Shop Secret for **Super-Stong Miter Joint**

Router Technique for Perfect-Fitting Parts

Smoothing Planes — **Say Goodbye to Sanding**

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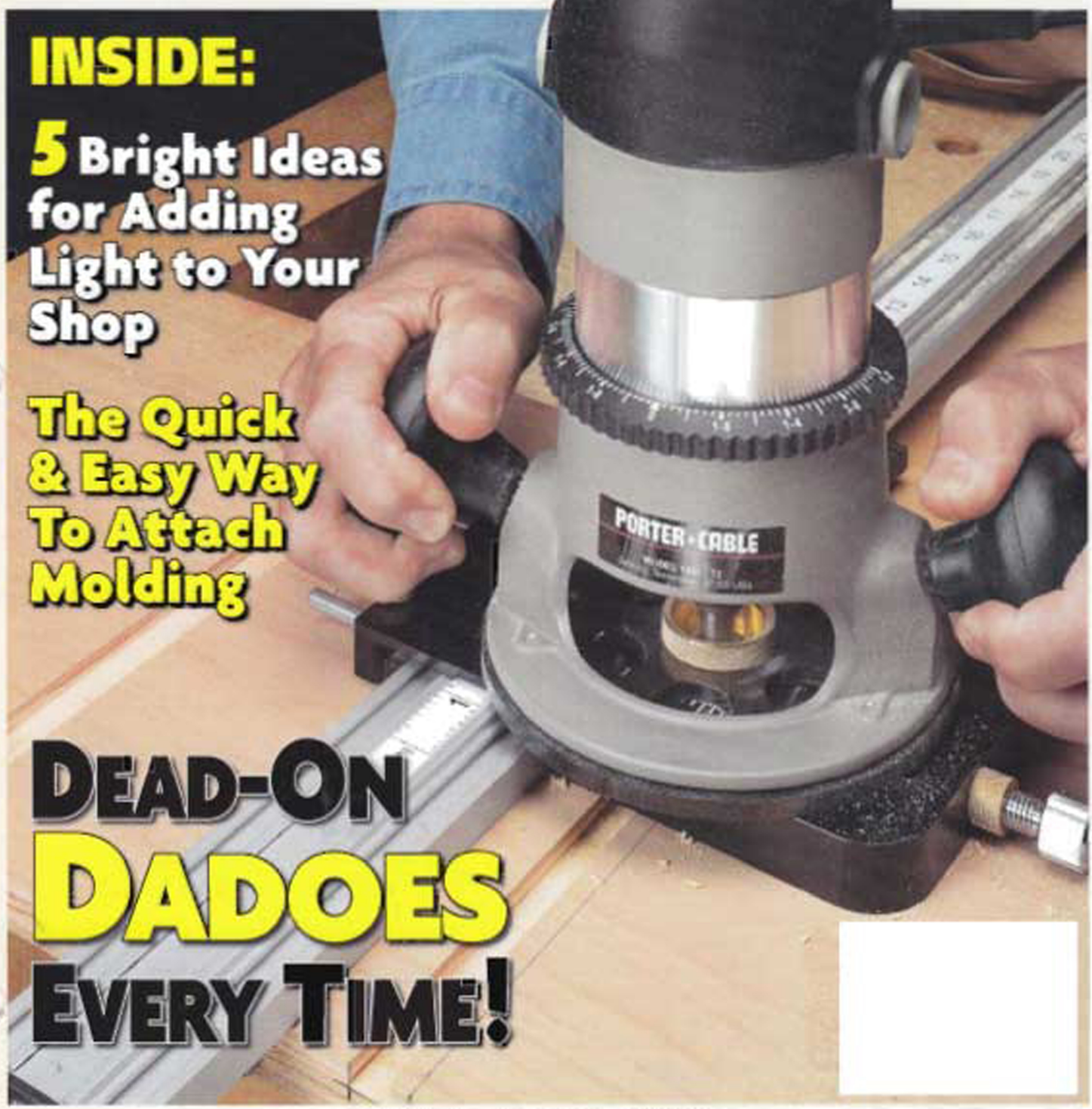


INSIDE:

5 Bright Ideas for Adding Light to Your Shop

The Quick & Easy Way To Attach Molding

DEAD-ON DADOES EVERY TIME!

A Publication of August Home Publishing

looking inside

Table of Contents

Pizza Peel page 16

Book Rack page 20

projects

editor's note

Sawdust

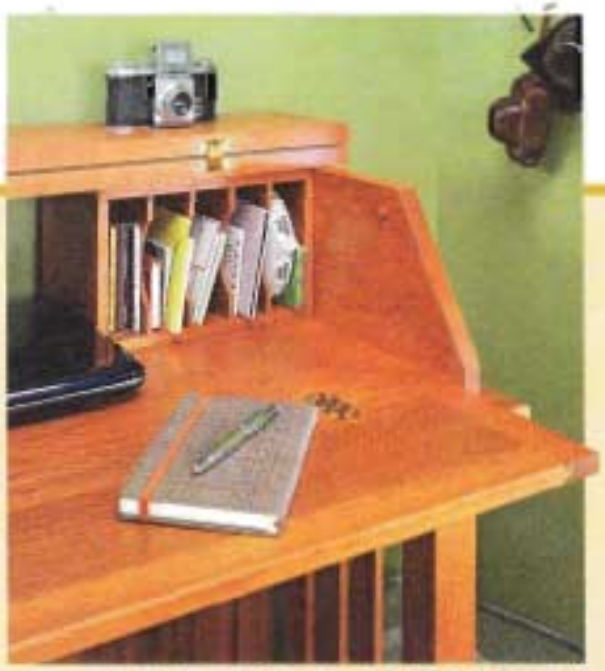
One of the first decisions we make for every project we build in *Woodsmith* is the type of wood we're going to use. Sometimes, the style of the project dictates the wood selection, like using quartersawn oak for a Craftsman-style project. But when it came to choosing a wood for the gathering table shown on page 24, there really wasn't an obvious choice.

After kicking around the usual standbys (oak, cherry, and maple), Todd Lambirth, our art director, threw out a different suggestion — hickory. Hickory often shows a lot of "character marks" — worm holes, streaks, stains, and even sapwood — the stuff that we usually try to avoid when selecting wood for a project.

Now, I'll admit that I was a little skeptical at first. Up until now, my only experience with hickory has been as firewood. And the idea of using wood that might be full of "defects" made me even more uncertain. But seeing the finished project won me over. There's a certain appeal to allowing the true character of the wood to show through. It serves as a reminder that the look and beauty of wood is ultimately determined by nature.

Tom

Gathering Table page 24



Notebook Computer Desk page 32

Tips & Techniques

Squaring Jig

Whenever I glue up a frame and panel door, I want it to be dead-on square. That's why I created the jig you see in the photo above. It works great for gluing up assemblies, like doors, frames or drawers, quickly and accurately.

As you can see in the drawing below, the jig has two fixed fences. But the key is the adjustable fence that forces an assembly into the fixed fences and automatically squares it.

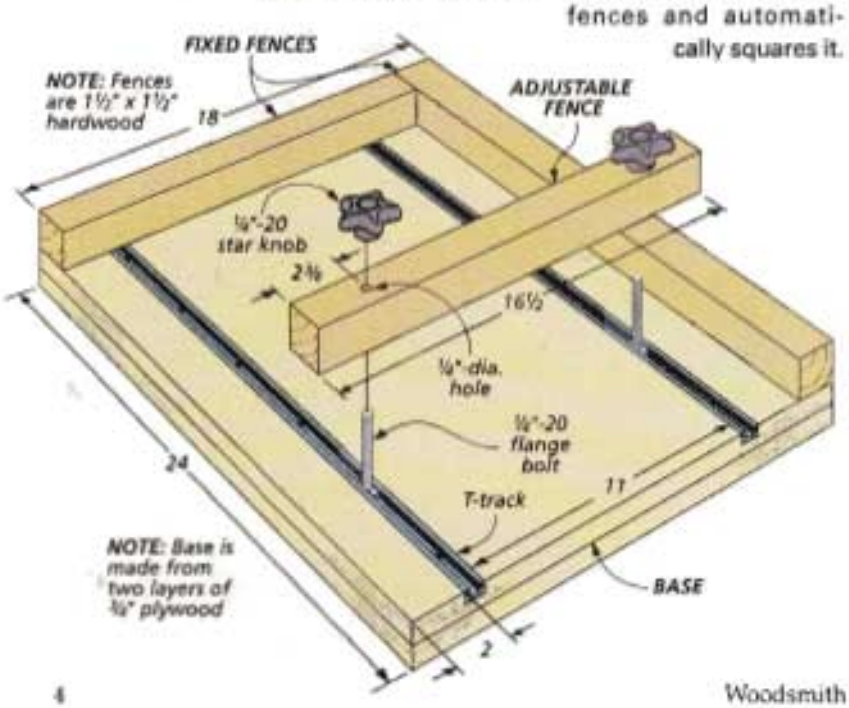
To make the jig, I cut two pieces of plywood and glued them together for a base. The next step is to cut grooves and add T-tracks. Then attach two fixed fences along two edges of the jig, making sure they're perfectly square to each other.

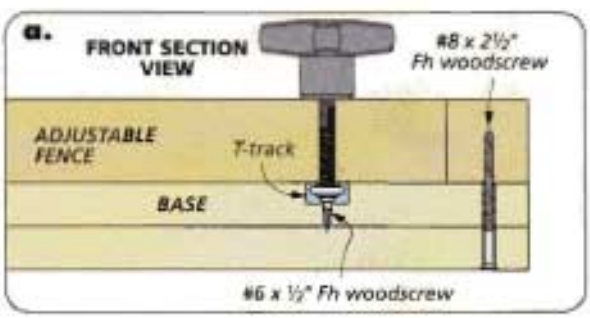
Finally, the adjustable fence is added. It's held in place with flange bolts and star knobs. A couple coats of paste wax completes the jig and keeps glue from sticking to the base and fences.

To use the jig, I fit my assembly against the two fixed fences and slide the adjustable fence up to meet it. Then you can tighten the star knobs. A couple of clamps across the frame will hold it together until the glue dries. You can see what I mean in the photo.

Since the fixed fences are perfectly square to each other, the assembly is virtually assured to be square as well.

Bill Fisher
Vancouver, Washington



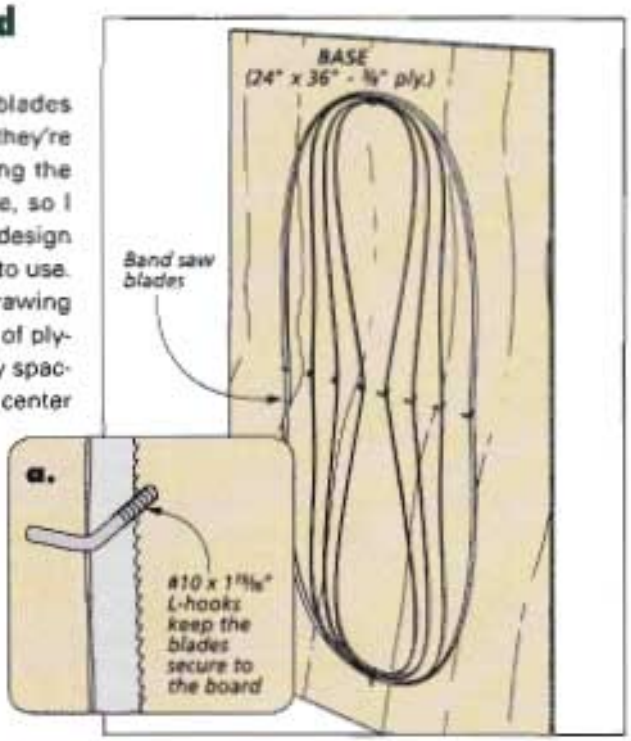


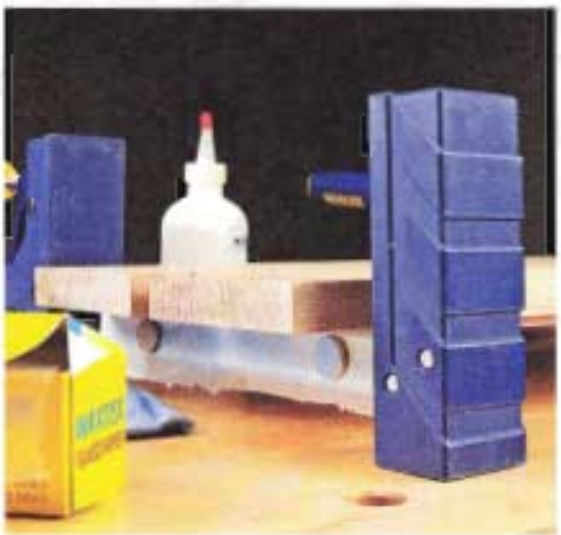
Storing Extra Band Saw Blades

I have several band saw blades that I need to store when they're not in use. I don't like using the standard folding technique, so I came up with this storage design that's a lot safer and easier to use.

As you can see in the drawing at right, you'll need a piece of plywood and a few L-hooks. By spacing the L-hooks across the center of the plywood sheet, you gradually tighten the loops on each blade so multiple blades can be nested inside each other. The L-hooks keep the blades in place, while allowing for easy removal.

David Kocken
Minneapolis, Minnesota





Easier Glueups

When I do a glueup, I always use waxed paper over the clamp beams to keep them clean and to prevent staining my project. But the waxed paper tends to slide around. So I found a solution to this slippery problem.

As you can see in the photo, I use a couple of rare-earth magnets to hold the waxed paper. And when I'm done, I can throw the paper away and store the magnets on the clamps.

J. Hahn
Priest River, Idaho

SUBMIT YOUR TIPS ONLINE

If you have an original shop tip, we would like to hear from you and consider publishing your tip in one or more of our publications. Go to:

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Table Saw Organizer

I always seem to be hunting the shop for the tools I need when I'm about to use my table saw. So I solved the "lost" tool problem with the table saw organizer you see in the photo below.

As you can see in the drawing, the organizer is an open-top box that hangs on the rip fence. A bracket stretches across the fence and holds a cleat that fits inside the top of the fence. The organizer is held securely to the fence with rare-earth magnets.

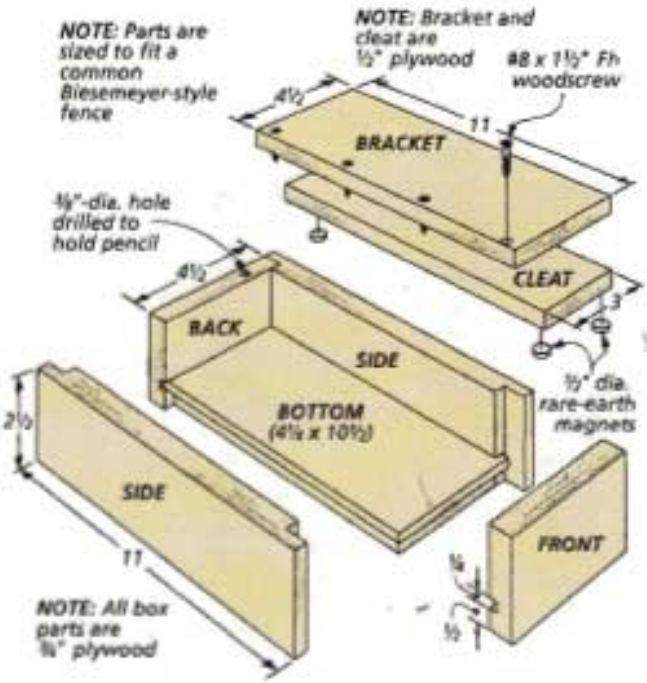
To build the tray, first I cut the pieces to size. Then I made the rabbets on the sides and the grooves to hold the bottom.

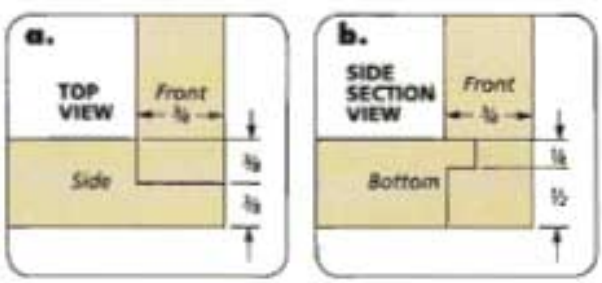
Once the box is assembled, you can add the bracket and cleat. The dimensions for the organizer shown here fit a Biesemeyer-style fence. If you have a different brand of fence, you may have to modify the bracket and cleat.

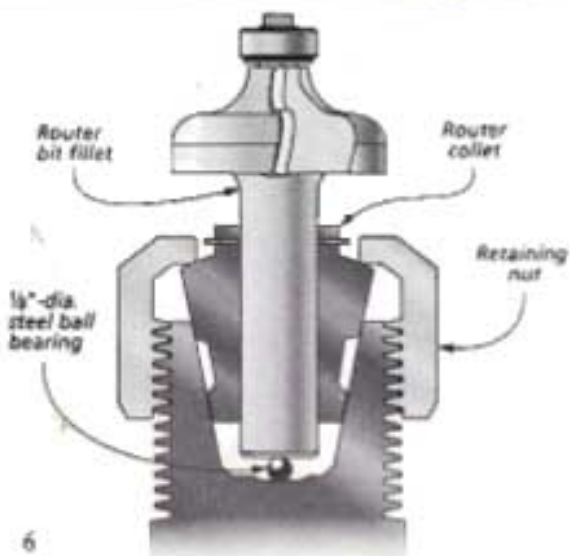
I attached the bracket to the tray using countersunk screws. After you drill the holes in the cleat to hold the magnets, you can attach it to the bracket with glue. I also drilled a hole in the edge of the tray for a pencil.

With the organizer, I now have a place for all the tools I need to work at the saw. Plus, the tools are safely confined in the organizer while the saw is running.

Cory Hoehn
Jeffersonville, Indiana







Router Bit Depth Adjuster

A router bit should be raised far enough out of the collet so that it isn't clamping on the curved fillet of the bit. But not so far that the collet doesn't have a good hold.

If you've ever tried to hold the bit out of the collet just the right amount while tightening the nut, you know it's a hassle. To raise the bit the right amount, I found that a ⅛" ball bearing raises the bit just the right amount.

Phil Floyd
Roscoe, Illinois

Honing Jig

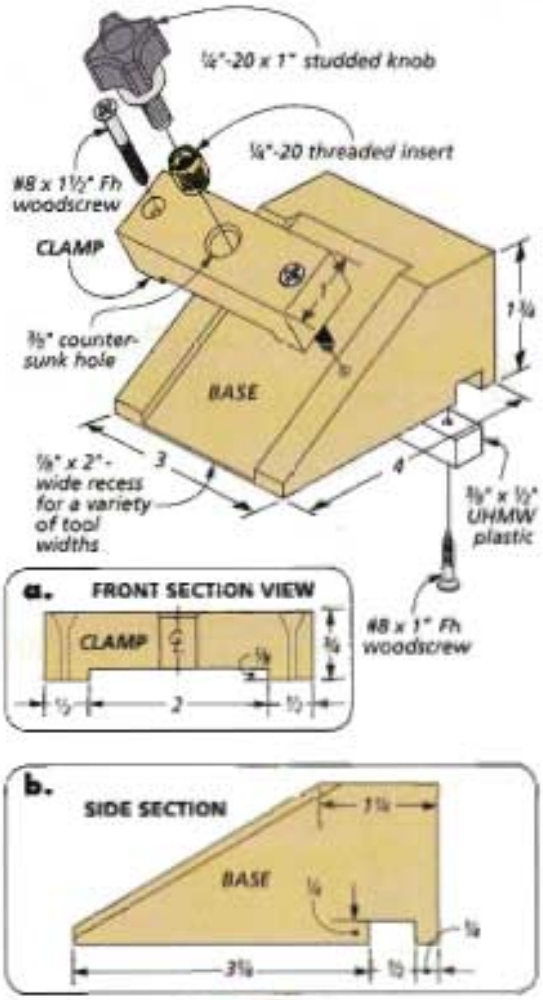
Instead of buying a new honing guide to sharpen chisels and planes, I decided to make my own. The jig you see in the photo above is the result.

The jig is a block of maple cut into a wedge with a 25° angle. I cut a groove down the center of the angle to create an area to hold the tool. A piece of UHMW acts as a glider on the bottom of the block. As you can see in the right drawings, I made the base wide enough to accept 2" plane irons, as well as chisels.

Finally, I added a clamp to hold tools in place. The clamp consists of a studded knob inside a threaded insert. The knob tightens down on the tool. A plane iron may have a open slot down the center, but a shim will give the knob something to clamp down on.

To adjust the jig for different bevel angles, I move the blade within a small range on the ramp until it's set at the proper angle.

Bill Wells
Olympia, Washington



Win This Bosch Impactor Driver

That's right, send us your favorite shop tips. If your tip or technique is selected as the featured reader's tip, you'll win a *Bosch* impact driver just like the one shown here. To submit your tip or technique, just go online to *woodsmith.com* and click on the link, "SUBMIT A TIP." You can submit your tip and upload your photos for consideration.

The Winner!

Congratulations to David Kocken, winner of the *Bosch Impactor* driver. To find out how you could win a *Bosch* driver, check out the information on the left.

Quick Tips

QUICK STOP BLOCK

When cutting multiple short pieces on the table saw, I had been using a stop block clamped to the rip fence ahead of the blade. But I found an easier way to do this.

I use a magnetic block fixed to the saw's table instead. To set this up, I add the width of the magnetic block to the length of the workpiece. Then position the rip fence at this distance, slide the block against it just ahead of the blade, and close the switch on the block. Now I can move the fence and the block stays in place. And there are no clamps to get in the way while cutting.

Len Urban
Rancho Mirage, California

PLANE EDGE SAVERS

I don't like to store my planes on the blades. And if I lay them on their side, they tend to take up too much room on the shelf. But I solved this problem with a pair of rare-earth magnets.

Two magnets attached to either end of the sole will lift the plane high enough so that the blade clears the shelf. When I'm using the plane, I can store the magnets on the top of the plane iron. And since rare-earth magnets are coated with nickel plating, I don't have to worry about the magnets scratching the plane's surface or promoting rust.

Serge Duclos
Delson, Quebec

5 bright ideas for Task Lighting

Whether you prefer incandescent or LED, bench mounted or freestanding, there's a light for you.

Lighting that shines right where you need it will give you a big advantage in your shop.

Most shops, no matter how well equipped, suffer from some lighting deficiencies. Commonly used overhead fluorescent lights offer a good solution at an affordable price, but they're limited to providing general illumination. There are times when you need to concentrate light on a particular area. And that's when you need to look at adding some task lighting.

There are several types of task lighting solutions for the shop, as you can see in the left photos. Light-emitting diodes (LED) are cooler and brighter than most other types of lighting. But you may prefer incandescent for it's warmer glow, availability, and lower price.

1 Rockler LED Work Light

The gooseneck LED light in the main photo is one of my favorites. It's sold by *Rockler* for about $60. Although it's the most expensive light here, it's worth it.

For starters, the gooseneck works great. You can turn it in any direction and it stays put. The LED lamp has 14 diodes that spread light evenly so there are no hot spots or dark areas. And the base attaches to any ferrous metal with three large, rare earth magnets. As an added feature this lamp comes with a clamp that lets you attach it to any non-metal work surface, as well. The light runs on three AAA batteries or an included AC adapter.

2 Rockler LED Magnifier

The LED light on the opposite page has a removable head. So you can swap it out for the magnifying lens you see in the right photo.

Since the light is powered with a low-voltage transformer or batteries, you don't even have to unplug it to change it. All you have to do is unscrew the small lamp and screw in the magnifying lens.

The magnifier features 18 LEDs circling the magnifying glass. Your work area is not only magnified, but well-illuminated too. If there's a downside to this light, it's that the circle of lights leaves a dark spot in the middle of the magnified area. I had to adjust the lens several times to get the light concentrated on the area where I was working. But since this magnifier is designed for close-up work, adjusting it isn't too much of an inconvenience. I found this light to be a good choice for its stability during use.

3 Delta Work Light

If you prefer incandescent light in the shop, you won't have to look far to find a good gooseneck lamp. *Delta Tools* makes one for about $27. At half the price of the LED light, this is a bargain. And the even glow and convenience of using a standard light bulb is also a plus.

This lamp is built for use in the shop. The gooseneck bends easily but stays put. Like the LED light, it also has magnets in the base to attach to any ferrous metal table or machinery. While the magnets aren't as strong as rare earth magnets, they're strong enough to support the lamp even if it's turned on its side.

4 Cordless Light

To illuminate the inside of a case or tool cabinet, a cordless flashlight is a good option.

Some cordless tool sets come with a flashlight as a bonus tool. And with features like a swiveling head or free-standing base, it can be an indispensable tool in your workshop.

Personal Lighting : Hands-Free

5 Headband Lamp

For "on-the-go" task lighting, check out the headband lamp shown here. This LED light is great for using when you're setting up your tools or performing a little maintenance on shop tools. The headband lamp was originally designed for sportsmen. But it has some features that are really helpful in a shop setting, too.

First off, the light is always in front of you as you work. And most have lights that swivel, so you can aim the light where you need it. The one shown here, made by *Rayovac*, has three light intensity settings, so you can adjust it to fit your needs. It runs on three AA batteries, but they last quite a long time. On the lowest light setting, you'll get 70 hours of use on the batteries.

The comfort level for this light is pretty high, as well. It has a soft, adjustable band that fits around your head and one across the top keeps the light securely in place. Plus, it only weighs a few ounces, so it's light enough that you won't feel the weight of it on your head after a day in the shop.

▲ The double trigger mechanism is designed to prevent inadvertent firing of a pin.

23-gauge

Pin Nailers

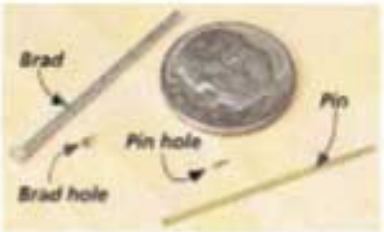
When you want to install light-duty fasteners that are virtually invisible, here's a tool that hits the nail right on the head.

A number of years ago, I purchased a brad nailer thinking that it would be handy for installing small, hard-to-clamp moldings and other project parts. I soon discovered that although a brad nailer has a thousand uses around the shop, tacking delicate trim is not one of them. The large, highly visible holes left by the 18-gauge brads and their tendency to split thin stock amount to serious drawbacks.

I had to wait a few years before a tool came along that would fill this need — the 23-gauge, headless pin nailer. The significant difference between a pin nailer (also called a micro-pinner) and a brad nailer is the size and shape of the fastener. The shaft of a 23-gauge pin is about one quarter the overall size of an 18-gauge brad. Furthermore, unlike a brad, the pins don't have an enlarged head.

The are two benefits. First, the headless pins fired by a pin nailer leave a tiny, nearly unnoticeable hole in the surface of the wood (photo at right). So filling the holes before or after finishing is often not necessary. And if you do choose to fill them, the result will almost certainly be invisible.

The second advantage is that even when fired into the thinnest, most delicate stock, a 23-gauge pin won't cause splitting.



▲ A 23-gauge pin leaves a hole that's a fraction the size of a typical headed brad.

HOW THEY WORK. Since the goal is a nearly blemish-free surface, a pin nailer is designed to operate a bit differently than a brad nailer. The firing mechanism on a brad nailer is pressure-activated to prevent accidental firing. A retractable tip has to be depressed by pushing it against the surface of the wood before the gun will fire. This inevitably leaves a noticeable dent, especially in softer woods, along with a good-size brad hole.

▼ Good-quality pin nailers offer a range of common features.

A pin nailer avoids this problem by using a different mechanism to control firing. All newer model pin nailers have a double safety trigger (inset photo, opposite page). Firing a pin requires two fingers. First, you use the middle finger to disengage the trigger lock or secondary trigger. Then the index finger can pull the primary trigger to fire a pin.

With the trigger lock disengaged, a nail will fire each time the primary trigger is depressed. And the spring-loaded trigger lock will automatically reengage when released, preventing firing. This system takes some getting used to, but it's not difficult to master.

MANY CHOICES. Today, there are a dozen or more different brands of pin nailers on the market that offer a variety of features. (See page 51 for source information.) You can buy a bargain model for less than $75 or spend upwards of $300 on a top-of-the-line gun. There are quite a few high-quality guns that fall in the $100 to $200 range.

One feature that correlates with price is the upper range of the length of pins a nailer can handle. Pins are available from ⅜" to 2" long (upper photo). And each model of nailer will handle a range. Increasing the upper end to 1¾" or 2" can tack $100 on to the cost. Unless you have a very specific need, it's probably not worth the extra investment. Several of the other handy features you'll find on different pin nailers are shown in the box below.

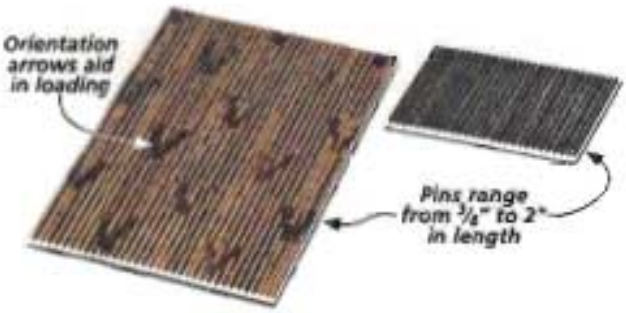
THE PINS. Like brads, different brands of pins are pretty much interchangeable. Any pin should work with any gun. The pins come in sticks of 100. Most nailers hold one stick while a few hold two.

As I mentioned, the pins are headless but they do have a head and a tail end. If you look closely, you'll see that one end of the pin has a chisel tip while the opposite end is flat. Arrows printed on the sticks indicate which end goes down (photo above).

Most nailers load from the side like a brad nailer, but a few load from the bottom. From my perspective, side loading gets the nod. It's easier and the pins won't fall out.

USING A PIN NAILER. When using a pin nailer, the first rule is to match the tool to the right tasks. The holding power of a headless pin is pretty fair but not great. So don't expect a pin to play a serious structural role. (A few guns shoot "slight head" pins that provide a better bite, as shown in the margin photo.) I like to rely on glue along with the pins to hold the workpiece. The pins simply act as clamps while the glue dries.

Resist the temptation to select a pin that's longer than necessary. For tacking ½"-thick stock, a 1" pin will generally do the job. A longer pin may not countersink fully and



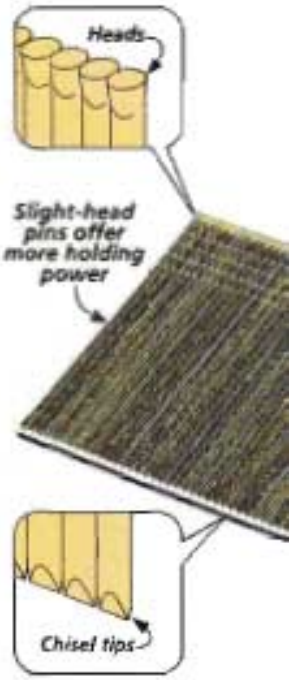
increases the odds of deflection. And whenever possible, shoot the pins at a right angle to the workpieces. There will be less chance of the pin wandering and blowing out through an edge.

PRESSURE. Pin nailers don't use a lot of air volume but require fairly high pressure — 60 to 100 lbs. So be sure you have enough pressure to set the pin fully. Ideally, it should end up just below the surface.

Depending on the nailer, increasing the air pressure may or may not set the pin deeper. If you find that the pin isn't being set as deep as you'd like, you may want to try a minor modification. File a little length off of the tip of the nailer. This results in the pin driver extending further beyond the tip when the nailer is fired.

Finally, I always try to pick an inconspicuous spot to install the pins. A pin placed in the "seam" between two molding profiles will be virtually invisible.

Admittedly, a pin nailer wouldn't make my list of everyday tools. But I sure like knowing it's in the cabinet when I need it.



Pin Nailer Features: From Common to Unique

▲ Most pin nailers have a window into the magazine near the tip to show when pins are running low.

▲ This Cadex pin nailer features a swivel air connection and a rear-facing exhaust diffuser.

▲ Some nailers include a soft tip that can be installed to prevent marring a finished surface.

precision

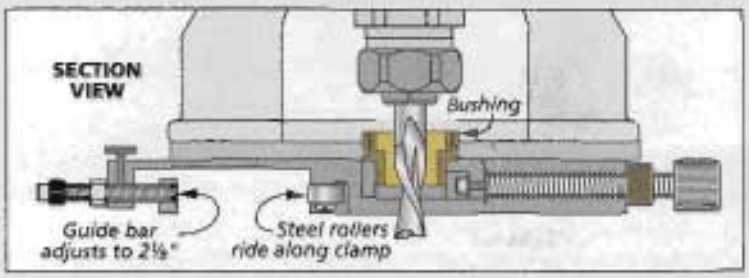
Router Dado Jig

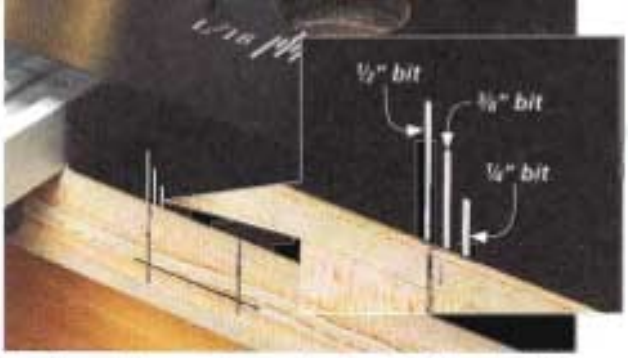
You can make precise dadoes, grooves, and rabbets every time with a jig that requires a minimal amount of set-up.

Using a jig to rout a dado or groove can give you fast, accurate results. That is, if the jig isn't too complicated and doesn't take a lot of setup. That's why I like the *Precision Router Dado Jig* from *Infinity*. With this jig, you'll be routing a dado in as little time as it takes to apply a clamp to a board.

ACCURACY. The jig consists of a cast aluminum base that fits over and slides along a straightedge clamp, as shown in the main photo. Included with the jig is a guide bushing that fits into an opening in the adjustable carriage, as you can see in the left photo. The bushing attaches to your router's baseplate and locks the router to the jig for clean, accurate dadoes.

BUSHING. With this bushing you can use a bit up to ¾" in diameter.





▲ Three index marks on the front of the dado jig allow you to locate the jig quickly. Each index mark is set for a different size of router bit.

▲ Routing a dado exactly the width you need is easy with this jig. A micro-adjust feature allows you to fine-tune the dado width.

This means you won't have to make as many passes for wide dadoes. And the bushing allows you to lift the router off and on the jig easily, so you can make adjustments quickly. This feature is one of my favorites. It really saves time when I'm making wide or multiple dadoes in a workpiece. I can also adjust the depth of my router bit without having to work around the jig.

LENGTH. Another feature I like about this jig is that it rides on a straightedge clamp. (The clamp is not included.) This means that the length of your dado is limited only by the length of your clamp. So you can rout dadoes in wide workpieces, like case sides. And the jig adjusts to fit different sized straightedge clamps.

DIAL IN. Dialing in a precise dado width is easy with this jig. If you take a look at the lower photo on the opposite page, you'll see the adjustable carriage in the jig that holds the bushing. This carriage slides side-to-side by means of a micro-adjustable screw. An indicator scale printed on the jig lets you know how far you've moved the carriage. Once positioned, the carriage can be locked in place by means of a locking nut.

GUIDE SYSTEM. On the underside of the jig you'll find a bar that guides the jig along the straightedge clamp (drawing, opposite page). An adjustment screw on the end of the jig draws the guide bar to the straightedge evenly, and a locking nut holds it in place. Set screws on the top of the jig can be tightened down to keep the bar from racking. Across from the guide bar are two steel rollers that help the jig glide on the straightedge. When adjusting the guide bar to the straightedge clamp, you want the jig to slide freely without slop.

SET-UP. Located on the front of the jig are three small index marks (left photo, above.) Each mark indicates the inside edge of a particular size of bit. To position the straightedge clamp and the jig in one step, all you need to do is lay the straightedge clamp on the workpiece with the carriage zeroed out. Then align one of the index marks with the layout line of your dado, clamp the straightedge to your workpiece, and you're ready to rout dadoes.

After you've made the first pass with the router, you can widen the dado by moving the micro-adjust screw (right photo above). Just loosen the locking nut and turn the screw for a precise fit of any width. The indicator scale is marked in 1/16" graduations. And it's easy to check the width of your dado after each pass (right photo).

RABBETS. The jig routs rabbets as easily as it does dadoes. But I set the adjustable carriage at the center of the indicator scale to balance the weight of the jig. I cut the edge of the rabbet first and then worked my way in for a wider rabbet.

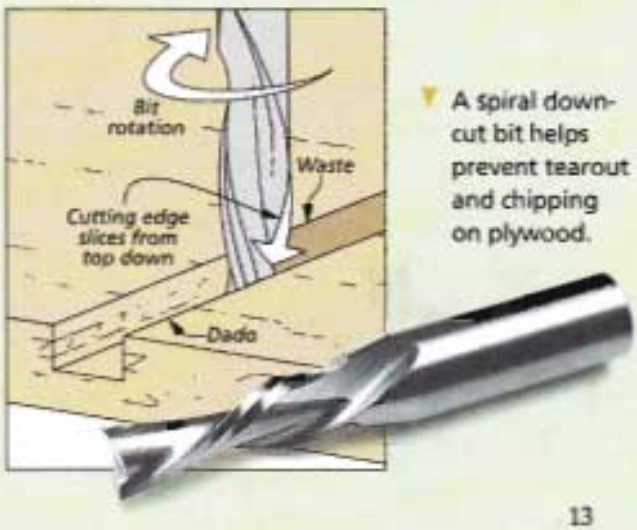
I found this jig to be one of the best I've used. It's simple setup and ease of use out-classed other dado jigs I've tried. I think you'll find it delivers perfect dadoes every time. And it can be done without spending a lot of time setting it up.

◀ With this jig, you can dial in accuracy for a perfect-fitting dado every time.

Cleaner Dadoes: Spiral Downcut Bit

Using a spiral downcut bit to make dadoes, grooves, or rabbets in plywood guarantees a nice clean edge. It even limits tearout in hardwood, too.

The spiral bit is designed to sheer down so that the top veneer of the plywood doesn't tear out. I keep a ½"-dia. bit on hand to cut wide dadoes in two passes. Spiral bits are available from ⅛" to ½" in diameter. There's more information in Sources on page 51.



▼ A spiral downcut bit helps prevent tearout and chipping on plywood.

complementary Template Routing

This outside-the-box routing technique provides a foolproof way to create a seamless joint along a curved line.

When making the pizza peel on page 16, I used a simple trammel to cut the matching arcs that form the joint between the handle and the paddle. This is an easy way to get a good match between two curves. However, working on this unique joinery brought to mind another technique I wanted to try. The trick to this method is to use a pair of templates to rout the two parts of the curved joint.

COMPLEMENTARY TEMPLATES. In brief, the technique involves making two complementary templates. Starting with a single blank, you make both templates with a single cut using a router in a trammel, and a ⅜" spiral upcut bit. The radius of the outer arc created by the cut matches the desired curve of the joint. The radius of the arc on the opposite side of the cut will measure ⅜" less.

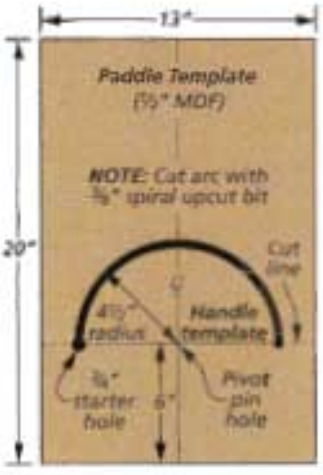
After separating the templates, each is used with a different router bit to create the joint. A flush trim bit guided by the concave template will give you the correct radius for one half of the joint. Since the radius of the convex template measures ⅜" less, you make up the difference by using a bit with an oversize bearing on the shank. In this case, I combined a ⅝"-dia. straight bit with a 1⅜"-dia. bearing to create the ⅜" difference needed for the cut. The end result is a perfect match between the two curves.

It may seem like a lot of work for a "one shot" use. But if you're making multiples, this technique makes considerably more sense. And the same general technique can even be applied to free-form curved joints.

THE TEMPLATES. Making a set of accurate templates is essential to the success of the process. I found

▼ These three bits team up to create a perfect-fitting curved joint.

Note: For sources of bits and bearings, see page 51



▲ The two ½" MDF templates are made in a single cut using a router trammel.

Using the template for the paddle, lay out the arcs on both workpieces, then rough cut them on the band saw.

that there were three keys: I used easy-to-rout ½" MDF for the template blank, a ⅜" spiral upcut bit with a ½" shank to make the cut and, as I mentioned, a shop-made trammel to guide the cut.

I started with a blank big enough to accommodate both templates with enough extra material for clamping when in use. The drawing on the opposite page shows how the blank is laid out.

After drilling the pivot pin hole, lay out and drill a starter hole for the router bit near one edge. The template cut you'll make is roughly semicircular. This will give you more than enough "guide edge" when making the short arc cuts on the paddle and handle blanks.

THE TRAMMEL. The trammel I used is simply a rectangular piece of ¼" hardboard mounted to the router base (lower photo, opposite page). After attaching it and installing the bit in the router, you can measure from the outside edge of the bit to locate the pivot hole (4½"). I used a small nail as a pivot pin.

THE TEMPLATE CUT. Now, you're nearly ready to make the template cut. First, be sure the bit is adjusted to cut completely through the blank. Then clamp the blank down over a sacrificial panel. Place the bit in the starter hole and securely engage the pivot pin in the blank. You'll have to lift the router slightly to start it, then plunge it into the backup piece and slowly rout the half circle. Finally, the two templates can be separated at the band saw by making a cut from each side (template drawing).

THE PADDLE CUT. Making the templates is the hard part. Using them is pretty straightforward.

I started with the paddle blank. The template for this half of the joint matches the final shape so you can use it to mark the paddle blank for rough-cutting on the band saw. Draw a centerline and two end lines on the paddle blank and use them to position the template, as shown in the left photo above. When removing the waste, stay just outside of the layout line (right photo above).

As I mentioned, you'll use a flush-trim bit with the paddle template. This means the template has to be positioned beneath the blank when routing, as you can see in the left photo below. I positioned the template using the layout on the paddle blank, then flipped it over to clamp both parts down firmly to the bench. The section to be routed overhangs the benchtop.

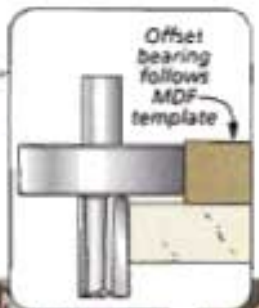
To get a smooth, chatter-free edge, I used a spiral downcut flush-trim bit with a ½" shank. Rout from left to right, concentrating on keeping the router flat on the blank.

THE HANDLE CUT. The handle cut is different in a couple of minor ways. Since the handle template is offset from the final joint line, I again used the paddle template to lay out the joint on the handle blank for rough cutting. Just reverse its orientation so the template extends off the end of the blank.

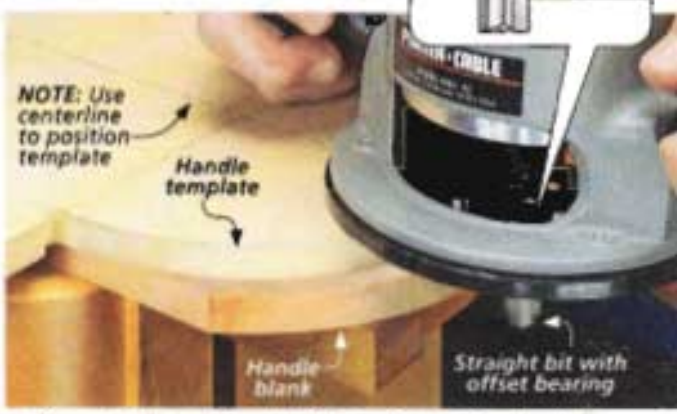
This half of the joint is cut with the "offset" bit I described earlier. You can use any combination of bit and bearing that creates a ¾" offset. But just make sure the bearing is fixed tightly on the bit shank.

Since the bearing is on the shaft, the template will be positioned on top this time (right photo below). It works best to make this cut in one shallow pass. You may get minor chipping at the end of the cut, but this is waste that will be cut away.

Now if you're anything like me, you'll be itching to check the fit of the two pieces. And if your experience matches mine, you'll be pleased with the result.



The arc is routed on the paddle blank with the template positioned on the underside and both parts clamped over the edge of the bench. Use a clean-cutting flush-trim bit to make the cuts.



To rout the mating half of the joint, the handle template is positioned on top of the handle blank. It's offset ¾" from the joint line.

restaurant-style Pizza Peel

With this attractive and handy item, you may never want to eat pizza out of a box again.

▲ The tapered design of the peel makes it easy to slide under a hot pizza so it can be transferred from the oven to a cutting board.

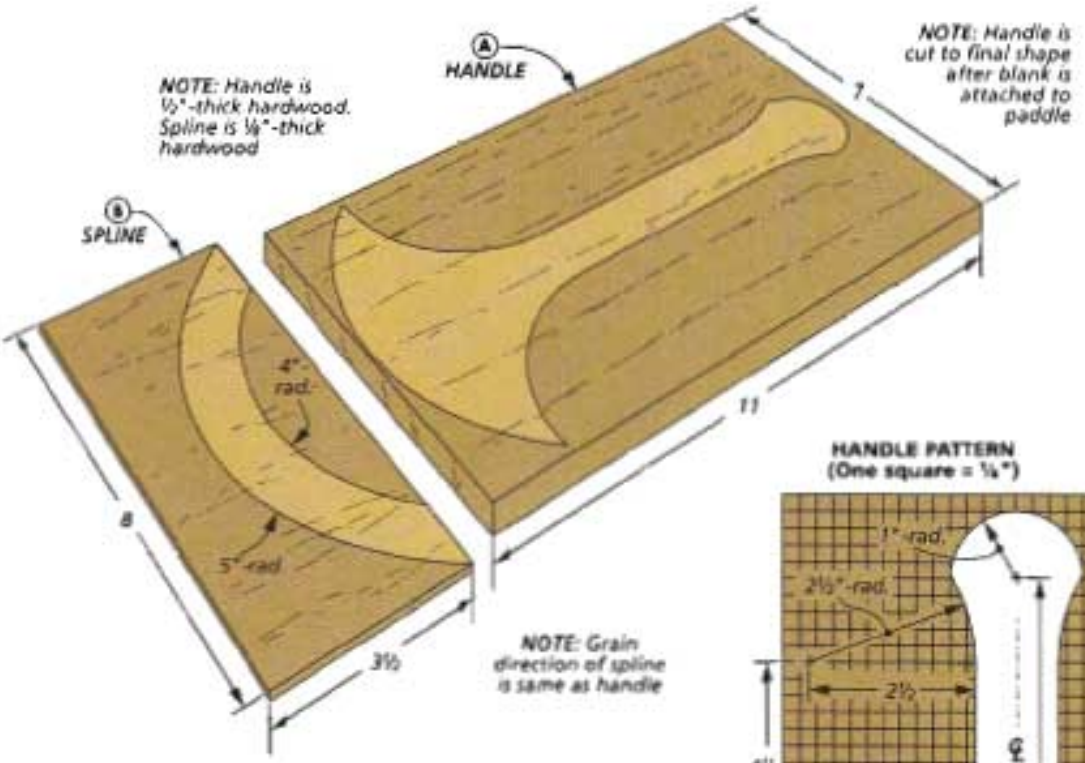
A pizza *what*? That was the first question I had about this project. However, I've been assured by several people who know more about these things than I do that "pizza peel" is the proper name for this kitchen gadget. It's used to slide pizzas in and out of the oven.

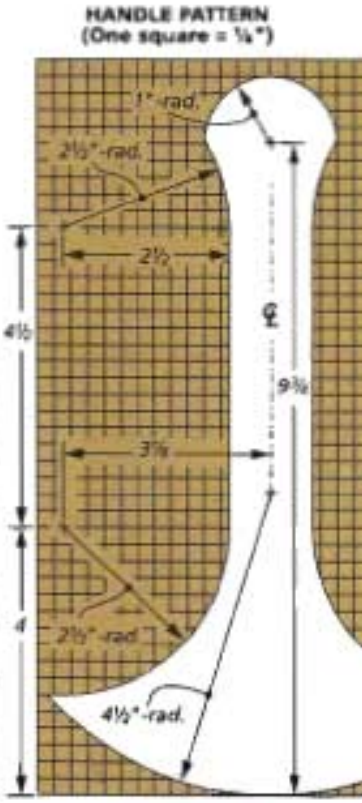
Of course, as a woodworker, I was more interested in how this project was going to be constructed rather than what it was called. At first glance, it looks quite simple — just a flat, glued-up paddle with an integral handle.

After a closer look, I realized there were a few details to work out. For one, the handle and paddle are made separately and connected by a curved, splined joint. This requires shaping these two parts to fit together seamlessly.

Another challenge was figuring out a way to taper the paddle along its entire length. For this, I came up with a simple jig that allows you to do the tapering with a planer. Before getting too far into all of this though, let's start by working on the handle.

start with the HANDLE





This pizza peel is made up of two main parts — a handle and a paddle. To give the peel a distinctive appearance, I made these parts out of contrasting woods. For the handle, I chose cherry.

The handle begins as a slightly oversized blank of ½"-thick stock. But you won't cut the handle to final shape until after it's joined to the paddle. For right now, the focus is on creating the curved, splined joint that connects the handle to the paddle.

ARC. If you take a look at the pattern at right, you'll see that the arc on the end of the handle has a radius of 4½". In order to ensure a smooth, precise fit between the handle and the paddle, I decided to use a router and a simple trammel to cut the curve.

The trammel is nothing more than a piece of ¼" hardboard. It has two pivot holes spaced ½" apart. One hole is used to cut the curve on the end of the handle blank and the other hole will be used when you cut the matching curve on the paddle blank.

To avoid driving the pivot pin directly into the handle, I taped a pivot block to the blank. (For more on the trammel, see page 31.)

I cut the arc using a ½"-dia. straight bit, as shown in the first drawing in the box below. You'll want to make sure to place a sacrificial backer board underneath the handle blank so that you don't rout into your workbench. Then you can cut the profile in two passes, lowering the bit between passes to remove the waste.

(For an alternate method of creating this curve, see the template routing article on page 14.)

SLOT. With the arc completed, you can make the slot for the spline that will connect the handle to the paddle. This can be done at the router table using a slot cutter, as shown in the middle drawing in the box below.

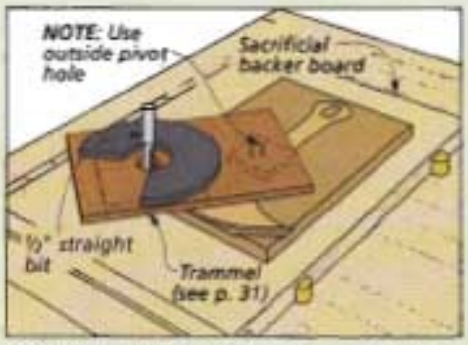
You may experience some minor tearout as the bit exits the cut, but don't worry. Since the blank is extra wide, this tearout will disappear once the handle is cut to final shape later.

SPLINE. The last step before moving on to the paddle is to create a spline to join the two pieces of the peel. To match the profile of the slot in the handle (and later, the paddle) I laid out two arcs on the spline blank. After cutting the inside curve, you can glue the spline into the handle. Once this is done, you can set the handle blank aside while you work on the paddle.

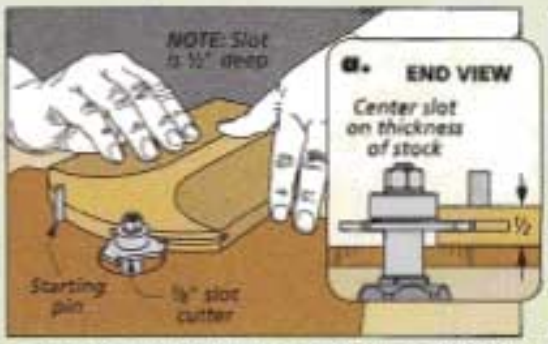
Woodsmith GO ONLINE EXTRAS

For a full-size pattern, visit our website at Woodsmith.com.

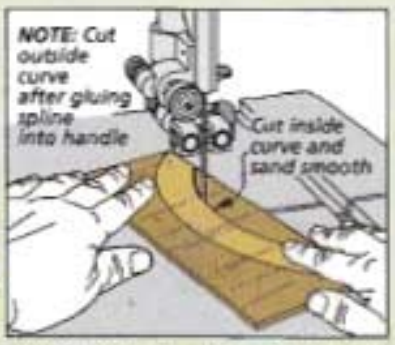
How-To: Make a Curved Spline Joint



Rout Arc. *Using a straight bit and a router trammel, rout the arc on the end of the handle blank in two passes.*

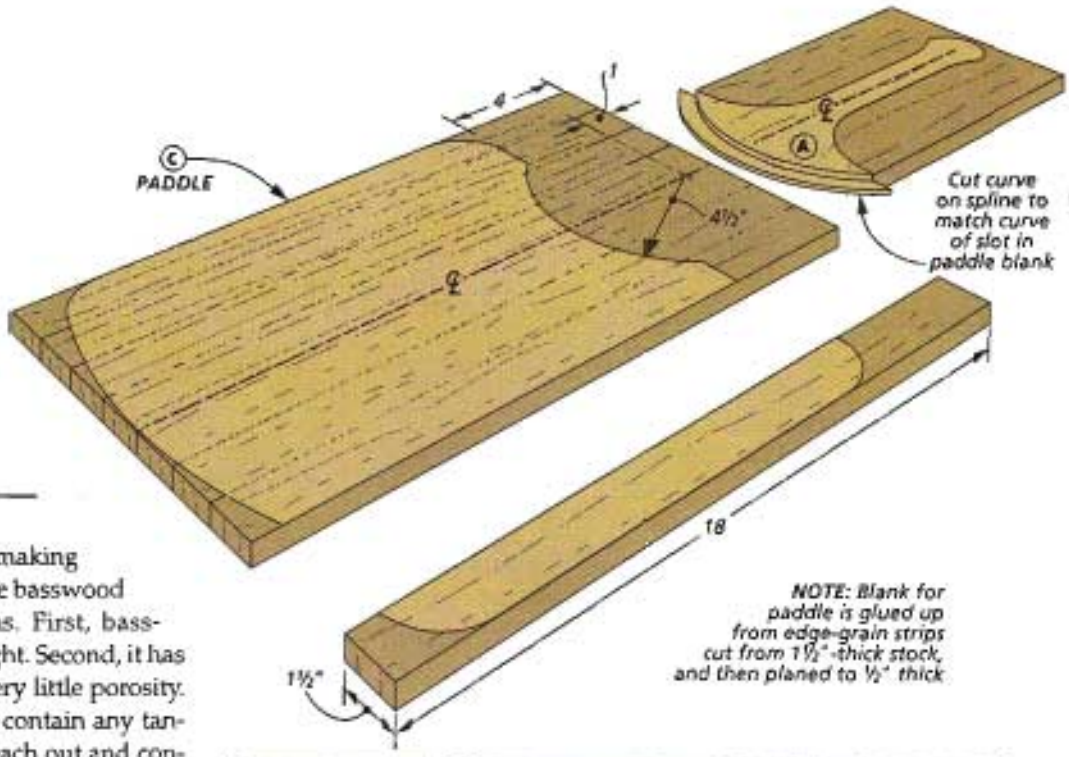


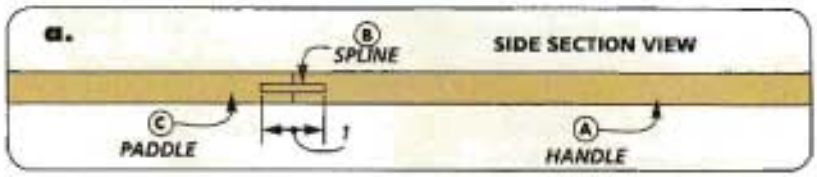
Create Slot. *At the router table, rout a centered slot on the curved end of the blank with a slot cutter. A starting pin helps control the workpiece.*



Shape Spline. *After cutting the inside curve for the spline, glue it into the slot in the handle blank.*

adding the PADDLE





When it came to making the paddle, I chose basswood for a few reasons. First, basswood is lightweight. Second, it has fine grain with very little porosity. Finally, it doesn't contain any tannins that might leach out and contaminate the flavor of the pizza.

PADDLE BLANK. Like the handle, the paddle also starts out as an oversize blank. I made this blank extra long to accommodate the pivot point that will be used to rout the curve for the handle.

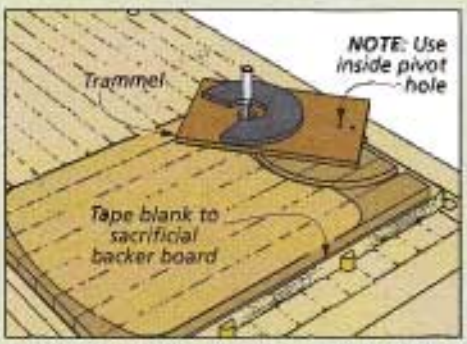
But because the paddle is so much wider than the handle, I glued up the blank from edge-grain strips of wood, as you can see in the drawing above. To end up with a 12"-wide blank, I ripped eight strips from a 1½"-thick board. (I ripped my strips a little wider than ½" so that I could plane the blank to final thickness after it was glued up.)

ROUT ARC. Once the paddle blank is glued up, it's planed and trimmed to its initial size. The next step is cutting the arc for the handle. I used the same trammel as when routing the handle — but this time using the inside pivot hole (to account for the diameter of the router bit). You can see how this is done in the first drawing of the How-To box below.

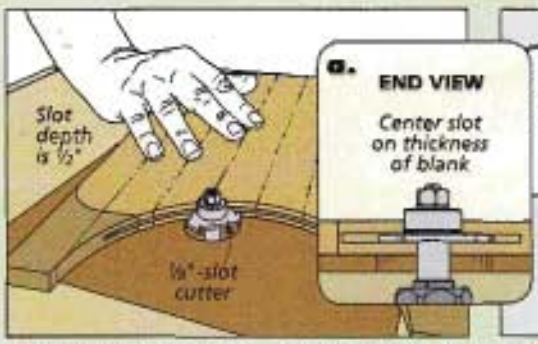
SPLINE SLOT. With the arc cut, you can step back over to the router table and the slot cutter to make the slot for the spline, as shown in the second drawing below. Then to make it a little easier to fit the handle to the paddle, I trimmed off most of the excess waste at the end of the blank.

GLUEUP. Before you can glue the handle to the paddle, you still need to trim the spline to match the curved slot in the paddle blank. I cut away most of the spline waste at the band saw and then sanded the edge smooth. After checking the fit, you can glue the blanks together. To help align the pieces during the glueup, I drew a centerline on both blanks.

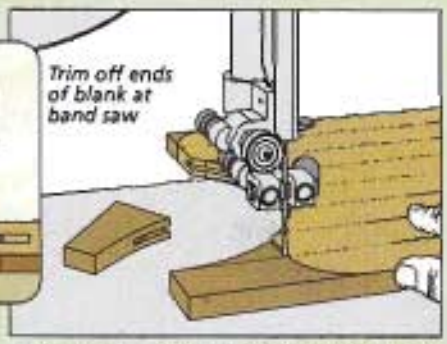
How-To: Make the Paddle



Rout Arc on Paddle. *Using the trammel again, rout an arc at one end of the paddle blank to accept the handle.*

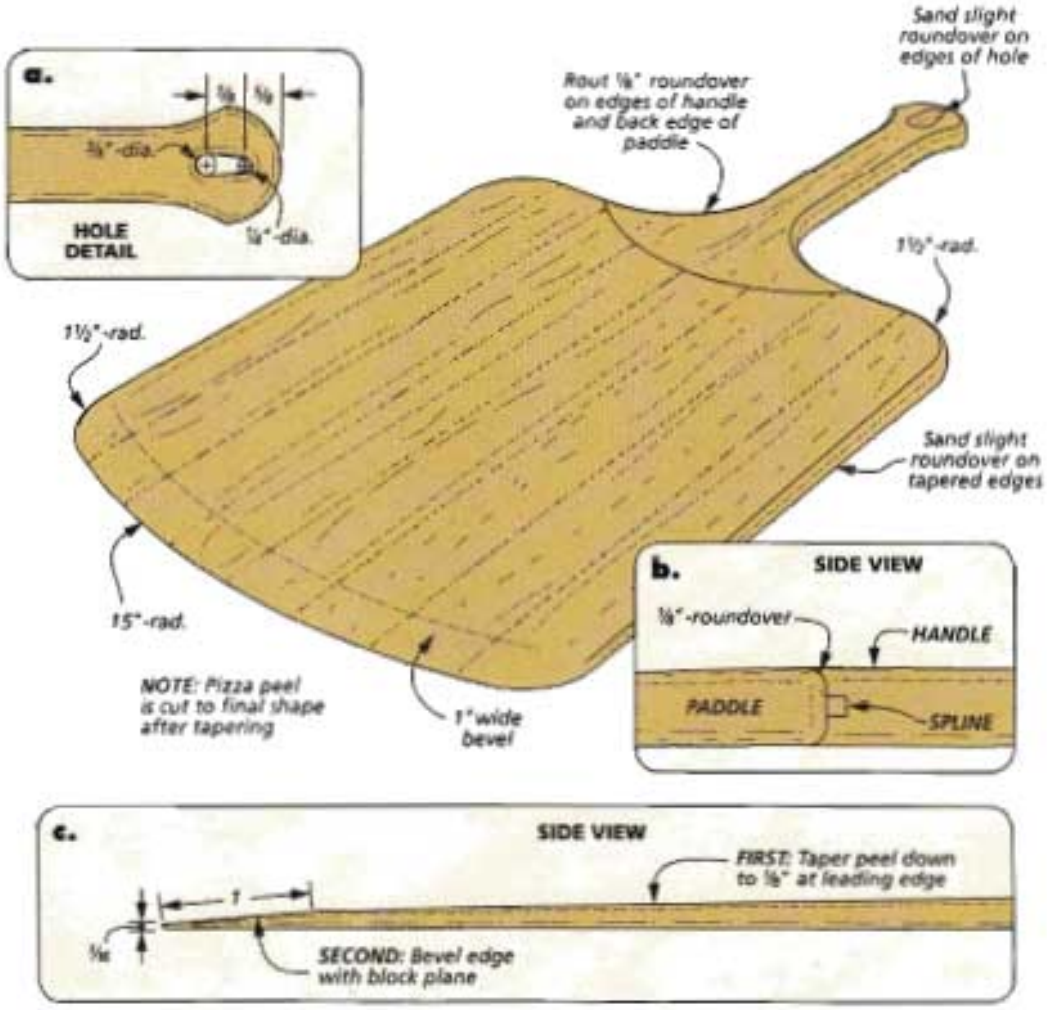


Rout Slot for Spline. *After cutting the arc, it's back to the router table to rout the slot for the handle spline.*



Trim Ends. *Before gluing the handle and paddle together, trim the "ears" off the end of the paddle blank.*

completing the PEEL



If you take a look at detail 'c,' you'll notice that the peel tapers from ½" to less than ⅛" at the leading edge. To create most of this taper, I made a tapering sled for my planer. It holds the pizza peel at the correct angle while it passes through the planer, as you can see in the first drawing in the How-To box below. (For more on making the sled, see Shop Notebook on page 30.)

SHAPING. After you've finished tapering the peel, the tough work is pretty much over. All that remains now is to do the final shaping. I started by laying out the shape of the pizza peel on the blank. Then it's just a matter of cutting the profile on the band saw and sanding the edges smooth.

BEVEL. To allow the peel to easily slide under a pizza, I created a 1"-wide bevel along the leading edge. This requires a little hand work with a block plane (or sanding block), but it's not difficult. I just drew a layout line 1" back from the front of the paddle and then beveled the edge down to ⅛".

HANG HOLE. In order to store the pizza peel when it's not in use, I added a teardrop-shaped hole to the handle, as shown in detail 'a.' You can create this opening by drilling a hole at each end and then cutting out the waste in between with a scroll saw or coping saw.

The final step is to round over the edges of the peel (see drawing above and detail 'b'). After adding a finish (see page 51 for suggestions), you can warm up the oven — and have a pizza dinner.

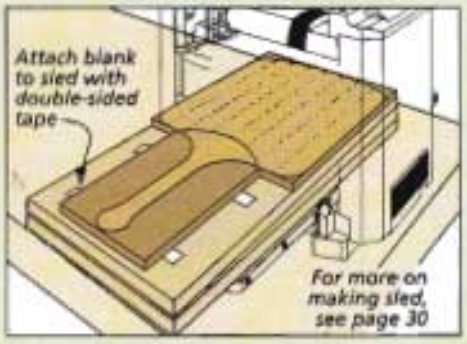
Materials, Supplies & Cutting Diagram

A	Handle (1)	½ x 7 - 11	NOTE: Dimensions shown are for blanks. Parts are cut to final size after assembly
B	Spline (1)	½ x 8 - 3½	
C	Paddle (1)	½ x 12 - 18	

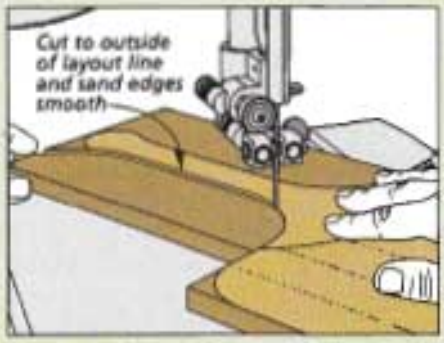
½" x 8" - 24" Cherry (1.3 Sq. Ft.)

1½" x 6" - 24" Basswood (2 Bd. Ft.)

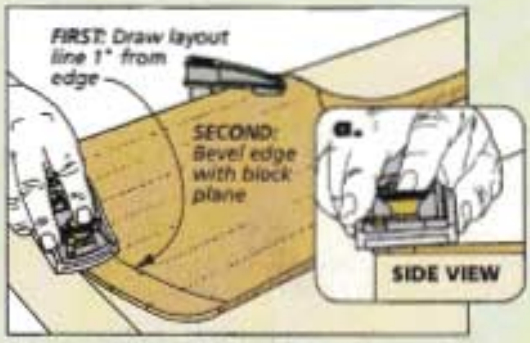
Shape the Peel



Tapering Sled. *Using a shop-made tapering sled, taper the blank on the planer until the front edge is ⅛" thick.*



Cut to Shape. *After carefully cutting away the waste at the band saw, sand the edges of the peel smooth.*



Bevel Edge. *A block plane makes quick work of creating a short bevel on the front edge of the paddle.*

Craftsman-style Book Rack

With just one board and a couple days in the shop, you can build a handsome place to organize and display your favorite books.

At first glance, there are a few things that make this small book rack really stand out. First, the decorative openings on the ends catch your eye. Then the joinery grabs your attention. Finally, the quartersawn white oak I used to build the rack gives it a classic, solid look.

There are only three main parts to this project — a shelf and two ends. When building a small project, I tend to be particular with the details. So I enhanced the design with gently curved ends that include an arc on the bottom.

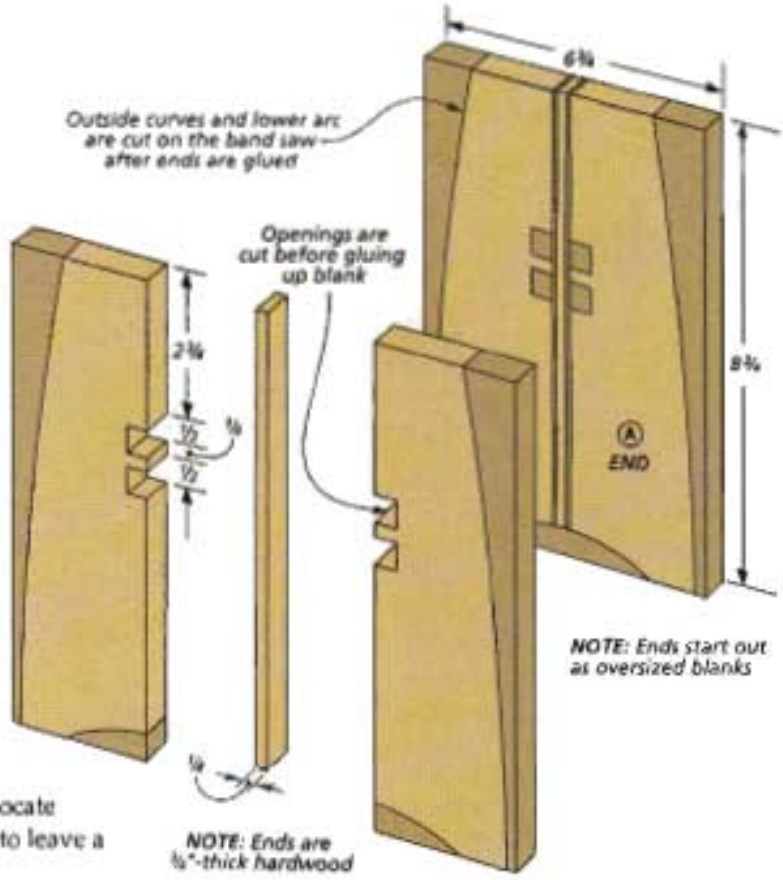
As for the joinery, the shelf looks like it's connected to the ends with through tenons. But these "tenons" hold a secret. They're actually plugs over screws that connect the shelf to the ends. Along with the square openings, the plugs contribute to the Craftsman-style appearance of the book rack.

And speaking of the openings, there's a unique table saw technique for making these square holes that ensures they're perfectly sized and centered with a minimum of hassle.

For a consistent look, the cutouts and the plugs are all the same size. And I'll show you a quick way to guarantee that the ends of the rack turn out looking like identical twins.

So while this project may look simple, I think you'll find it an interesting one to build. And you'll have the chance to hone some of your woodworking skills.

make the **ENDS**



The two, curved ends define the look of the book rack and they support the shelf. In addition, the ends feature a pattern of square openings. And that's where I started with the book rack.

OPENINGS. The challenge in creating these openings is to get them even, smooth, and square. Rather than trying to chisel out the openings by hand, I came up with a table saw technique to do this.

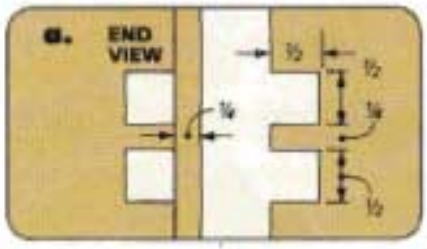
It starts with an extra-wide blank, as you can see in the drawing at right. The blank is then sliced into three pieces. (The middle piece is simply a narrow strip.) The wide, outer pieces then have a pair of notches cut in one edge. When the parts are glued back together, evenly sized and spaced square openings are formed. By starting with an extra-wide blank and gluing the pieces back together in the same order, you can practically eliminate any glue lines.

The box below shows you the specific steps to make the openings. It's a good idea to mark the face of each blank to help in reassembling the pieces later on.

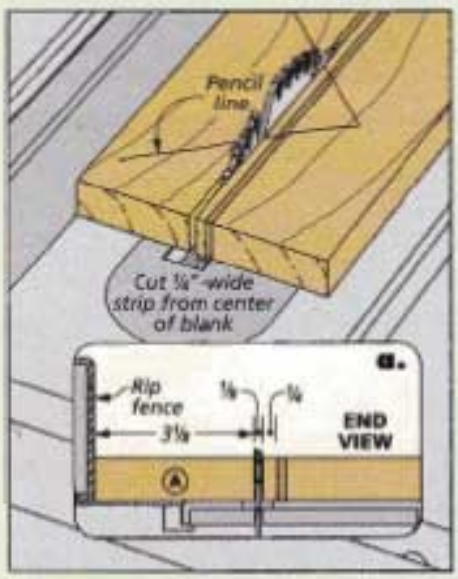
NOTCHES. I cut the notches in each "half" of the ends with a dado blade. You can attach an auxiliary fence to the miter gauge to both support the pieces and prevent tearout.

To keep the notches in each end aligned, I held the pieces together with a strip of double-sided tape. Then set the rip fence to locate each notch. Just be sure to leave a ¼" tab between the two.

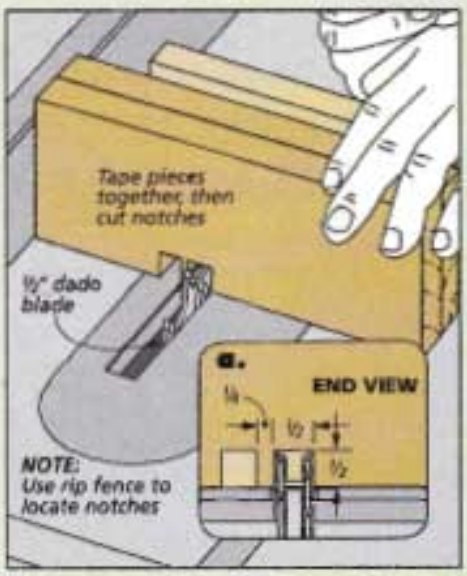
GLUE UP THE ENDS. Now you can reassemble the pieces to make the ends. What's important here is to make sure all three pieces (and notches) are perfectly aligned. You can see the clamping setup I used for this in the lower right drawing. Once the clamps come off, the ends are ready to be shaped.



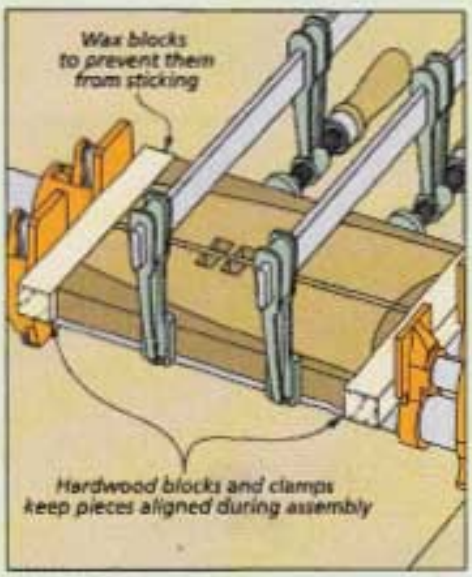
How-To: Create the Openings



Cut Apart. *To create the three pieces, rip the first section free. Then turn the piece end for end and make another cut.*

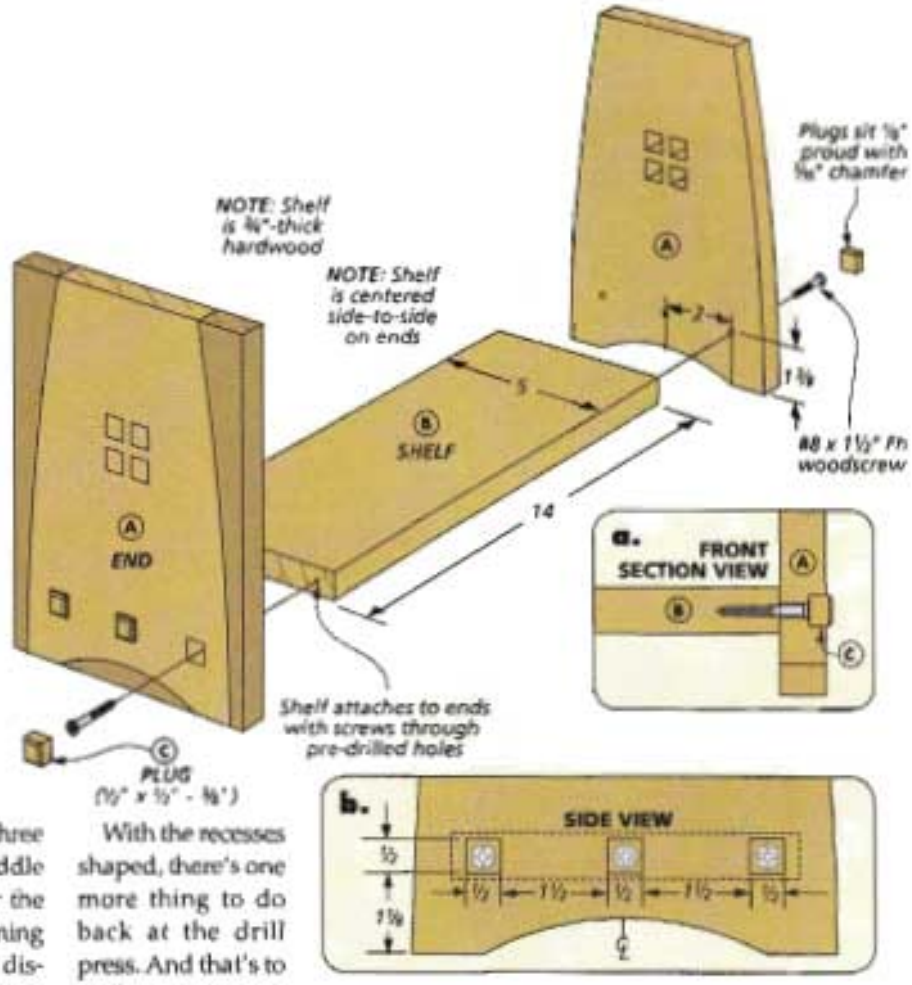


Make The Notches. *Tape matching sides together to cut the notches so they are perfectly aligned when you glue them up.*



Glue Up. *Once the notches are cut you can glue the ends together. Use clamps in both directions to keep the pieces aligned.*

shaping the ENDS



Now that you have the end blanks glued back together, there are just a few more steps to complete before you can add the shelf.

The shelf is attached to the ends with screws. The screws are set in shallow recesses and then covered with square plugs to create the look of through tenons.

RECESSES. I laid out the three recesses starting with the middle recess centered directly under the square openings. The remaining recesses are placed an equal distance away from the center, as you can see in detail 'b'. Since the end blanks are still square, you can use the edges to lay out the shape of each recess so that it's square and aligned with the others.

Creating the recesses is a two-step process, as you can see in the box below. The first step is to drill out most of the waste at the drill press. Then back at the workbench, square up the sides with a chisel. Work carefully here to keep the recess square and uniform.

With the recesses shaped, there's one more thing to do back at the drill press. And that's to drill a countersunk screw hole in each recess. Here, you can use the center point left by the Forstner bit to locate the holes.

CURVES & ARC. At this point, you can shape the edges and bottom of each end. The pattern on the opposite page makes it easy to lay out each detail. There's also a full-size pattern available online at our website, Woodsmith.com.

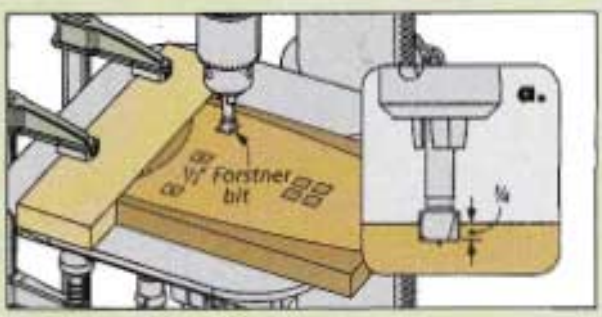
The key is to shape the ends so they are exact duplicates. The way to do that is to tape the blanks together and then shape them both at the same time. The box on the next page walks you through the process.

ADD THE SHELF

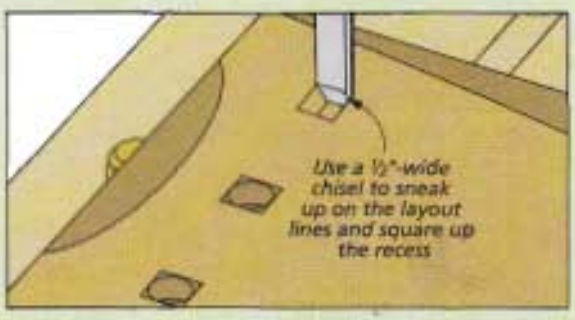
Completing the ends wraps up most of the work. All that's left is to make the shelf and some plugs.

SHELF. The shelf is pretty straightforward. It's simply a board that's cut to the size shown in the drawing above. As I mentioned earlier,

How-To: Making Shallow Recesses



Drill Out the Waste. *Use a Forstner bit to clean out the waste from each of the recesses. Center the middle recess directly under the four openings.*



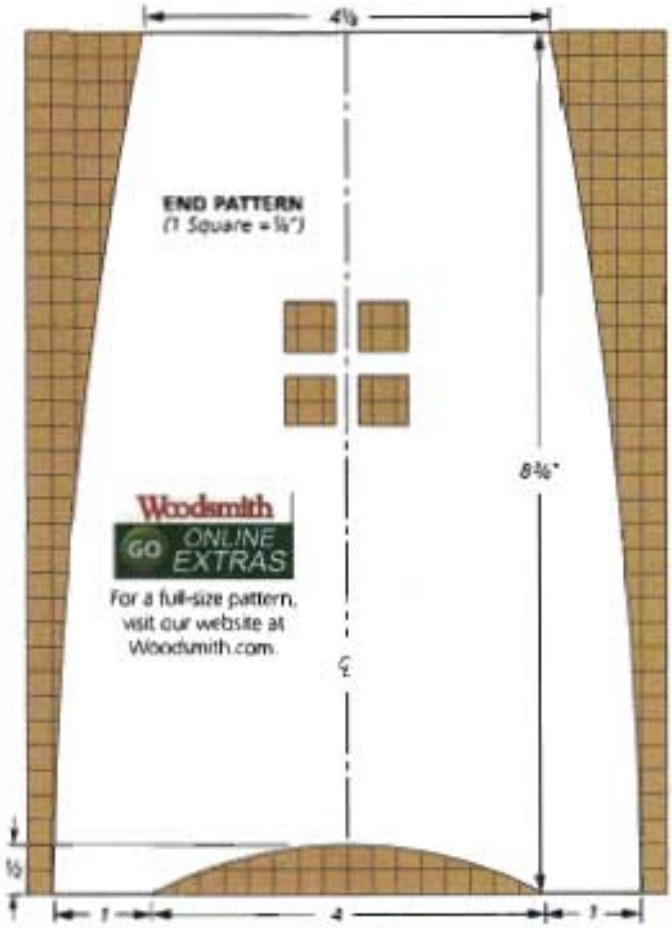
Square it Up. *A sharp chisel helps you square up the corners of the recesses. Pay particular attention to keeping the corners square, so the plugs fit snugly.*

screws connect the shelf to the ends. To drill pilot holes and install the screws, I raised the shelf on temporary supports. A clamp will keep everything in place while drilling, as shown in the third drawing at right.

PLUGS. Since the plugs that cover the screws are meant to look like through tenons, it's important to note that the grain orientation is correct. And since the pieces are small, it's a good idea to work from an extra-long blank. Size the blank to fit snugly in the recesses in the ends.

After sanding a slight chamfer on the end of the blank, crosscut the plug to length, as shown in the lower right drawing. Glue the plugs in place to complete the book rack. There's more information about the finish I used on page 51.

Finally, you can find the right place to display your latest creation — and your favorite books.

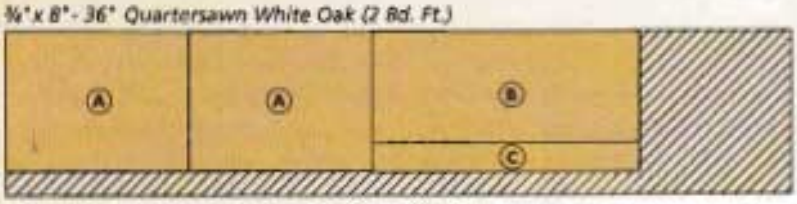


Materials, Supplies & Cutting Diagram

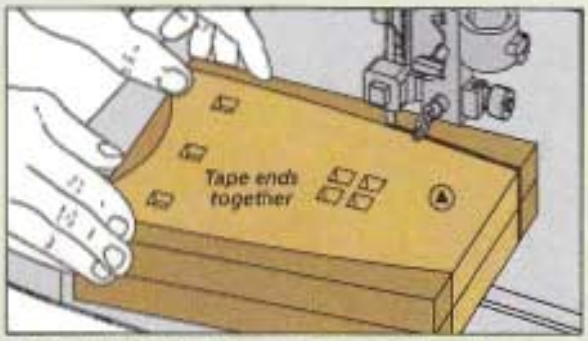
A	Ends (2)	¾ x 6 - 8¾
B	Shelf (1)	¾ x 5 - 14
C	Plugs (6)	½ x ½ - 3/8

• (6) #8 x 1½" Fh screws

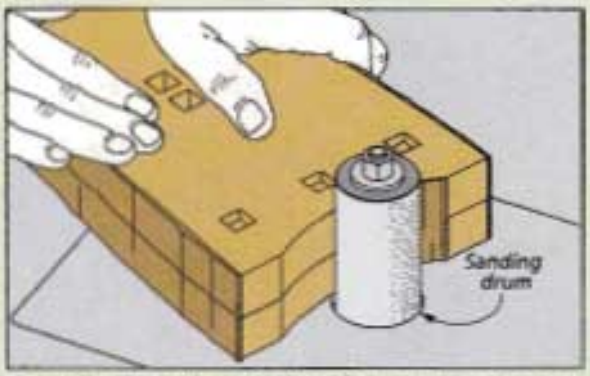
¾" x 8" - 36" Quartersawn White Oak (2 Bd. Ft.)



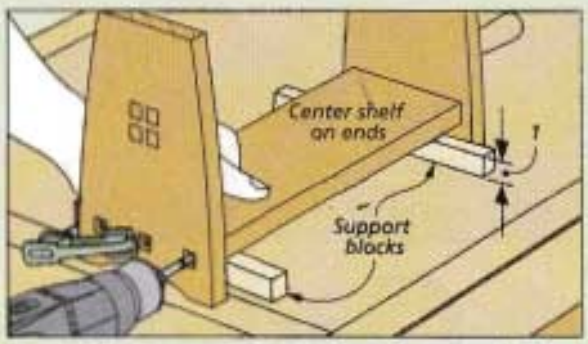
How-To: Curves & Plugs



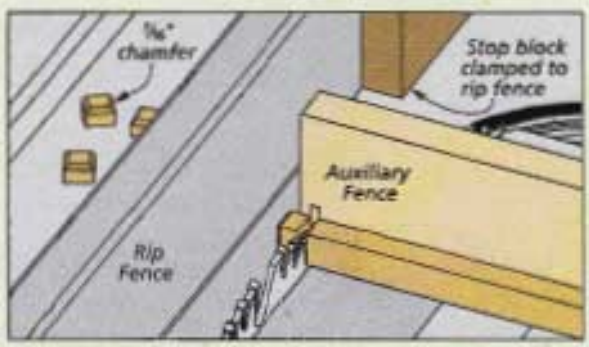
Shape the Ends. *When you're ready to cut the curves and arc in the ends, use a band saw and cut just outside the line marked from the pattern.*



Sand it Smooth. *A sanding drum will make short work of smoothing the bottom arc. Sand the curves on the sides with a sanding block.*



Assembly. *Supports at either end of the shelf raise it to the right height and keep it flat and level for drilling the pilot holes and driving the screws.*



Chamfered Plugs. *Sand a chamfer on the ends of the blank. Then cut the plug from the end of the blank, using a stop block in front of the blade.*

casual

Gathering Table

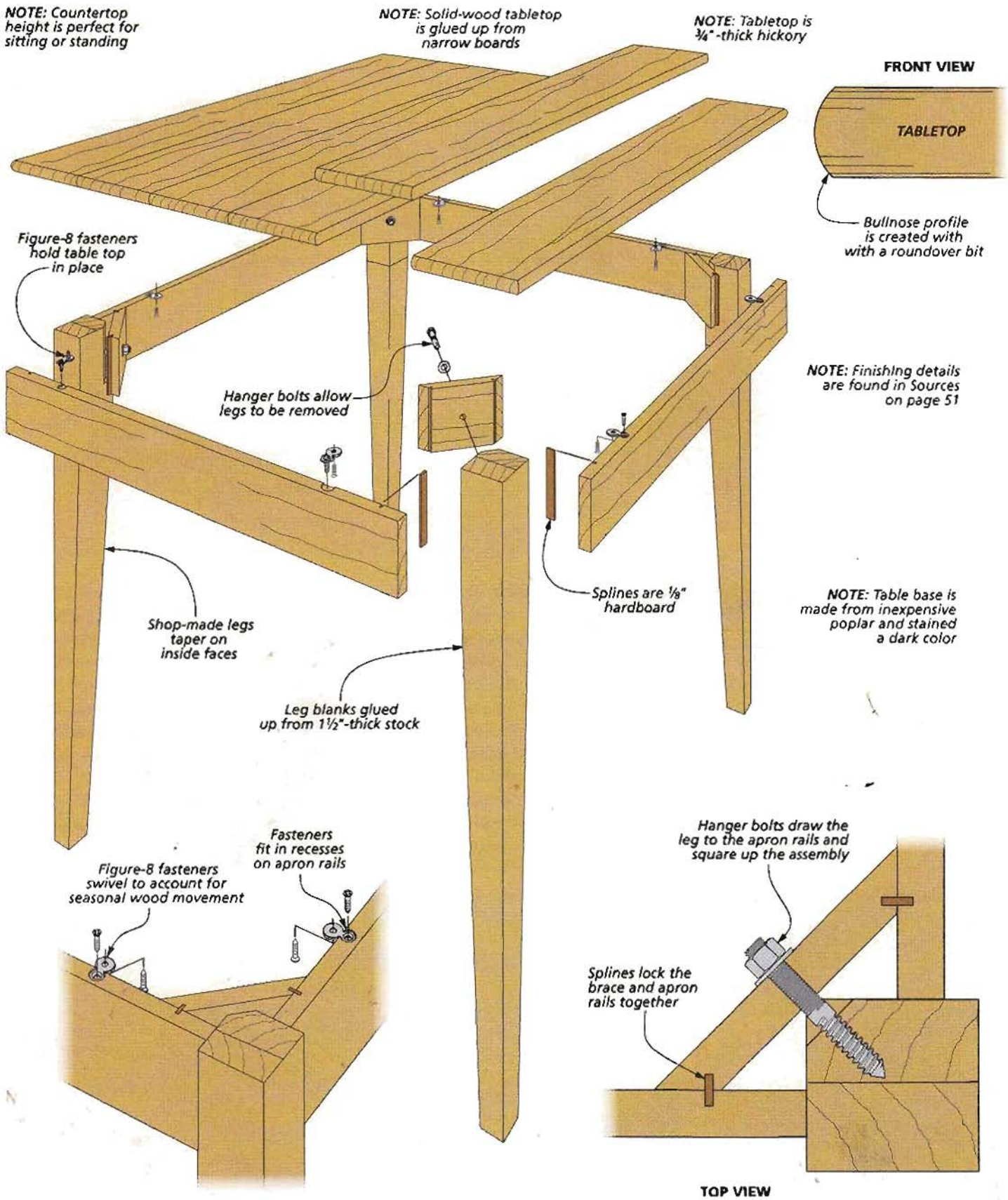
Bring everyone together around this easy-to-build table. The tall height is comfortable whether you're sitting or standing.

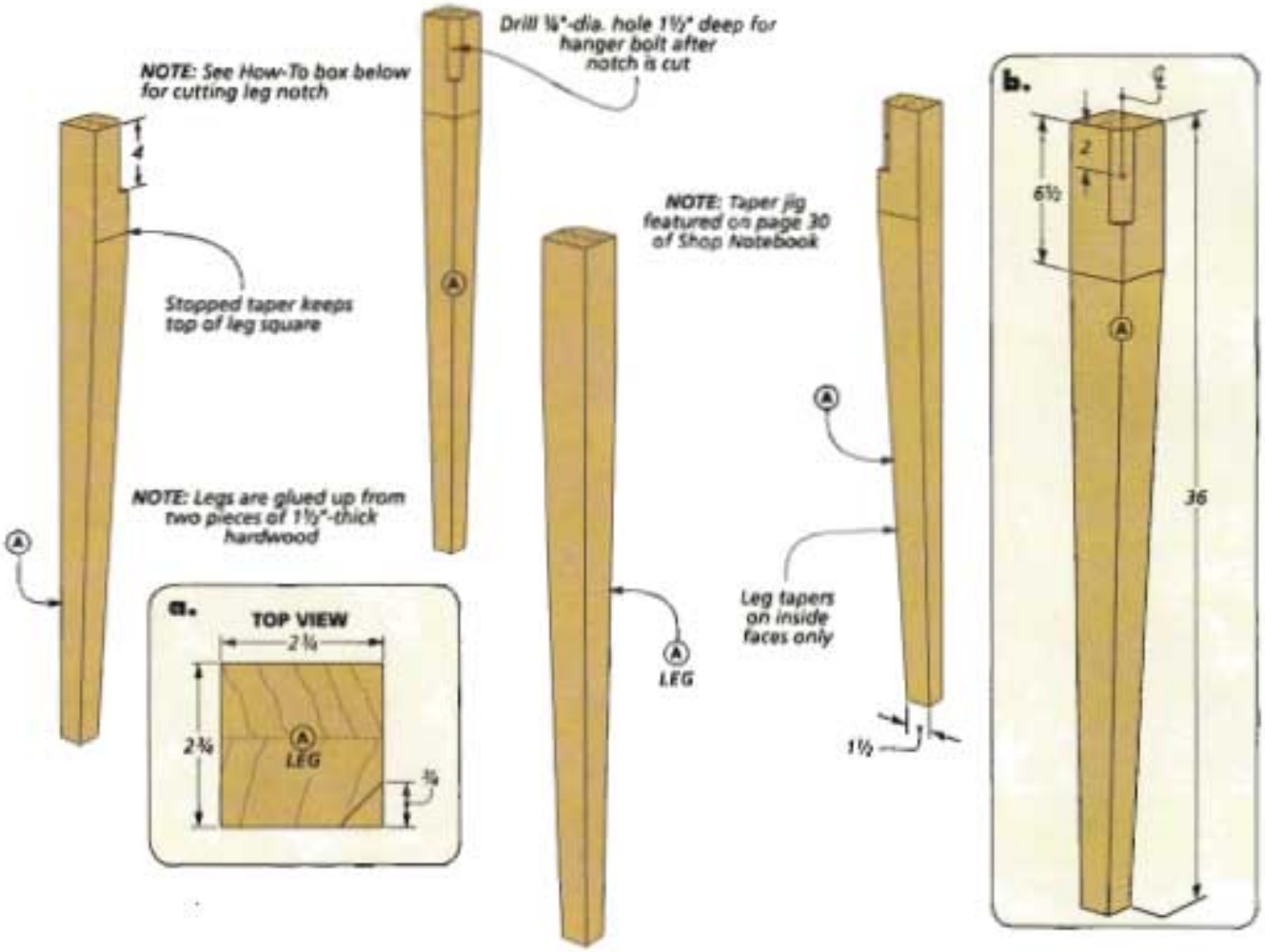
A "gathering table" is a fairly new concept in home furniture. Standing roughly at countertop height (36"), it's taller than the typical dining table. This means you can be comfortable either sitting in a taller chair or standing next to the table. It's a perfect, casual gathering place for friends and family.

From a woodworker's point of view, it's a quick build, which makes it possible to have the table in the house by next weekend. The knock-down construction eliminates any complicated joinery. The table is mostly constructed with screws and bolts. The simple design also means it's easy to change the style. If the table shown in the photo above doesn't fit your home's décor, take a look at the classic and country designs in the Designer's Notebook on page 29. When the table is done, you can purchase as many chairs as it takes to get everyone gathered around your new table.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS: 40"L x 40"W x 36¾"H





make the LEGS

When I build a table, I usually start with the legs. They're the defining part of the project since they determine the height and set the style.

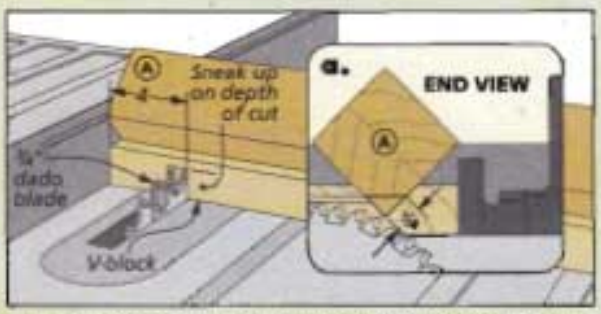
The table legs are tapered on the two inside faces. There's also a notch on the inside corner of the leg that provides a surface for installing a hanger bolt.

BLANKS. To get the thickness needed, the leg blanks are glued up from two extra-wide pieces (3"). This way, you can trim off any glue squeezeout and clean up the faces after the glue is dry. After you square up the blanks, go ahead and cut the legs to finished length (detail 'b').

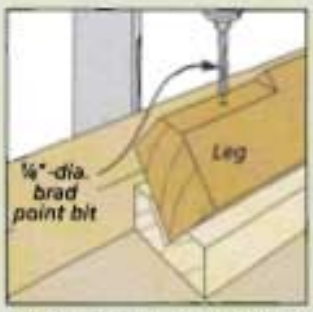
NOTCH. I cut a notch at the top of each leg to create a flat surface in which to drill a hole for the hanger bolt that connects the leg to the apron rails. You'll need a V-block to hold the leg at an angle. It's a length of "two-by" stock with a V-shaped groove, as shown in the left drawing in the box below. To cut the notch in the leg, I laid the leg in the V-block and made several passes over a dado blade in the table saw (box below).

BOLT HOLES. The V-block comes in handy again when you drill the hole for the hanger bolt, as shown in the center drawing below.

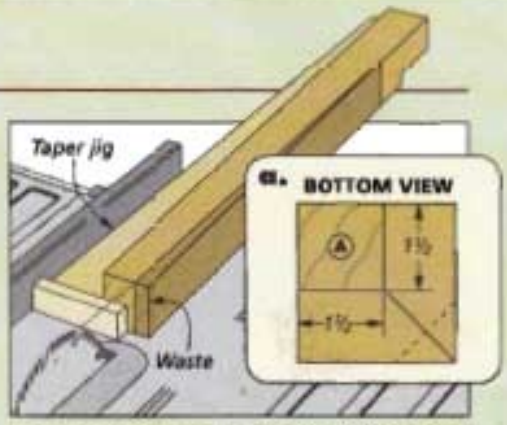
How-To: Make Tapered Legs



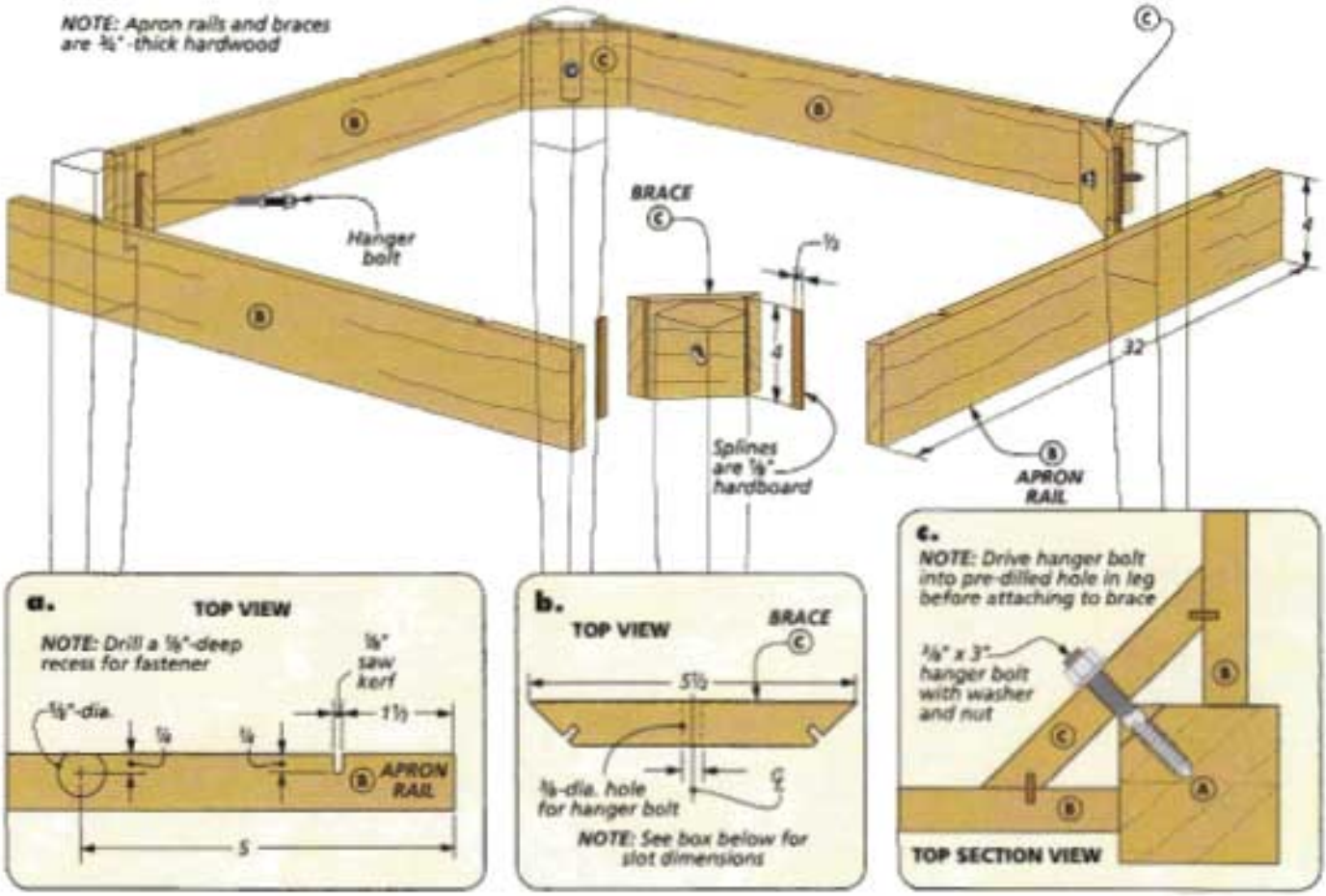
Cut the Notch. *With the leg firmly in the V-block, make several passes over a wide dado blade. Move the leg after each pass until the notch is completed.*



Drill. *Pre-drill the hole in the leg for the hanger bolt at the drill press.*



Leg Tapers. *Using a simple jig (see page 30), cut the taper on one inside face. Then rotate the leg and cut the adjacent face.*



TAPERS. The final step to completing the legs is to taper the inside faces. I made a simple jig that holds the leg at the proper angle to cut the tapers. You can read more about it and how to use it in Shop Notebook on page 30.

APRON

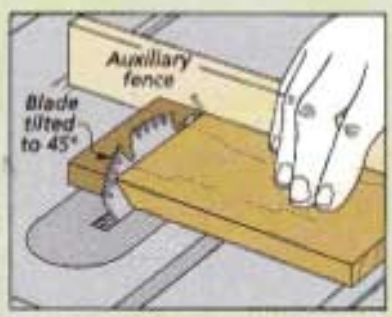
The legs are joined to a base frame made up of apron rails and a brace at each corner. The rails and braces are joined with splines. The brace draws the leg against the rails as you tighten the nut on the bolt.

To build the rails and braces, I started by cutting each piece to size. The rails have a kerf cut near each end to hold a hardboard spline (detail 'a'). Then you can use the drill press to drill the holes for the figure-8 fasteners you'll add later (detail 'a'). These hold the top on.

BRACES. The braces are beveled on each end, as shown in the left and drawings below. There are also slots for the splines in the ends (right drawing below). To finish up the brace, you can drill a hole through the center for the bolt.

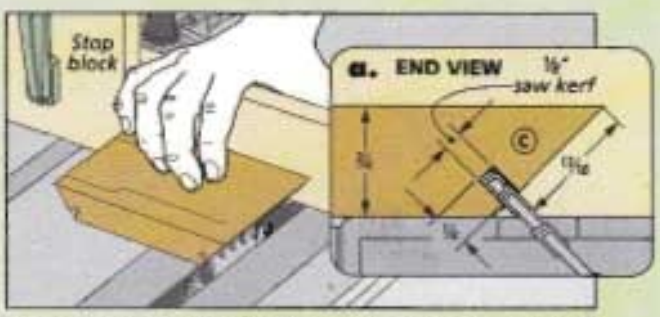
ASSEMBLY. Assembling the base is pretty straightforward. All you need to do is glue the splines into the matching slots in the rails and braces. Then attach the legs with hanger bolts. The bolts will pull the legs into place between the aprons. This automatically squares up the assembly.

Cut Miters

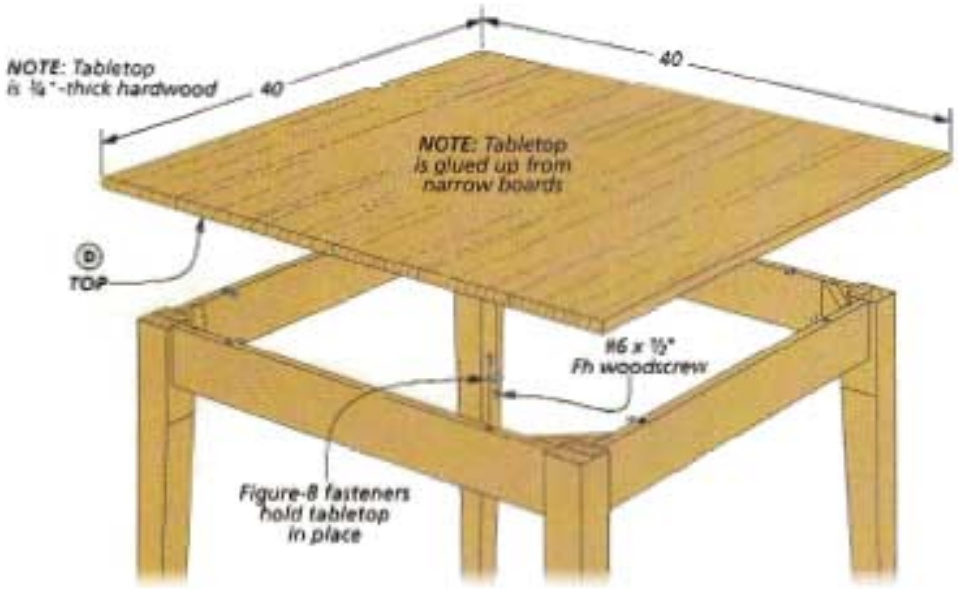


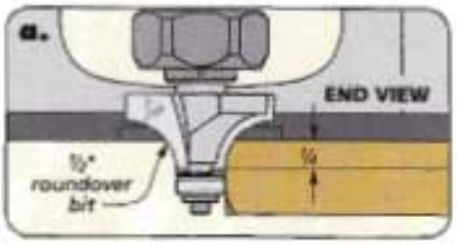
Beveled Brace. *The braces are beveled at 45° on both ends. An auxiliary fence minimizes tearout.*

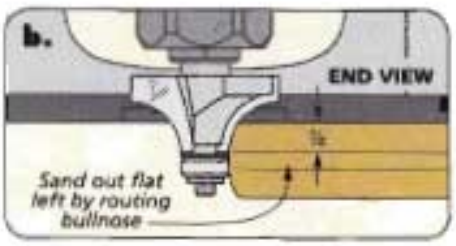
Cut to Length. *The second miter cuts the brace to length. Use a stop block to make four identical braces.*



Slots. *To cut the slots in the braces, leave the blade at 45° and lower it so that you cut ¼" into the brace. Use a stop block to locate the slots correctly.*







complete the TABLE

With the base complete, you've entered the home stretch. The tabletop is simple, solid wood construction that won't take long to complete. A bullnose profile on the edges relieves the sharp corners on the top. It's attached with figure-8 fasteners on all four sides.

GLUE UP. The tabletop is glued up from narrow stock. If you start with boards that are extra long and wide, you'll have enough excess to cut the top to a perfect square.

After the glue is dry, you can sand the top flat. Then trim the top to size. Since the tabletop is large, I used a straightedge clamp and a circular saw to cut it to final width and length. Once the top is square and smooth, you're ready to rout the edge treatment.

BULLNOSE. I used a bullnose profile on the table edge. It's created by easing both the top and bottom edges with a ½" roundover bit, as shown in details 'a' and 'b.' A handheld router will make the task easier. Rout one edge with the bit lowered only ¼", as shown in detail 'a.' Then flip the top over and rout the other edge with the bit at the same depth (detail 'b'). The bit will leave a flat spot along the center of the edge. You can sand out this flat spot to create a smooth bullnose profile.

FINISH. You might have noticed in the main photo on page 24 that the table is finished in a two-tone effect. I left the top natural so that the striking grain is visible. And since the base is made from light-colored poplar, I stained it with a dark stain for a deep contrasting look. For this reason, I finished the base and top separately before I attached the top. You can read more about the finish I used in Sources on page 51.

ATTACH THE TOP. After the stain and finish are applied, you're ready to attach the top. I used two figure-8 fasteners on each side of the table. These fasteners allow for wood movement. I attached the fasteners to the apron first. Then I flipped the tabletop upside down on my workbench and centered the base on the table to attach the top.

Now that the table is complete, all you need to do is add a set of tall chairs, and bring your family and friends around your new table. W

Materials, Supplies, & Cutting Diagram

A	Legs (4)	2¾ x 2¾ - 36	**D**	Top (1)	¾ x 40 - 40
B	Apron Rails (4)	¾ x 4 - 32	•	(4) ⅜" x 3" Hanger Bolts	
C	Braces (4)	¾ x 4 - 5½	•	(4) ⅜" Flat Washers	

- (4) ⅜" Hex Nuts
- (8) Figure-8 Fasteners
- (16) #6 x ½ Fh Woodscrews

1½" x 7" - 96" Poplar (Two boards @ 9.3 Bd. Ft. each)

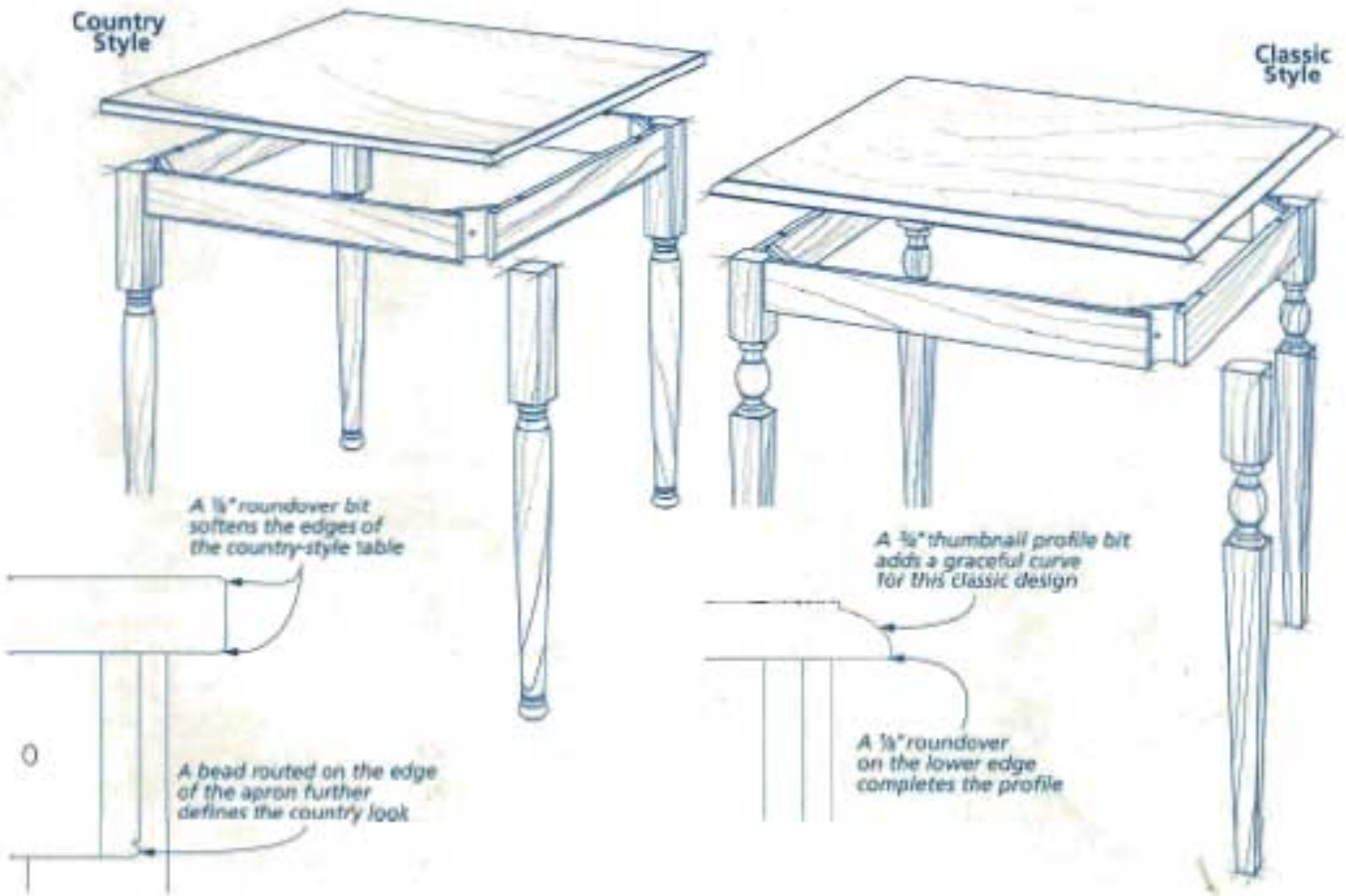
¾" x 5" - 96" Poplar (Two boards @ 3.3 Bd. Ft. each)

⅝" x 8" - 96" Hickory (Three boards @ 5.3 Bd. Ft. each)

Also needed: ⅛" Hardboard for splines

DESIGNER'S NOTEBOOK

A Flexible Design



If the rustic look of the hickory-topped table doesn't fit your style, the design is versatile enough to easily change the look. For example, simply change the style of the legs, the profile on the table edge, and the wood choice and you can build the table in either a country or classic style. Both styles make use of purchased legs (right photo). You can read more about where to buy these legs in Sources on page 51.

I built the country-style table from pine. The stout, turned legs define the style, but you can also rout a bead around the apron that further adds to this look (left detail). The square edge of the 1"-thick tabletop is softened with a ⅛" roundover on the top and bottom edges.

For the classic-style table, I chose cherry. Again, I purchased the turned and tapered legs to complement the look, as shown in the lower right photo. For the profile on the tabletop, I used a table edge bit to create a thumbnail. You'll find information about this bit in Sources on page 51. To complete the edge profile, you can use an ⅛" roundover bit on the bottom face of the tabletop.

▲ Purchased legs will help you build a table with a different style. Sources for both legs are on page 51.

SHOP NOTEBOOK

Taper Sled

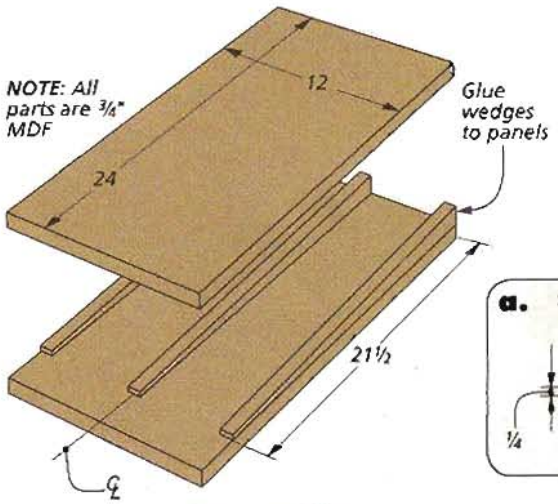
To make the pizza peel (page 16) lighter in weight and easier to slide under a pizza, the paddle is tapered from front to back. In order to create this taper, I made a tapering sled for my planer.

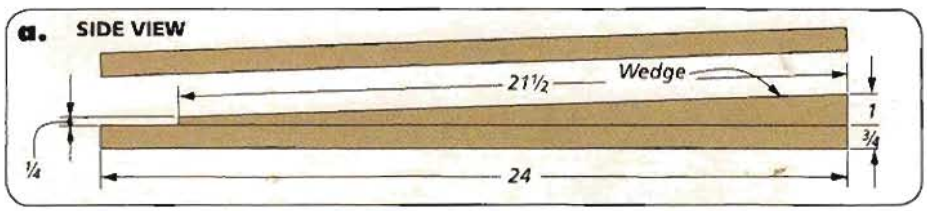
The idea behind the sled is simple. It holds the blank at a slight angle as it travels through the planer. By taking multiple, light passes, you can taper the paddle in almost no time at all.

The sled is made out of a couple pieces of ¾" MDF. Sandwiched in between these two pieces are three wedges. After cutting the wedges on the band saw and sanding the edges smooth, I simply glued them between the two MDF panels.

USING THE SLED. To use the sled, start by attaching the pizza peel blank to the top of the sled with double-sided tape. With the blank securely fastened, adjust the planer for a light cut. Due to the slope of the sled, only the "peak" of the blank will contact the feed roller of the planer initially. So you'll have to pull the sled through the planer from the back for the first few passes.

Continue to lower the cutterhead of the planer until the front edge of the paddle is planed down to ⅛" thick. Then you can remove the tapered peel from the sled and finish up the rest of the shaping.

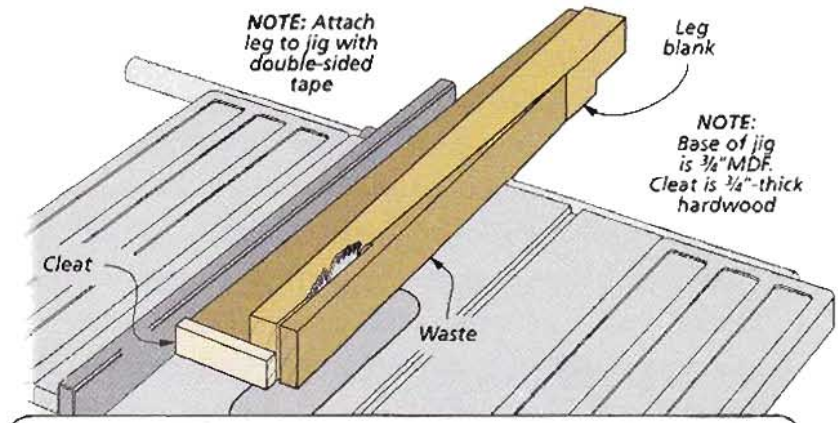


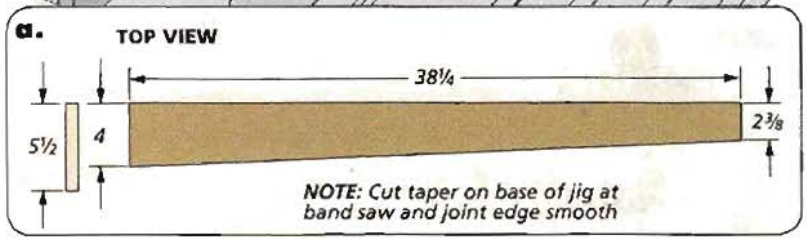


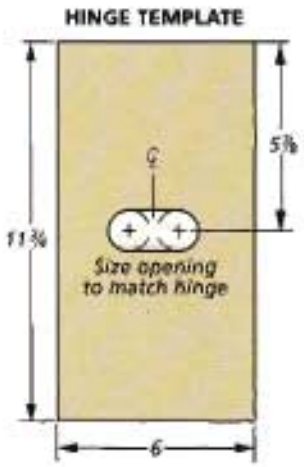
Taper Jig

The legs of the gathering table on page 24 are tapered on the inside faces. To cut these tapers, I made a simple taper jig for my table saw. As you can see in the drawing at right, the L-shaped jig rides against the table saw rip fence and holds the leg blank at a slight angle as it passes through the saw blade.

The jig is just a narrow piece of ¾" MDF tapered to match the taper angle of the legs. A hardwood cleat is glued to one end. As you push the leg blank through the saw, the jig rides along with it. (Double-sided tape between the leg blank and the edge of the jig can be used to help hold the two together.)







A template and a dado clean-out bit allow you to rout the mortises for the twin pin hinges.

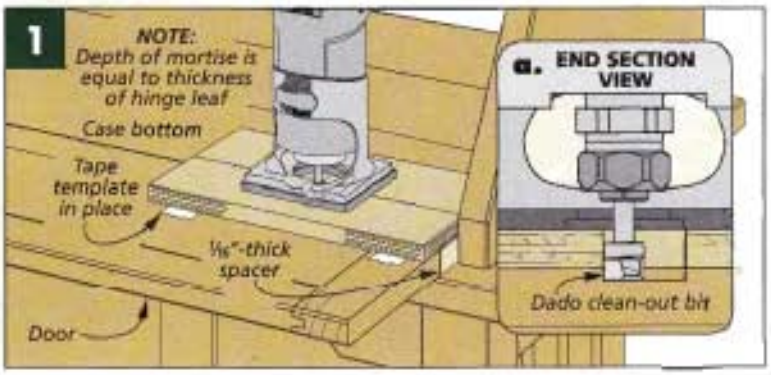
Hinge Mortises

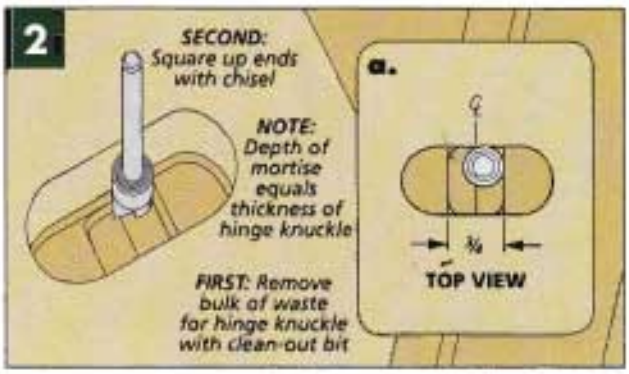
The drop-front door of the desk on page 32 pivots on a pair of twin pin hinges. These are recessed flush with the door and the case bottom. Creating the hinge mortise is a two-step process. First, a shallow mortise is routed for the leaves of the hinge. Then, a deeper mortise is created for the hinge knuckle. All it takes to do this is a router and a shop-made template.

TEMPLATE. The template is just a piece of ½" plywood with an oval opening sized to match the hinge. You can make this opening by drilling a hole at each end and removing the remaining waste with a jig saw. Then sand the edges smooth with a sanding drum.

To use the template, clamp the door to the case, using spacers to center it side-to-side. Then attach the template to the desk with double-sided tape. As you can see in Figure 1, a dado clean-out bit makes quick work of routing the recess for the hinge leaves.

To create the deep mortise for the hinge knuckle, first mark the edges of the mortise. Then, lower the bit and rough out the bulk of the waste, as shown in Figure 2. Finally, you can square up the edges of the mortise with a chisel.





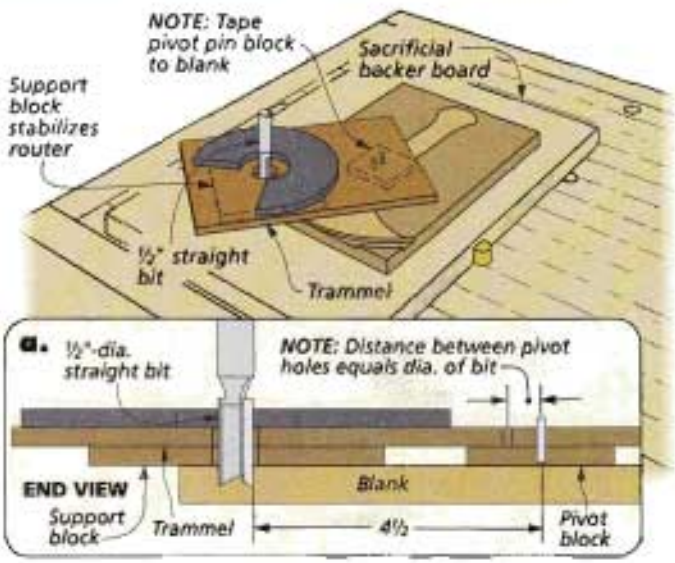
Router Trammel

One of the distinctive features of the pizza peel is the curved joint between the handle and the paddle. I cut these curves using a router and a ½"-dia. straight bit. And to make sure I routed a perfect arc on both pieces, I used a router trammel.

The trammel is nothing more than a piece of ¼" hardboard mounted to the base of the router. It fits over a steel pivot pin to guide the router in a perfect arc. (I used a nail as my pivot pin.)

The radius of the curved joint between the handle and the paddle of the pizza peel is 4½". But because you'll be cutting both an outside arc and an inside arc, you'll need to make two pivot holes in the trammel — measuring 4½" from either edge of the bit. You'll use the outside pivot hole to rout the arc on the handle and the inside pivot hole to rout the arc in the paddle.

PIVOT BLOCK. One other thing: To avoid leaving a hole from the pivot pin in my handle blank, I drove the pivot pin into a block of hardboard that was taped to the blank. Then to support the router, I added a second hardboard block to the bottom of the trammel.



notebook Computer Desk

When closed, the small desk hides its function as a space-saving workcenter.

Look past the classic design and you'll find that efficient workspace is the name of the game here.

There's a lot to be said for downsizing — minimizing the clutter while maintaining the essentials. One way to work toward this goal is to make the most efficient use of limited space. Building this compact, drop-front desk is guaranteed to put you on the right road.

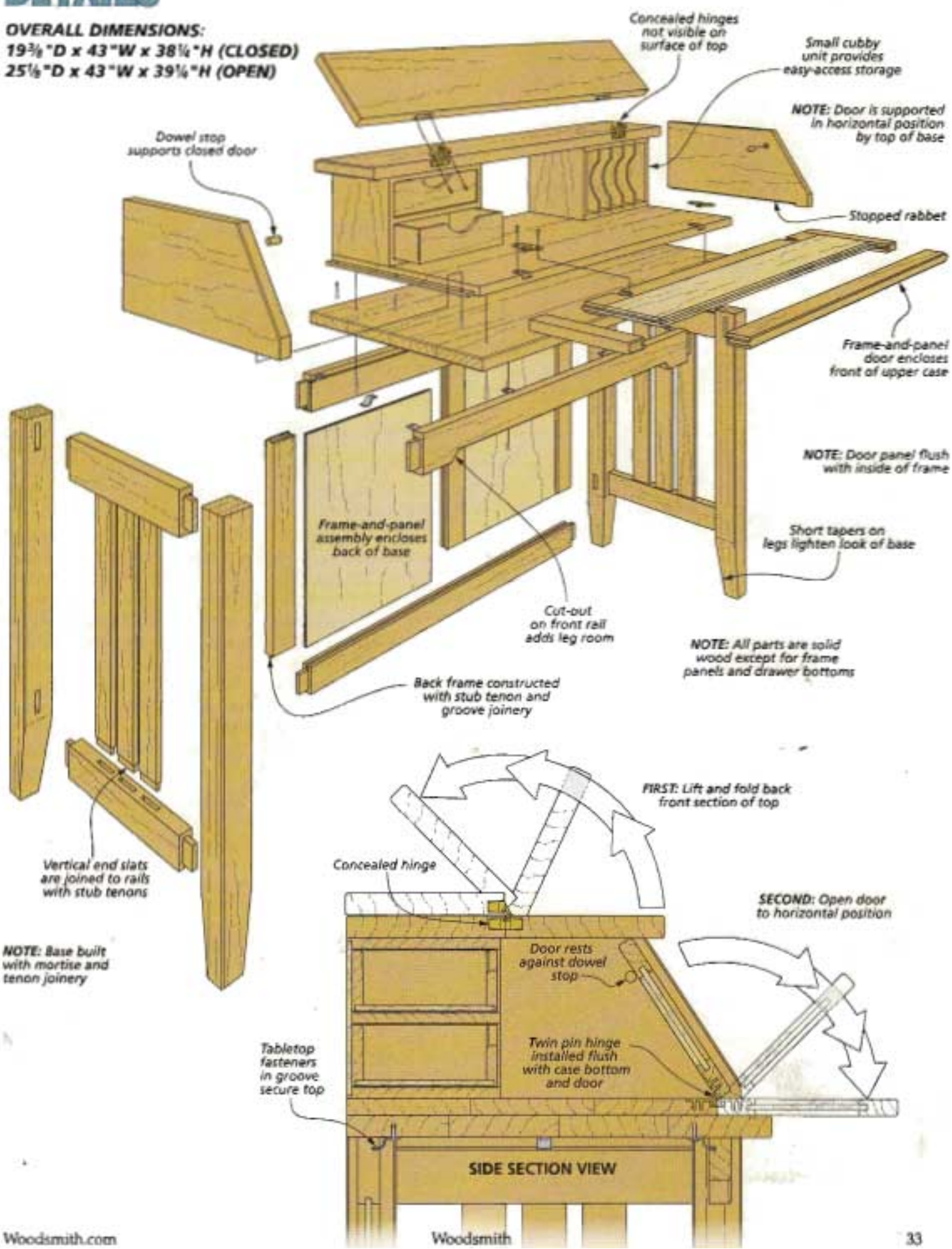
As you can see in the photo at left, when not in use, the appearance is neat and tidy. The benefit comes from the clever way the small desk converts into a wide-open workspace. To make the switch, you simply fold back the hinged top and then drop the door to its horizontal position. What you have now is a surprisingly large and efficiently organized desktop.

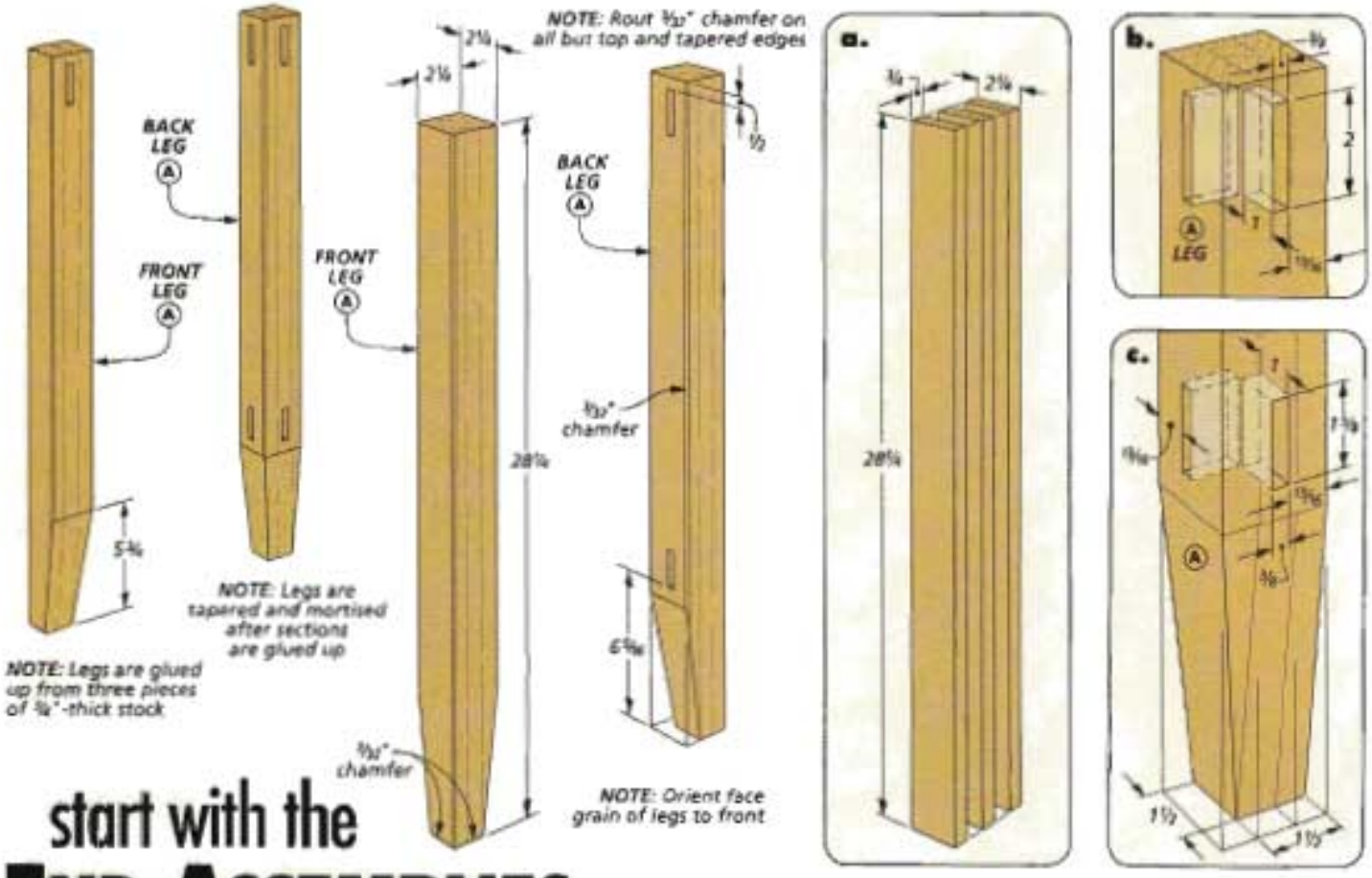
Inside, you'll find a two-drawer case and a cubby that provide versatile storage options. Between the two cases is an open area perfectly sized to hold the indispensable notebook computer. Everything is right at your fingertips.

And to match the practical purpose of the desk, you'll find the construction is also no-nonsense. Traditional joinery and techniques keep it manageable. After all, simplicity is the watchword.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS:
19⅜"D x 43"W x 38¼"H (CLOSED)
25⅛"D x 43"W x 39¼"H (OPEN)





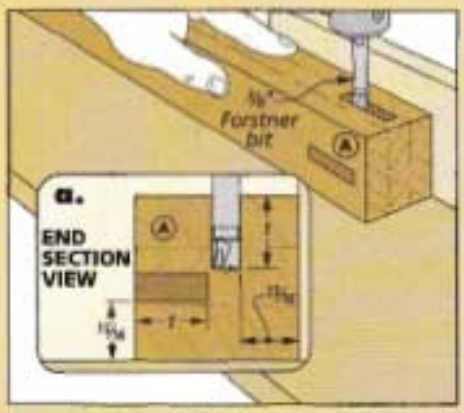
start with the END ASSEMBLIES

I approached building the base for the desk in two stages. First, I put together end assemblies consisting of two tapered legs, an upper and lower rail, and three vertical slats fit between the rails. Then I connected the end assemblies with a frame-and-panel back and a single profiled front rail. Traditional mortise and tenon joinery is used throughout the construction.

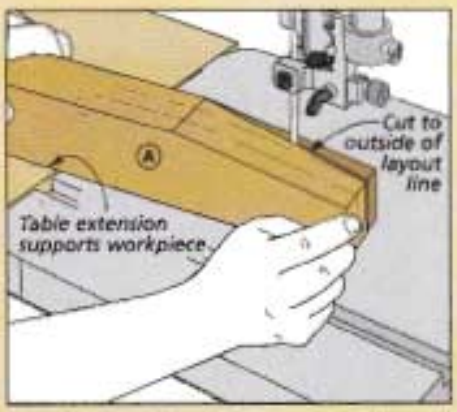
FOUR LEGS. Making the four legs comes first. In keeping with sturdy, Craftsman-style design, the legs are a hefty 2¼" square. But rather than buy expensive thick stock, I glued up each leg blank from three pieces of ¾"-thick stock, as shown in detail 'a.' If you take care to get a good grain and color match, you won't notice the joint lines. Once all four blanks were glued up and trimmed to final size, I positioned them for the best appearance and labeled them clearly.

MORTISES. Next, I laid out all the mortises in each leg. There are a couple things to share here. First, note that the ⅜"-wide mortises are not centered on the thickness of the legs (details 'b' and 'c'). They're offset toward the outside faces. Second, remember that the front

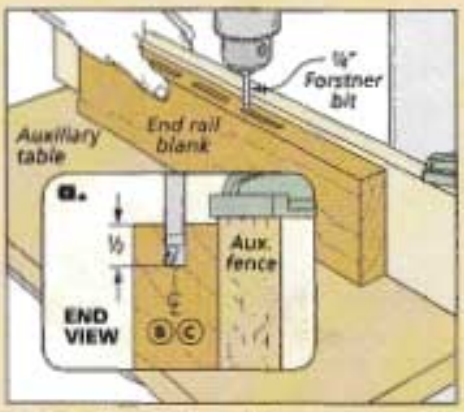
How-To: Cut Mortises & Tapers



Leg Mortises. *After laying out the mortises in the legs, drill a series of overlapping holes to remove most of the waste.*



Leg Tapers. *The short tapers on the ends of the legs can be cut on the band saw. Clean up the cuts by sanding or planing.*



End Rail Mortises. *When cutting the centered mortises in the end rails, concentrate on spacing them consistently.*

legs need only a single mortise on the front inside face for the upper rail. When the layout is complete, you'll have left and right pairs that are mirror images.

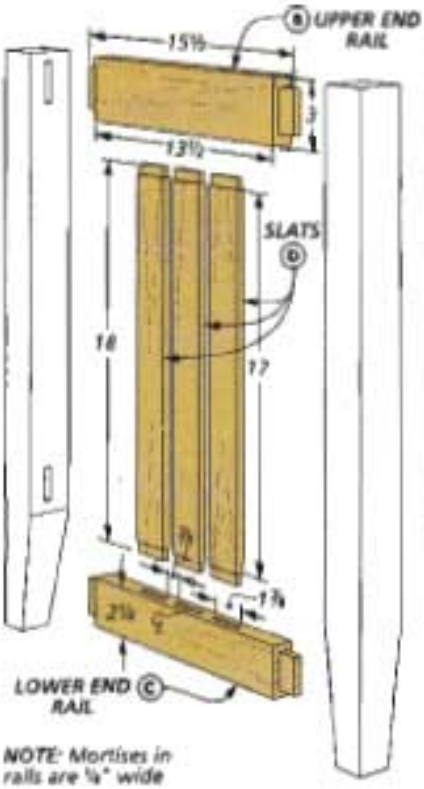
The How-To box on the opposite page shows the next step. I took the legs to the drill press to rough out the mortises. This was followed by a short stint back at the bench squaring them up with chisels.

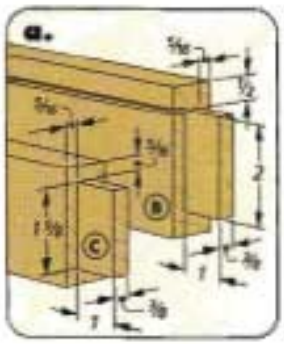
SHORT TAPERS. As you can see in detail 'c' on the opposite page, the bottom section of each leg is tapered on the two inside faces to create a short foot. The easiest way to add this detail is to simply lay out the taper cuts on each leg, then remove the waste at the band saw, as shown in the box on the opposite page. A sanding block or a hand plane can be used to clean up the saw marks.

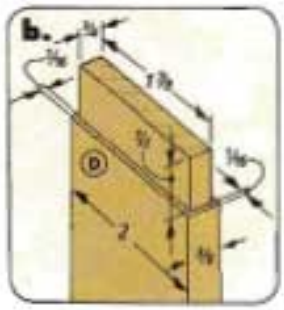
Finally, all the edges of the legs, except the tapered and top edges, can be softened with a chamfer bit in the router table.

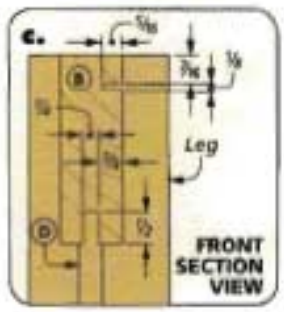
END RAILS. Now, you can start work on the end rails. All the rails are cut from 1"-thick stock. However, as you can see in the drawings above, the upper and lower end rails are two different widths.

MORTISES. Creating the shallow mortises in the rails for the end slats is the next task (How-To, opposite page). You want to focus on laying out and cutting the mortises consistently from rail to rail.









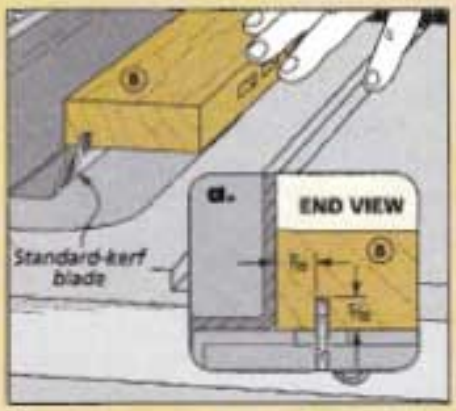
FASTENER GROOVES. Before installing a dado blade in the table saw to cut the tenons on the rails, I took care of a minor detail. The upper rails need grooves to hold the tabletop fasteners used to attach the top of the base (detail 'c'). This groove is simply a shallow kerf, as shown in the box below.

TENONS. A wide dado blade will make quick work of the tenons on the rails, as illustrated in the How-To below. Just take note that the edge shoulders of the upper and lower rails are cut to different widths (detail 'a').

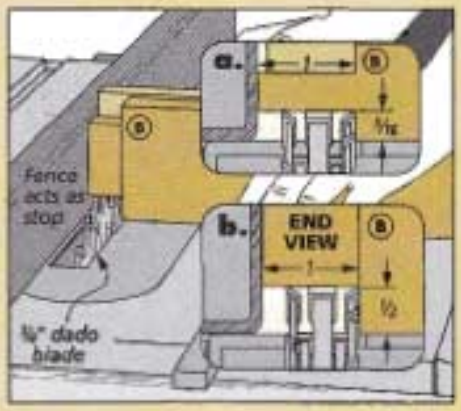
SLATS. Before gluing up the end assemblies, you need to make the vertical slats. After they're cut to size, they need a short tenon on each end. The goal is to match the slat's shoulder-to-shoulder length to the distance between the upper and lower rails. To get this right, I dry assembled the legs and rails to test the fit.

With the slats ready, you can get out the glue and clamps. I glued up each end in one step using a slow-set glue to make the job less hectic. Don't forget to check for square.

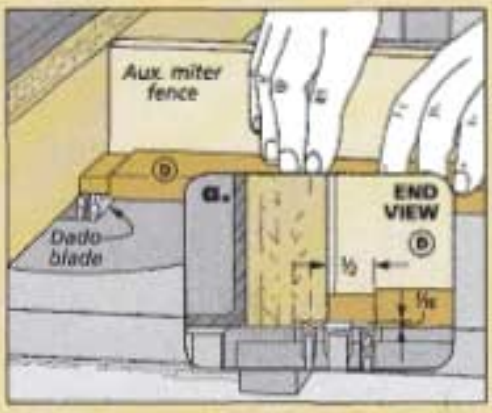
Grooves & Tenons



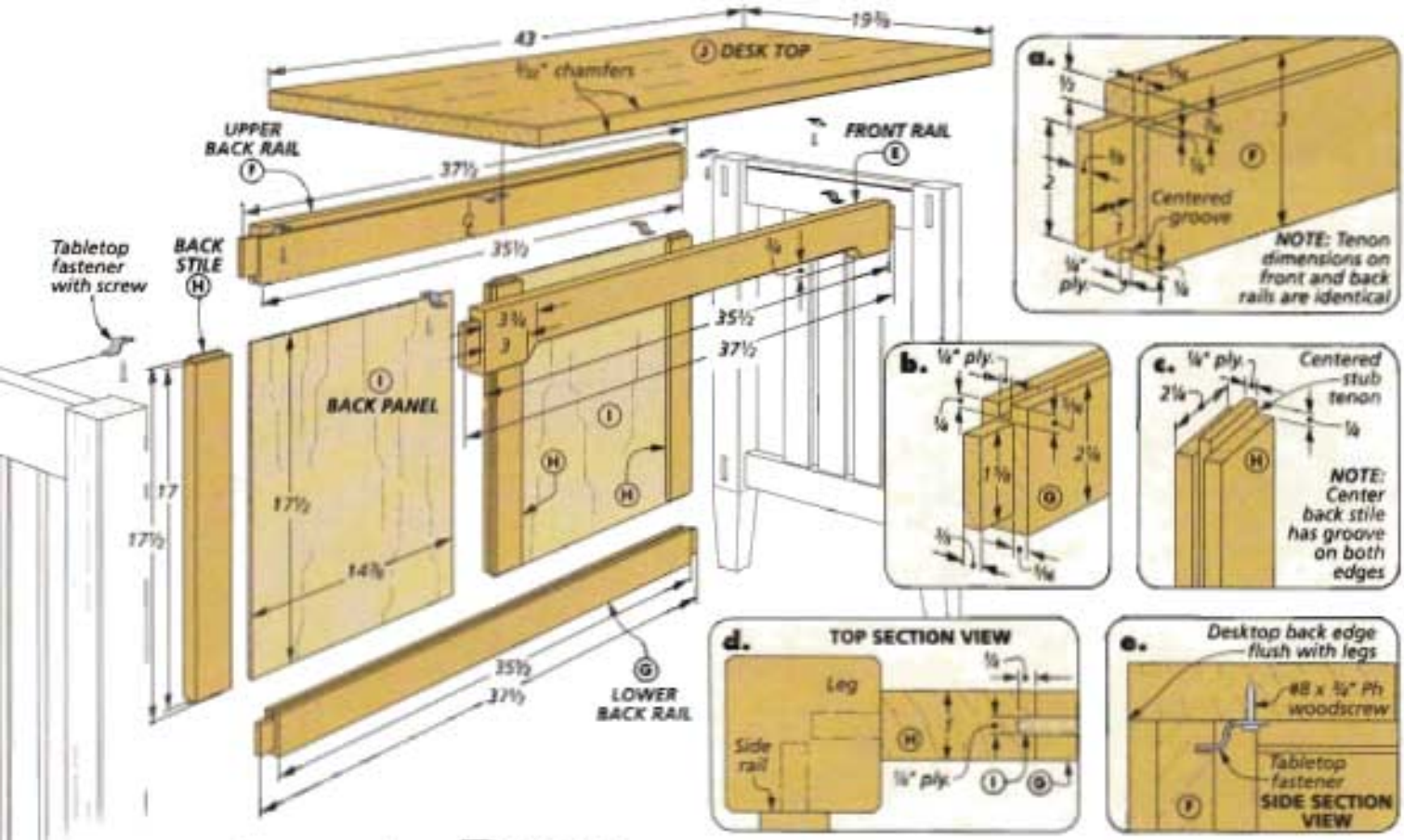
Fastener Groove. *Make a single pass over the saw blade to cut grooves for tabletop fasteners in the upper rails.*



End Rail Tenons. *Once the cheeks of the tenons are cut, adjust the height of the blade to cut the different end shoulders.*



Slat Tenons. *With the dado blade buried in an auxiliary rip fence, sneak up on a snug shoulder-to-shoulder fit between the rails.*



completing the **BASE**

To complete the base, you need to connect the end assemblies with a front rail and a frame-and-panel back. And finally, add the top.

BACK JOINERY. To get started, I cut the front rail and the back rails and stiles to size from 1"-thick stock. Then I temporarily set the front rail aside to begin the stub tenon and groove joinery used for the back. The box below shows the two simple steps involved. But before switching to a dado blade to cut the stub tenons on the stiles, I took a quick detour and cut fastener grooves in both the front rail and upper back rail (detail 'a').

RAIL TENONS. Next up are the longer tenons on the ends of the front and back rails. This should be pretty familiar. They're identical to the tenons you cut on the end rails (details 'a' and 'b').

BACK ASSEMBLY. After cutting the plywood panels to size, the back frame can be glued up. Make sure the edges of the outer stiles align with the shoulders of the rail tenons and that everything is square.

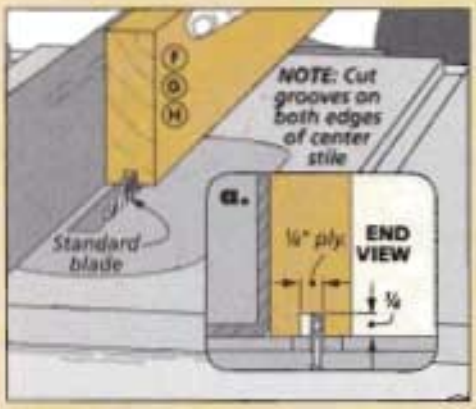
FRONT RAIL. While the glue is drying, you can finish up work on the front rail. To create more leg room, I added a shallow cutout to the lower edge, as shown above.

The cutout is created by making a 45° bevel cut at each end on the table saw, then removing the waste in between at the band saw. After smoothing the cuts, the final detail is a chamfer routed along the entire lower edge. The inside "corners" can be completed with a chisel.

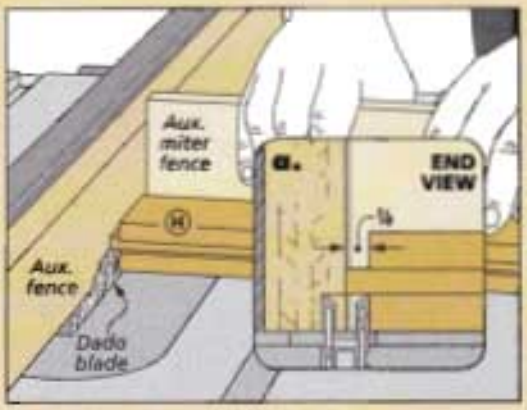
When the clamps come off the back assembly, the ends, back, and front rail can be glued together. Just keep things square.

THE TOP. Now all you need to do to complete the base is make and install the top. The top can be glued up from 1"-thick stock, cleaned up, and trimmed to final size. I routed a chamfer on the top and bottom edges of the front and sides. When attached, the top should be centered side-to-side and flush with the legs at the back (detail 'e').

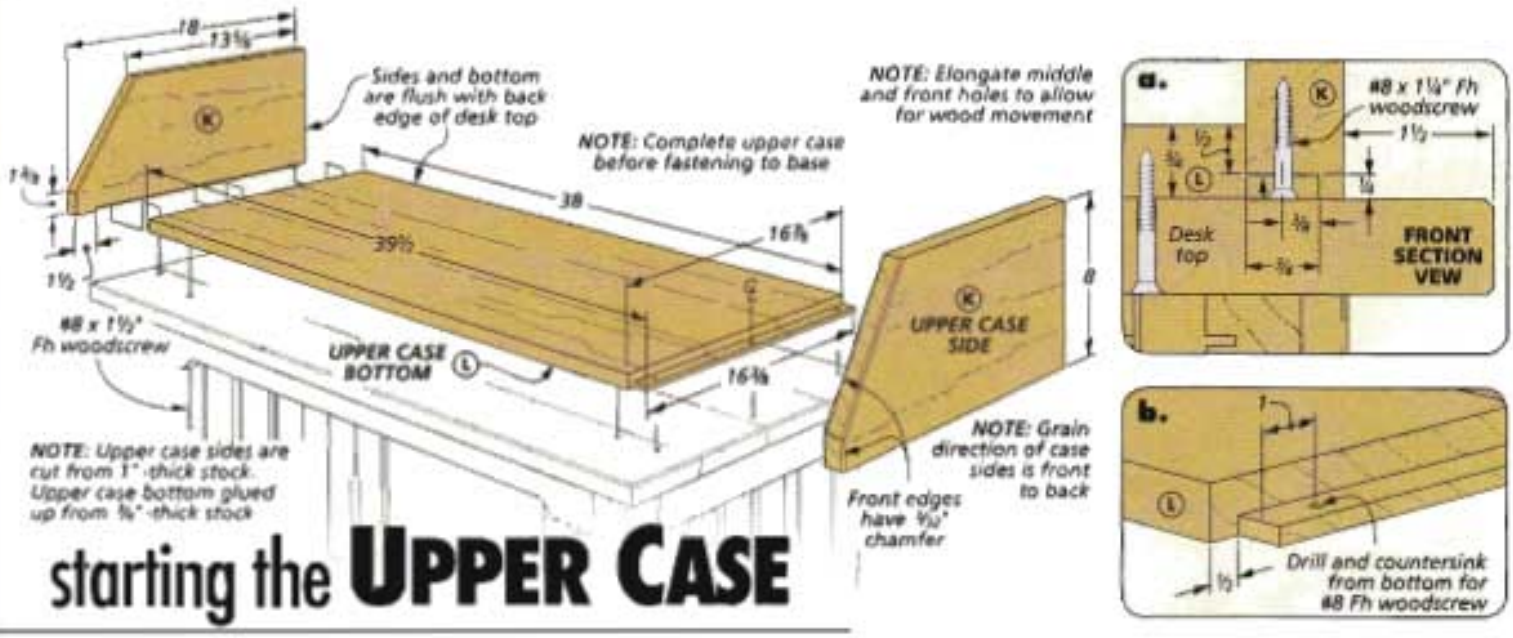
How-To: Cut Stub Tenon & Groove



Grooves. *First, cut centered grooves in the stiles and rails by making two passes, flipping the pieces end-for-end in between.*



Stub Tenons. *Use a dado blade buried in an auxiliary rip fence to cut the stub tenons on the stiles. Sneak up on a snug fit to the grooves.*



starting the UPPER CASE

The upper drop-front section is where things get really interesting. The function adds a fun twist to the job and there's nothing difficult about the woodworking.

The upper section of the desk is built as a separate case. When completed, the it's simply fastened to the base with screws installed from below. The basic case is made up of two sides with beveled front edges, a recessed bottom, and a two-piece, hinged top. Once the sides and bottom are made and joined together, the top can be added.

I got started by gluing up panels for the sides and bottom. The sides are 1" thick, the bottom is ¾" thick. And note that the grain of the sides runs horizontally. After the panels are cleaned up, you can cut them to final size and shape. I used a long auxiliary fence on the miter gauge to cut the bevels on the sides.

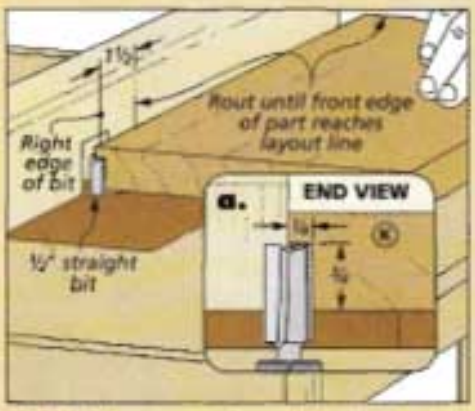
STOPPED RABBETS. The bottom is joined to the sides with a "blind" tongue and rabbet reinforced with screws (details 'a' and 'b'). So the next step is to rout a stopped rabbet in each side to hold the tongue you'll cut on each end of the bottom. The rabbets stop 1½" from the front edges. The box below shows how to rout these rabbets with a straight bit in the router table. The "stopped" ends will have to be squared up with a chisel.

CHAMFERS. Before leaving the router table, I took care of a simple detail. I switched to a chamfering bit to rout a chamfer on the front edges of the sides (main drawing).

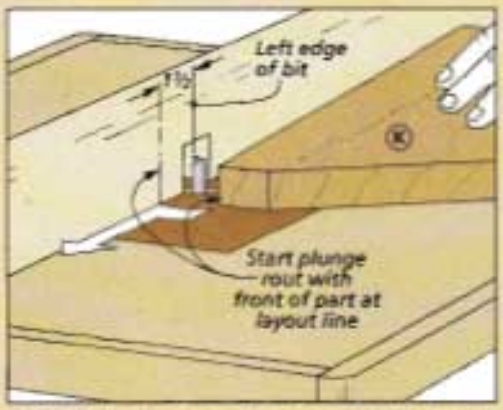
THE TONGUES. Next, you can cut a tongue on each end of the bottom panel. A dado blade in the table saw handles this task (right drawing below). Then the front edge of the tongue is trimmed back ½" (detail 'b'). I did this by hand with a back saw and a chisel.

ASSEMBLY. Now, the sides and bottom are ready to assemble. Since the grain on the sides runs cross-grain to that of the bottom, you need to accommodate seasonal expansion and contraction of the bottom. To do this, I glued only the back 6" of the joints. The remaining width of the bottom is fastened with screws through elongated holes, as in the main drawing. And finally, make certain the sides are square to the bottom.

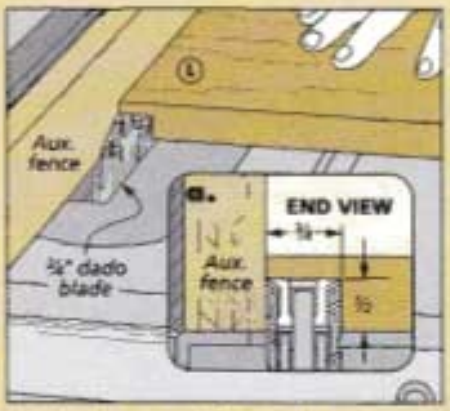
Stopped Rabbets & Tongue



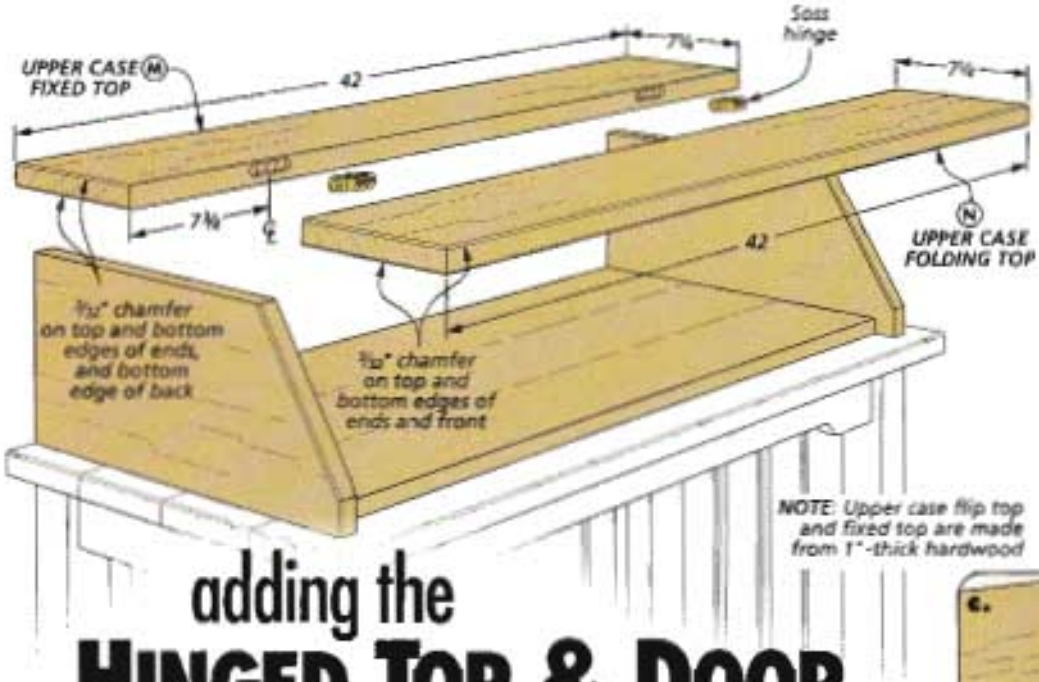
Right Side. *To rout the rabbet in the right side, start at the back edge. A reference line on the fence shows where to stop.*

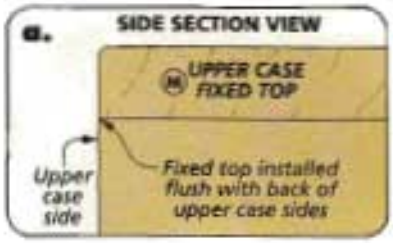


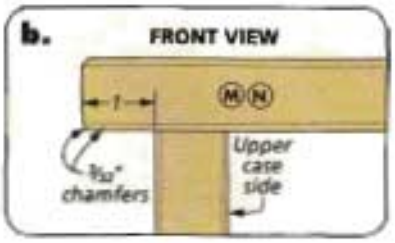
Left Side. *Start the rabbet in the left side by aligning the front edge with the reference line and then plunging into the bit.*

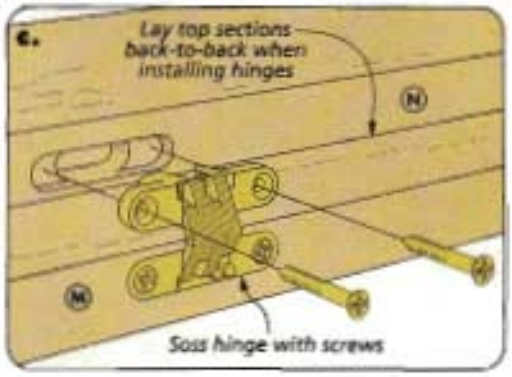


Bottom Tongue. *I formed a tongue on each end of the bottom panel by cutting a deep rabbet with a dado blade.*









adding the HINGED TOP & DOOR

Installing the two-piece top completes the basic upper case. The two sections of the top are hinged so that the front section can be folded back to lay flat on the fixed section. The door can then be dropped down, creating a surprisingly spacious and open work area.

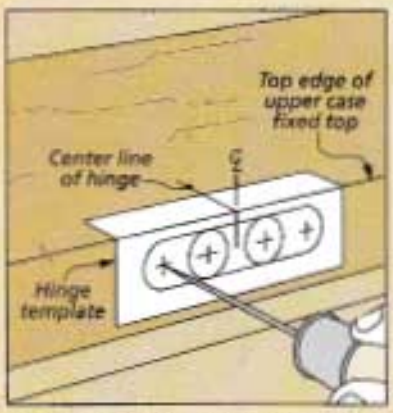
The best way to approach adding the top is to make the two sections, then fit the hinges before gluing the fixed section to the sides. So the first step is to cut two panels to identical size from 1"-thick stock.

The only other detail is a chamfer routed along all but the mating edges of both sections and the lower back edge of the fixed section, as shown in details 'a' and 'b.'

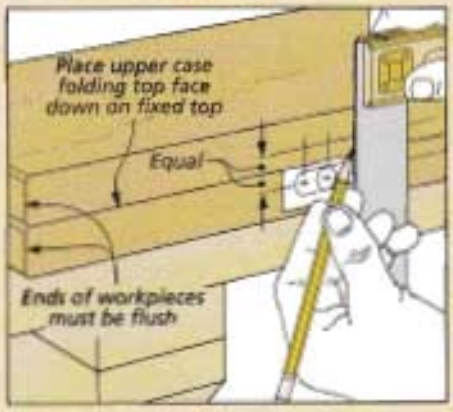
THE HINGES. Now you're ready to install the hinges between the two sections. When selecting hinges for the top, I had one main desire. I wanted the hinges to form a tight joint between the sections while remaining completely hidden. At the same time, the hinges have to allow the front section to fold back a full 180°. The answer is to use Soss invisible hinges. These unique hinges are mortised into the edges of the two mating pieces for a seamless appearance while still allowing full rotation of the parts.

The installation of the hinges is a little finicky but it's not really difficult. The trick is to make sure the mortises are positioned and aligned properly. On the plus side, the hinges come with helpful instructions and an installation template. The How-To box below offers some pointers.

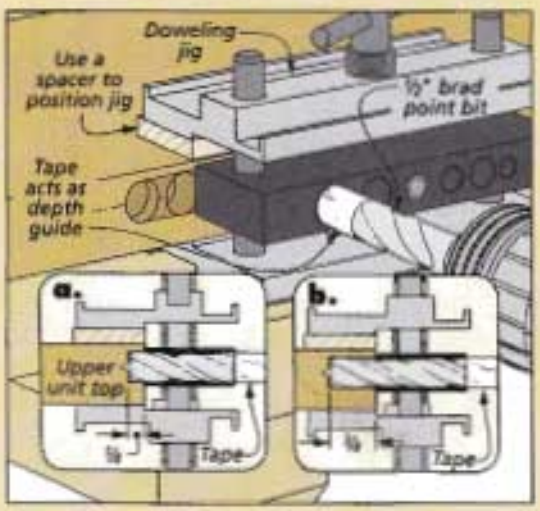
How-To: Install Soss Hinges



Fixed Section. *Position the template on the edge and mark the hole locations for the mortise.*

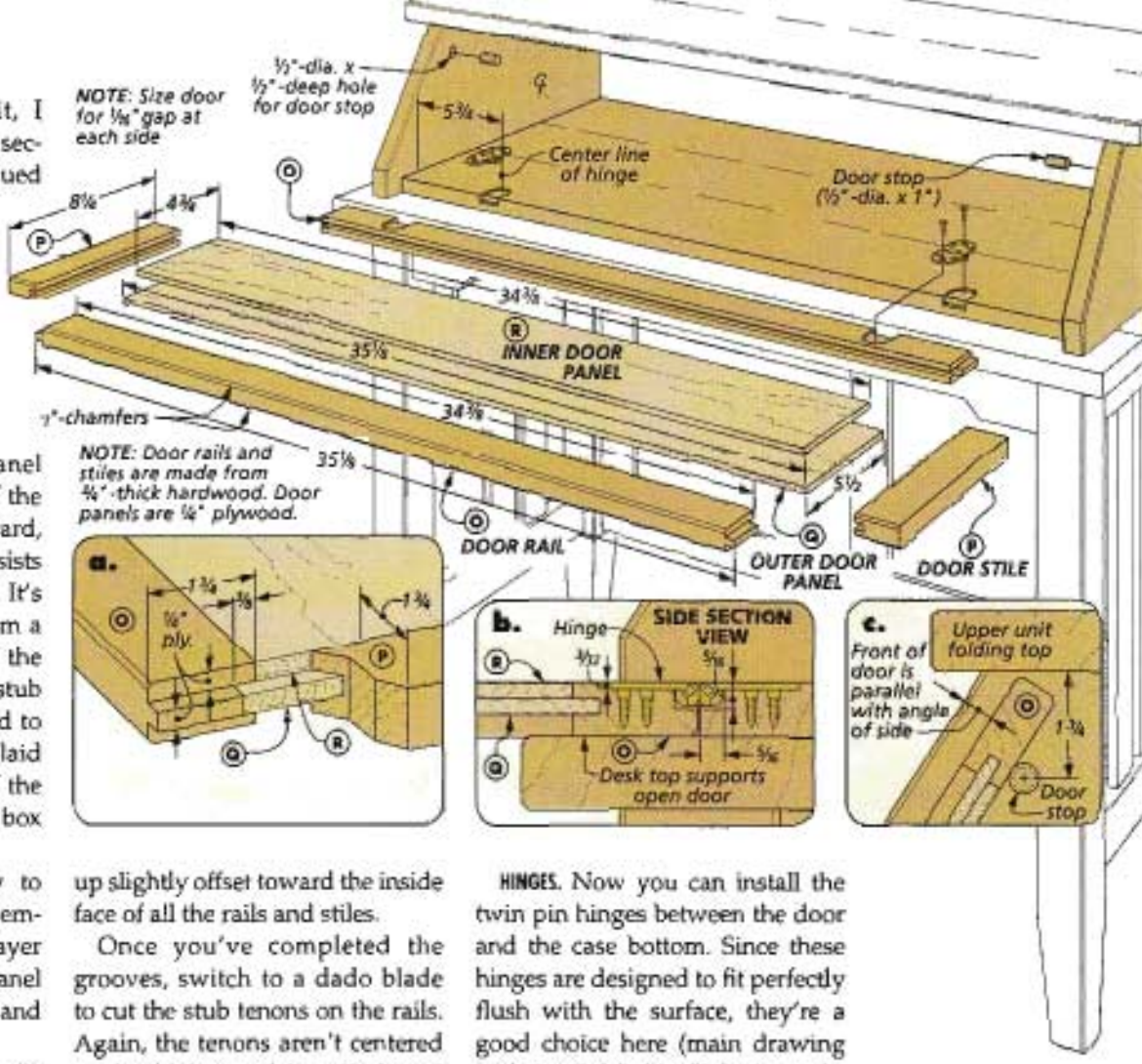


Transfer Marks. *With the front section aligned on top of the fixed section, use a square to transfer the hole locations.*



The Mortises. *I used a doweling jig to drill two sets of holes for the stepped mortise. You can remove the remaining waste with a chisel.*

Once the hinges were fit, I removed them from the fixed section of the top so it could be glued in place. Details 'a' and 'b' on the opposite page show how it fits. Then check to make certain the measurement between the sides is equal across the top and the bottom.



MAKING THE DOOR

Next up is the frame-and-panel door that encloses the front of the case. This is pretty straightforward, with one twist. The panel consists of two layers of ¼" plywood. It's positioned in the frame to form a flush surface on the inside of the door. To make this work, the stub tenon and groove joinery used to construct the door has to be laid out based on the thickness of the two-layer panel (detail 'a'). The box below offers more on this.

THE FRAME. The easiest way to build the door is to start by assembling the frame with a single layer of plywood. Then the inner panel can be cut to fit the frame and glued to the outer panel.

So after cutting the frame rails and stiles to size, my next step was to measure the actual thickness of my ¼" plywood — both a single thickness and a double thickness. Then you can set up the table saw to cut grooves in the stiles and rails. In my case, the plywood was undersized so the grooves ended up slightly offset toward the inside face of all the rails and stiles.

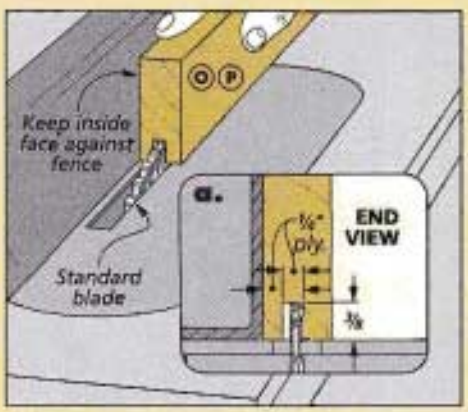
Once you've completed the grooves, switch to a dado blade to cut the stub tenons on the rails. Again, the tenons aren't centered on the thickness of the rails. I used the grooves in the rails as a guide.

With the joinery complete, you can cut a panel to size and assemble the frame. And when the clamps come off, the inner panel can be fit and glued in place. Finally, I chamfered all but the ends and the inside "mating" edge of the door.

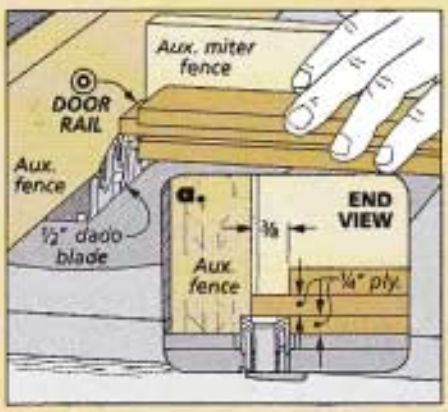
HINGES. Now you can install the twin pin hinges between the door and the case bottom. Since these hinges are designed to fit perfectly flush with the surface, they're a good choice here (main drawing and detail 'b'). You'll find a technique for routing the rounded hinge mortises on page 31.

STOPS. Finally, I added a door stop to either side of the case. These are simply short pieces of ½" dowel (detail 'c'). They're positioned to support the door parallel with the bevel of the sides.

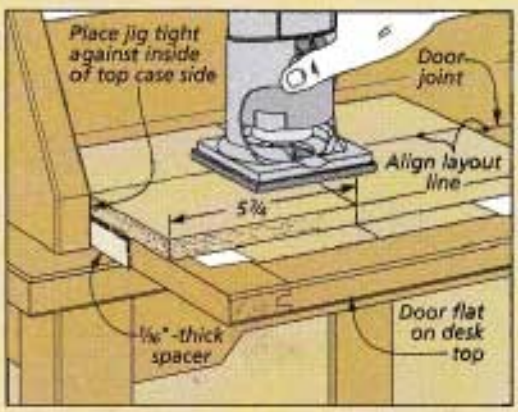
Add Frame & Panel Door



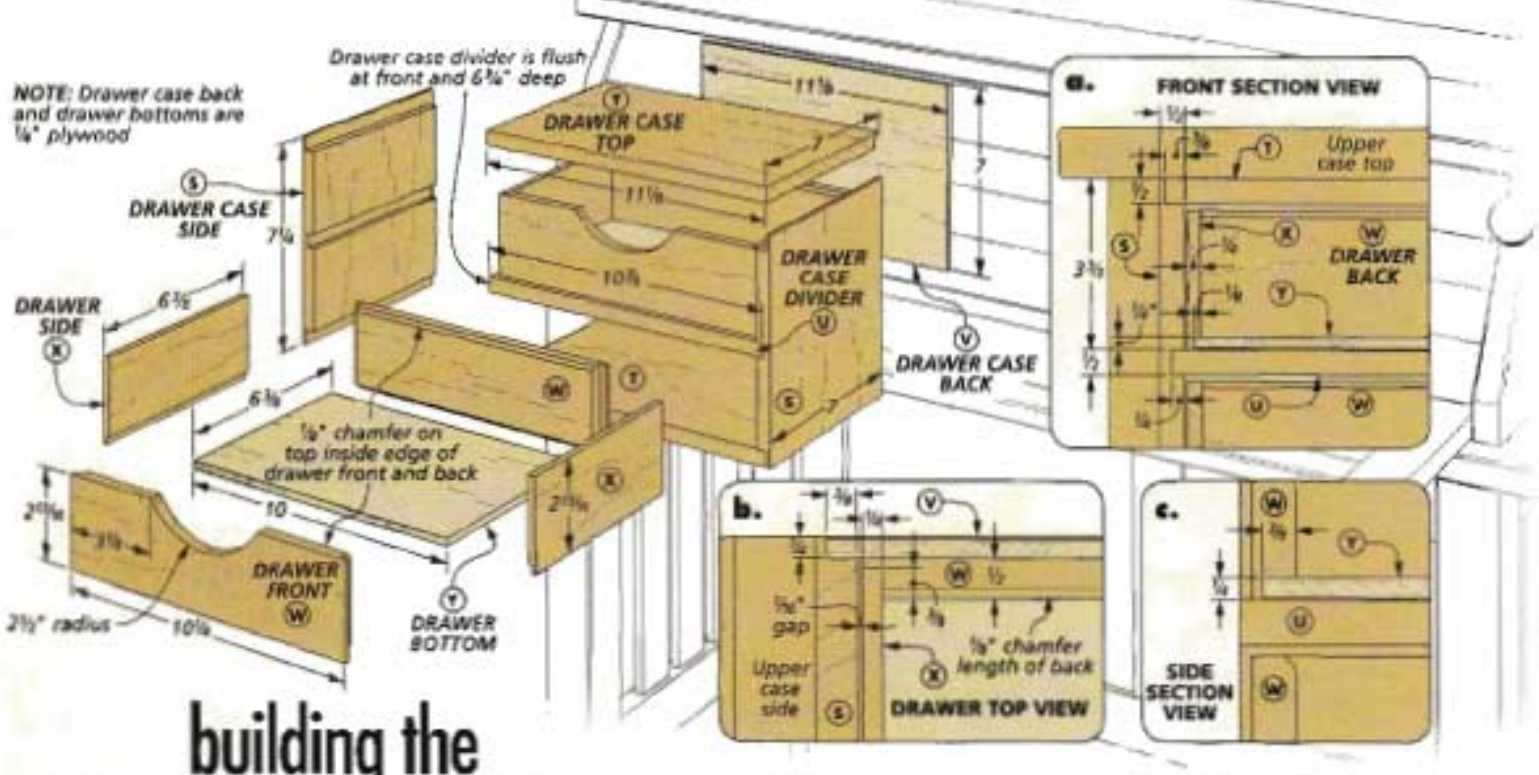
Offset Grooves. *Position the grooves in the door parts based on the thickness of two pieces of the plywood for the panels.*



Stub Tenons. *The grooves can be used as a guide when cutting the offset stub tenons on the ends of the door rails.*



Hinge Mortises. *To form clean, snug-fitting mortises for the door hinges, I used a routing template.* *Turn to page 31 for more details.*



building the DRAWER & CUBBY UNITS

Making the drawer and cubby units will complete the desk. The cases are identical in size and use the same joinery. The only difference is in the way they're divided. The drawer case has a horizontal divider to create two drawer openings while the cubby has four vertical dividers. I'll start with the details on building the cases. Then I'll finish up with the drawers.

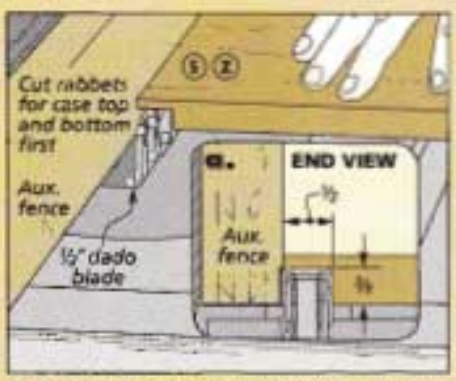
THE BOXES. Each case starts as a box made with solid-wood sides, top, bottom, and a plywood back. The corners are joined with rabbets cut into the sides (detail 'a'). The top, bottom, and sides of the case are rabbeted to hold the back panel (detail 'b'). The dividers are held in dadoes.

All of the joinery for the cases can be cut with a dado blade in the table saw, as shown below. I began with the rabbets in the sides, followed by the rabbets for the back panel. The dadoes in the sides of the drawer case were next up. Use the rip fence to make sure they're aligned from one side to the other. Finally, after switching to a ¼"-dado blade, you can cut the dadoes in the top and bottom of the cubby case in pairs. Cut the dado near one end, flip the piece end for end, then cut the dado at the other end.

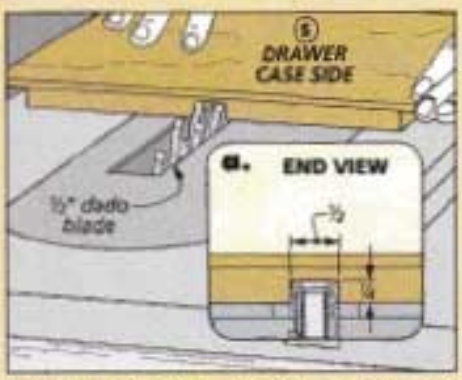
DIVIDERS. Once all the dividers and the backs are cut, the cases can be assembled. As you can see on the opposite page, the cubby dividers have a cutout on the front edge to allow easier access. To form the cutouts, I ganged the dividers with double-sided tape and cut them all at once on the band saw (right How-To drawing). Then I smoothed the cuts with a sanding drum on the drill press.

THE DRAWERS. Once the cases are assembled, building the two

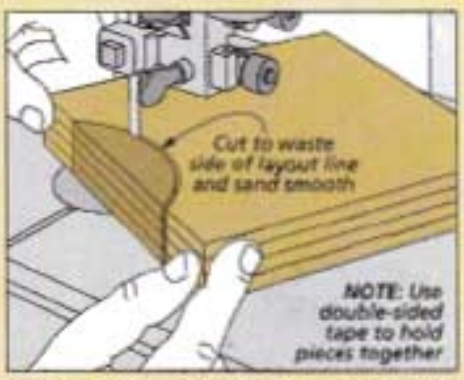
How-To: Cut Rabbets, Dadoes & Curves



Side Rabbets. *With an auxiliary rip fence in place, use a dado blade to cut a rabbet in both ends of the sides.*



Divider Dadoes. *When cutting the divider dadoes for both cases, use the rip fence as a guide to align them.*



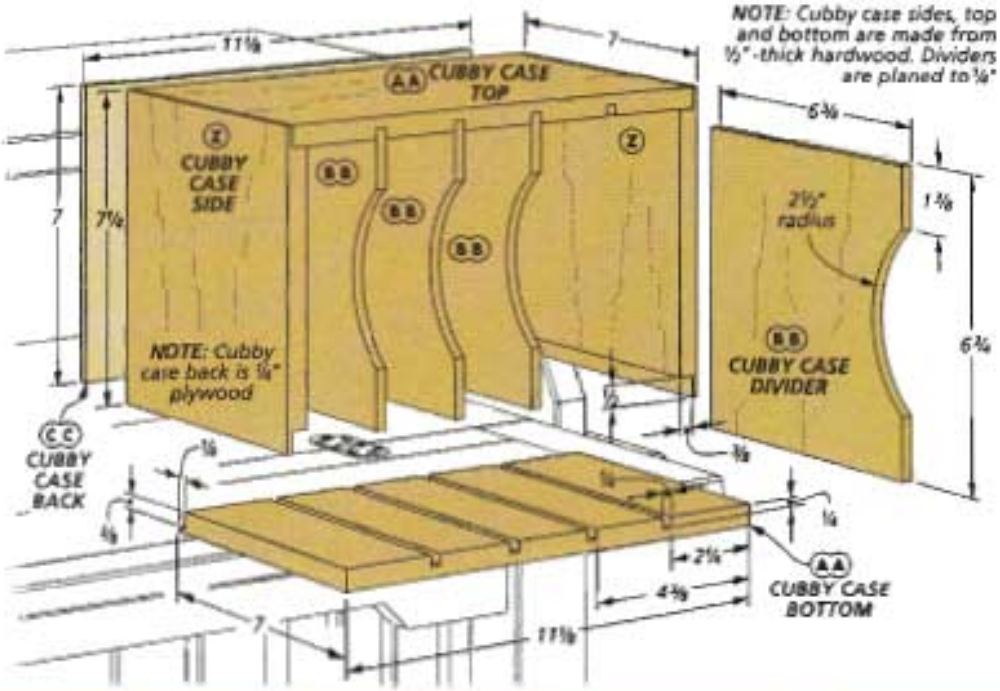
Cutouts. *You can get the cutouts done quickly and consistently by ganging the dividers with double-sided tape.*

identical drawers will complete the job. Again, the joinery is very basic. The ½"-thick front and back are rabbeted to hold the ¼"-thick sides. The plywood bottom fits into rabbets cut in all the pieces (detail drawings, opposite page).

There are a couple of extra details. I added cutouts to the upper edge of the fronts to serve as pulls. And finally, I softened the inside front and back edges with a chamfer.

When assembling the drawers, I dry fit the bottoms to help square them up. When the glue is dry, you can glue the bottoms in place.

That's just about it. Stain and a couple of coats of finish are all you have left to do. Then it's time to pare down and simplify.

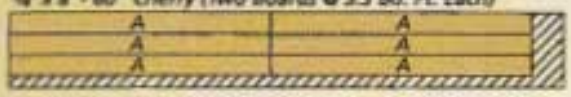


Materials, Supplies & Cutting Diagram

A	Legs (4)	2¼ x 2¼ - 28¼
B	Upper End Rails (2)	1 x 3 - 15½
C	Lower End Rails (2)	1 x 2¼ - 15½
D	End Slats (6)	⅜ x 2 - 18
E	Front Rail (1)	1 x 3 - 37½
F	Upper Back Rail (1)	1 x 3 - 37½
G	Lower Back Rail (1)	1 x 2¼ - 37½
H	Back Stiles (3)	1 x 2¼ - 17½
I	Back Panels (2)	¼ ply. - 14⅞ x 17½
J	Desk Top (1)	1 x 19⅜ - 43
K	Upper Case Sides (2)	1 x 8 - 18
L	Upper Case Bottom (1)	¾ x 16⅞ - 39½
M	Upper Case Fixed Top (1)	1 x 7¼ - 42
N	Upper Case Folding Top (1)	1 x 7¼ - 42
O	Door Rails (2)	¾ x 1¾ - 35⅛
P	Door Stiles (2)	¾ x 1¾ - 8¼
Q	Outer Door Panel (1)	¼ ply. - 5½ x 35⅛
R	Inner Door Panel (1)	¼ ply. - 4¾ x 34⅜
S	Drawer Case Sides (2)	½ 7 - 7¼
T	Drawer Case Top/Bottom (2)	½ x 7 - 11⅛
U	Drawer Case Divider (1)	½ x 6¾ - 10⅞
V	Drawer Case Back (1)	¼ ply. - 7 x 11⅛
W	Drawer Fronts/Backs (4)	½ x 2 13/16 - 10¼
X	Drawer Sides (4)	¼ x 2 13/16 - 6⅜
Y	Drawer Bottoms (2)	¼ ply. - 6⅜ x 10
Z	Cubby Case Sides (2)	½ x 7 - 7¼
AA	Cubby Case Top/Bottom (2)	½ x 7 - 11⅛
BB	Cubby Case Dividers (4)	¼ x 6¾ - 6¾
CC	Cubby Case Back (1)	¼ ply. - 7 x 11⅛

- (8) Tabletop Fasteners w/Screws
- (1 pr.) Twin Pin Hinges w/Screws
- (1 pr.) 2⅜" Soss Hinges w/Screws
- (2) ½" Cherry Dowels (1" Long)
- (4) #8 x 1½" Fh Woodscrews
- (6) #8 x 1¼" Fh Woodscrews

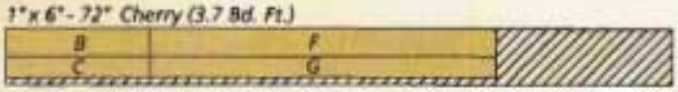
¾"x 8" - 60" Cherry (Two Boards @ 3.3 Bd. Ft. Each)



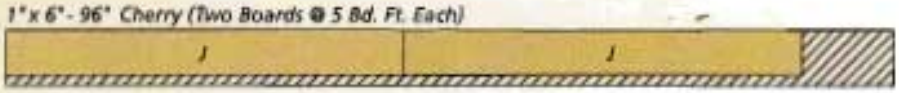
¾"x 8" - 84" Cherry (Two Boards @ 4.6 Bd. Ft. Each)

1"x 6" - 72" Cherry (3.7 Bd. Ft.)

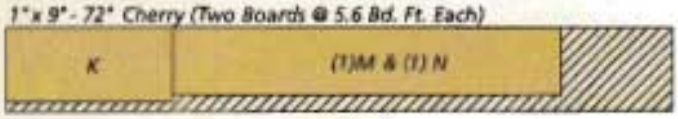
1"x 6" - 72" Cherry (3.7 Bd. Ft.)



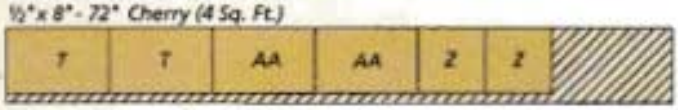
1"x 6" - 96" Cherry (Two Boards @ 5 Bd. Ft. Each)



1"x 9" - 72" Cherry (Two Boards @ 5.6 Bd. Ft. Each)



½"x 8" - 72" Cherry (4 Sq. Ft.)



½"x 8" - 72" Cherry (4 Sq. Ft.)

NOTE: Part D is planed to ⅛" thick

½"x 7" - 72" Cherry (3.5 Sq. Ft.)

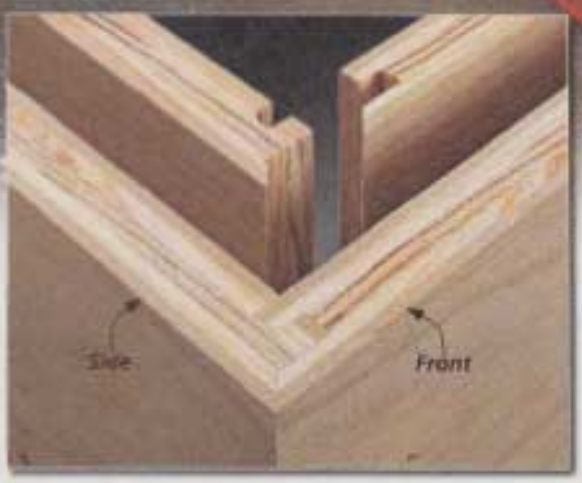
NOTE: Parts X and BB are planed to ⅛" thick

ALSO NEEDED: One 48"x 48" sheet ¼" Cherry plywood

table saw

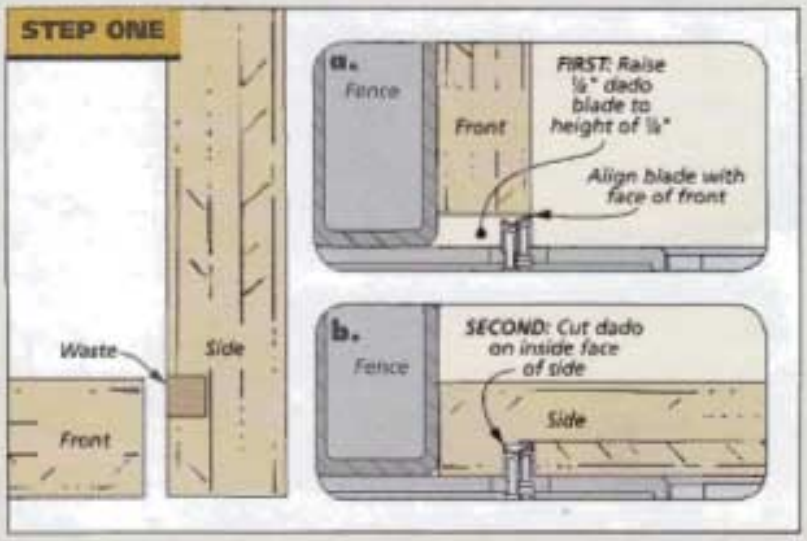
Locking Miter Joint

Create strong, tight-fitting miter joints with nothing more than a table saw.



Miter joints are a great way to seamlessly join two workpieces at a right angle. Unfortunately, they aren't known for their strength. Although you can use splines or biscuits to reinforce miter joints, there's also another method — a locking miter joint.

As you might guess from the name, a locking miter joint is similar to a locking rabbet joint — a tongue on the end of one piece fits into a dado cut on the inside face of the mating piece. The key difference is that the outside corner of the joint is mitered. This way, once the pieces are assembled the joint is hidden with no exposed end grain (inset photo above).



Cut Dado. *With a dado blade installed on your table saw, use one of your workpieces as a gauge to position the rip fence as shown in detail 'a' above. Then cut a dado on the inside face of the side.*

Locking miter joints have a few other things going for them. For one, they offer both mechanical strength and greater gluing surface than splined miters.

Second, because of the way the pieces fit together and interlock, you only have to clamp the joint in one direction (as opposed to a splined miter, which requires clamping in both directions).

And lastly, you can create a locking miter joint entirely on the table saw, without any special equipment. (For some of the steps, it's necessary to clamp a simple auxiliary fence to your rip fence.)

Locking miter joints are well suited for plywood carcase construction. And because the joint has a good mechanical lock in one direction, it can also be used for drawer construction.

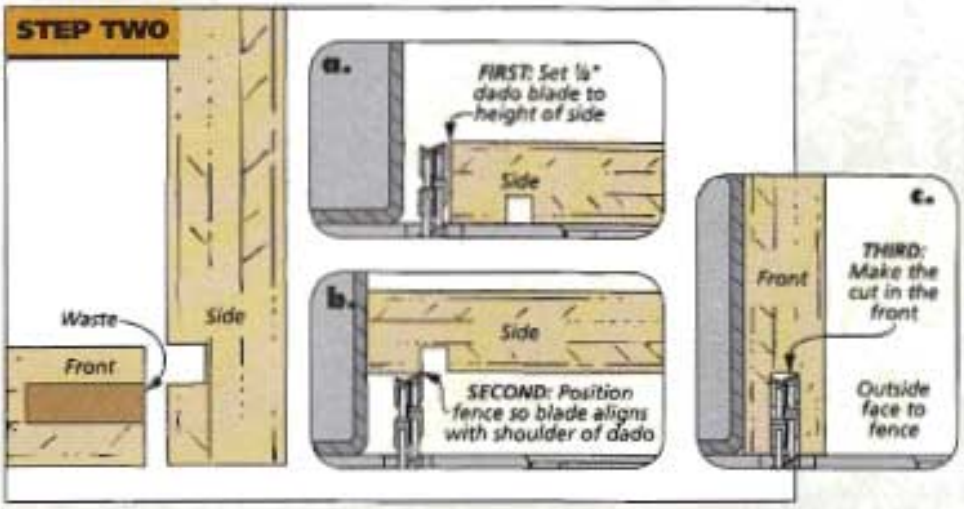
STEP-BY-STEP. The locking miter joint is made with the six steps shown here. One of the nice features of this joint is that after making the first cut, your workpieces become the gauge for setting up the saw for the subsequent cuts. So it's possible to make this joint without any layout tools.

The drawings will walk you through each cut, but there are a few fine points worth mentioning. First, in order to achieve a close-fitting joint, it's important to make sure that all your workpieces start off with square ends.

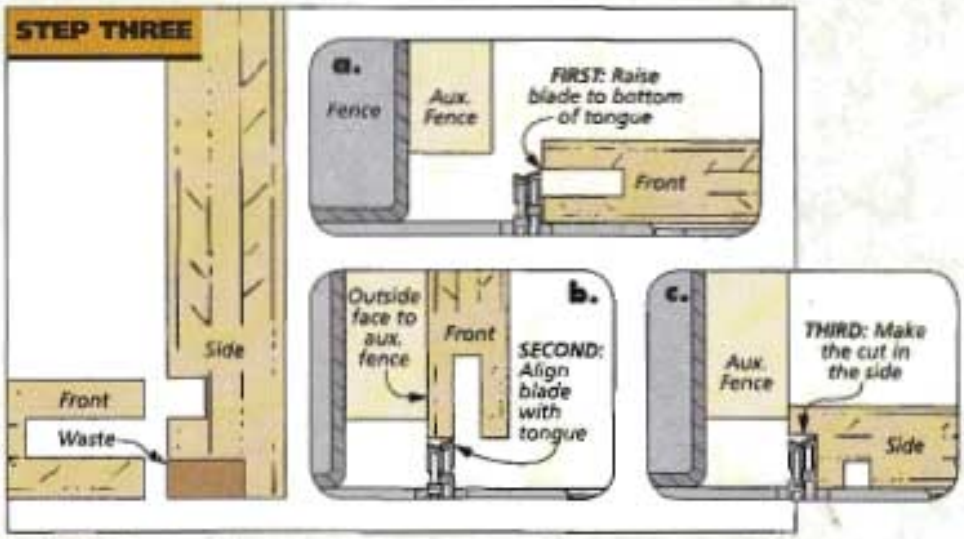
Second, I like to cut a few test pieces from the same material as my project in order to fine-tune my setups and check the fit as I go along. And lastly, I prefer to sneak up on the cuts wherever possible. This way, I can make sure I have an exact fit before making any cuts on my actual workpieces.

SIZE. For the example shown, I cut a ¼"-wide tongue and dado in ¾" plywood. But you can vary the width of the tongue and dado to suit the thickness of your stock.

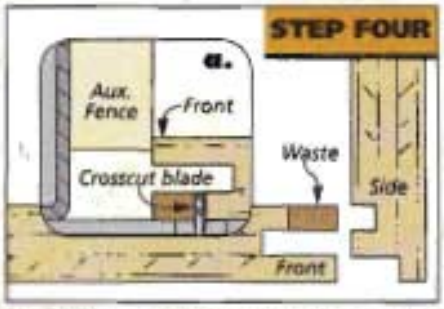
I'll be the first one to admit that this is a fairly specialized joint. And it's probably not one that you'll use every day. But if you're looking for a unique way to build strong, mitered cases, it's worth giving locking miters a try.



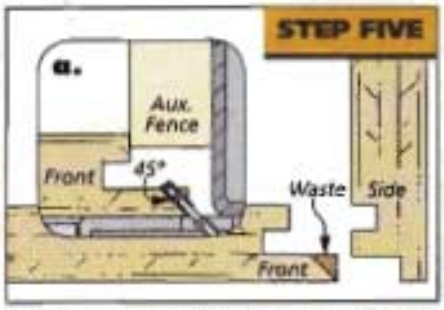
Cut Slot. *Raise the dado blade to match the thickness of the stock. Then position the rip fence to cut a deep slot on the end of the front, creating a tongue that will fit in the dado on the side.*



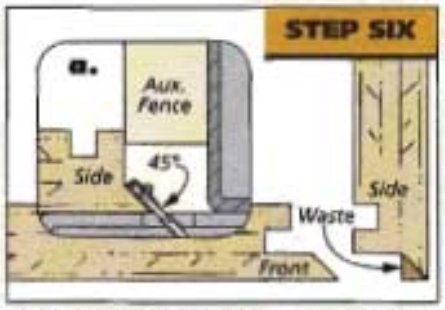
Rabbet Side. *Next, clamp an auxiliary fence to your rip fence so it rests just above the saw blade. Now, you can cut a rabbet on the end of the side to match the thickness of the outer tongue on the front.*



Trim Tongue. *After switching to a single saw blade, trim back the tongue to fit in the dado cut in the side.*



Miter Front. *With the blade tilted to 45°, adjust the rip fence to miter the end of the outer tongue on the front.*



Miter Side. *Reposition the rip fence to miter the end of the side. This allows the two pieces to fit together.*

tips & techniques for using a

Smoothing Plane

For the ultimate in smooth, flat surfaces, this versatile hand plane can't be beat. Here's how to make this tool a shop workhorse.

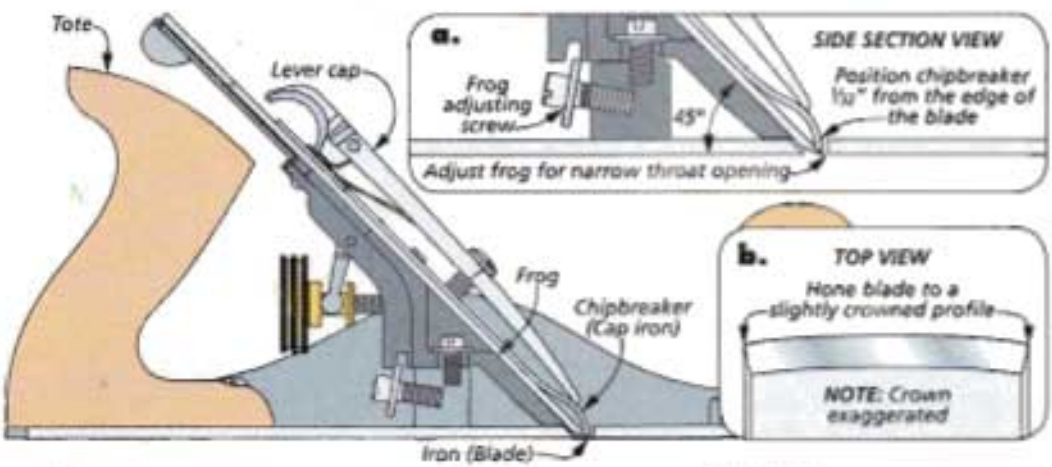
Many woodworkers will tell you that a standard block plane is the most versatile hand plane in the shop. But I would offer another candidate for the title of all-around, go-to hand plane — the slightly larger smoothing plane. Although not quite as easy to handle as a small block plane, a smoothing plane can do everything a block plane can do and more — from removing machine marks and trimming parts to size, to edge jointing and final surfacing.

WHAT'S A SMOOTHER? Smoothing planes (or smoothers) vary widely in design, but they are easily categorized by their size and main task. A smoother is in the range of 8" to 10" long with an iron about 2" wide. Its main purpose is to put a perfectly smooth surface on the wood. And nothing does the job better. To call the surface produced by a well-tuned smoothing plane "glass smooth" is no exaggeration. In order to get this kind of result from a smoothing plane, you just need a little know-how.

SMOOTHER SETUP. Tuning up a hand plane for optimum use is a lesson in itself. I won't go into all the details here, but there are a few things you can do regarding the setup of a smoothing plane that will help ensure better results.

For me, the focus is on the way the iron is sharpened. The cutting angle of a standard metal smoother is fixed at 45° by the plane's frog, as shown at left. This cutting angle, along with a bevel angle of between 25° and 30°, will produce good results in most woods. But I add one more feature to the configuration of the iron — a barely perceptible crown across the edge.

A crowned iron prevents the corners from digging into the wood and also gives you fine control of



the cut. A narrow shaving using only the center portion of the iron greatly reduces the cutting effort in hard or difficult woods. And you'll find that the slight undulations left by a crowned iron can't be seen and can barely be felt.

Once the iron is honed, replace the chipbreaker, carefully positioning it about 1/32" behind the cutting edge. This helps stiffen the iron, keeping it from deflecting and chattering during the cut.

Finally, make sure the frog is adjusted to leave only a very narrow throat opening in the sole. A narrow throat opening supports the wood fibers ahead of the cut, preventing them from lifting and tearing before they're sliced cleanly.

THE TECHNIQUES. Using a smoother is all about control. And the first step is to secure the workpiece to a solid surface. There are various ways to accomplish this. A bench vise can hold a board on edge. Bench dogs, a bench stop, or clamps can be used to hold boards or panels laid flat on the bench.

GRAIN DIRECTION. When securing the workpiece for planing, you always want to read the grain. Then position it so you'll be pushing the plane "uphill," as in the upper left drawing below. In this orientation, the wood fibers will be pressed flat and cleanly severed rather than being lifted and torn.

FIRM STANCE. Using a smoother effectively is almost like playing a sport — body position can be very important. Pushing the plane along a board to take a shaving requires a fair amount of force, so solid, well-balanced footing is essential. The lower left drawing illustrates a good planing stance.

FIRM & STEADY. A metal smoothing plane is generally fairly heavy — anywhere from 3 to 5 lbs. And for good reason. This mass helps keep the plane in contact with the wood and moving steadily without chattering. But the plane can't do the job alone. Your contribution is to provide steady forward motion along with firm downward pressure. The Shop Tip below offers help in this regard.

The speed of the stroke can also affect the cut. If tearout is a problem, try slowing down. A slower stroke allows the iron to shear the wood fibers before they can tear.

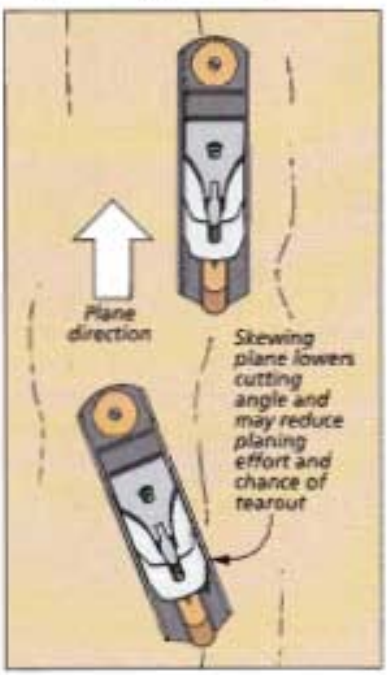
EDGE PLANING. When using a smoother to clean up an edge, I wrap the fingers of my forward hand under the sole to brush along the workpiece and steady the plane, as shown in the photo above. This makes it much easier to control the plane and keep it square on the narrow edge.

▲ When planing a narrow edge, use your forward hand to steady the plane.

SKEWING THE PLANE. It's hard to hold a plane perfectly straight when planing. It feels more natural to skew the plane very slightly. However, one effect of skewing the plane is a lower cutting angle, as shown in the lower right drawing.

In some instances a lower cutting angle can be can helpful, reducing the effort needed to make the cut. But at other times a very low cutting angle may produce a "riving" action and lead to tearout. The only answer here is trial and error.

A smoother doesn't have to replace the power sanders in your shop to earn its keep. It's simply a handy alternative that can often do the job quicker and better.



Shop Tip: Wax-On

▲ Beeswax applied lightly to the sole of the plane can greatly reduce the friction resistance that leads to fatigue.

a guide to

Finishing Solvents

To get top-notch finishing results, you need to know which type of solvent is the best choice for the job at hand. Here's the scoop.

One aspect of finishing that doesn't get much attention is the vast array of solvents used in the process. Having the right solvent on hand is often more an afterthought than a primary concern. That is until you want to thin a finish or clean a brush and you don't have the solvent you need or aren't even sure what that might be. The upshot is that it pays to have a basic knowledge and understanding of the properties and uses of the different finishing solvents.

The labels are different, but the solvents inside serve the same general purpose.

WHAT DO THEY DO? All finishes contain one or more solvents. They serve two purposes with a fine distinction. Solvents are primarily used to dissolve the resins in the finish so they can be applied to the surface of the wood.

In other instances, solvents are simply added to the finish to reduce the viscosity or "thin" the finish, making it easier to apply. So what we lump together as solvents can either be a true solvent or simply a thinner. Sometimes a solvent can serve both purposes. Here, we'll just consider them all as solvents.

MILD TO STRONG. Solvents can be generally classified in terms of their ability to dissolve different finishes and their volatility level (evaporation rate). I simply think of solvents as falling in a range from mild to strong. This is an "unscientific" distinction, but it provides a good starting point.

TURPENTINE. At one time, turpentine was the solvent used in all paints, varnishes, and other finishes that used linseed oil as a base. It's made by the distillation of gum or sap from certain pine trees. And its strong, "piney" odor is pretty unmistakable.

Today, turpentine has limited use in finishing. Its slow evaporation rate has the undesirable effect of extending the drying time of already slow drying varnishes, paints, or oil finishes. But it's still used in some traditional finishes such as beeswax and turpentine.

MINERAL SPIRITS. Mineral spirits have replaced turpentine as the solvent and thinner for varnishes,

other oil-based finishes, and oil-based paints. Mineral spirits are distilled from petroleum and are less labor intensive and costly to manufacture than turpentine.

But not all mineral spirits are equal which leads to confusion. Depending upon minor differences in the formulation, mineral spirits can be labeled odorless, low-odor, or standard mineral spirits. Besides strength of odor, each type has slightly different solvent properties. The odorless and low-odor types tend to evaporate faster and have a bit weaker solvent effect.

Any of the three will work about equally well with finishes requiring mineral spirits. The low-odor types can be more expensive, but if you're sensitive to the fumes, it might be worth the extra cost.

PAINT THINNER? Is there a difference between mineral spirits and paint thinner? The answer is maybe. Often, products labeled as paint thinner are pure mineral spirits. When this is the case, it's stated on the can. In other instances, paint thinners may contain various cheaper solvents. When thinning finishes, it's probably a good idea to stick with pure mineral spirits.

NAPHTHA. I consider naphtha sort of a "second string" solvent with a few specific uses. Like mineral spirits, it's a petroleum distillate. It has a fairly low solvent strength but a fast evaporation rate. This is what makes it useful.

Naphtha can be used as a thinner if a faster drying time is desired, such as when applying paste wood filler or oil-based stain. It can also be used as a lubricant and cleaner when rubbing out a finish.

DENATURED ALCOHOL. Shellac is my favorite all-purpose sealer. And consequently, I always keep denatured alcohol on hand. It serves as both the solvent for the shellac resin and as the thinner used to dilute it for application.

Denatured alcohol is simply ethanol that has poisonous methanol added to it (or denatured) to prevent consumption. It's highly volatile. And this is what makes shellac such a handy sealer — it dries in minutes. Denatured alcohol is also used as the solvent for certain NGR (non grain-raising) dyes.

LACQUER THINNER. Lacquer thinner combines high volatility with high solvent strength. This is why it's such a useful finishing solvent. As well as being the thinner for nitrocellulose lacquer, it will soften or redissolve many other types of finishes and makes a good all-purpose cleaner. But the fumes are very strong and can be harmful.

Lacquer thinner is actually a mixture of chemicals. This feature means lacquer thinner can be custom blended for different uses such as thinning a slower-drying brushing lacquer.

THE REST. You'll find a number of other solvents on the store shelf that fall into the "highly volatile" category — acetone, methyl ethyl ketone, and xylol for example. Some of these are the components of lacquer thinner. They are mainly used as thinners for specialty finishes and also make effective cleaners, but generally have little home shop use.

SOLVENT SAFETY. When working with solvents, it pays to take some simple precautions. First, don't overlook the hazard of fire. Be sure to store the solvents appropriately. And second, during any prolonged exposure, I always wear proper protection (photo below).

Knowing your solvents isn't rocket science — just a little chemistry. But when the goal is a great finish, it's worth the effort.

▼ Gloves, safety glasses, and a respirator should be part of your wardrobe when working with highly volatile solvents.

▲ Denatured alcohol serves as both the solvent and the thinner for shellac.

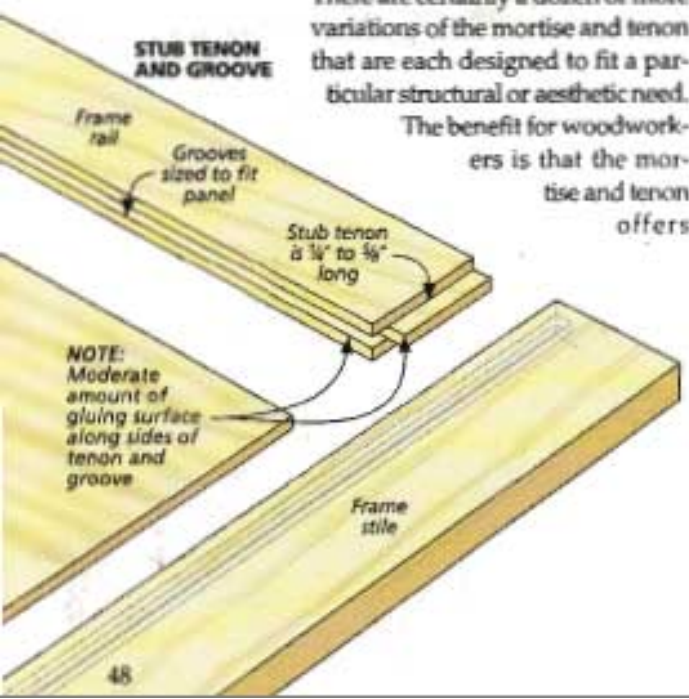
Solvent Summary

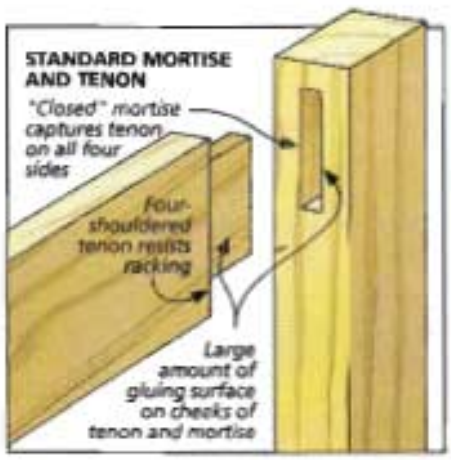
Type	Uses	Volatility	Comments
Turpentine	Once used as the solvent and thinner for oil-based paints and varnishes. Now limited to specialty finishes.	Low	Distilled from pine sap and has strong but not unpleasant "piney" odor. Relatively expensive.
Mineral Spirits/ Paint Thinner	Replaced turpentine as the solvent and thinner for all oil-based paints, finishes, and stains.	Low	Distilled from petroleum and inexpensive. Various formulations offer slightly different properties.
Naphtha	Can be substituted for mineral spirits when a faster drying time is desired. Also serves as rubbing lubricant.	Moderate	Has low solvent properties and moderate odor. Evaporates faster than mineral spirits.
Denatured Alcohol	Serves as the solvent and thinner for shellac resin. Thinning pre-mixed shellac is its main shop use.	High	Evaporates rapidly giving shellac a fast drying time. Is "denatured" by adding toxic methanol to ethanol.
Lacquer Thinner	Mainly used to thin standard lacquer for spraying. Will soften or strip many other finishes. Effective as a cleaner.	High	Lacquer thinner is a mixture of highly volatile chemicals and is formulated for specific uses. Strong odor.
Acetone/MEK/Xylol	Use of these highly volatile substances is generally limited to specialty finishes and epoxies.	High	These products are commonly found on store shelves and some are the components of lacquer thinner.

choosing the right Mortise & Tenon Joint

The mortise and tenon isn't a "one-size-fits-all" joint. The trick is knowing which type works best for your application.

You may have heard it said that the mortise and tenon is the fundamental joint in woodworking. And although you can easily make an argument to back up this statement, it might be a bit simplistic. The mortise and tenon isn't just one joint but a whole family of joints. There are certainly a dozen or more variations of the mortise and tenon that are each designed to fit a particular structural or aesthetic need. The benefit for woodworkers is that the mortise and tenon offers a real joinery bonanza. The catch is that when designing and building a project, you have to decide which type of mortise and tenon is the best choice for meeting a particular goal. But this doesn't have to be a difficult decision. One of a handful of common variations of the mortise and tenon will fill the need on almost any project. When you familiarize yourself with the strengths of each type, you'll be able to call on the right joint.



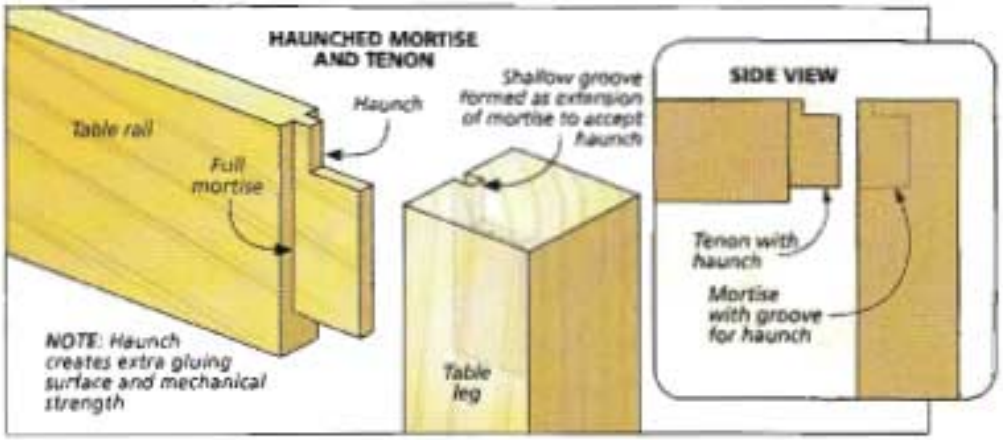


STUB TENON & GROOVE. The simplest form of mortise and tenon is shown at left. Termed a stub tenon and groove, this joint is made by fitting a short tenon (usually no longer than ⅜") into a continuous groove. This joint has the advantage of being easy to cut and is often used to make cabinet doors and other light-duty frame and panel assemblies. It offers a fair amount of gluing surface but the open ended, continuous groove has weak sides that can crack fairly easily if stressed. This weakness can be overcome by gluing a plywood panel into the grooves.

STANDARD MORTISE & TENON. When a deeper, fully enclosed mortise is cut to accept a longer tenon, you end up with a much stronger joint (drawing above). Since the sides of the mortise are supported by the wood on either end, the chance of splitting is much less likely. Greater gluing surface is another benefit. This is a good choice for

joints that will be put under stress, such as a rail-to-leg or stretcher-to-leg joint of a chair or table.

The tenon can be made with shoulders cut on all four edges, as shown, or just the two long edges. A two-shouldered tenon has the advantage of being easier and quicker to make. A four-shouldered tenon has greater racking resistance and ensures that any gaps between the ends of the mortise and the tenon will be hidden.



HAUNCHED MORTISE & TENON. When a tenon is cut back or notched along one edge, the resulting short stub is referred to as a haunch (drawing above). This type of mortise and tenon joint is commonly used in making heavy-duty frame and panel assemblies. The obvious benefit here is that the haunch fills the end of the groove.

A haunched tenon can also offer structural benefits. For example, when making a large table frame, a haunched tenon offers a slightly stronger choice for joining the rails to the legs. The mortise can be reduced in length and kept back from the end of the leg, reducing the likelihood of splitting. A shallow groove between the mortise and the end of the leg holds the haunch on the tenon. This arrangement creates a continuous gluing surface and also provides a mechanical connection that keeps the rail from twisting out of alignment.

THROUGH MORTISE & TENON. For heavy-duty, structural applications, a through mortise and tenon, as shown in the left drawing below, is often your best option. This traditional variation is designed to maximize the mechanical strength of the joint. A trestle base for a workbench or table, or a large door can benefit from the added rigidity a through tenon provides. Another advantage is that wedges can be inserted into the joint to lock it into the mortise.

A through tenon also offers aesthetic appeal and is often incorporated as a detail on Craftsman-style furniture. But note that since the joint is exposed, both the mortise and the tenon have to be cut and fit cleanly and accurately.

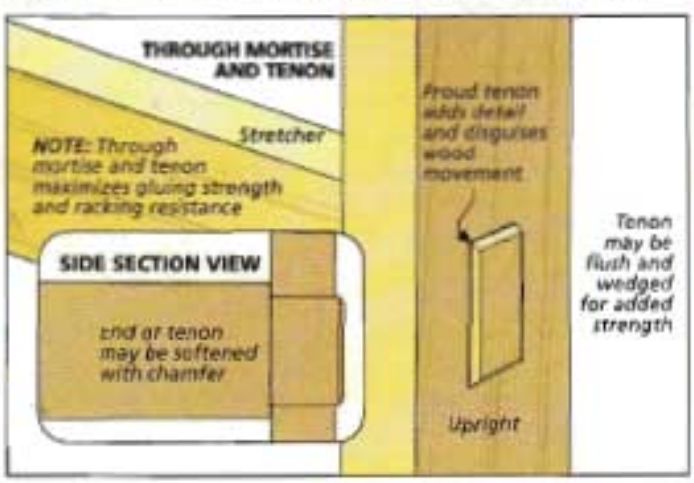
TWIN TENONS. Creating twin tenons or double tenons, as illustrated in the right drawing below, is called for in pretty specific situations. When a "flat" rail is joined to a vertical piece, a single, wide mortise and tenon joint would provide only a small amount of long grain gluing surface along the edges of the tenon. In this instance, using two side-by-side mortises along with twin tenons essentially doubles the amount of long grain gluing surface in the joint.

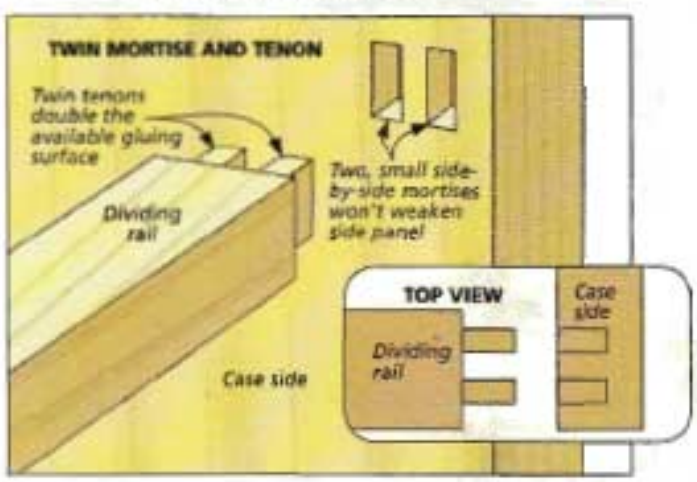
Twin tenons are commonly used on solid-wood cases. The joint creates a strong connection between the dividing rails and sides.

SPLIT TENONS. Sometimes it's necessary to join a fairly wide rail (6" or more) to a stile or leg. But a long mortise fit with a wide tenon has a couple of weaknesses. First, when the tenon is glued rigidly into the mortise, wood movement is restricted and becomes an issue. This can cause the rail to crack or the joint to fail. Secondly, the long mortise can seriously weaken the rail. Spreading or splitting at the sides of the mortise is a possibility.

The solution is to divide the tenon into two sections, as shown in the main drawing on the opposite page. Two shorter mortises connected by a shallow groove will maintain the strength of the rail while separating the tenons allows a small amount of wood movement.

Basically, it all comes down to matching up the structural requirements with the right type of mortise and tenon. The reward is a joint that will last a lifetime.





Questions & Answers

Liquid Hide Glue

***Q** I was shopping for some wood glue the other day and came across something called "liquid hide glue." Is there any difference between this glue and the hide glue that you have to heat up before using?*

Randall Claxton
Omaha, Nebraska

▲ Dry hide glue must be soaked in water and heated before use. Liquid hide glue can be used straight out of the bottle.

A Hide glue has been used by furniture-makers for centuries. It gets its name from the fact that the glue is made from the collagen protein found in animal hides (horse or cow hides).

Traditional hide glue is usually sold in dry, granular form (see photo). Before it can be used, the glue must be pre-soaked in water and then heated in a glue pot until it liquefies.

Hide glue has a number of benefits over other types of glue. The glue can be redissolved by soaking it in warm water, making it possible to disassemble a joint, if necessary. For this reason, hide glue is used by musical instrument makers and restorers of antique furniture.

Hide glue doesn't "creep" like yellow (PVA) glue. And unlike yellow glue, it also sands easily and will accept most stains and finishes.

Despite these advantages, one of the major downsides to traditional hide glue is the need to heat it up before use. Not only is this a hassle, but the heated glue can give off an unpleasant odor.

LIQUID HIDE GLUE. To get around this inconvenience, *Franklin Adhesives* developed a liquid hide glue product in 1935. By adding urea and other chemicals to traditional, hot hide glue, the glue remains liquid even at room temperature. So you can use it straight out of the bottle.

DIFFERENCES. Because it's made from animal collagen, liquid hide glue possesses many of the same benefits as traditional hide glue. But the urea used in liquid hide glue also changes some of the glue's working characteristics.

Glue Pot. *Traditional hide glue is heated up in an electric, double-boiler glue pot. It starts to set up almost immediately after it's applied and begins to cool.*

The biggest difference is that liquid hide glue has a longer open (working) time than hot hide glue, which tacks up almost immediately as it cools. In fact, liquid hide glue has a longer open time (up to 20 minutes) than most yellow glues.

This can be a big benefit when gluing up a complicated assembly. The extra working time gives you a better opportunity to position parts and clamps before the glue starts to set up.

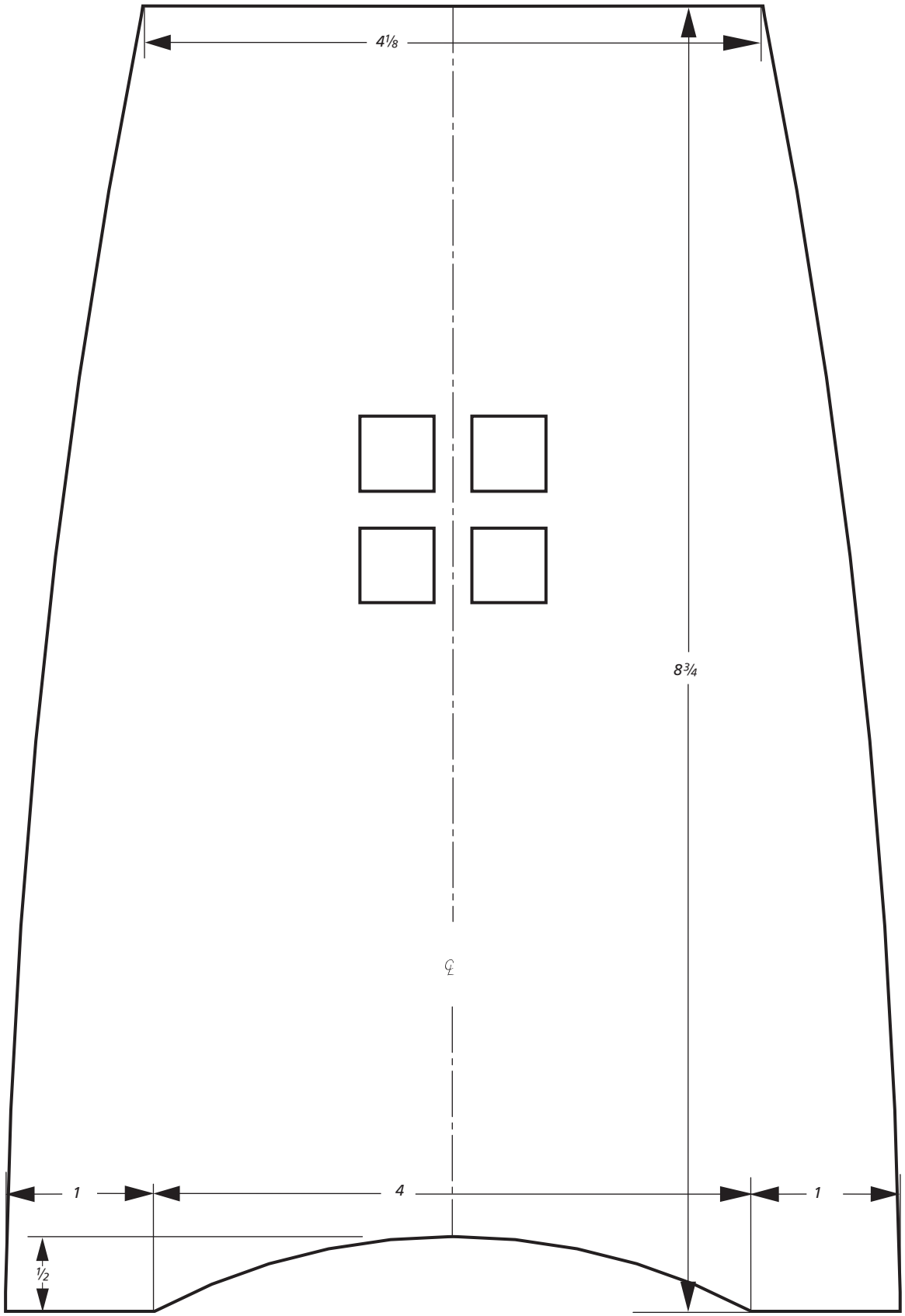
However, in addition to the difference in open time, the urea slightly decreases the holding power compared to hot hide glue. But I've never found this to be a problem. The glue is still strong enough for most furniture projects.

SHELF LIFE. If there's any real downside to liquid hide glue, it's the glue's shelf life. In its dry state, traditional hide glue has an unlimited shelf life.

However, liquid hide glue has a shelf life of only six months to a year. So you'll want to check the manufacture date that is stamped on the bottle before you purchase or use it.

Online Extra

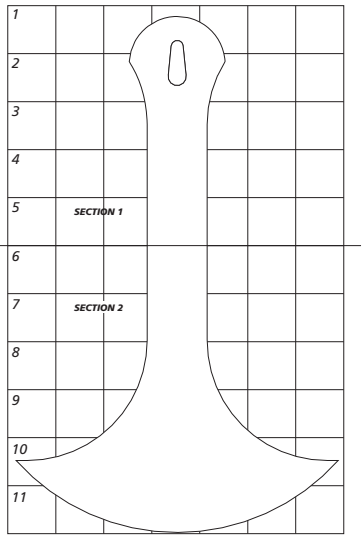
Book Rack Pattern



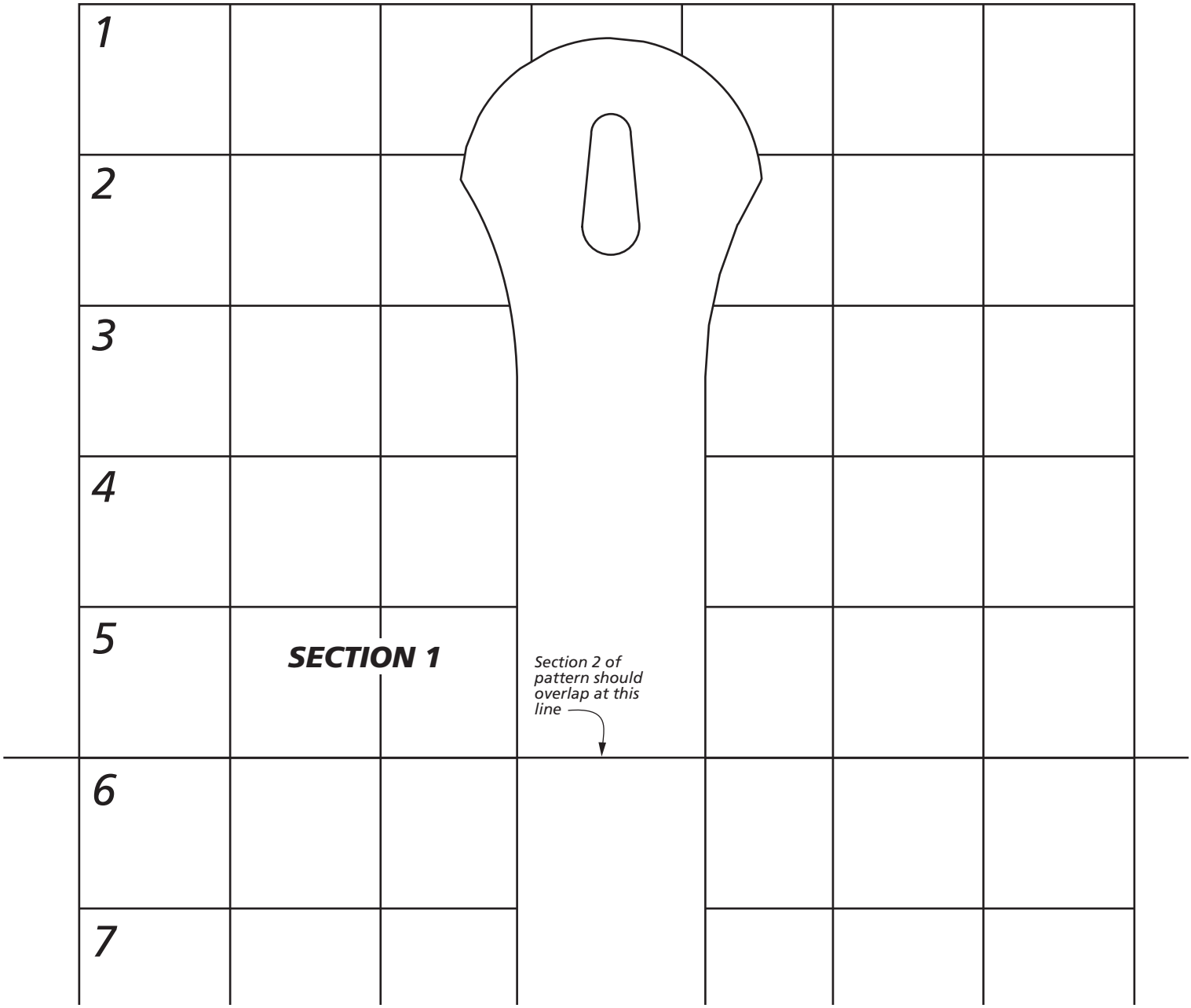
Online Extra

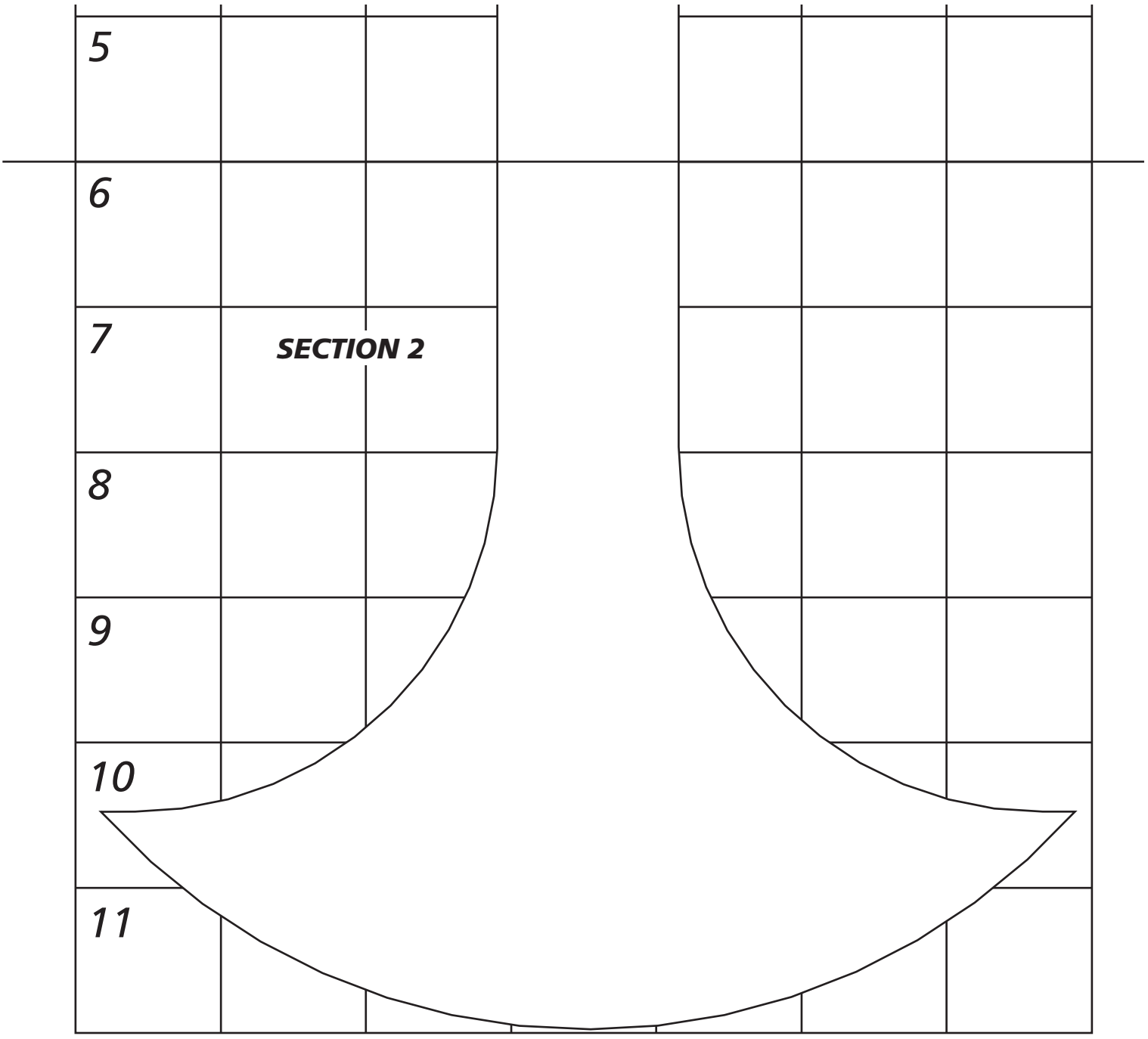
full-size pizza peel

Handle Pattern



NOTE: Cut and tape both sections together for full-size pattern





Sources

TASK LIGHTING

Task lighting is a great way to add extra light right where you need it. The *LED Work Light* (26429) and *Magnifiying Head* (23061) shown on page 8 are both sold by *Rockler*. The *Delta* work light is available from *Amazon*, the *Woodsmith Store*, and other tool dealers who carry *Delta* products.

PIN NAILERS

When it comes to attaching moldings, glass stop, or other small parts, a pin nailer is an invaluable tool. They're available from several online tool dealers.

PRECISION DADO JIG

The *Precision Dado Jig* (PDJ-100) featured on page 12 is available directly from the manufacturer, *Infinity Cutting Tools*. Their information is in the margin at right.

The spiral downcut bit shown with the jig is available from several different router bit manufacturers. You can purchase them through a number of woodworking supply catalogs.

TEMPLATE ROUTING

Template routing is a great technique for creating mating arcs or curves in two workpieces. The technique relies on a router bit with a 1⅜"-dia. bearing fixed at the shank. We purchased our bearing (232) from *MLCS*. Included with the bearing is a stop collar and hex wrench.

PIZZA PEEL

The pizza peel on page 16 doesn't require any hardware. However, since the peel will be used with food and washed occasionally, you'll want to select a finish that's food safe and easy to maintain. For this reason, we went with a wipe-on oil finish (*General Finishes' Salad Bowl Finish*). It's food safe after drying for 72 hours.

BOOK RACK

Other than a few woodscrews, you won't need any special hardware for the book rack on page 20. To finish the rack, we stained it with *Zar's* honey maple stain and then sprayed on a couple coats of lacquer.

GATHERING TABLE

Aside from the commonly available screws, nuts, and washers, the hardware for the gathering table on page 24 came from *Rockler*. This includes the figure-8 fasteners (21650) and the hanger bolts (24448).

The base of the table was stained with *General Finishes' Gel Stain (Java)*. Then the entire table was finished with a couple coats of spray lacquer.

For the two Designer's Notebook options on page 29, we used legs purchased from *Classis Designs by Matthew Burak Designs* (303-LV36 and 304-B36). To rout the profile on the edge of the classic table, we used a thumbnail profile bit (8559) from *MLCS*.

DROP-FRONT DESK

To build the desk on page 32, you'll need a pair of *Soss* hinges (26526), a pair of twin pin hinges (26765) and some tabletop fasteners (34215). These are all available from *Rockler*.

For the finish, we first stained the desk with a mixture of three parts *Zar* stain (cherry) and one part *WoodKote Jel'd Stain* (cherry). Then we sprayed the desk with two coats of lacquer.

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MAIL ORDER SOURCES

Project supplies may be ordered from the following companies:

Woodsmith Store
800-444-7527
Delta Work Light, Figure-8 Fasteners, Hanger Bolts, Soss Hinges

Amazon
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General Finishes' Products, Pin Nailers, Task Lighting, Zar Stains

Classic Designs by Matthew Burak
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mlcswoodworking.com
Ball Bearing Guides, Spiral Router Bits, Thumbnail Router Bit

Rockler
800-279-4441
rockler.com
Figure-8 Fasteners, General Finishes' Products, Hanger Bolts, LED Work Light, Magnifying Head, Soss Hinges, Tabletop Fasteners, Twin Pin Hinges

WoodKote
800-843-7666
woodkote.com
WoodKote Stains

looking inside

Final Details

Gathering Table. This informal table is the perfect height for sitting or standing. We've even included a couple optional designs. Turn to page 24 for easy-to-follow plans.

Book Rack. Quartersawn oak, square openings, gentle curves, and through "tenons" give this easy, weekend project a Craftsman-style appearance. Step-by-step plans start on page 20.

Pizza Peel. While this project may have a simple purpose, it involves plenty of woodworking techniques. You'll find all the details beginning on page 16.

Notebook Computer Desk. A folding top and drop-front door transform this compact desk into a spacious work-center. Turn to page 32 for complete project plans.