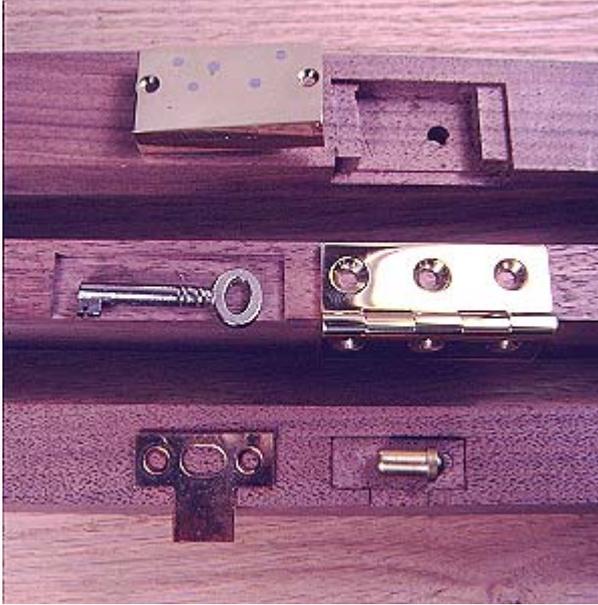


Router Hardware Installation

Easy templates make it worthwhile



Installing hardware can be one of the most time consuming aspects to any furniture project, because there are a lot of small, careful cuts that must be made. Shop-made jigs that allow you to cut out mortises with a router and template guide can do this quickly and accurately, but if it takes too much time to make the jigs themselves you might as well install the hardware by hand with chisels and mallet. Whether I choose to make jigs or not depends on two factors; how much hardware I have to install, and how much time it will take to make jigs for that particular hardware. The method I use for making templates is

very fast for making rectilinear mortises, which most hardware requires, and so I don't need to have a great deal of hardware to install to justify the effort.



Shown here is standard hardware for a cabinet door; hinges, lock and ball catch with strike. The lock is one of the smallest available, but size doesn't matter since the principle of making rectilinear mortises remains the same. The ball catch itself is installed with only a well-placed round hole, but the strike must be mortised in so that it doesn't interfere with the clearance of the door in its frame. Since I made five similar cabinets all using the same hardware, there was no question that making jigs was the way to go on this project, particularly since the hardware presented no problems that

would slow a production installation run.

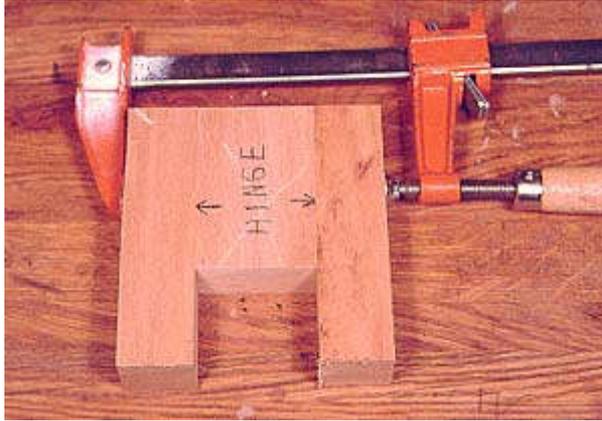


Photo 1- This is the primary template which you use to flush trim the mortising template. The arrows show the length of the template needed to match the hinges being mortised for.

The three dimensions that you must establish with the jigs for each mortise are: the depth, which equals the thickness of the hardware; the width, which depends on the type of hardware; and the length, which equals the length of the piece. Since there is a good chance that there will be some variation in dimensions on your hardware, it is a good idea to carefully measure all pieces before establishing the dimensions you will use on your jigs. Out of the 10 hinges that I used, all had thicknesses and widths that were very close, but two were $\frac{1}{32}$ nd less in height than the others. I chose to make the template to fit these hinges, which means I will have to lengthen by hand the mortises for eight hinges by that extra $\frac{1}{32}$ nd. This requires a little extra time but guarantees that all hinges will have a tight fit. If having the odd smaller hardware fit loosely doesn't matter to you, you can save time by going with the larger dimension.

The depth of the mortise is established by the depth setting of the router bit in its base. The width of the mortise is established by the location of the jig fence on the template. The only dimension that is fixed by the template itself is the length. After the jig is made this is the only dimension that cannot be altered without remaking the jig, so care in establishing this dimension is essential for accuracy.

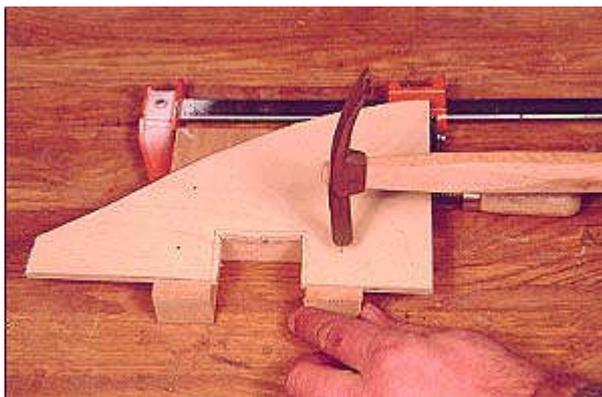


Photo 2- Clear most of the waste out of the template plywood with a band, scroll or saber saw, then nail the plywood onto the primary template as shown.

Start by figuring all the lengths you will need for each template. In this case I needed four; one for the hinges, one for the ball strike, and two for the lock. On the lock mortise one template is used to cut the deeper hole for the lock box, and a second template is used to cut recesses on two sides for the brass plate. Figure the template lengths by adding onto the hardware lengths the distance from the router bit to the template guide, in this instance $\frac{1}{8}$ " on each side. With 2" long hinges the template length comes out to $2\text{-}\frac{1}{4}$ ", adding $\frac{1}{8}$ " twice, once for each side. Also I subtracted

1/32" from this as explained above, and so arrived at 2-7/32".

Next carefully rip to width some scrap at the dimensions established for the template lengths. These ripped pieces will become the primary templates for flush trimming plywood pieces that become the jig templates themselves, and so it is this ripped dimension that, in effect, is the actual template dimension. Be sure to rip these exactly. Use hardwood or a harder softwood for the primary jig pieces so that the flush trim bearing that contacts the pieces will not dig in, altering the dimensions.

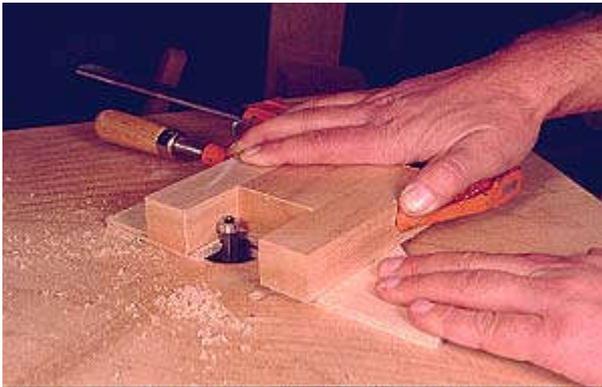


Photo 3- Flush trim the plywood to the shape of the primary template on the router table using a bearing guided flush trim bit.

The only other step for making the primary templates is to clamp onto the ripped pieces two straight scraps of equal thickness (photo 1). Since they are clamped along the ripped dimension the distance between them is that same dimension. The clamp will stay on through the flush trimming procedure, for that reason it is a good idea to use material for the primary templates that is thick enough to accommodate the pads of the clamps you use. Place plywood template stock over the U-shaped cavity of the primary template and trace the inside of the U onto the plywood so that you can cut out the bulk on the band or scroll saw. I use 1/4" birch ply for templates because it is tough and it machines well.

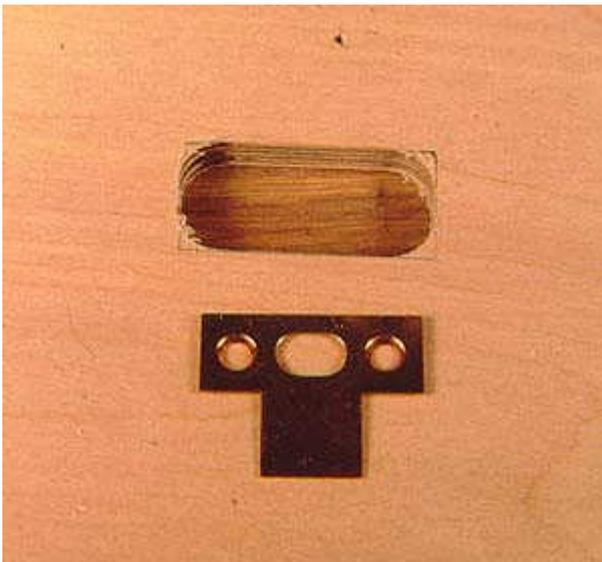


Photo 4- The mortise for the ball catch strike is just a hole. You could make this template 'T' shaped like the strike, but that takes a lot of extra time to get accurately, and it's so easy to cut out the base of the 'T' on your wood parts once the main part has been mortised.

At this point you are not establishing the width dimension of the jig, but you must leave enough room on either side of the U to attach the fence that will do so. I made the U an inch or so longer than it needed to be to cut the mortise, then fixed the birch ply onto the primary template with small brads as in photo 2. Now flip the template

assembly over and flush trim the U on a router table as in photo 3. You could do this flush trimming with a router free hand, placing it on top of the plywood, but I find that with small template assemblies you have better and safer control on a table.

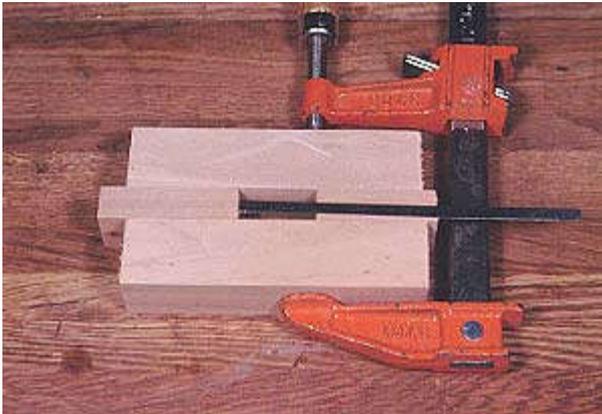


Photo 5- That's a measuring stick in the middle of the photo. It's being used to carefully set the distance between the two small chunks of wood being clamped together, thus establishing the length of the ball catch strike mortise.

It is most efficient to make all the templates you need together. I look on it as making a small production run of templates for doing a small run of hardware, and you might as well make use of production time saving in making the templates as well as in using them. So, I did all the ripping to width at once as well as all the flush trimming at the router table. Note that the template for the ball strike differs from the others because both the length and width dimensions are established at the flush trim (photo 4). To make the primary template for this, place two pieces ripped at the width dimension between two straight scraps, and clamp them all together with the ends of the ripped pieces spaced at the length dimension as in photo 5. Bore holes to hog out the waste, and flush trim as with the others.

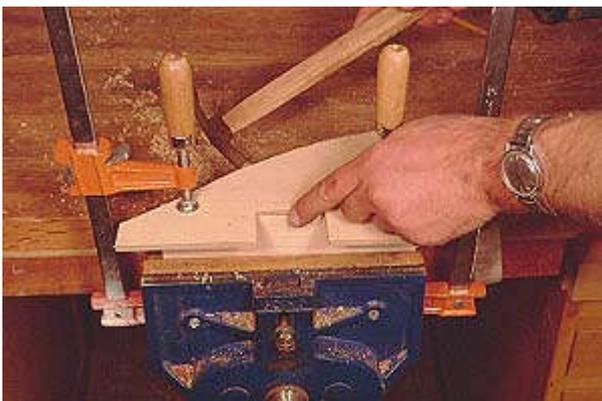


Photo 6- Locating the hinge template on its fence. Clamp the two together, carefully measure how far the back of the 'U' is from the fence, tap with a hammer to adjust, then screw or nail the template to the fence.

Now make up some flat stock with a square edge to use for the fences that fix onto the templates. The fence fixes beneath the template and parallel to the bottom of the U, and in use one face of the part being mortised butts against the fence. The fence establishes how far from this face the bottom of the U will be, and in this way establishes the width of the mortise. The fence can be located at the top or bottom of the U. Note that you must figure in the distance from the template guide to the bit from the distance between fence and U bottom. On my hinge installation, I wanted the vertical edge of the hinge to be 1/8" from the rear edge of the door and frame, and

since the distance between bit and guide was the same dimension I flushed the fence to the U bottom. To install the fence to the template, first clamp the fence in place, measure its relation to the template U bottom, tap the template edge with a hammer to adjust (photo 6), then secure the template to the fence with nails or screws. By using screws you can easily change the width dimension later by removing them and moving the fence to another point and securing it again.

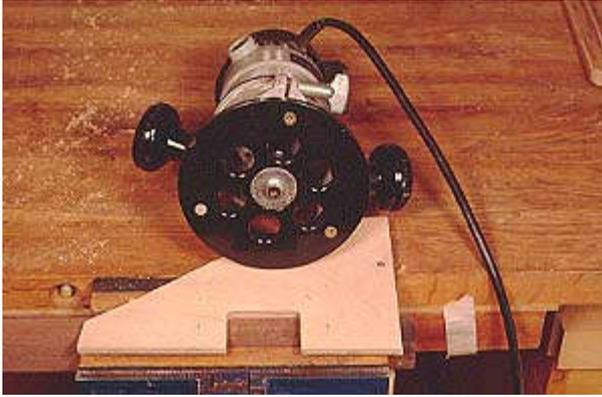


Photo 7- The hinge template in use. The wood part is clamped to the template fence with the template resting on top of the wood part, then the router is pushed along on top with the template guide riding along the edge of the template.

With the fence secured to the template the jig is now ready to use (photo 7). Clamp it in place with a test piece and set up the template guide in the router base. I used a 1/2" guide and a 1/4" bit. The minimal bit diameter was important to keep the corner radii to a minimum on these small mortises. The disadvantage here was that the bit chattered some if I pushed it too fast, and that can make an uneven mortise edge which looks bad against a straight metal piece. So I cut slowly. Template guides can be troublesome if they are not well centered to the bit, thus causing the mortise to be offset from the template. In order to center the bit, I have occasionally put masking tape between the router motor and base to shim the motor shaft toward center. But usually I just hold the router so that the off-center bit points away from areas where it might cut too deeply. Thus I had 1/8th inch plus 1/64th or so between my hinges and the part rear faces instead of exactly 1/8th inch. The trick here is to duplicate the error exactly on both door and frame mortises so that both are equal.

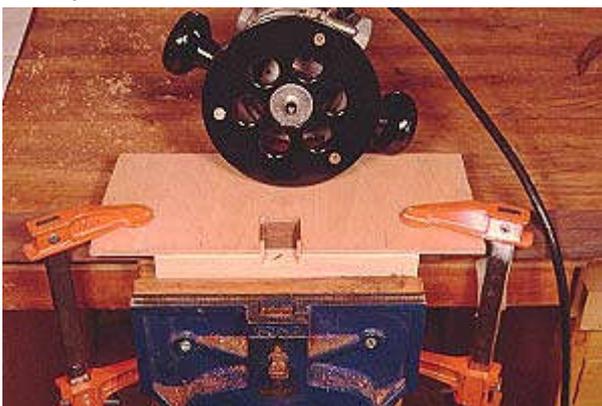


Photo 8A- Cutting out the lock box portion of the lock mortise.

Another, more accurate way to deal with the centering problem is to use an overhead bearing flush trimmer to cut the mortises, rather than a template guide mounted in the base. These are never offset from their bearing. To do so you will need to use plywood template stock at least 1/2" thick. But I have found template guides to be accurate enough most of the time.



Photo 8B- Blowup of the result of the operation shown in photo 8A.

The lock mortise is made with three separate cutting operations using two jigs (photos 8 thru 10). I first cut out the deeper, smaller hole for the lock box (photo 8) and then locate the two shallower, larger cuts by locating that jig in reference to the first cut (photos 9 and 10). You could do the shallow ones first just as easily. Both shallow cuts are made using the same jig because the height is the same for both, only the width and depth change, and both of these are easy enough to change that there is no need to make a third jig. After the first shallow cut is made on the door inside face (photo 9), the jig is then set up on the edge with a spacer between the fence and door (photo 10). The width of the inside face mortise was $\frac{3}{4}$ " and the width of the edge mortise needed to be $\frac{3}{8}$ ", so with a $\frac{3}{8}$ " spacer the difference was easily taken up. Carefully align the heights of the two cuts before making the edge cut.