CMT

ORANGE TOOLS®

CMT Raised Panel Set

This is the finest of sets that allows you to make beautiful raised panel doors even in solid oak with the smoothness that is needed — without sanding

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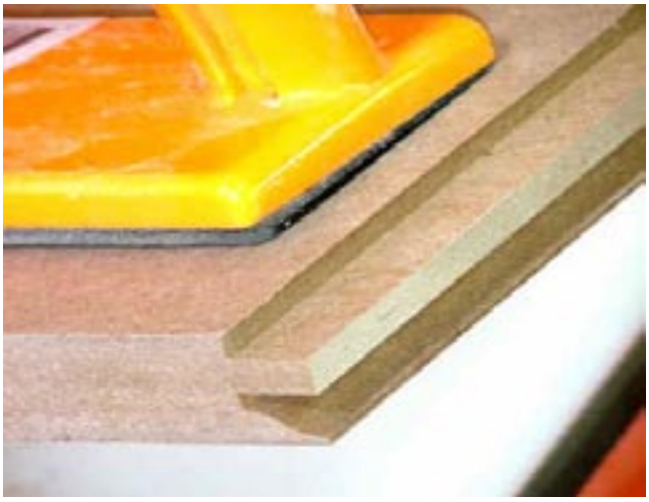
There is no miter slot in the Sommerfeld router table. He uses a pushblock that guides against the fence for accurate, controlled cuts. That pushblock does the work of moving the workpiece through the cutter. My left hand simply positions the workpiece against the fence.

The zero clearance fence allows the workpiece to slide by the cutter opening without catching and hanging up.

This pushblock is nothing more than a standard rubber soled pushblock screwed to a piece of 3/4" MDF. The MDF block gives a good square edge to locate against the fence. It also serves as a backer board and reduces tearout of the oak.

This close-up shows the correct profile of the cope bit. Note the bottom lip. That is the one that I used the Formica chip to set the 1/8".

When this pushblock base is done, I will unscrew the MDF portion and label it; "Setup Block — Cope Cut."



The cutting of the rail ends is quick and accurate.

With the rail ends all cut, it is time to change to the other bit of the matched set. This will profile the ogee edge along the lengths of the rails and stiles. This edge will "frame" the raised panel.

"Matched set" means that I can insert the new bit and have it at the right height without any further adjustments. The O-rings at the bottom of the collet allow me to do that. I simply insert it and press down until I can feel the spring of the O-ring. Then, I use the bent wrench to lock the collet. Bit changing can't be easier than that.

You can see that I have inverted the fence insert. This gives me a new area in which I can cut the “zero clearance” for this new bit. As I said before, each insert allows me to cut profiles of two bits.

I have moved the fence into the moving cutter to start the cut. With the router stopped, I trace the outline of the top bearing section.

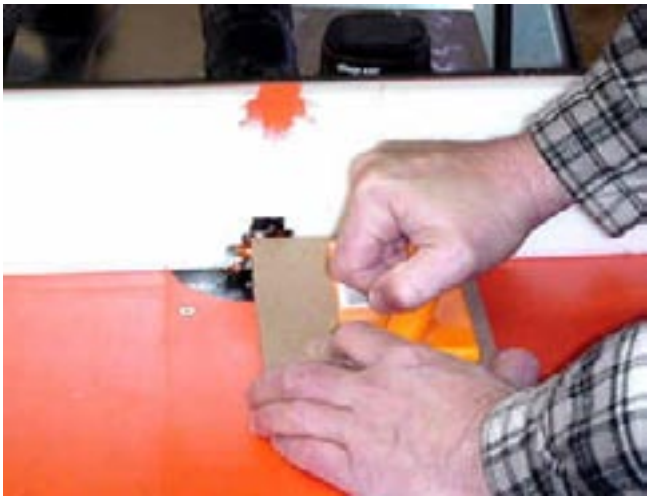
As before, I cut this section out at the bandsaw.

Having made my bandsaw cuts and with the router running, I move the fence forward into the router until the entire profile is cut. Remember, I have set the speed to the lowest for this insert cutting operation.

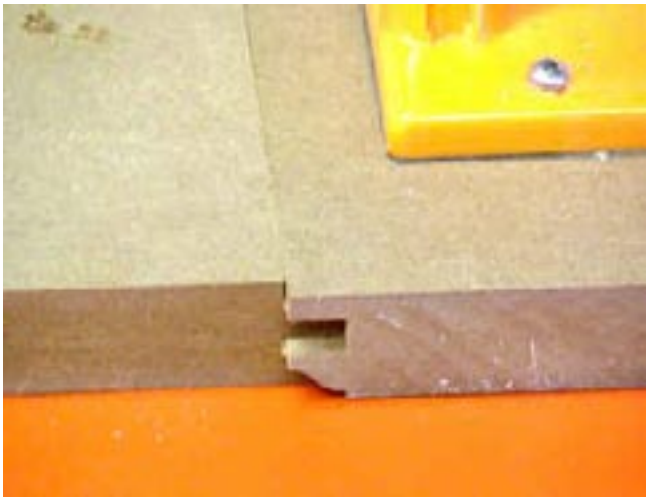
As I did before, I move the entire fence laterally and elongate the profile cut just slightly. Once that is done, I center the insert on the bit.

I set the fence so that it is aligned to the bit’s pattern bearing. I am ready to make a test cut.

With a piece of MDF screwed to the pushblock, I make a trial cut on one side.



The new cut is on the right. It fits perfectly with the MDF that is the “Setup block” from our rail end cope cuts. That is the true test of “matched set” router bits. It is time to cut wood.



I start with the rails and stiles of the drawers. Since they are short, I use two push shoes — one to keep the rail flat on the table, the other to keep it against the fence. You can see that I have clamped feather boards before and after the cutter. These are for safety but also allow a more constant pressure and therefore provide a smoother cut.

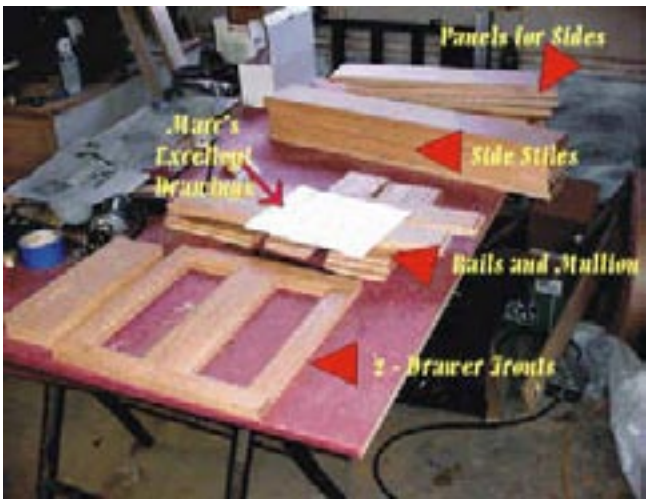
The first rail and stile corner — it looks good to me!

The stiles have square cut ends, so get profiled by just running normally. The rails and mullions, on the other hand, have ends that have been coped. I use the MDF block that I just shaped to fit into the end of the rail. This tight fit greatly reduces tear-out in the cope profile.

This is what that looks like. My right hand pushes the pushblock with the shaped edge which mates with the end of the rail. My left hand uses the push shoe to give firm pressure against the workpiece.

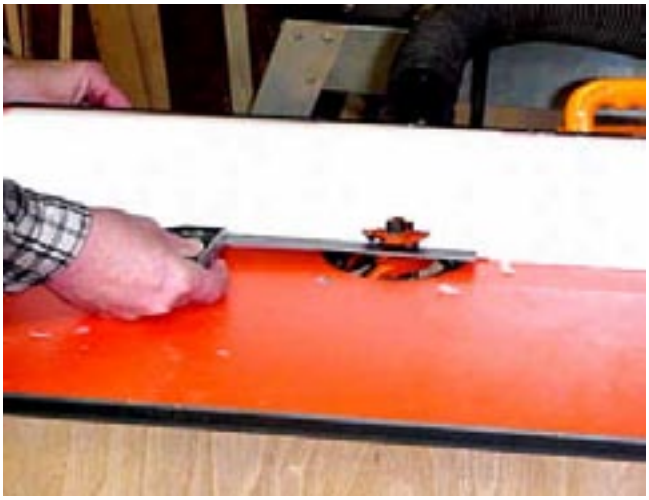
It really is a very simple and smooth operation. When it is time to cut the stiles with squared ends, I rotate the push block so that a flat edge pushes the workpiece.

Well, here is my layout table — and the progress so far. Every edge is profiled. I can now move to the final stage — cutting the raised panels.



As you can see, I have installed a new insert in the fence and have cut it with the profile of the large, raised panel cutter. The steps are exactly the same as with the other shapes.

Here, I am aligning the fence with the pattern bearing. This will be my final cut, but I will make this profile in several cuts.



I have added a small piece of masking tape to the adjustment end of the fence. The mark at the far left is the position of the fence aligned to the bearing.

The fence is located now for the first cut. The marks in between are my marks for the progressive cuts. You can see that the third mark is very close to the final. That is on purpose. I want the final cut to be a finishing cut.

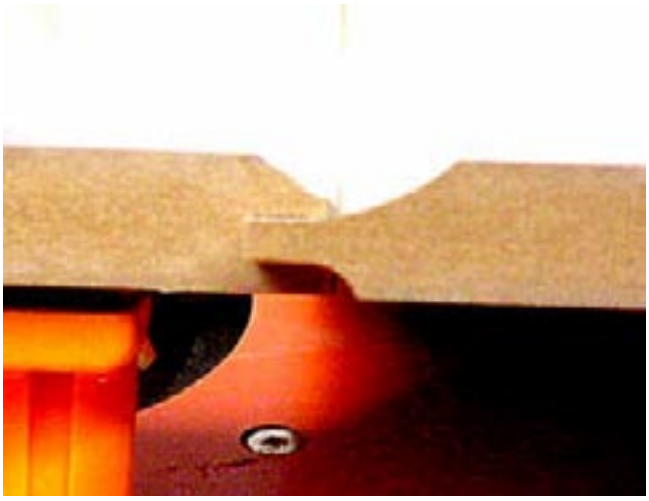
Even with the final cut marked on the masking tape, I always set the final cut using a straight edge and the pattern bearing. The masking tape is for estimating the earlier cuts.

The rail and stile cutting bits were “matched sets” and needed no resetting of router depth. The panel cutter does require some minor resetting. It is easy to do. I use the sample from the end cope cutter to make the alignment. The bearing of the panel bit should line up with the “tongue” of the end cope. I have added the yellow bar just to help you visualize.

As before, I make my trial cut in a piece of MDF. I make the cut in three passes, moving the fence back a bit each time.

Is that a good fit, or what? I test fit the raised panel sample (right) into the rail profile I had just cut.

The raised panel does not have to be flush with the stile and rail. Some people like the raised panel to be a bit "proud". However, if you make it level with the frame, it is much easier to sand the completed assembly as a unit. That is what I want to do.



I cut the panels. I always start by cutting one of the end grains and working around the panel. I made the panel raising cut in 4 separate cuts...each time moving the fence back about 1/4". This oak is hard but really machined very well. I took the 4 cuts mainly so that the final cut could be the very slightest cut.

Here is one of the drawer fronts dry fitted together. It is a perfect raised panel. To me, it is a true testament to a very smooth table, a great fence system and very sharp bits.

The raised panels are made to "float in the frame channel. This allows expansion and contraction of the wood.

To keep the panels centered, I insert these tiny Panalign Strips. One in the short ends and two in the longer sides does the trick.

I carefully dry fit each panel first. It takes a second, but I do not want to have any surprises once the glue is spread.

In the larger side panels, there is a mullion at the mid-point. I measure and mark where this mullion should go.

I apply glue to the rail ends.

I brush the glue carefully over all the mating surfaces. The rail and stile joint has a lot of good gluing surfaces. It makes sense to brush a fine coat of glue over all these surfaces.

Only very light clamping is necessary. The joints are so well cut that they slide together quite snugly. I clamp just to get a small amount of glue squeeze out at each of the corners. The clamps also help to compress the Panalign Strips.

I will set these panels aside to set. Next week we will try to finish up this great shop cabinet.

The four panel sides to the cabinet have set overnight, and I have removed any glue squeeze out from the joints.

I am following Marc's lead and am going to use the locking miter joint for the four corners.

Here, I am cutting a new fence insert to match this bit's profile. Before cutting, I have set the bit to the approximate height for 3/4" stock. I used the same clearance widening procedures as described earlier.

Even with setup blocks, I always run an "A/B" test with the same stock. I was close, but after one very slight adjustment, I was "dead on."

I will run the heavier side panels flat on the table. I am setting feather boards, before and after the bit, to help me keep the workpiece flat on the table.

I made each of the cuttings in two passes. You can see that I have set up a roller stand to help support the weight of the panel. In fact, I removed this stand for the second run — it was smoother not having to shift my hand around the stand. These heavy side panels were very easy to control, thanks to the ample size of the router table top.

Yes, you have seen this before. My simple masking tape markings worked for this bit as well. I just moved the tape, once the fence was set at the final cut.

I will think about refining this indicator – maybe with a magnetic tape like on the Incra TS-III, but frankly, this works very well. Sometimes, simple is better.

With the side panels profiled, I shift the feather board to help hold the end panels vertically against the fence. The standard featherboards are too short, so I am using a long one I had cut for use with the SuperStation.

I was surprised at how easy it was to keep the large panels vertical against the fence. I made two passes for these pieces as well. The CMT locking miter bit cut this hard oak very easily with minimal tearout or chipping.

I am not gluing yet. I am dry fitting to see how the locking miter joints look – they are GREAT!!! I do love that bit.

While the unit is together, I mark the tops of each section so that I do not make a mistake in the next process.

Marc's plan calls for two shelves to be inserted in dados. I am cutting the first one which will be the floor of the top, router compartment.

The second dado places the shelf at the bottom of the lower drawer.

There are the dados. The top is now at the right of the picture.

One advantage of the locking miter corner is that dados do not show through in either direction. That, plus the excellent gluing surface, makes the locking miter corner a great method — one that adds to my joinery "bag of tricks".

With the dados cut, I re-assemble the unit. I am checking for square. With the sides and end panels being exactly the same width, it should be square — it is.

I use a little used carpenter's wood rule with an extension to take inside measurements in the dadoed grooves. I will cut the shelves 1/8" less than these measurements.

Rather than add the numbers of both the ruler and the extension, I simply use the ruler to set the fence.

I make the cuts.

Clearly, this is one of those times when it would be nice to have another set of hands. I want to figure out how I can glue up the assembly without it all falling down in the process.

The locking miter joints help. I can unclamp one side and spread the ends apart slightly. That allows me to remove that side panel.

I am brushing a generous amount of glue over all the locking miter surfaces on just the back joint.

With the back right corner glued, and a clamp placed on that side, I now unclamp the left side and remove the panel. Again, I will glue only the back corner.

After clamping the side together, I use the nailer to shoot 1 1/2" finish nails at several points along the corner.

The glued and nailed back corners hold without the clamps, so I can now turn the cabinet onto its back and let gravity and a rubber mallet work the shelves into the dados.

I brush on glue to both of the front face frame corners.

Note: this picture does not show the two shelves I had inserted. In fact, while brushing on the glue, I realized the shelves had to go in so I put the front panel aside and inserted the shelves. One thing good about working in a cold shop is that glue doesn't setup on you when you make such errors.

One last check for square.

A few more finish nails and I can let the cabinet set overnight.

Is that a nice corner or what?

I don't know if that is a look of appreciation of the fine joinery or a look that says she want to go to the warmth of the house.

This router cabinet is coming fine. Next, I will make the drawers, add a mobile base, and move the router table and fence to its new home.

"Let's go inside, Samantha."

I know, you just saw this picture. I repeat it so I can illustrate a major goof on my part (who else's?)

It looks right but I have the front panel upside down — and I cut the dados to this — and my top compartment is 4" too short.

Who said men can't cry. What I did, or said, I can't repeat — then I came up with a solution.

My fix is a 4" top section. It is joined with the same locking miter joints, and I am using pocket screws to connect it to the lower section. I will saw out the old top rail once the top is on.

I am really irked with this mistake, however, the height of the cabinet is now at a better working height for me. If I add the mobile base I may have to trim 1" off the cabinet, but for now, this works. Thankfully, I had enough oak left over.

I have moved the whole cabinet to the work table and laid it on its side. I want to add filler strips so that the drawer slides can be aligned with the face frame.

I have tried various combinations of stock and have found that 3/4" poplar and 5/8" flake board will do the trick.

I have cut enough to be able to place them vertically at three points. That will be plenty for attaching the slides.

I am using a narrow crown stapler with 1 1/4" staples. I nail the 5/8" chipboard first and then the poplar.

I am using 22” full extension KV 8400 series slides. Note the 1/4” strip of wood between the slide and the frame. That spacer is necessary for proper mounting of these slides.

I use the square to align the slide before screwing it to the vertical spacers.

Here is the slide for the bottom drawer. Fact is, I am now realizing that I made another mistake. I have placed the slide back as I would for an inset drawer. These drawers are overlap, so I must move the slides forward — they should be 1/8” back from the drawer front. I will do that first thing tomorrow. All things considered, this error is rather painless.

This is more like it. http://www.woodshopdemos.com/smfld-125.jpg

One measurement that is very critical is the distance between the slides. Ordinarily, I subtract 1 inch (1/2” per slide). Since I have the slides mounted, I can measure between the slides to get the final drawer width. Once again I use the folding rules extension to measure this width.

At my miter saw, I set the adjustable stop to the measurement.

I cut a small scrap to that measurement and test it between the slides at many points. My drawers can be a fraction narrower, because I can shim where necessary. But they can't be any wider. If this stick binds at any point, I will make the length slightly less.

I am ripping a 2' by 4' panel of 3/4" birch ply into four 5 3/4" widths. The plans called for 6" but to allow for the kerf of the blade, I cut to the narrower dimensions.

Why do I dovetail drawers for shop cabinets? I have several reasons: 1) the shop drawers get heavy use and need the mechanical advantage that dovetails have; 2) they look better; and 3) it is good practice.

I am going to use the KatieJig for making dovetails on these two drawers.

The KatieJig comes with two bits — a straight bit for cutting the pins and a dovetail bit for the dovetails. They have pattern bearings to guide against the jig.

They are 1/4" and 3/8" shafts and must use collar adapters to be used in the 1/2" collet.

Sommerfeld Tools now sells the KatieJig and has persuaded CMT to make the right bits with 1/2" shanks. These will be good bits to have.

The Katie Jig uses two backer boards that have to be replaced when you start a new setup. The thickness has to be very exact. I use the thickness sander to slowly bring some scrap MDF down to the right thickness.

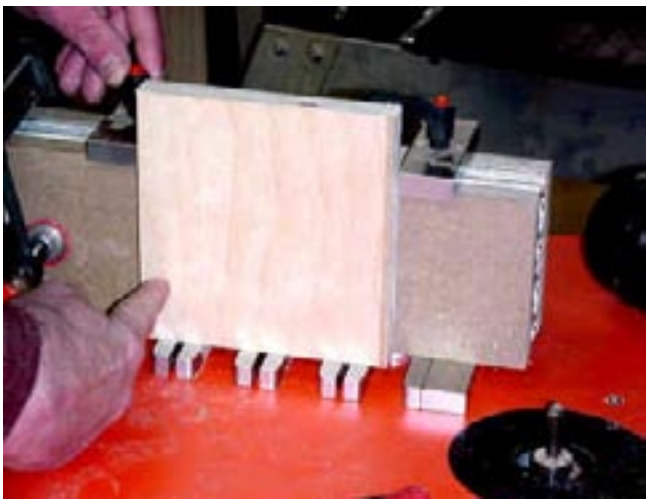
The KatieJig Manual tells the exact thickness the backer boards should be. I don't have a micrometer, so I put the original board in the center and the two MDF pieces alongside and feel the difference. I keep passing them through the sander until they feel exactly the same. It works for me.

I now space out the fingers of the jig. I want one half of a tail on each end of the board, so I simply space the end forks by eye.

With the end forks spaced for the width of the board, I now adjust the two center forks so that they are pretty much equally spaced. The forks do not have to be perfectly symmetrical. Even if one or both are off, the tails and pins will match up because of the way they are cut — more on this in a bit.

With the fork spacing done, I can set the edge guides. I start by centering a piece of wood scrap that is the same width as the drawer sides. Again, I can do this by eye.

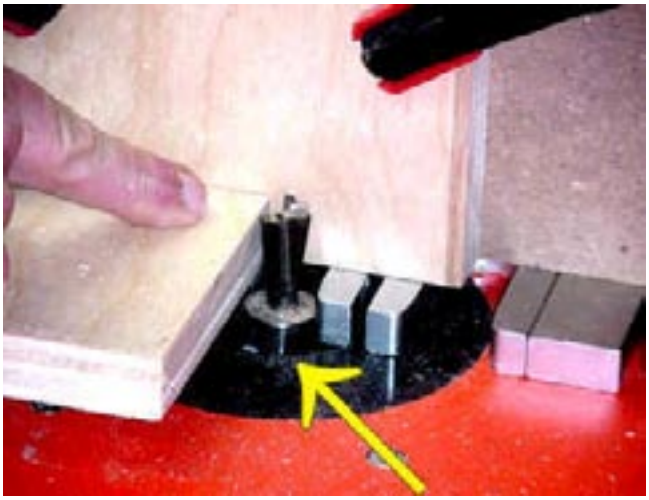
When I set the stops, I add about 1/16th" extra space to allow for any slight wood variations.



I now add the handles for using the jig with the router table.

This is one way to set the bit height. Place a piece of the stock on top of the jig forks and raise the bit until it is just "peaking" over the top.

I am showing this method mainly to show you that the bearing (arrow) must contact the forks of the jig and have at least 1/8" overlap — this dovetail bit gives a good amount of overlap — that is good.



I am making a sample cut.

About 5 minutes later, I have re-adjusted my forks to give slightly more room for the 1/2 tails. Note that with the 1st try, at the right, the outside tails would be very tiny and subject to chipping off.

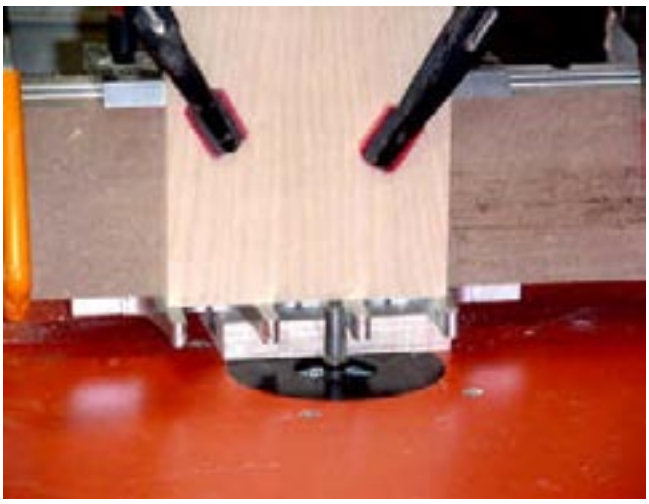
The 2nd setup allows wider, stronger tails. That is what is nice about a variable spaced jig — it allows you to set up what will look best and be strongest.

Now to change bits and make the pins.

I have mounted another test piece on the pin side. I use the edge guides without changing them.

This is the other way to set router bit height. I have placed a piece of the stock under the jig. Now I can raise or lower the bit until the top of the bit just clears the fork.

You should then check to be sure that enough of the bearing is riding against the fork.



I have now cut the pins in the sample. Note all the tearout. This can happen with plywood or any wood. In a minute, I will show how to minimize that.

The tearout is pretty bad, but the fit of the corner looks very good.

I can now cut the drawer sides and ends.

I have been known to make the pins and tails on the wrong pieces. There are several things I do now to prevent that. First, I mark on the sample corner, the correct orientations. The sides get the dovetail cuts and the ends, the pins. If in doubt, try to pull them apart. They well come apart easily in one direction but not the other. That is the direction for the depth of the drawer.

This is the next step to avoid errors in cutting. I have laid the sides and ends out exactly as they should be in the final drawers.

Next, I number the corners from 1 through 4.

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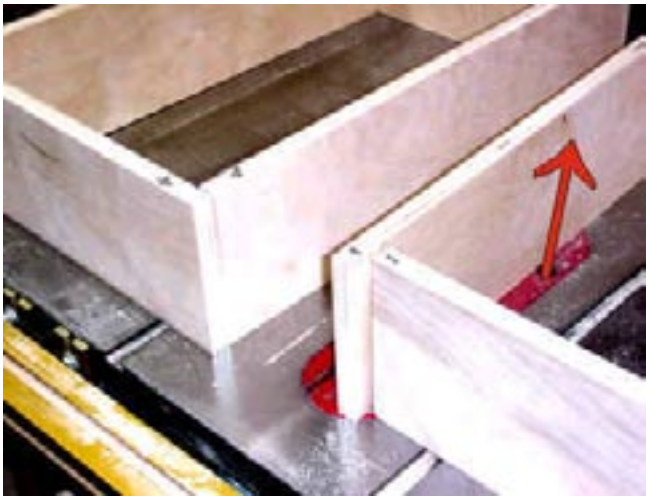


Do you see anything different about this picture? I have clamped another piece of MDF on the outside of the board. This will greatly reduce tearout on the front side. Between this, and the MDF backer board, there should be little tearout.

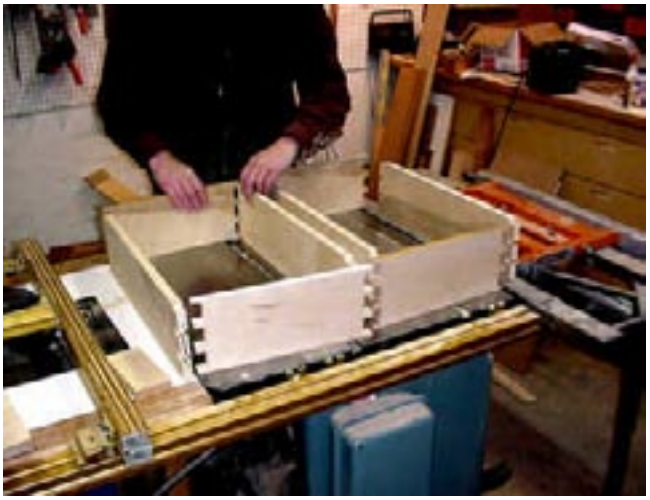
I do the same when cutting the pins. You can see how fragile the little pin sections can be.

This close-up tells the story quite well. You can see the MDF "fronter" board has held up pretty well, even after all the corners have been cut.

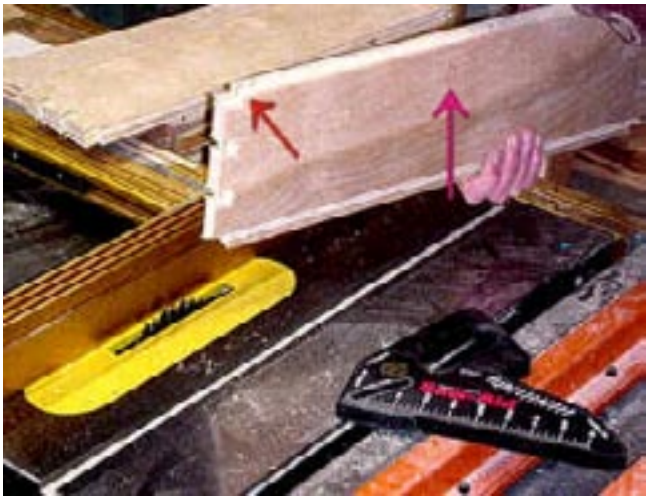
But the real story is in the actual plywood corner. Each of the pins is smooth and sharp with no tearout."

This is where it really counts. The corners fit together smoothly.

It is time to dado a groove for the bottom.



If you recall, when I marked the corners and then placed a dot on the inside, I said these would come in handy. They were used during the routing to properly position each board. Now, I am using them to be sure that I cut the dado on the inside, bottom edge. It would be very embarrassing to have it anywhere else.



They are starting to look like drawers. I have dry-fit the sides together and am now measuring from groove to groove. I want to cut the bottom to be about 1/16" short of this measurement.

With the drawer bottoms installed, I am again dry fitting. Once I start gluing, I do not want to find that it is off a hair.

With the other end clamped, I can pry this end apart and add glue to all the mating surfaces. There is enough spring so that I can ease this corner back together and then glue the other corner of this end.

I could leave them clamped to dry, but I find it easier to simply pin them together. I am using 1 1/4" brads. [Yes, that is a watch cap on my head — the unheated shop is 31o right now.]

My two drawers have dried. Now I can sand down the corners. If you recall, when setting the router bit height, I let it be just the tiniest bit higher than the jig. Now, I can sand the corners down until they're flush.

The Delta Bench Orbital Sander with 100 grit paper does the plywood drawers quickly.

Now that is a lot of orange. I am installed a 3/8" rounding over bit. The next step is to round over the inside and outside of the drawer sides.

I round over all the insides and all but the front outside. That remains square since the oak panel drawer front will be attached to it.

They both fit nicely and slide without any difficulty.

Now I can attach the drawer fronts.

Before I do, I want to route a mortise to hold this oak drawer pull. I use these a lot since they protrude the least and, I think, they look nice on the drawers — and they are inexpensive.

I usually mount the pull near the center. In this case, I will install it on the top rail.

I use this shop-made jig to guide the router. The jig has the router bit and guide information.

I have matched the centerlines, clamped the jig and now route the mortise. This is an easy operation, but you must vacuum out the mortise in between passes. The dust accumulates and has no where to go.

You can see the amount of dust trapped in the mortise. Actually this mortise took 3 route/vacuum cycles.

The drawer pull fits perfectly.

Two brads placed inside the drawer pull can hold it in place while the glue dries. I angle them in so they don't pop out the back.

I add to small blobs of hot melt glue to the front of the drawer,

The hot melt glue gives me about 2 seconds to center the drawer front to the drawer. I hold it in place for a few more seconds and then can ease the drawer open without moving the added front.

I add two 1 1/4" screws from the inside drawer to the oak front panel. These drawers are done.

In the top drawer, I place one of the CMT bit organizers to store the many individual bits. This is also a handy place for tools — like the famous bent wrench, an extra fine diamond file, and a small can of lubricant.

I am using the lower drawer to hold a number of inserts — I am planning on having 7 inserts (14 shapes) to handle most of my future needs.

There is also room for the router bit sets. Right now I have the CMT/Sommerfeld Raised Panel Set, the CMT/Sommerfeld Junior Raised panel set, and the CMT Incra Jig set. I have some other matched sets to add here, like the window sash set, the
22 1/2o locking miter set (new), etc.

I may build in some dividers to keep things in their place, but I won't do that until I find out where things should be — a couple weeks of use should help.

I have put the router table over on its new home. It looks great and is at the right height for me. [Note: I added the painted background rather than to clean the shop. The cold was getting to me; I'll do that tomorrow.]

I plan a few more things for this great unit: 1) adding a mobile base; 2) creating a way to simply lock the top to the base; and 3) adding a small supplemental platform to one side so that I can mount the Incra Jig Ultra to this unit. I love the Sommerfeld fence and inserts, but I would like to be able to also use the Incra System of joinery. I will do these things for next week's update.