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Arts & Crafts End Table

In this plan you will be getting:

- Step by Step construction instruction.
- A complete bill of materials.
- Exploded view and elevation drawings.
- How-to photos with instructive captions.
- Tips to help you complete the project and become a better woodworker.

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Arts & Crafts End Table

There are many signature features of Mission-style furniture, but one of the more prominent details are mortise and tenon joints where the tenons show. You might think they're difficult to make, but a simple drill press technique and a few chisels are all it really takes. This end table will give you ample opportunity to try these joints on for size.

Through mortise and tenon joints are attractive hallmarks of Arts & Crafts furniture. They also form rock-solid connections for table legs and other high stress parts. If you've been avoiding them because you don't own a mortising machine, there's a simple solution: all you need is a drill press with a sharp Forstner bit. The technique is accurate, quick and wonderfully low tech. If you can drill a series of holes, deep through mortises are a cinch to make.

Start with the Legs

Begin by planing 8/4 stock down to 1½" for the legs (pieces 1). Cut them to size and joint the faces smooth. As you can see from the *Exploded Drawing* on the next page, each leg has a number of mortises, and their arrangement can get a little confusing. Take time now to lay out all the mortises before you begin milling. Choose the best face of each leg (with nice quartersawn rays) to face forward.

Conventional wisdom for making mortise and tenon joinery is to cut the mortises first, then trim the tenons to fit. The logic is that you can always trim a thick tenon thinner but you can't make a too-wide mortise narrower. On through mortises, this reasoning is especially sage. Since the mortises show, you'll want to make them as neatly and accurately as possible, then fiddle with the tenons to fit the joints together.

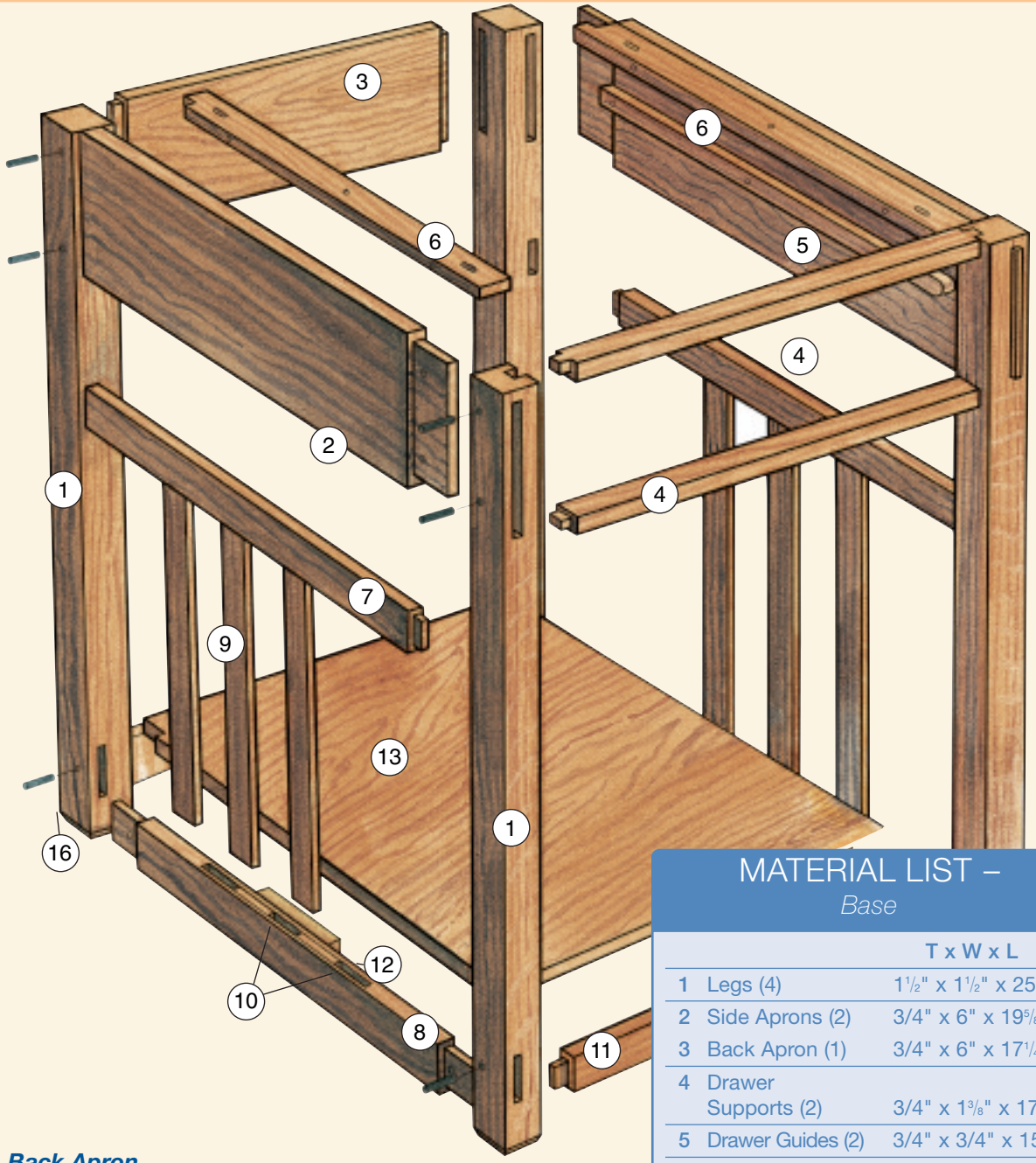
The *sidebar* on page 154 will guide you through the process of making the leg mortises, but here are some important tips. Whether you are cutting through or stopped mortises on the legs, start at one end of the mortise and bore a series of holes along its length. Space the holes so they touch but do not overlap, to keep the bit from wandering into the previous hole. Drill all the way through the legs for the through mortises, boring down into the show faces, hiding any tearout on the back beneath the tenon shoulders. When you are about two bit widths from the end of the mortise, skip to the end and drill it out, then back up and drill out the remaining waste. Slide the leg along the jig's fence to drill each hole. Once the first round of drilling is complete, repeat to remove the crest-shaped waste areas that remain.

One jig setup on the drill press allows you to tackle all of this table's mortises except those for the drawer supports, which run perpendicular to the rest. You can align the bit by eye for hogging these out. Note that the mortises for the upper drawer support are open at the tops of the legs to house the bare-faced upper support tenons.

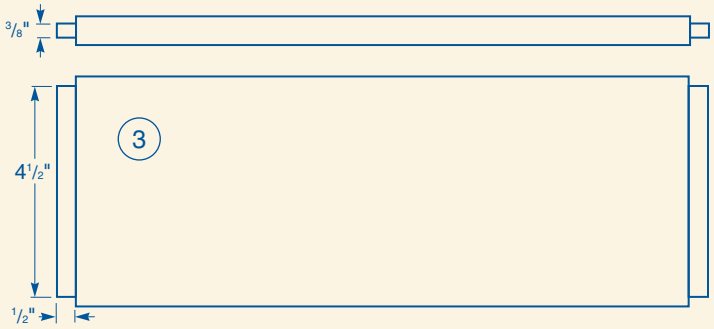
Turn to the Tenoned Parts

Start the tenoning process by cutting the aprons, drawer supports, side rails and shelf supports (pieces 2, 3, 4, 7, 8 and 11) to size. These pieces all have 3/8"-thick tenons. A wide dado blade in the table saw will make quick work of trimming the tenons to the correct thickness and length. Use the rip fence to index the first long shoulder cuts with parts held face-down against the miter gauge. Make additional passes over the blade to rough out the broad tenon cheeks, and then trim the tenons to width on the band saw. Refine the tenons with a shoulder plane or sandpaper until they slide into their

Table Exploded View



Back Apron
(Top and Front View)

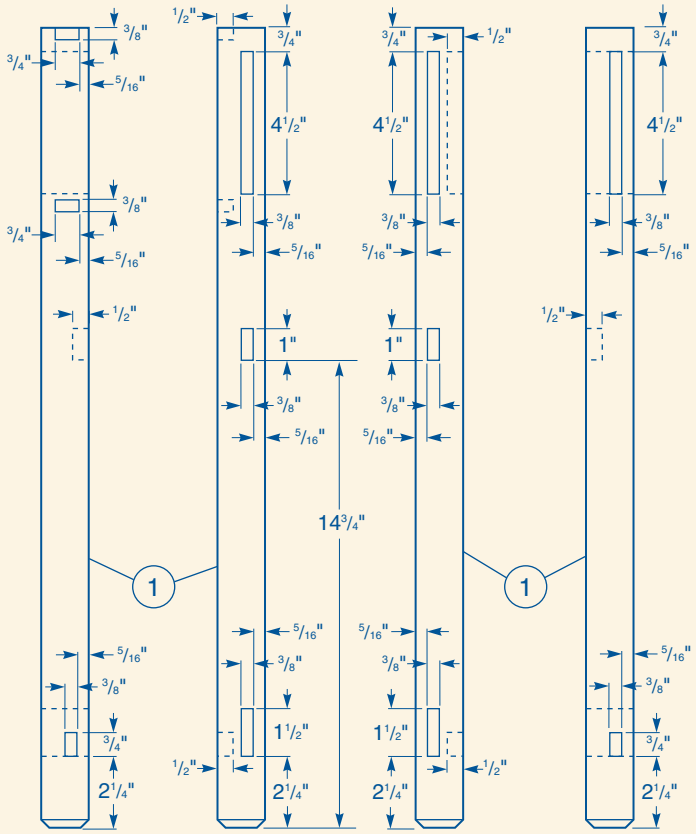


MATERIAL LIST – *Base*

		T x W x L
1	Legs (4)	1½" x 1½" x 25¼"
2	Side Aprons (2)	3/4" x 6" x 19⅝"
3	Back Apron (1)	3/4" x 6" x 17¼"
4	Drawer Supports (2)	3/4" x 1⅜" x 17"
5	Drawer Guides (2)	3/4" x 3/4" x 15½"
6	Top Cleats (2)	3/4" x 1½" x 16½"
7	Upper Side Rails (2)	3/4" x 1½" x 17"
8	Lower Side Rails (2)	3/4" x 2" x 19⅝"
9	Side Slats (6)	3/8" x 1½" x 11½"
10	Slat Spacers* (8)	3/8" x 1/2" x 1½"
11	Shelf Supports (2)	3/4" x 1¼" x 17"
12	Shelf Cleats (2)	3/4" x 3/4" x 4"
13	Shelf (1)	3/4" x 17" x 19"

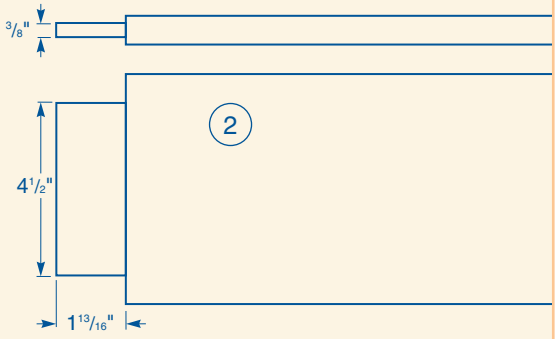
**Cut to fit*

Front and Back Table Legs Mortise Location Details

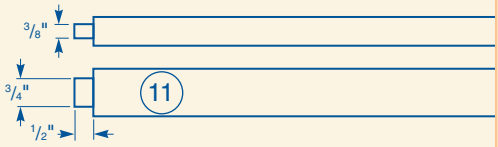


Front Legs *Back Legs*

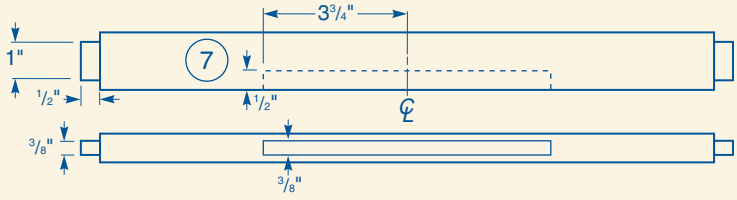
Side Apron
(Top and Front View)



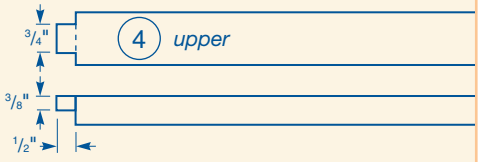
Shelf Support
(Top and Front View)



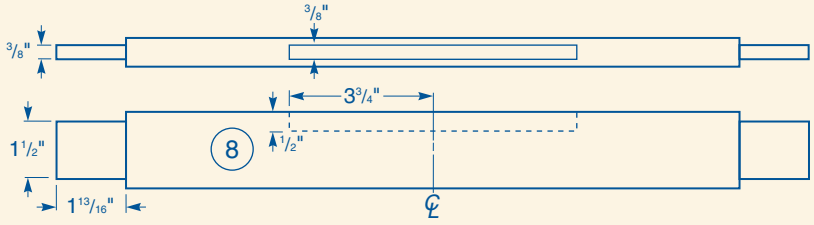
Upper Side Rail *(Top and Front View)*



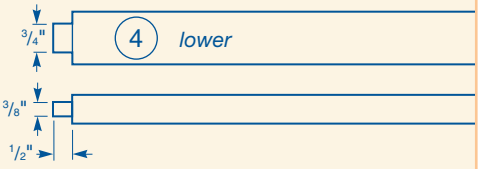
Drawer Support
(Top and Front View)



Lower Side Rail *(Top and Front View)*



Drawer Support
(Top and Front View)



DRILLING THROUGH MORTISE AND TENON JOINTS

Drill press mortising sure beats hand chiseling, and it works well for cutting deep through mortises that would otherwise require a long router bit or dedicated mortising machine. The technique doesn't demand a burly floor-model drill press or complicated tooling to complete. Armed with a only benchtop drill press and sharp Forstner bit, you'll have great success. It also helps to have a combination alignment fence and hold-down jig to assist the drilling operation. It's easy to make: just screw a straight piece of stock, 1/16" thicker than the legs, to a piece of scrap plywood. Then fasten a couple of hold-downs to the top of the jig fence (about 5" apart). The fence will align the multiple borings required to create the mortises, and the hold-downs will keep the bit from lifting the legs off the drill press table when clearing the chips from the openings.

Lay out all the leg mortises with a combination square before you begin milling them. This will help keep their order and orientation clear on each leg.

Clamp the hold-down jig to the drill press table so the drill bit spur is centered inside the mortise. Drill a series of adjacent holes along the mortise to remove the waste.

Square up the mortise ends with a chisel and mallet. For deep through mortises, a mortising chisel works best. Keep the chisel held square to the leg as you tap it home.

Cut the tenons to thickness and length with a dado blade on the table saw, then make the end cheek and shoulder cuts on the band saw. Guide your work against a fence.

Take shavings off the tenon until it fits its mortise, then chamfer the ends and edges. The chamfers help smooth the assembly and become distinctive visual details.

mortises with just a bit of resistance.

Preparing the Rails and Slats

Rather than drill separate mortises for each side slat, we'll mill a stopped groove into the side rails for all three slats, then fill the gaps with spacers. Cut these grooves on the router table, and square the ends. Now plane enough 3/8" stock to make the slats and spacers (pieces 9 and 10). Cut the slats to size, but wait on the spacers for now.

Assembling the Table Frame

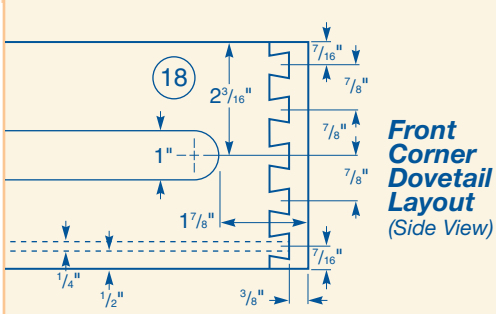
After all this mortise and tenon work, it's time for some assembly. Start by preparing two side frames consisting of two legs, a side apron, the upper and lower side rails and three slats. Dry-fit the parts first, then disassemble and do your finish sanding. Glue and clamp the side frames, but fit the slats into their grooves dry. When gluing the through tenons, spread glue on the tenons only, not their mortises. Keep the first 1/2" or so of the tenons free of glue and you'll have no glue to clean off the exposed ends after sliding the parts together. With the side frames clamped, drill and insert six dowel pins to lock the joints. Now, cut the spacers to fit and glue them between the slats.

Join the two side frames together by gluing and installing the drawer supports, back apron and shelf supports in place. Spread clamps across the frame to close the joints.

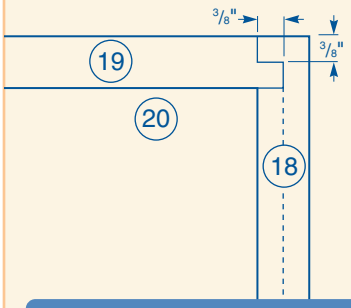
Making and Hanging the Drawer

There are no surprises in the construction of the flush-fit drawer. Cut the face, sides and back (pieces 17 through 19) to size, then mill all the corner joinery. Use a dovetailing jig and router to form the half-blind dovetails and a dado blade to cut the back rabbet and dado joints. After milling the

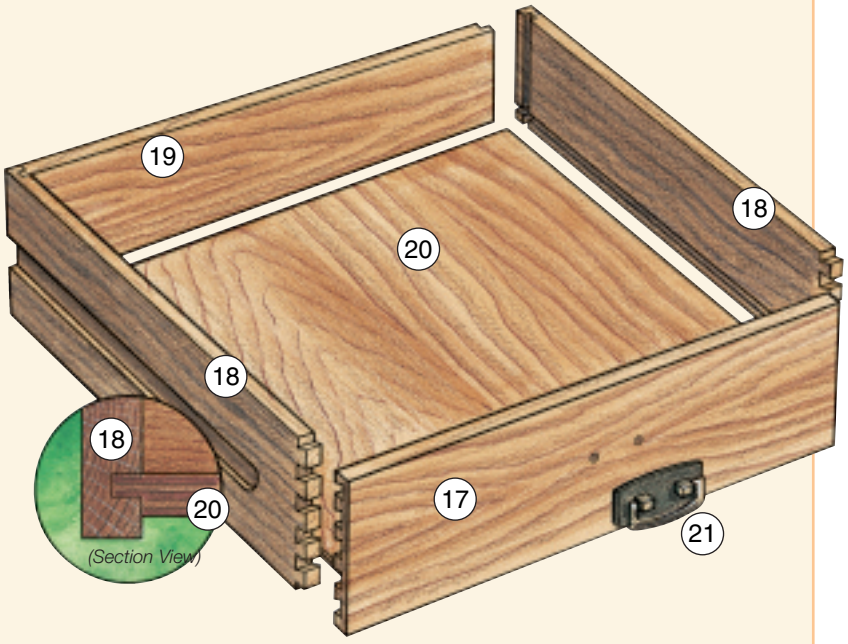
Drawer Exploded View



Front Corner Dovetail Layout *(Side View)*



Back Corner Joinery Detail *(Top View)*



MATERIAL LIST – *Drawer*

	T x W x L		T x W x L
17 Drawer Face (1)	3/4" x 4 3/8" x 15 7/8"	20 Drawer Bottom (1)	1/2" x 14 7/8" x 16 1/2"
18 Drawer Sides (2)	3/4" x 4 3/8" x 16 1/2"	21 Pull	Hammered copper
19 Drawer Back (1)	3/4" x 3 5/8" x 15 1/8"		

corner joints, rout grooves along the appropriate inside faces to accept the bottom panel. Be sure to stop this groove on the face or it will show after assembly. Sand the parts and glue up the drawer box. Cut the bottom panel (piece 20) to size, slide it into place and pin it to the drawer back with brads.

The drawer hangs on a pair of guides (pieces 5) that fit into stopped dadoes in the sides and attach to the side aprons. Plow the guide grooves into the sides with a 3/4" straight bit in the router table. Now rip and crosscut the drawer guides, round their front ends and sand them until they slide easily in the drawer grooves.

The trick to hanging the drawer is locating the precise positions of the drawer guides on the aprons. Here's how we did it: First, fit the entire drawer assembly into place with the guides in the drawer grooves. Hold it in place with a scrap block clamped to the back apron. Adjust the drawer face for a flush fit. Mark the top and bottom edges of the guides on both aprons near the back. Pull the drawer out, position the guides on the aprons and fasten them through their rear pilot holes with screws. Replace the drawer and insert thin shims of cardboard around the face to center it evenly in its opening. Then, mark the drawer guide positions on the aprons near the front. Finally, adjust the guides to your front reference marks with the drawer removed, and drive in the remaining screws.

Adding the Tabletop and Shelf

Breadboard tops aren't typical features of Arts & Crafts tables, but our author chose this style because the breadboard ends help keep the top flat and hide its end grain. To make the top, glue up a wood panel for the center section (piece 14), and cut the breadboard ends (pieces 15) to size. Next, chuck a 1/4" straight bit in the router table and plow a long stopped groove into one edge of each breadboard end. With the grooves cut, mill the center panel tongues just as you made the tenons (see *Elevation Drawings*). Notice that the tongues are 1/4" narrower and 1/8" shallower than the grooves to allow for wood movement.

Attach the breadboard ends to the

Rout evenly spaced pins across the sides with a dovetailing jig and 1/2" dovetail bit. Test the setup on scrap before cutting the actual parts.

Mill tails into the drawer face to complete these half-blind joints. On this jig, a stopblock clamped to the fence limits the depth of the cuts.

panel with six dowels (pieces 16) driven through the tabletop. Be sure to first form slotted holes in the tongues for the outermost dowels so the center panel can expand and contract. Spread glue along just the center 4" or so of the tongues when installing the ends. Use a light film of glue on the dowels to keep excess glue off the tongues.

The center panel will expand and contract across the grain far more than the breadboard ends will move along the grain, so the parts won't always line up. To help minimize this mismatch, be sure to use lumber kiln-dried to at least 8%. If there's room in your budget, choose quartersawn stock for the top—it will move significantly less than plainsawn lumber.

To install the tabletop, cut the top cleats (pieces 6) to size and shape, outfitting them with round and slotted screw holes. Align the cleats flush with the tops of the aprons, then attach them with glue and screws. Position the tabletop and adjust it for an even overhang. Use a scratch awl to mark the screw locations, drill stopped pilot holes and drive the four screws into the slotted holes. Use washers under the screw-heads to ensure that these joints will slip when necessary.

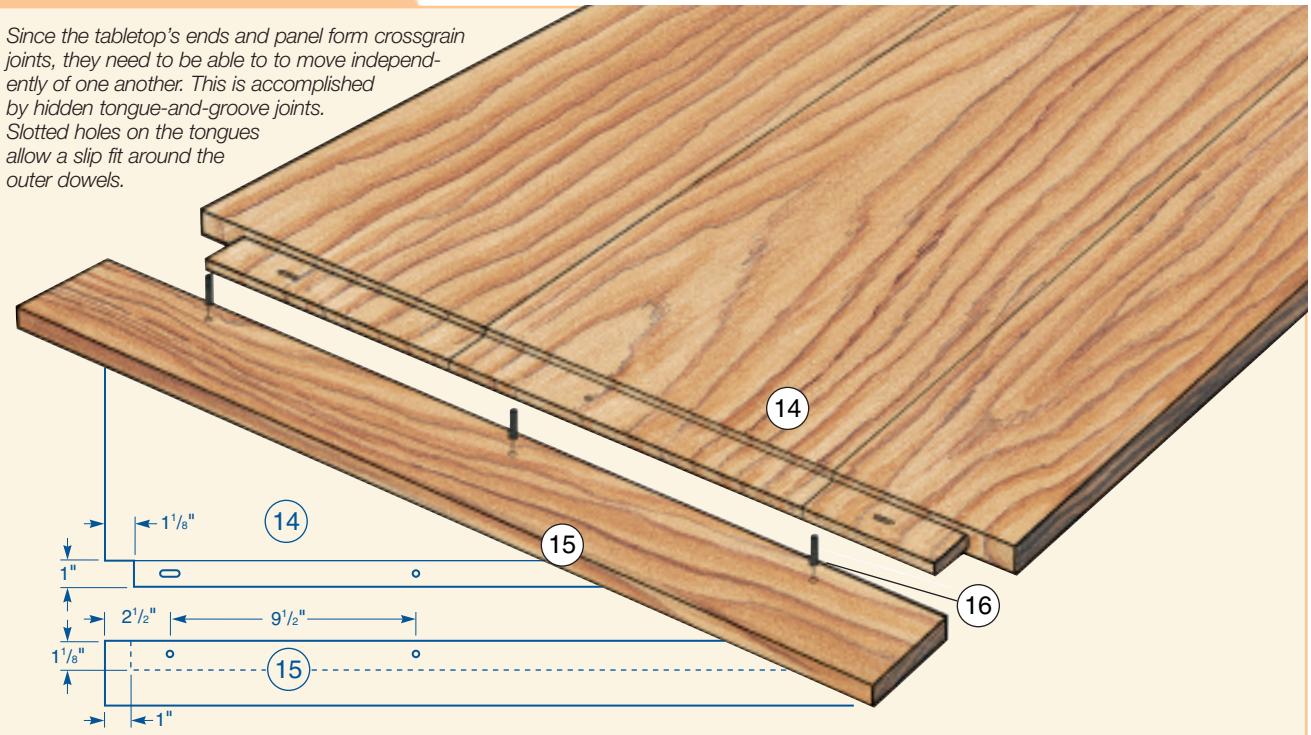
QuickTip

Strengthening Spline Joints for the Long Haul

Spline joints are a great way to join two long edges. But while most woodworkers have no problem routing the grooves for the spline, they often let the ball drop when it comes to making the actual spline. A ripped piece of hardwood won't work, as it will tend to split along the grain—right where you need the most strength. Plywood is the perfect answer: its alternating grain prevents splitting, and it comes in thicknesses that are perfectly suited to the router bits you use to make the grooves. The only time plywood won't be desirable is if your splines show, but a little re-designing may easily solve this problem.

Tabletop Exploded View

Since the tabletop's ends and panel form crossgrain joints, they need to be able to to move independently of one another. This is accomplished by hidden tongue-and-groove joints. Slotted holes on the tongues allow a slip fit around the outer dowels.



MATERIAL LIST – *Top*

	T x W x L		T x W x L
14 Tabletop Center Panel (1)	3/4" x 21" x 24"	**16** Dowel Pins (18)	1/4" Dia. x 1 1/4"
15 Breadboard Ends (2)	3/4" x 2 1/2" x 24"		

Now for the shelf (piece 13). Glue up a solid panel and cut it to size, notching the four corners so they fit around the legs with 1/8" of extra clearance for seasonal expansion. Cut and screw two shelf cleats (pieces 12) to the lower side rails, and attach the shelf to the cleats with screws.

Finishing Up

Give the tabletop and shelf a final sanding. Tint the end table with a medium-dark stain, followed by a topcoat of varnish and paste wax. While you're at it, wax the drawer guides and their grooves for slippery smooth drawer action. Attach a reproduction Stickley drawer pull (piece 21) to complete the table.

We hope this drill press mortising technique draws you into building more Mission-style furniture. Now that through mortise and tenons are within your reach, you'll probably get hooked!

Half-blind dovetails are a nice touch when assembling the flush fitting drawers.