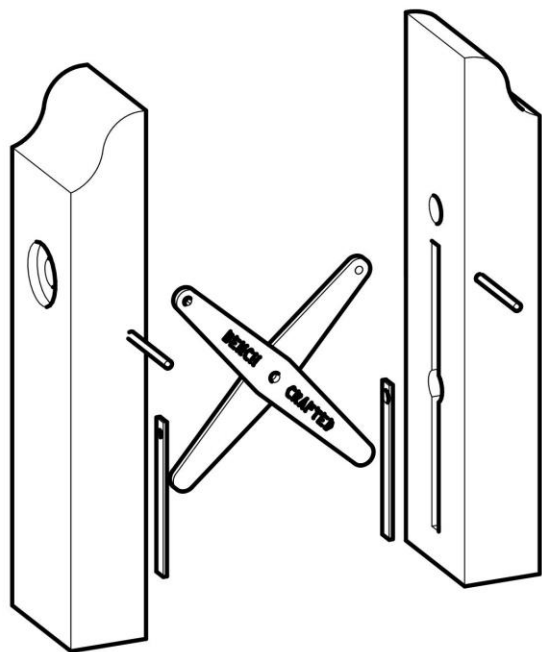
Building the Vise

Note: The following illustrations show the top of the chop and leg cut to final shape. This is only to provide a reference for orientation. You will cut the ogee/chamfers only after the vise is completely built and functioning correctly.

Get your parts milled to final dimension, but leave the chop, leg, and arms a bit over length.

Lay out the locations of the Crisscross mortise, main screw holes, hub counterbore, and mounting pin holes on the chop and leg. Drill the larger counterbore for the hub first, then the through holes in the chop and leg. Drill the two mounting pin holes. Drill from both sides to minimize blow out. There are two small cutouts midpoint in the Crisscross mortise to allow the pivot pin to clear when completely closing the vise. Drill this hole before cutting the Crisscross mortise.

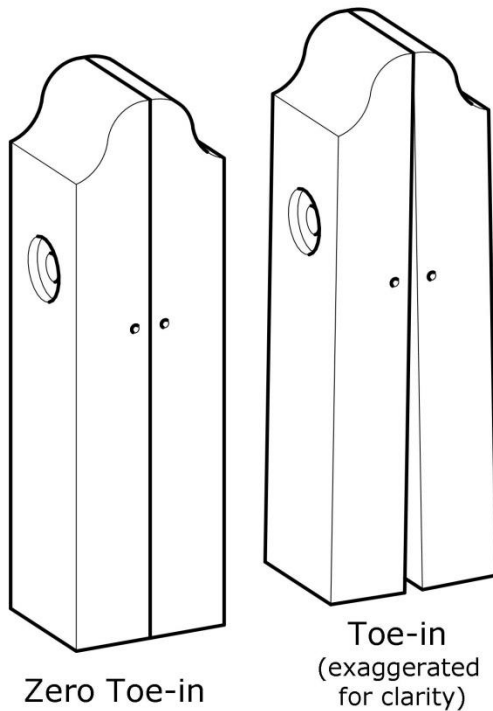
Once you have the holes drilled, cut the mortise for the Crisscross. Install the bearing plates in the bottom of the chop and jaw with the flat head screws (the bottoms of each Crisscross arm will ride on these plates) then drive the mounting pins half way into the chop and leg, so you can slip the hole in the Crisscross arms onto the exposed ends of the mounting pins inside the mortise. Assemble the Crisscross arms with the Benchcrafted name facing out and install the pivot pin. Snap just one of the clips onto the pivot pin for now. You'll install the last one later when the vise is completely finished. When assembling the Crisscross arms to the chop and leg, it's



easier to lay the vise down on its side, or clamp the leg upright in a vise. Slip the arms over the mounting pins, then tap the pins in until they enter the other side of the chop/leg.

With the Crisscross mounted, clamp the leg upright to a bench and check the action of the vise. The chop should move in and out on the Crisscross smoothly.

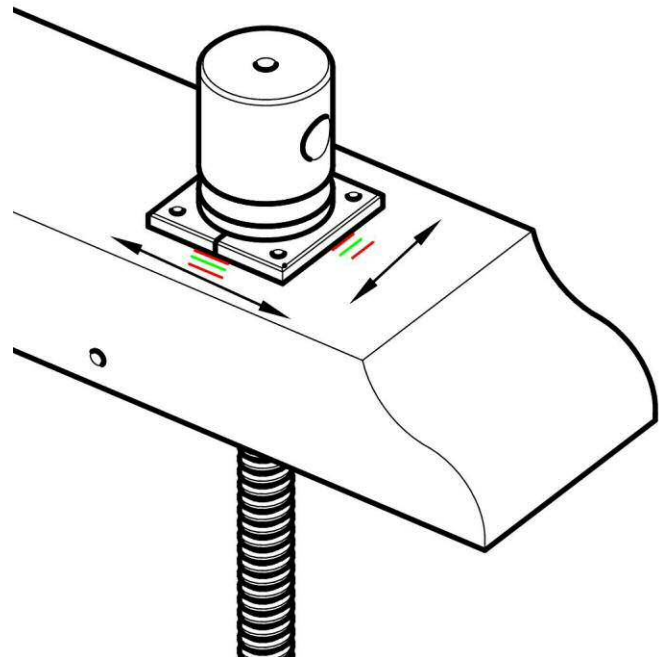
Toe-In



Check the toe-in. That's the tendency for the top of the jaws to contact before the bottom. You want this condition for the best clamping power. We don't engineer toe-in on the Hi Vise Crisscross arms. Depending on how accurately you created your mortises and drilled the holes for the mounting pins, you may already have the right amount of toe-in. The top edge should contact first, and there should be a gap at the bottom. On a 17" chop and leg, a gap of around $\frac{1}{4}$ " is ideal. It can be a little more or less than this and the vise will function fine. The best way to adjust toe-in is to simply shape the inside face of the chop to your liking. Mark a line down the side of the chop that represents your final toe-in, tap the mounting pin out, and plane the inside face to the line.

Install the Garters

To mount the garters (and thus the hub/screw assembly) to the chop, disassemble the vise and flip the chop down onto its inside face, insert the screw/hub into the hole in the chop while slipping the two garter halves into the slot at the back of the hub. Make sure you orient the garters so the split is running horizontally. Now is a good time to check if the back of the hub can turn freely inside the counterbore. If you identify some rubbing, go back and make the counterbore a little deeper. If its not deep enough, when you cinch down the garters the hub/screw will

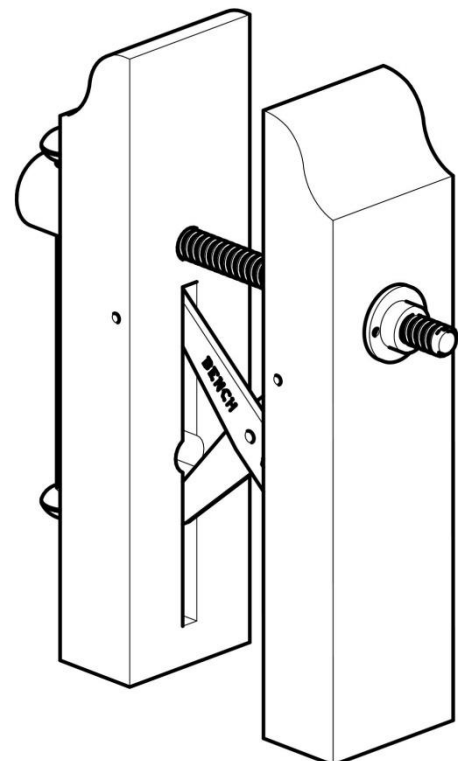


be locked down. For the next step make sure you hold the garters firmly together. Now you're going to center up the screw in the chop. Here's how. Keeping the garters square to the chop [try not to rotate them too much in their slot] push the garters [the hub will move with it a little] firmly towards the side of the chop until it stops, then make a mark along one side of the garter [see red mark in illustration above]. Now push the garters towards the other side of the chop until it stops and make another mark on the same side as you did before [the second red mark.] You'll end up with two marks. Now make a mark between these two [green mark in the illustration.] This mark is horizontal center. Now repeat the procedure, moving the garters up and down to find the vertical center. Once you've got your two "green" marks, position the garter edges right on these marks, double check that your garters are square to the chop edges. Carefully drill appropriate-sized pilot holes, using the holes in the garter as a guide, for the round head wood screws and then attach the garter. If you don't feel comfortable drilling through the garter holes, use a transfer punch to mark the positions on the chop.

Attach the garter to the chop using the four screws. Now reassemble the vise with the Crisscross arms. To install the handle, slip one leather washer onto the handle, then thread on one of the mushroom nuts. Pass the handle through the hub then install the other washer and nut. Later, after the vise is totally finished, you may want to reinstall the mushroom nuts with a couple drops of blue loctite to keep them in place. Now install the spring plunger in the end of the hub. It's the small threaded set screw with a spring-loaded plunger in one end. Thread it in carefully so you don't slip and scratch the hub. When it gets close to final depth, start sliding the handle in the hub to check the resistance the plunger applies to the handle. You want just enough pressure that the plunger clicks into the V groove in the center of the handle and holds it there positively, but not so firmly that its difficult to disengage the handle from the plunger. You can always make adjustments later.

Install the Nut

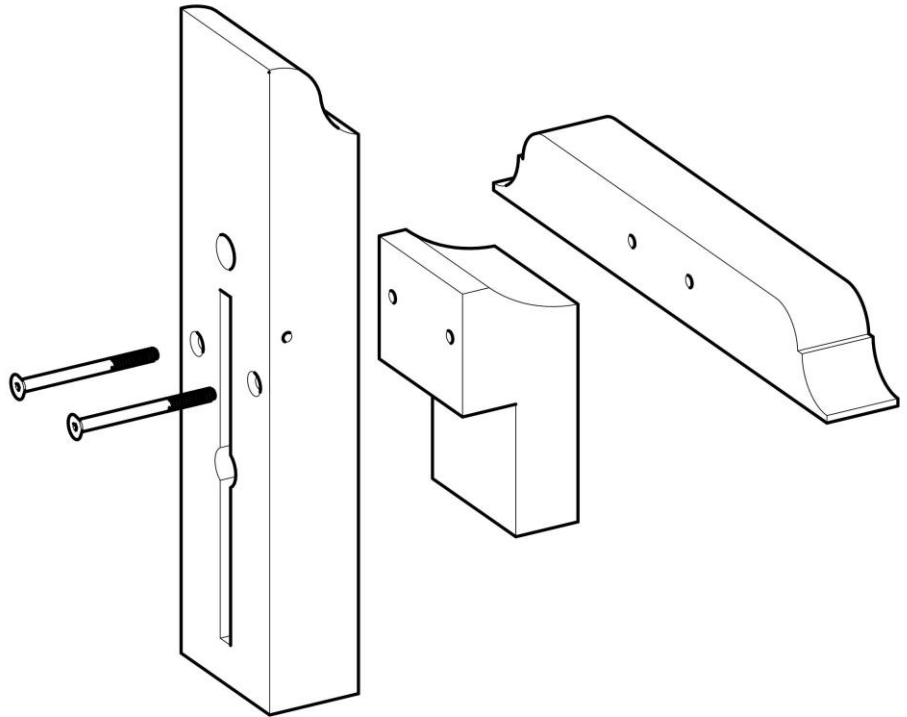
Reach around the back of the leg and thread the nut onto the screw a couple of inches. Now grasp the handle, and while turning the screw hold the nut with your other hand and while pressing it tight to the back of the leg, move it up and down and left and right while operating the vise slowly. You'll find that the vise will operate best with the nut in a certain position, and not necessarily dead center on the hole you drilled. If you feel resistance while turning the vise, the screw is probably rubbing inside the leg. Shift the nut away until it stops rubbing. Once you find the sweet spot, hold the nut in that spot, tighten the vise down, then drill through the nut's flange and attach it with two round head wood screws.



Install the Cleat or Batten

~ only if you're building this version ~

To install the cleat or batten, decide at which height you would like to use the vise and position the cleat/batten accordingly. Drill the through holes and countersink into the leg for the 5/16" x 4" cap screws, then transfer those holes to the cleat or batten. Now tap the cleat/batten with a 5/16"-18 tap and attach it firmly to the leg [see addendum at the end.] We don't provide dimensions for the cleat, since you'll have to size this to suit your existing Tail Vise installation. It's simple enough. The ogee with fillet on the end of our batten is purely decorative. Make your's to suit your taste.



Install the Arms and Mounting Screw

~ only if you're building this version ~

To install the Mounting Screw you'll need to mill some stock for the arms. 3/4" stock is fine. You'll also need to mill or glue up a thick block for between the lower pair of arms to mount the Mounting Screw's nut to. This also provides strength and rigidity against the clamping force of the Mounting Screw. Orient the grain in the thick block in the same direction as the arms, i.e.: long grain runs front to back, perpendicular to the grain in the leg.

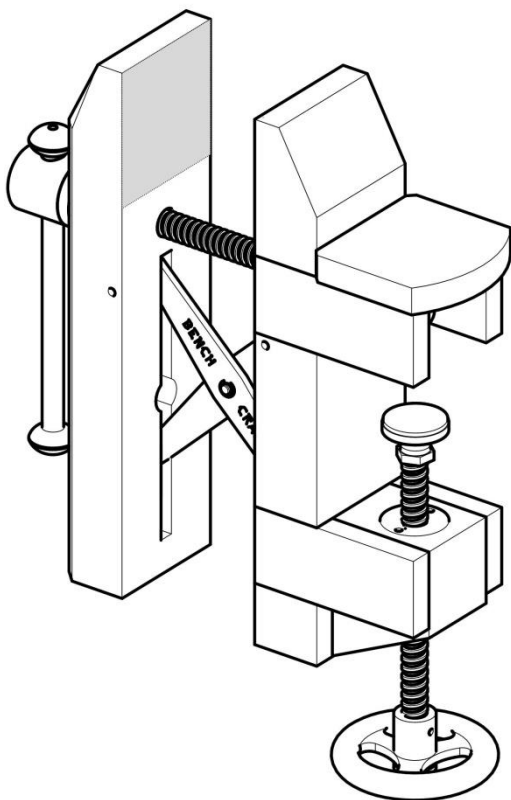
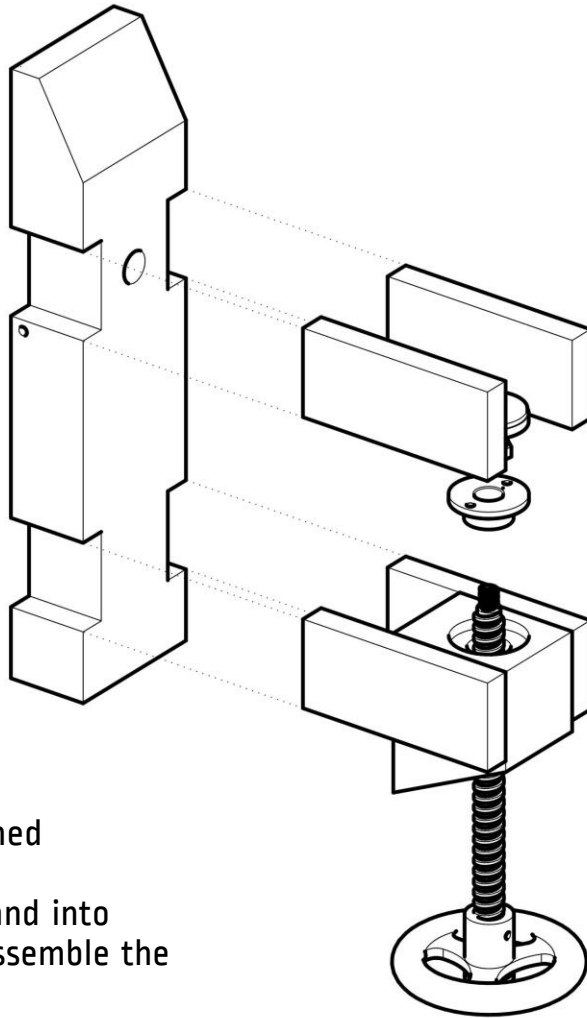
The arms are joined to the leg via large dadoes in each side of the leg. We cut the dadoes a little undersized, then plane the arms to feet sweetly. You don't want any slop here at all, as this fit makes the Mounting Screw arrangement very strong. Aim for perfection, and achieve it! The bevelled bottom of the lower block also helps resist racking forces from the Mounting Screw. Make everything fit tight here! You're basically building a large wooden C-clamp into the leg of the vise. The Mounting Screw is very powerful, and if you build your vise poorly, the Mounting Screw will destroy it over time.

The Mounting Screw's nut is best attached to the block/lower arms by counterboring for the nut's flange so you can install the nut flat side up. This isn't necessary for proper function, but it does serve the purpose of giving the Mounting Screw a bit more travel before the swivel foot bottoms out on the nut. Once you have the hole and counterbore drilled, attach the nut with the two round head wood screws.

IMPORTANT!

Make sure you drill and counterbore for the screw and nut before you glue the block and lower arms to the leg!

Once the nut is installed and the arms attached to the leg, you can reassemble the Mounting Screw by threading it up through the block and into the nut, then thread on the swivel foot. Reassemble the rest of the vise.



Finishing touches

Now that the vise is assembled and functioning properly you can mark the chop and leg and cut them to final length. Disassemble the vise and cut to these lines. Next, decide what kind of shape you'd like at the top of the vise, chamfers, ogees, a simply bevel, whatever pleases you. You can also add a cap to the top of the upper arms on the Mounting Screw version. It's not necessary, but adds a nice finishing touch. We install two short dowels in the top edge of the arms and drill corresponding holes in the underside of the cap and fit them tightly. If your vise is narrower than 4 1/2", you'll need to cut the mounting pins to match and smooth their ends.

Finally, glue the Crubber onto the inside of the chop and leg. We also glue two strips of Crubber onto the underside of the upper arms. This helps the vise hold tightly to the work surface it's mounted to. The swivel foot has a non-slip surface on the action face. You can leave the vise unfinished, or apply any finish of your choice. We use one coat of wiping varnish to keep the vise looking clean. Or you can finish it to a high level. Your choice.

Vise Maintenance

The vise is made from steel. It will rust if your shop is humid. Simply treat the vise like any other fine tool in your shop by wiping it down from time to time with a lightly oiled rag. Just like you wipe down your hand planes after you've used them. A drop of lubricating oil in the garter every now and then will help the screw rotate freely. The best lubricant for the screw and nut threads is simply to keep them clean. Beyond that we like a dry-type bicycle chain lubricant applied lightly to the threads.

Using the Vise

The Hi Vise is designed primarily for raising your work to a more ergonomic height. It's excellent for carving, or for paring joinery at chest height, where you can apply controlled power easily. It's also great for working on smaller projects where a bench-sized face vise might be too large and low. The Hi-Vise is wonderful for detail work. As a luthiery vise it can easily hold the necks of stringed instrument up and off the bench for repair work. As a chairmaking vise you can hold long curved pieces [like a Windsor chair's continuous arm] allowing close and 360 degree access that a typical face vise can't provide. As a portable vise you can toss the Hi Vise w/ Mounting Screw in the back of your car for a woodworking event or even the campsite.

The handle has a feature that allows it to be positioned so it's centered in the hub. The V groove in the handle engages in the spring plunger, holds it in this centered position and, since its balanced, allows rapid, easy adjustment of the vise. You can spin the vise in and out with one finger. To hold work with a bit more force, simply pull on one end of the handle and the spring plunger will release, allowing the handle to slide to one side so you can apply more torque with the longer handle. To recenter the handle, simply slide it back to center and the spring plunger will engage in the V groove as before.

Variations

The vises pictured here are simply a basic starting point. You don't have to build your Hi Vise exactly like ours, although we have been testing our prototypes for several years in professional shop settings to come to these versions of the vise. The hardware is robust, and will hold up quite well in vises of various sizes.

As always, if you have any questions about these instructions or the vise in general, we are available via email at info@benchcrafted.com

Addendum

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 a machine screw tap to install the 5/16"-18 machine screws in the cleat/batten version. Many of you will already have this tap, 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.

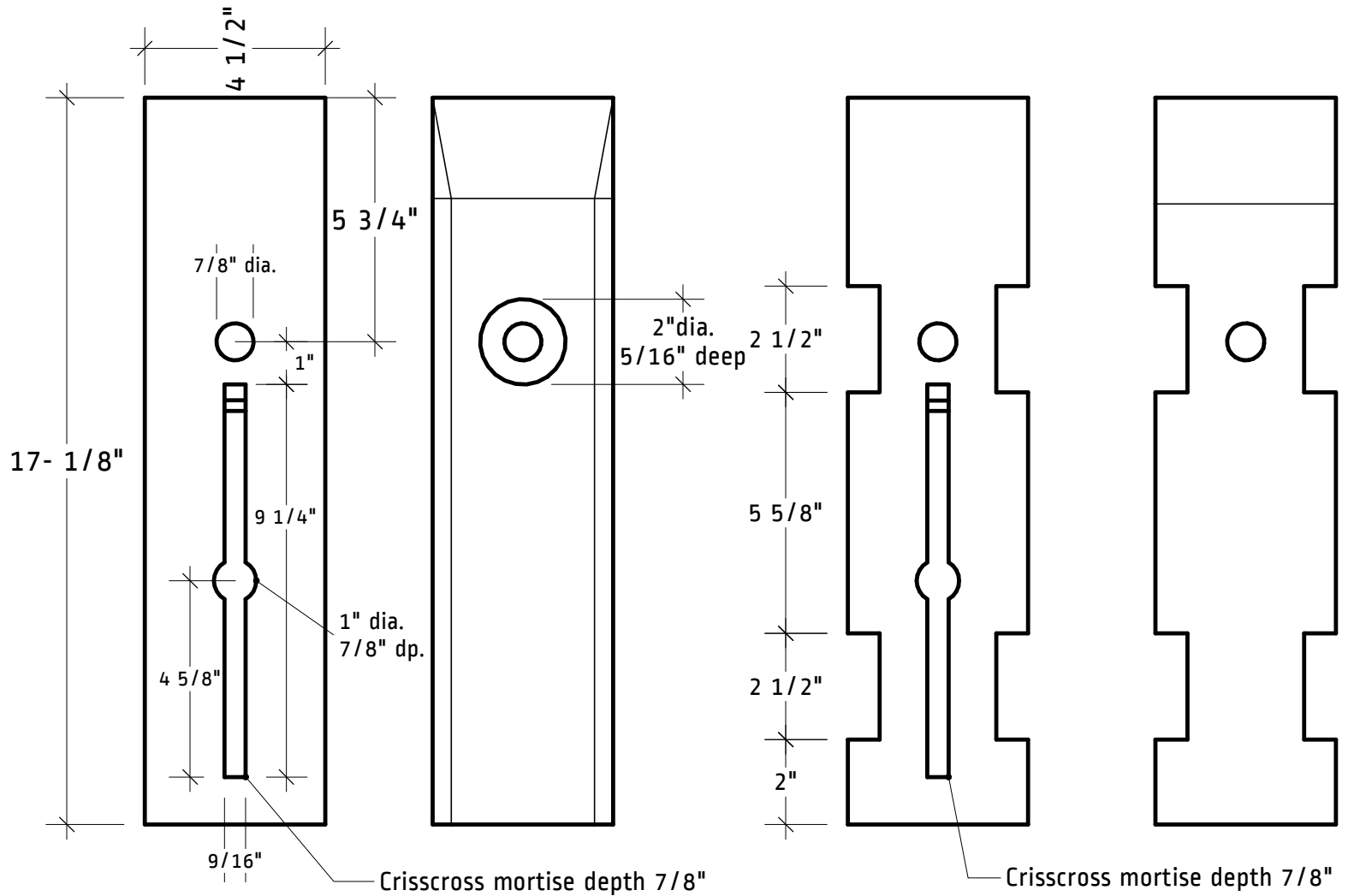
To attach the cleat or batten you'll need a 5/16-18 bottoming tap. Standard plug taps will work fine in a pinch, but bottoming taps cut threads almost to the bottom of a hole and require a shallower pilot hole. Pilot hole size for 5/16-18 is 1/4", or a tad less like 15/64 if you have it.

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 also a great technique for making jigs and knock-down joints.

Once you drill the pilot hole through the leg [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]. You can also set the clutch to avoid stripping the hole. Start with a low 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 and avoid tearing. 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.

Notes:

The location and dimensions of the Crisscross mortise, screw holes and mounting pin holes are identical for both the chop and leg. These are all located on center in the chop and leg.

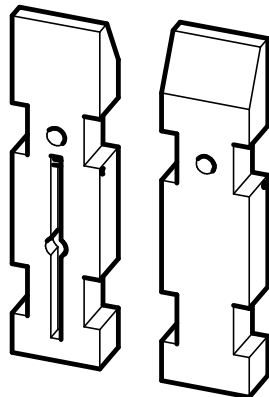
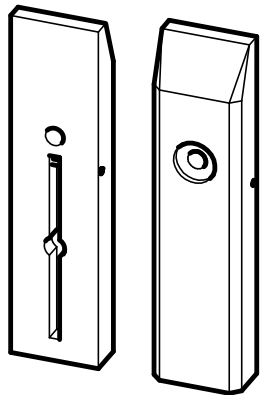


inside outside

CHOP

inside outside

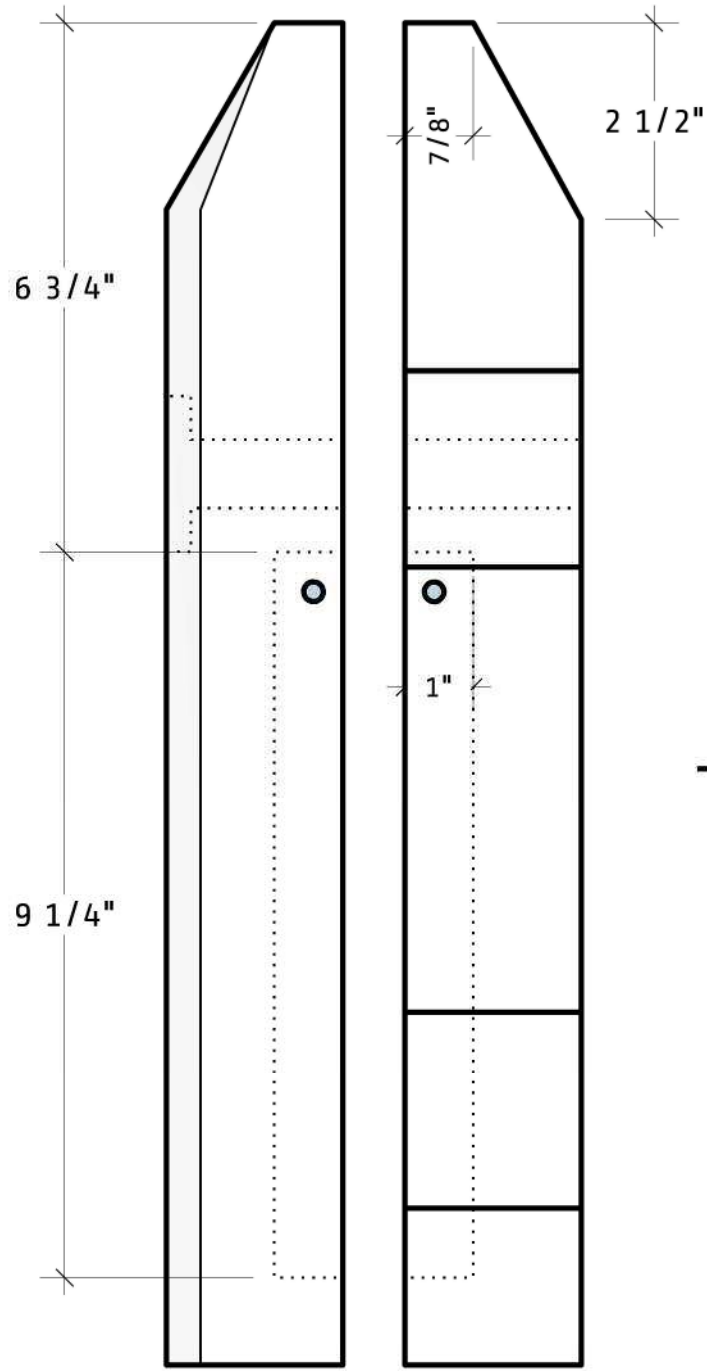
LEG



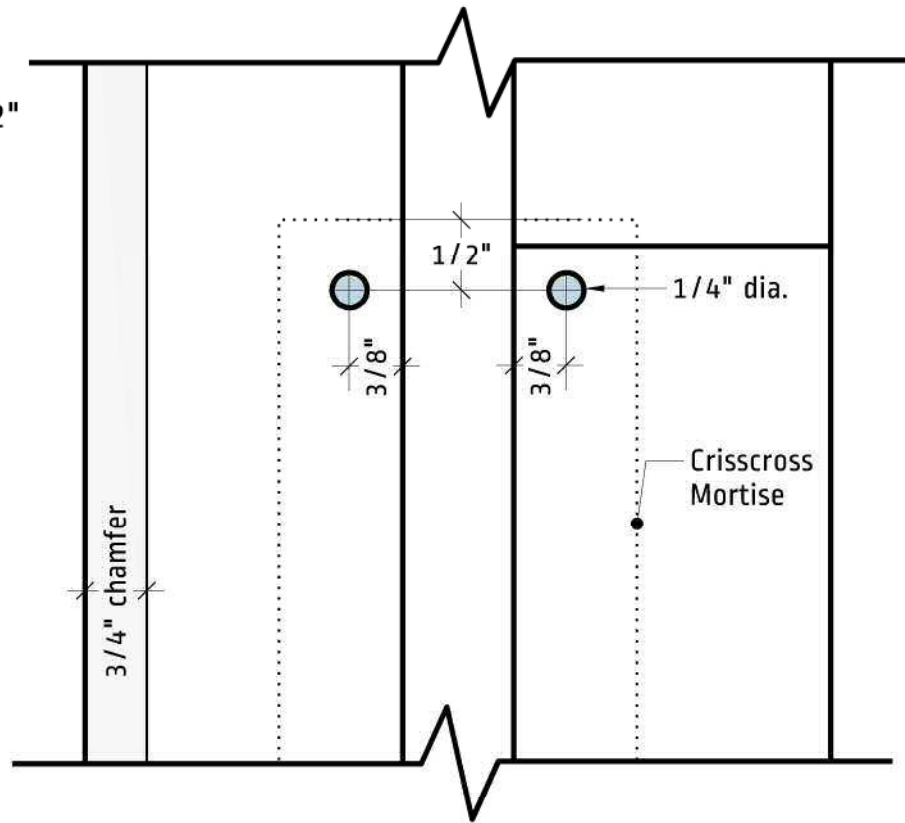
BENCHCRAFTED HI VISE
w/ MOUNTING SCREW P.1

Copyright 2016 Benchcrafted
No unauthorized duplication without permission.



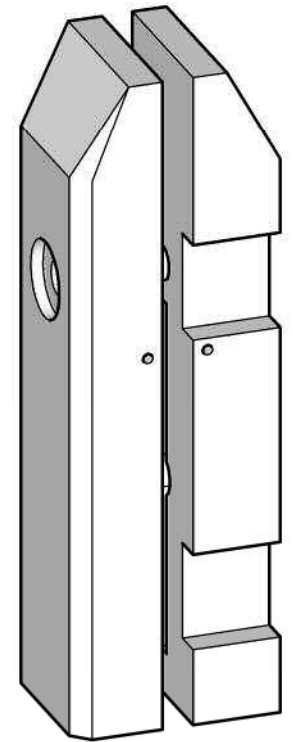


CHOP
 LEG
 CRISSCROSS MORTISE



DETAIL
 MOUNTING PIN HOLES

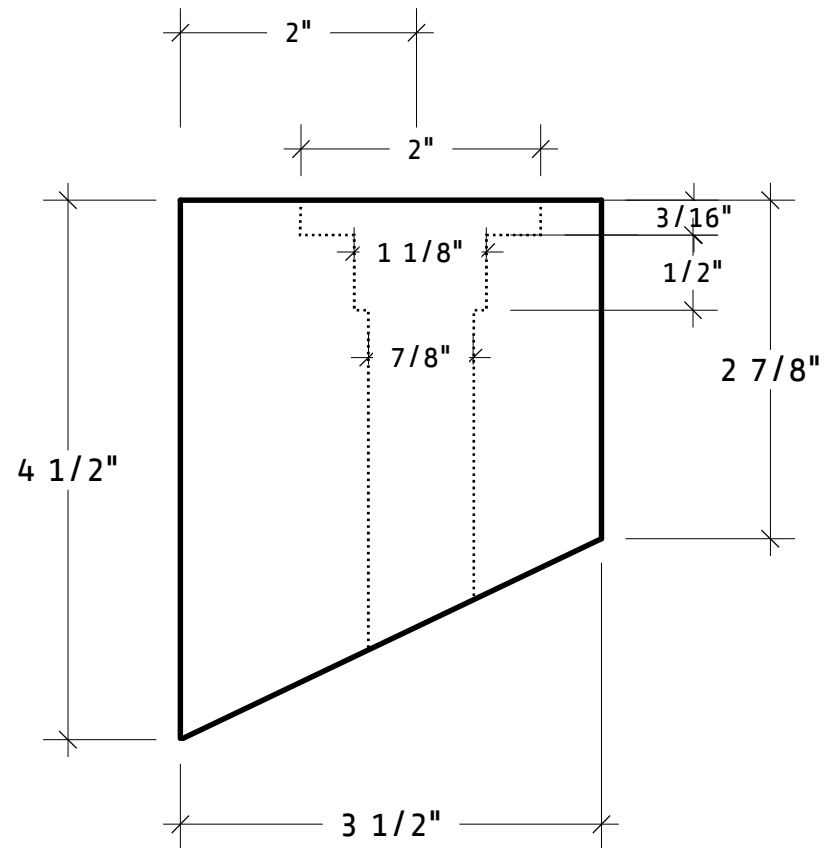
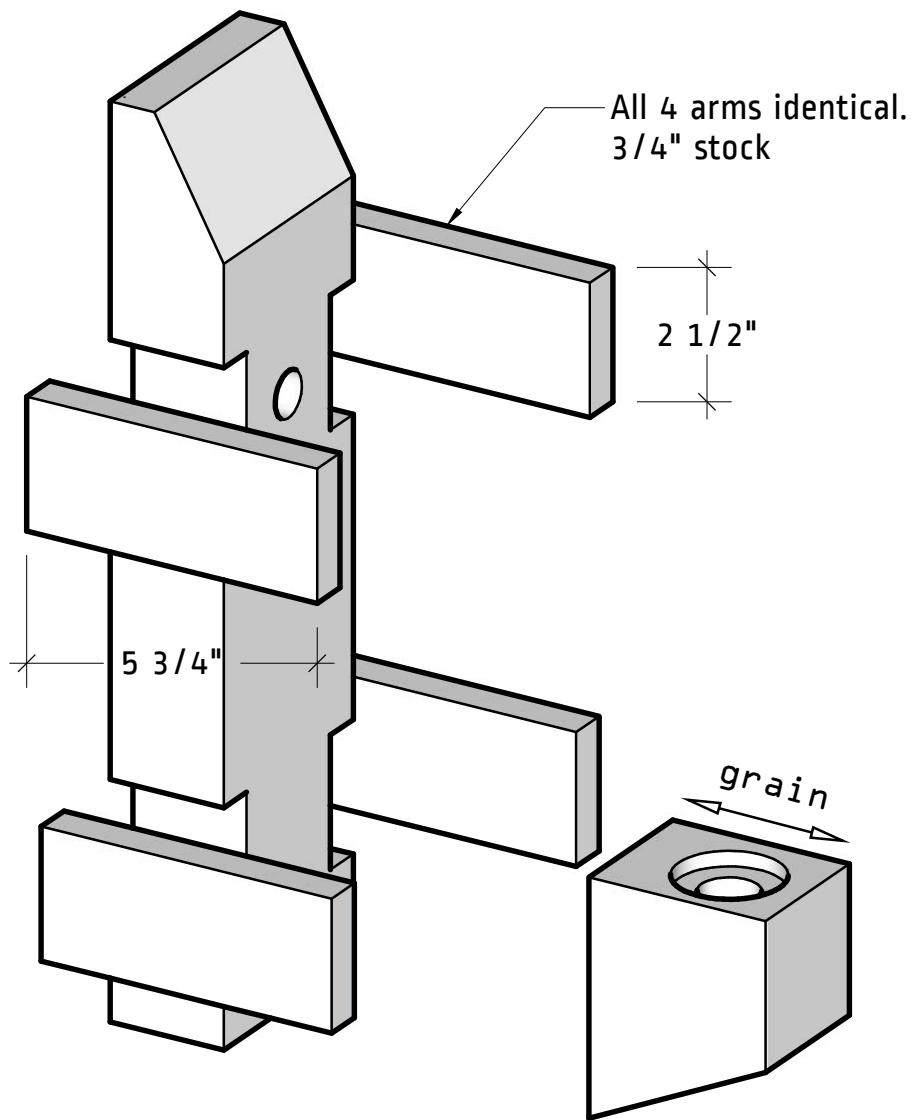
Tapered chamfer at top of jaw must be cut with block plane or chisel. Crisscross mortises and mounting pin locations are the same in chop and leg, and are mirrored on each other. Pivot pin recess hole not illustrated. See instructions for details.



BENCHCRAFTED HI VISE
 w/ MOUNTING SCREW P.2

Copyright 2016 Benchcrafted
 No unauthorized duplication without permission.



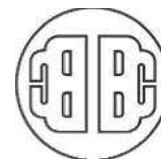


BLOCK

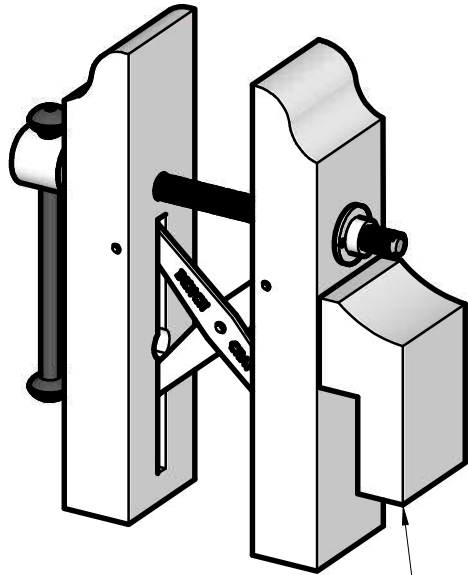
Cut angle on bottom as last step just before glue up.

BENCHCRAFTED HI VISE
w/ MOUNTING SCREW P. 3

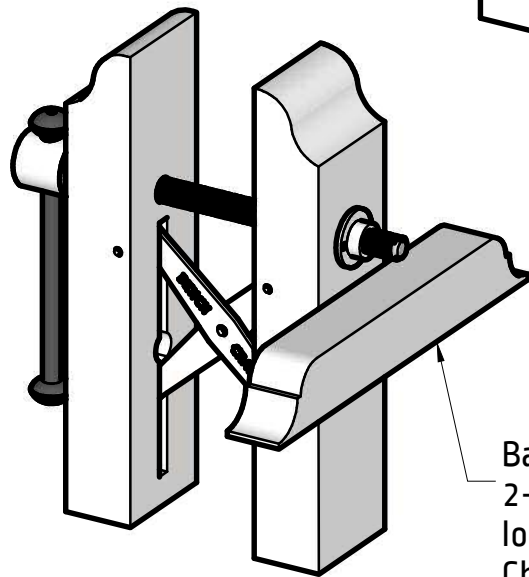
Copyright 2016 Benchcrafted
No unauthorized duplication without permission.



w/ Tail Vise Cleat

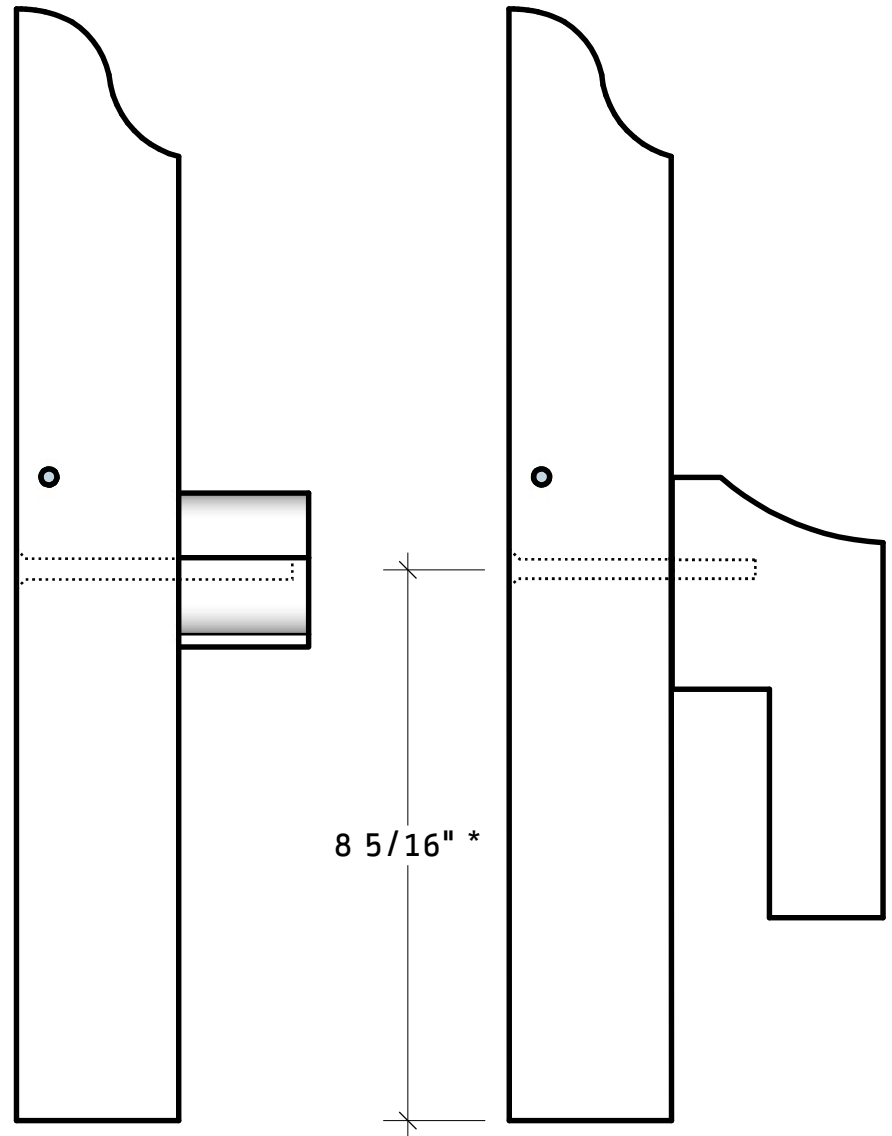


Cleat dims are dependant on the size of your front laminate and dog slot in your workbench. Must build to suit.



Batten dims 2" wide 2-3/8" high, X 16" long. Change to suit your needs.

w/batten



8 5/16" *

* position of cleat or batten is a matter of personal choice. See installation instructions for guidelines.

BENCHCRAFTED HI VISE
Cleat/Batten Version P.4

Copyright 2016 Benchcrafted
No unauthorized duplication without permission.

