SPECIAL JOINERY ISSUE: Dovetail Key Joints on the Router Table
Through Tenons with the Table Saw

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Vol. 20 Issue 116

Best-Built Jigs & Accessories

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Tough Cuts Made Easy

The Secret to Better Rip Cuts

Precision Router Upgrade

5 Uses for Router Edge Guides

Storage Solutions

For Any Shop!

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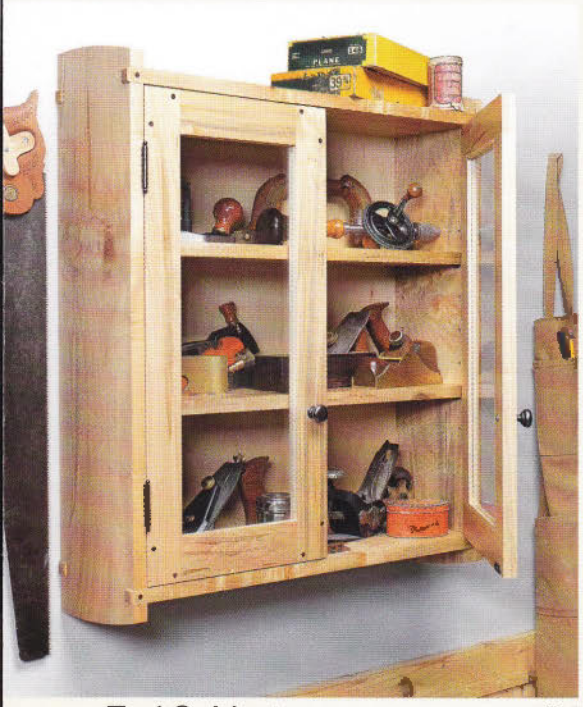

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Cutoffs

One thing I've learned from talking to other woodworkers is that we all view our tools as an investment. Even if our tools don't have a high dollar value, we wouldn't part with them. So no matter what their cost, protecting your tool collection is a natural part of the hobby.

In this issue, we're featuring plans for a wall-mounted cabinet designed to show off your most-prized hand tools. It's a great project for showcasing some special wood you've been saving for the right occasion.

For everyday tools you need to keep at hand, check out the drop-side tool tote. It's great for tasks both inside and outside the shop. No matter which project you decide to build, you're sure to pick up some new woodworking skills along the way.

Additionally, look over the plans for a couple of handy jigs. One will help you cut identical, contoured parts at the band saw. The other jig we're featuring makes it easy to install dovetail-shaped keys on the corners of boxes and case assemblies. The keys give the project a classic, decorative look and also strengthen the joints.

To top it off, we've included some tips and tricks for getting the most out of some other common shop tools. We've packed a lot of useful information into this issue. Just turn the page to get started.

Terry

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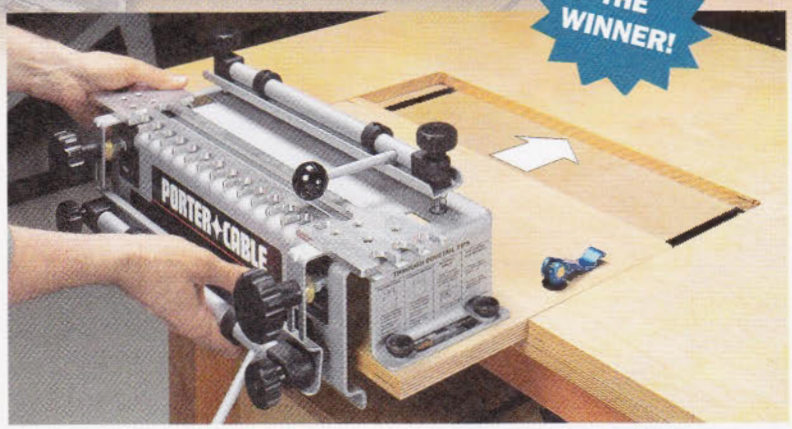
from our Readers

Tips for Your Shop

Shop Space Saver



In my small shop, having a dedicated stand for every tool simply isn't feasible. So I built one of my benchtops to accommodate a variety of tools and jigs. The secret is the interchangeable insert. It allows me to slip in a different tool in no time at all.

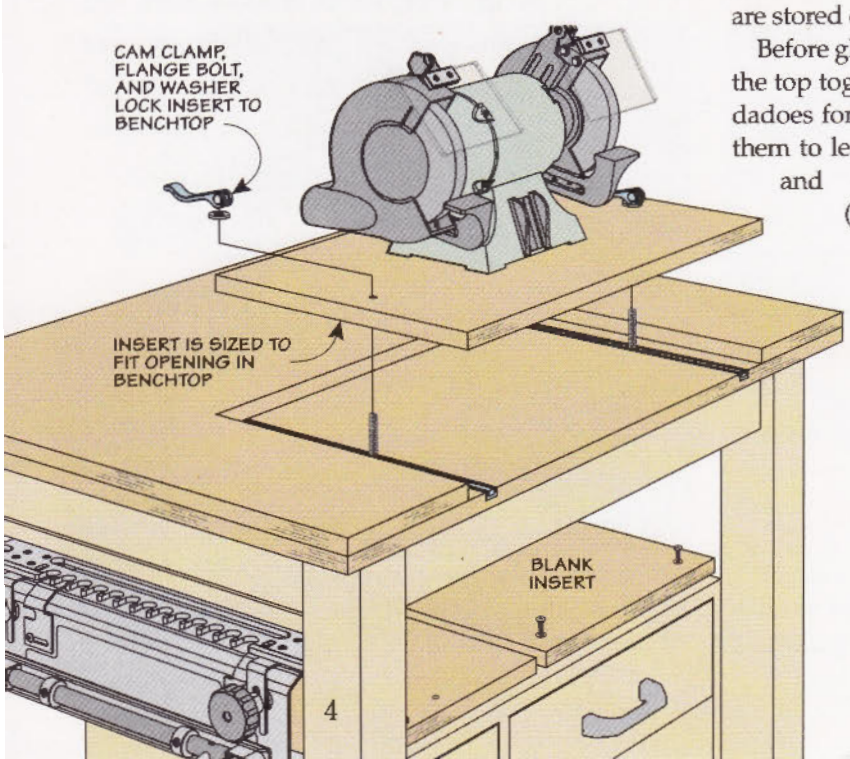
The benchtop is made from two layers of plywood. The bottom layer has a pair of T-tracks used for securing the insert in place. The top layer has a section cut out to accept the insert.

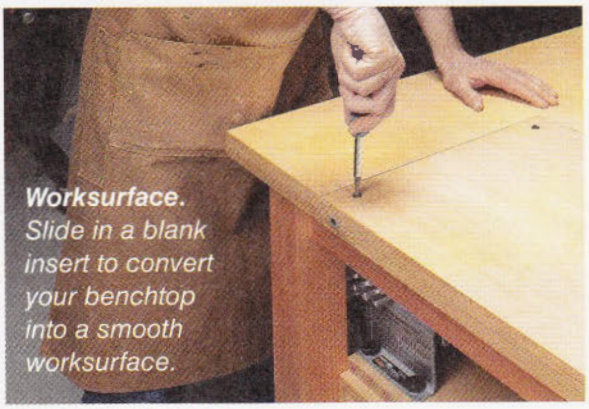
The drawing below shows the concept. You'll want to size the insert for the largest tool. And you'll need to take into account the storage space required for the tool when it's not in use. (Mine are stored on a shelf below.)

Before gluing the two layers of the top together, I cut the pair of dadoes for the T-track. I located them to leave space for the tool and clamping hardware (photo above).

After gluing the two layers, it's just a matter of making enough inserts for your tools. I used flange bolts and cam clamps to secure them, but knobs would work just as well (drawing below). For a flat worksurface, make a blank insert and use the hardware shown in the left margin to fasten the insert at each corner (photo below).

Robert Tindall
Littleton, Colorado





Worksurface. *Slide in a blank insert to convert your benchtop into a smooth worksurface.*

Tee Mallet

While browsing the plumbing aisle of the hardware store, it occurred to me that a brass pipe tee fitting would make a great mallet for the shop. I found two types, as you can see at right — a round cast fitting and a square machined fitting.

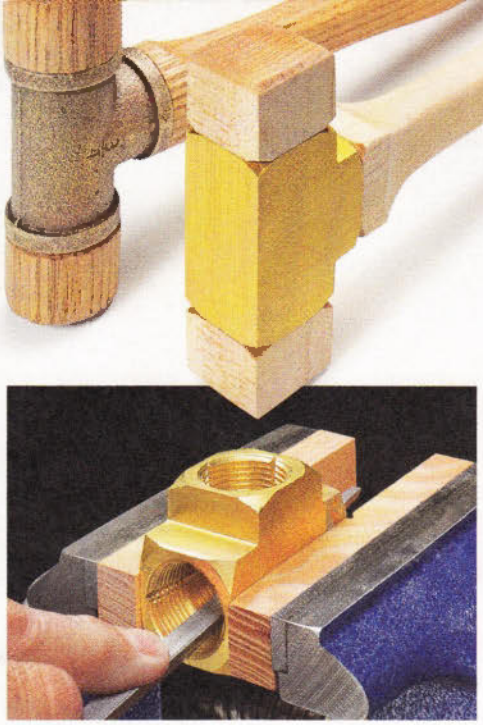
Now, I had to figure out a way to fasten the heads and handle. I wanted to be able to replace them when necessary, so using epoxy was out of the question. Instead, I used the fitting to cut threads on the wood parts for a solid connection.

You can see in the photo at right how I filed notches in the threads with a three square file. This helps form cutting edges to slice through the wood fibers.

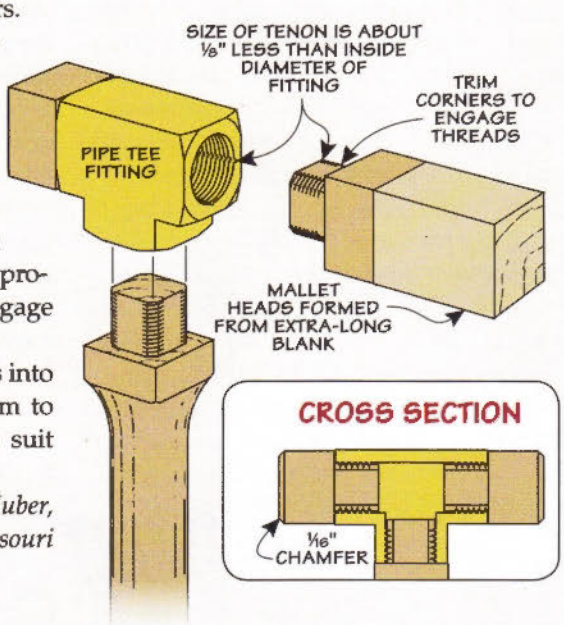
Next, I formed a square tenon on an extra-long blank for the heads and handle. The tenon is slightly undersized and the corners are trimmed with a chisel, as shown in the drawing at right. This provides enough "meat" to engage the threads of the fitting.

After installing the blanks into the fitting, you can cut them to length and shape them to suit your tastes and comfort.

Matt Huber,
Kansas City, Missouri



▲ ***Thread Cutting.*** *Notches filed into the threads create a "die" to cut the threads in the wood faces and handle.*



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SUBMIT A TIP

There, you'll be able to describe your tip in detail and upload photos or drawings. Or you can mail your tip to the editorial address shown in the right margin. We will pay up to $200 if we publish your tip. And if your tip is selected as the top tip, you'll also receive the *Bosch Impactor* shown on the right.

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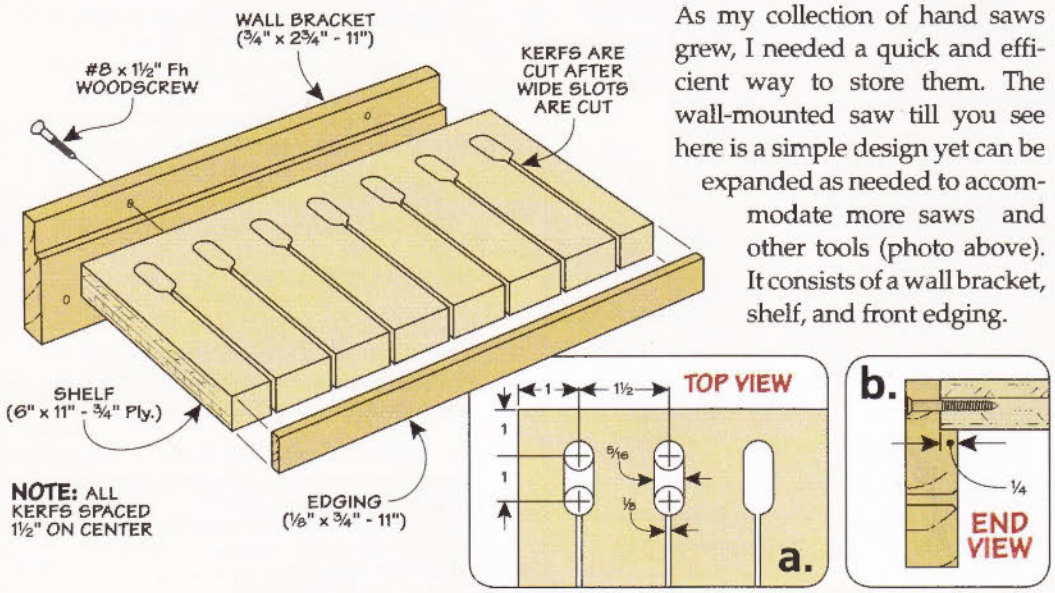
▲ ***Slot.*** *A wide slot accommodates the spine of a saw while the blade slips into a kerf.*

Quick & Easy Tool Till



As my collection of hand saws grew, I needed a quick and efficient way to store them. The wall-mounted saw till you see here is a simple design yet can be expanded as needed to accommodate more saws and other tools (photo above). It consists of a wall bracket, shelf, and front edging.

I first cut the shelf to size. Next, I cut slots spaced evenly along the length of the shelf. You can see what I mean in the drawing. These slots provide room for the spine of a saw to slip into the kerf (inset photo).

The kerfs are cut at the table saw. Just be sure to stop the cut when it reaches the slot.

The bracket is simply a rabbeted piece of hardwood. I used glue and screws to fasten it to the shelf. Finally, a strip of thin edging covers the ends of the kerfs.

Donald Henderson
Orleans, Ontario

Quick Tips

▲ *It's no secret that using a zero-clearance insert makes for a cleaner cut. But over time, they can get pretty chewed up.* ***Rich Constand*** *of Cincinnati, Ohio can usually restore an insert by using auto body filler. After filling the saw kerf with filler and letting it dry, you simply recut the kerf. This technique works great for miter saw inserts, too.*

▲ ***Jerry Gauthier*** *of Kamloops, British Columbia uses an inexpensive bath or kitchen mat as a sanding pad. It not only protects the workbench but cushions the workpiece, too. And the non-slip rubber backing keeps it in place.*

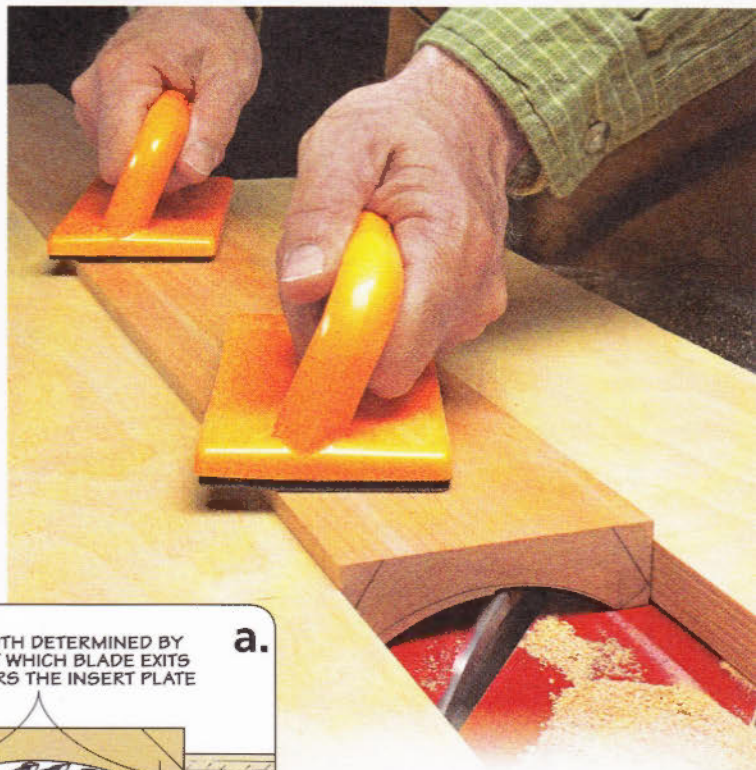
Cove Molding Calculations

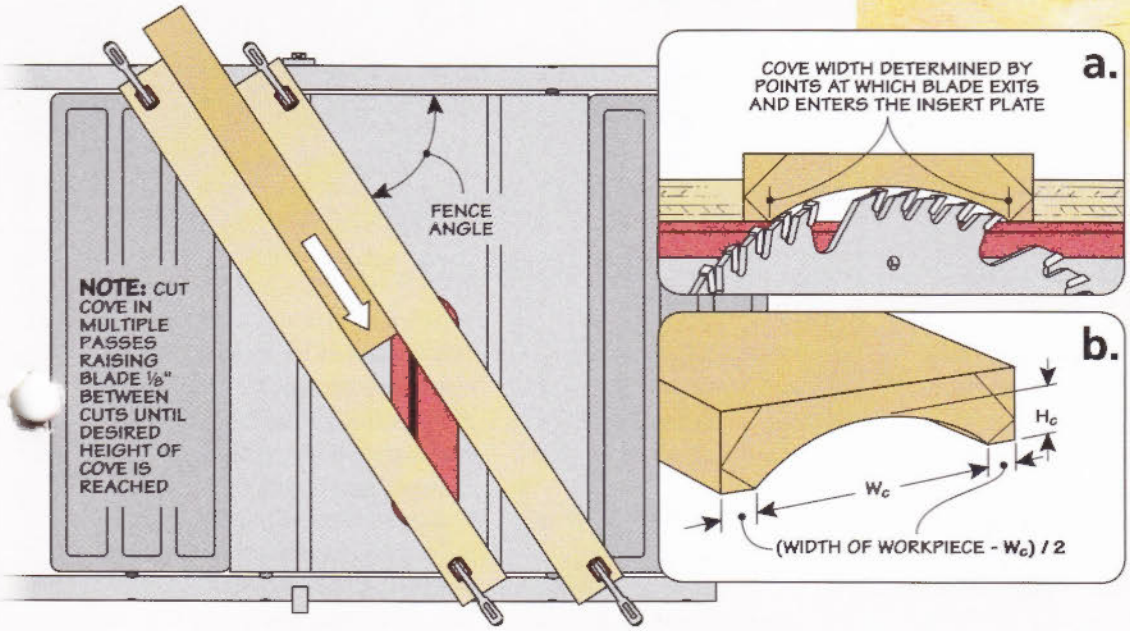
When cutting cove molding at the table saw, the fences are set at an angle relative to the saw blade. Since math is my other hobby, I worked out a formula that calculates the fence angle for any simple cove, like the one shown in detail 'b.'

The formula requires a bit of trigonometry. (Editor's Note: We've condensed Hugh's formula into an easy, downloadable PDF file you can find online at ShopNotes.com.)

Once the fence angle is computed, it's a simple task to set the miter gauge and use it as a reference to fix the fences to the table to cut the cove. The distance from the saw blade (set to the finished cove height) is determined by subtracting the cove width from the board width then dividing the remainder by two. You can see what I mean in detail 'b.'

Hugh Davey
Ellicott City, Maryland





$$\text{Fence Angle} = \cos^{-1}\left\{\frac{W_c - T_b}{10 * \sin(\cos^{-1}(1-H_c/5))}\right\}$$

Where:
H_c = Height of finished cove
W_c = Width of cove
T_b = Thickness of blade

ShopNotes GO ONLINE EXTRAS For custom cove calculations, go to: ShopNotes.com

▲ *Finishing tasks go a little smoother with these two tips.* ***Duane Heng*** *of Woodbury, Minnesota uses a lighting grid and marbles to support the workpiece when applying a finish. And to keep track of when and how many coats of finish he has applied,* ***Cory Hoehn*** *of Jeffersonville, Indiana uses the paper protecting the workbench as a notepad. He records the date, time, and number of coats, crossing out the previous entry.*

using a router Edge Guide

Unlock the potential of your hand-held router with this precise, inexpensive accessory.

It's amazing to me just how many jigs and accessories there are for routers. However, one inexpensive router add-on that I consider a must-have is an edge guide. Although it was once a pretty common accessory, I think it's often overlooked now. That's too bad, because an edge guide can help you get more out of your router.

Benefits. I like to think of an edge guide as a portable version of a router table. It's ideal for working on large workpieces that would be awkward to handle on a router table or table saw. As you'll see later, an edge guide lets you create custom profiles and details as well as cut precise joinery.

Simple Design. As versatile as it is, an edge guide is a simple device. It consists of just two main parts — a fence and an arm that can be quickly attached to the base of your router, as you can see in the photos below. The fence can be locked in place anywhere along the arm to set the position of the bit relative to the edge of a workpiece.

There are two other things I want to mention about edge guides. First, choose an edge guide that has a micro-adjust feature. This way you can fine-tune your setup for perfect cuts.

The second thing is it's a good idea to add hardwood auxiliary faces to the fence. This provides a longer reference edge for better control, especially when starting and completing a cut.

Using an Edge Guide. Using an edge guide is pretty straightforward. But there are still a few tips that are worth mentioning to get the best results.

Start by clamping the workpiece securely so it can't shift in use. As you do so, be sure to check that the edge guide track freely along the edge and doesn't get hung up on your workbench.

◀ ***Easy On.*** *Most edge guides attach directly to the router's base with a pair of screws.*

The next thing to think about is the routing direction. Just like any hand-held routing task, you should move the router from left to right along an edge.

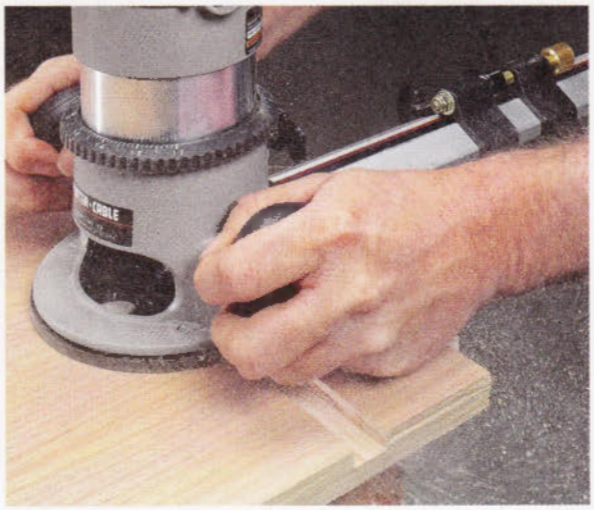
During a cut, your main goals are holding the guide firmly against the edge of the workpiece and gently pressing the router down onto the surface. This does two things. First, it keeps the cutting depth consistent. And second, it prevents the router from drifting away from the edge, which can spoil a cut.

Starting and ending a cut can pose a challenge. That's because only one side of the edge guide is making contact with the workpiece. To keep the router from diving into and out of the cut, shift your pressure to the side of the edge guide that's contacting the workpiece.

With these basic tips in mind, you're ready to put your edge guide to use. Here are three ways I regularly use mine.

Custom Profiles. One advantage of an edge guide is that you can use just a portion of a bit — whether it has a bearing or not (main photo, opposite page). This gives you more freedom in positioning the bit. And, you can mix and match bits to create unique profiles on cabinet and table tops.

Joinery. An edge guide lets you bring the tool to the workpiece for cutting joints on large case pieces. You can see two examples of this in the photos above.



▲ ***Dadoes & Grooves.*** *The fence on an edge guide ensures joinery cuts are perfectly parallel to the ends or edges of a workpiece.*

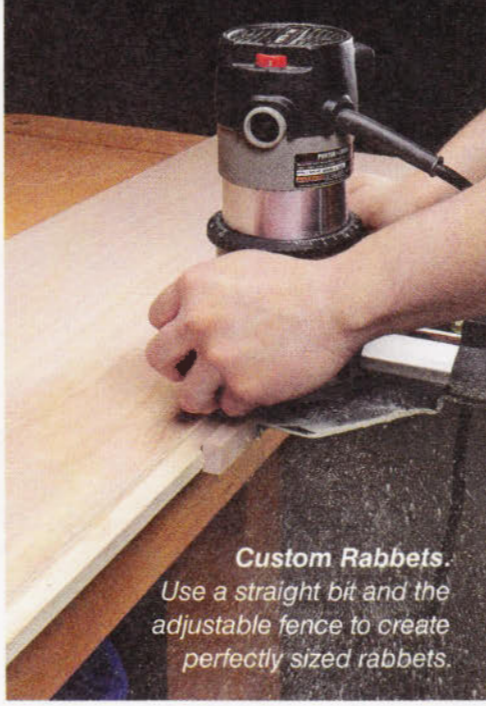
The left photo shows a dado being cut near the end of a long workpiece. Using the fence on the edge guide ensures that the cut will be perfectly parallel to the end. And I can easily make consistent cuts on other parts, too.

The precise adjustability of an edge guide really comes into play when routing rabbets in plywood (right photo). Here I can use an ordinary straight bit to rout a rabbet that perfectly matches the thickness of the mating piece. As an added benefit, routing with an edge guide gives me great visibility and control for making stopped dadoes, rabbets, and grooves as well.

Decorative Details. The ability to rout parallel to an edge isn't limited to joinery. In the photos below, you can see how to create decorative details with an edge guide. With the fence set, you can make perfectly parallel and symmetrical cuts from each edge quickly and easily.

Finally, an edge guide can be used on round pieces, too. The split fences create two contact points for routing around a table (lower right photo and inset).

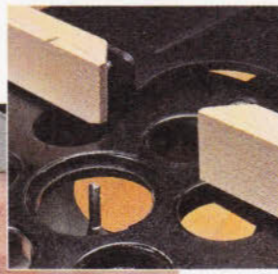
It's easy to see how an edge guide lets you get more from your router. And it's sure to become an essential part of your work.



Custom Rabbets. *Use a straight bit and the adjustable fence to create perfectly sized rabbets.*

Flutes. *Combine a core box bit and an edge guide to quickly make fluted parts.*

Inlay Grooves. *The split fence (inset photo) allows an edge guide to follow round tops for cutting inlay grooves.*



taking a look at

Doweling Jigs

A doweling jig is a handy shop accessory. Here's what's available and what they can do.

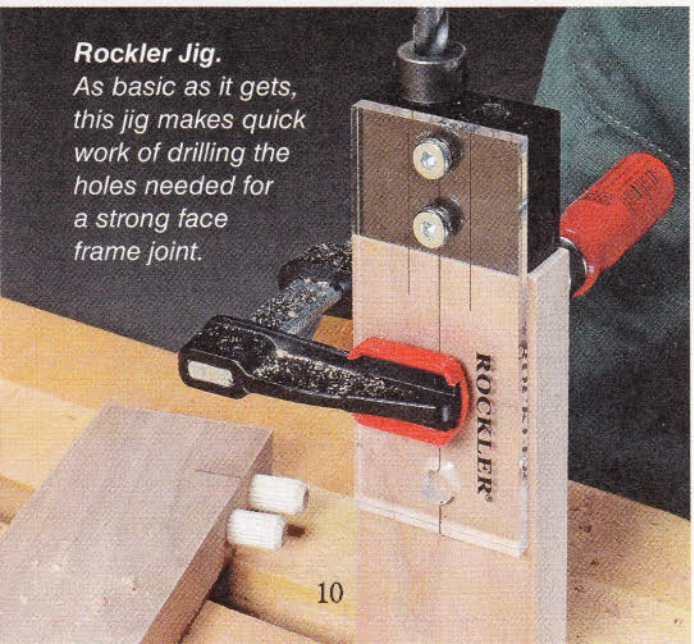
Ralph Waldo Emerson said, "Build a better mousetrap and the world will beat a path to your door." When it comes to doweling jigs, it appears there are a number of manufacturers that feel the same way.

Over the next few pages, you'll read about doweling jigs that range from a bare-bones *Rockler* model ($12), all the way up to the *Dowelmax*, a top-of-the-line jig that will set you back just a bit over $310. That's quite a price range. But as you'll see, the price sometimes defines the capability and ease of use for many of the jigs. (For sources, turn to page 51.)

The Tests. To check out how well each doweling jig performed, I ran each one through a set of basic joinery tasks — creating a face frame, strengthening a standard 45° miter joint, and joining workpieces edge-to-edge for a panel. I followed that up with some simple case construction jobs like making a corner butt joint and a T-joint (to add a shelf).

Doweling jigs are good for other tasks, too. So I worked through a few other tasks, like creating a mortise and drilling centered, perpendicular holes to a surface.

You'll find a summary chart on page 13 that details how each doweling jig fared on each test. Plus, there's information on the accessories included with each of the jigs as well as with any optional accessories you can purchase.



Rockler Jig. *As basic as it gets, this jig makes quick work of drilling the holes needed for a strong face frame joint.*

ROCKLER JIG

On the low end of the price range, the *Rockler* jig you see at the lower left has to be the simplest doweling jig I've ever used.

It's nothing more than a hardened steel guide with a pair of ⅜"-dia. holes drilled through it. Screwed to the guide is a clear plastic fence with reference lines. Two lines identify the centers of each hole and the third is the centerline of the pair.

The first step in using the *Rockler* jig is marking a centered layout line across the joint of each workpiece. Then, using the center reference line on the jig, align it with the layout line on the workpiece and clamp the jig in place (photo at left). After drilling a pair of holes in one workpiece, just repeat the process on the other one.

If all you ever wanted to do was create face frames, this is the

jig to use. And for the price, that's a bargain. This jig will work for miter and edge-to-edge joints as well, although I didn't find it as well-suited for those tasks.

SELF-CENTERING JIG

I wouldn't be surprised if the self-centering jig you see at right is the one you picture when someone mentions doweling. It's a heavy-duty, well-machined jig that comes in a couple of different sizes depending on your needs.

The one shown at right is available from a number of sources. It has a width capacity of 2" (some models go up to 4"), which can be somewhat limiting. But it does come with three pairs of bushings (¼", 5/16", and ⅜") to meet the needs of most workshops.

For edge-to-edge or face frame joints, this jig is quite easy to use and set up. You won't be doing case joinery with this jig, but for drilling centered holes in dowels (photo at right) or removing the waste to create a basic mortise (inset photo at right), this jig more than passes the test.

GENERAL JIGS

Although the next two jigs are from the same manufacturer, I included both of them because they're each designed quite differently, as you can see below.

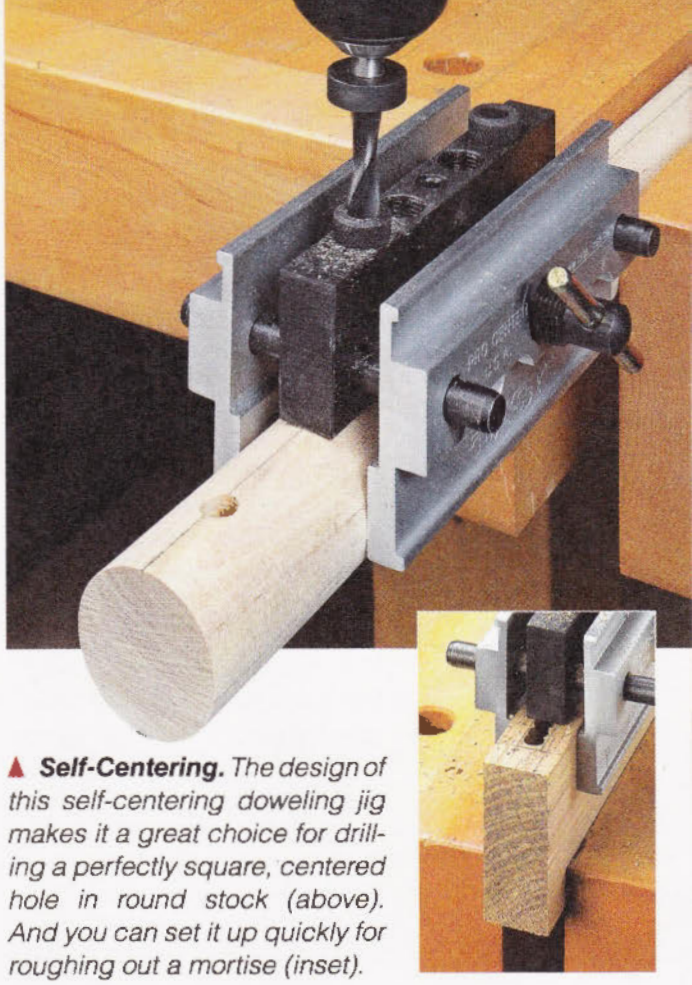
The first one I tried out was the *General EZ Pro* at the lower left. And I'll be quite frank, after using it on a basic T-joint, I was ready to set it aside and forget about it for the rest of the tasks I ran on the other jigs.

In my opinion, it's a hassle to use and simply isn't accurate enough to create strong, solid joints. The problem starts with the included guide bushings. The "matching" drill bits fit loosely in the bushings, reducing the accuracy of the holes. And when making a T-joint, you have to align the jig to a layout line by eye and hold the jig in position by hand to drill one half of the joint, as you can see in the photo below. A workable joint can be created, but it's just not worth the effort.

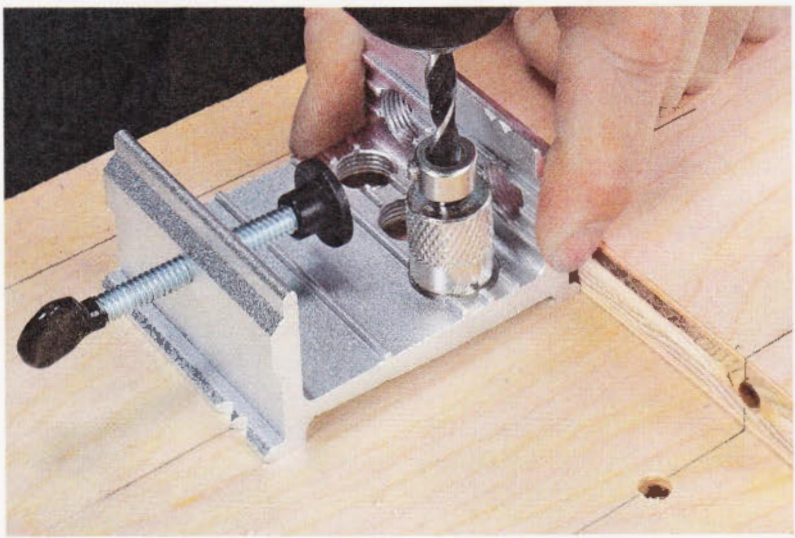
The *Pro-Doweling Kit*, on the other hand, fared a little better. It worked great at drilling into end grain, as shown in the right photo below. And again, with a little work, I could get acceptable edge-to-edge joints.

However, there are downsides to the design of this doweling jig. Any workpiece edge or face you want to drill into can't be any wider than 4". That means using dowels to connect a shelf into the side of a cabinet is out of the question. Unlike the *EZ Pro*, the bits fit the holes in the drilling turret better, but I'd be a little concerned about how well it holds up after repeated use.

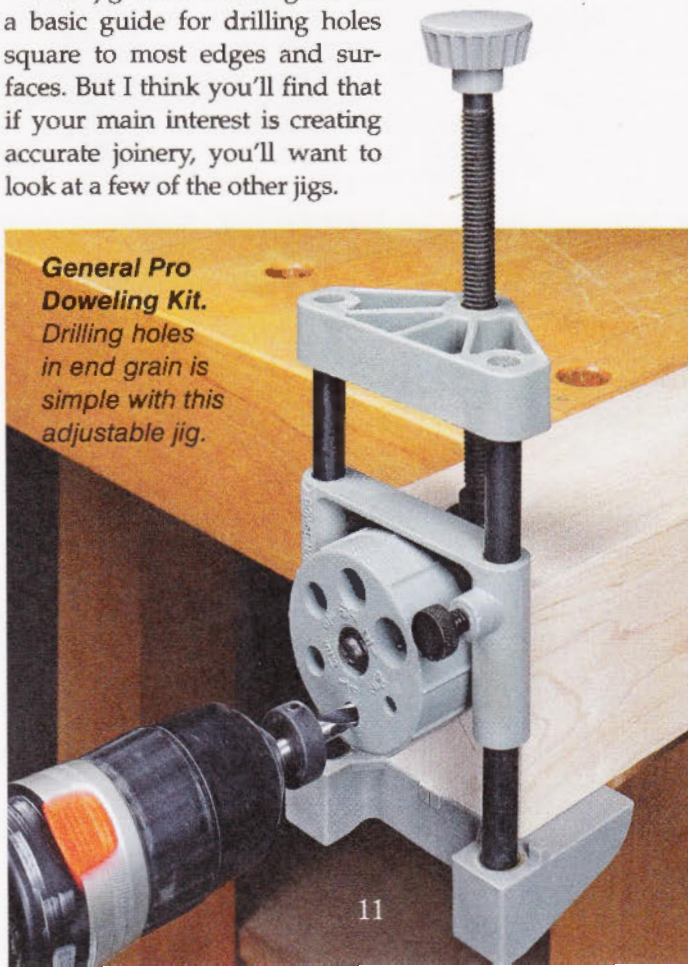
This jig does work great as a basic guide for drilling holes square to most edges and surfaces. But I think you'll find that if your main interest is creating accurate joinery, you'll want to look at a few of the other jigs.



▲ ***Self-Centering.*** *The design of this self-centering doweling jig makes it a great choice for drilling a perfectly square, centered hole in round stock (above). And you can set it up quickly for roughing out a mortise (inset).*



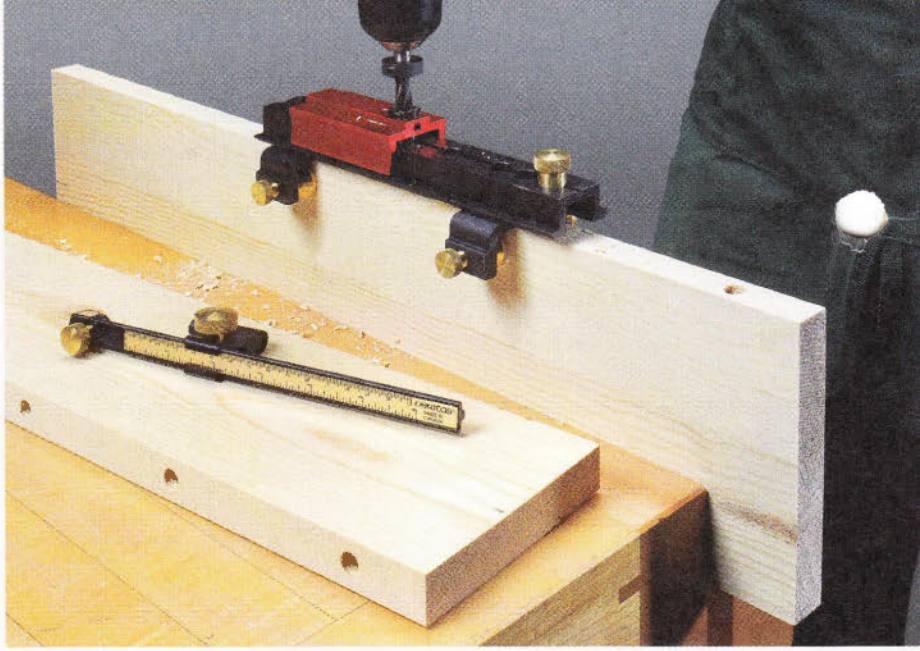
▲ ***General EZ Pro.*** *Creating a well-fitting T-joint is a challenge. Besides accurately transferring layout lines, you need to hold the jig in place while you drill the holes, which often end up misaligned.*



General Pro Doweling Kit. *Drilling holes in end grain is simple with this adjustable jig.*

higher-quality Jigs

On these pages, you'll find a few more doweling jigs that are worth considering. And on the opposite page, there's a handy summary chart comparing all the doweling jigs to one another. Finally, at ShopNotes.com, there's an online extra showing each jig along with the accessories that come with it and extras you can purchase.



▲ ***Veritas Doweling Jig.*** *The design of this doweling jig ensures that even if your stock thickness varies slightly, one side of a glued up panel will always end up with flush joints.*

VERITAS DOWELING JIG

The next doweling jig I took a look at is made by *Veritas* (upper right photo). Like most *Veritas* tools, this doweling jig is well-made. But what makes this jig unique is that it's based on the *Veritas 32mm Cabinetmaking System*. That does limit it usefulness when it comes to many doweling operations, as you'll see.

Consistent Reference. Where the *Veritas* jig excels is joining boards edge to edge (or end-to-end). The design of the jig allows you to consistently reference off one face on all your workpieces. This way, even if there's any variation in the thickness of the workpieces, at least one face of any glued up assembly will always be perfectly flush.

An indexing pin and accessory gauge head (resting on the completed board in the photo) ensure accurate alignment of the dowel holes from the end of the workpiece and along its length.

This jig works well for face frame joints and miters, too. You'll need to reposition the clamping bases to do this. Here again, you can rest assured that the joints will be perfectly flush.

Finally, the *Veritas* doweling jig can be used for mortises. Although it's not quite as convenient for this task as a self-centering doweling jig. But it does come with bushings for ¼", 5/16", and ⅜" — the most common mortise sizes I work with.

The Downsides. Unfortunately, that's about the extent of its abilities. Corner and T-joints for case assembly are off limits. And drilling into round stock and end grain are limited to workpieces you can fit between the clamping bases (about 1 1/16" in thickness or diameter).

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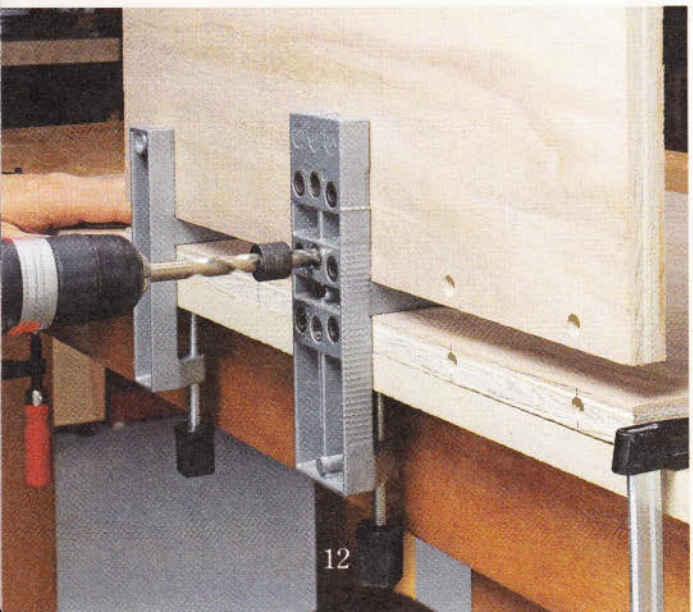
For more information on basic and optional accessories for each doweling jig, go to: ShopNotes.com



WOLFCRAFT DOWEL PRO

After working with the *Veritas* doweling jig, I was a little skeptical moving on to the *Wolfcraft Dowel Pro* (photo at left). The fit and finish weren't quite as nice, but once I started using it, I was pleasantly surprised by the results.

◀ ***Wolfcraft Dowel Pro.*** *This is the only jig that allows you to drill mating holes at the same time to ensure exact alignment.*

Dual Drilling. Unlike all the other doweling jigs, you don't drill all the holes in one workpiece and then move on to the mating piece. The *Wolfcraft* jig is designed to clamp the two mating workpieces into the jig at the same time. This allows you to drill one dowel hole and then immediately drill its mate.

What I found was that it pretty much guaranteed that the holes lined up on edge-to-edge joints. I was able to get similar results for a corner joint on a case, as in the photo at left. This system makes the entire process go faster since you don't have to set up a second time for the mating workpiece.

Miter and end-to-end joints worked out well, also. And as long as you can fit it between the clamps, you can drill perfectly square holes into end grain.

Can't Cover It All. While the *Wolfcraft* jig worked well in the tests above, a couple of the other tests didn't get a passing grade. While I was able to complete a face frame joint with a little work, it wasn't quite as intuitive as I'd hoped. It required more careful setup since the alignment wasn't automatic. Drilling a centered hole in a dowel is out. And it's a

hassle to create a centered mortise with the *Wolfcraft*. It only works with stock less than ¾" thick and then you have to use shims in many cases to get it just right.

DOWELMAX

The final jig I took a look at was the *Dowelmax* (upper right photo). But calling the *Dowelmax* a "jig" doesn't do it justice. As the included literature says, it's a "precision-engineered joining system" — a pretty accurate description as I found out.

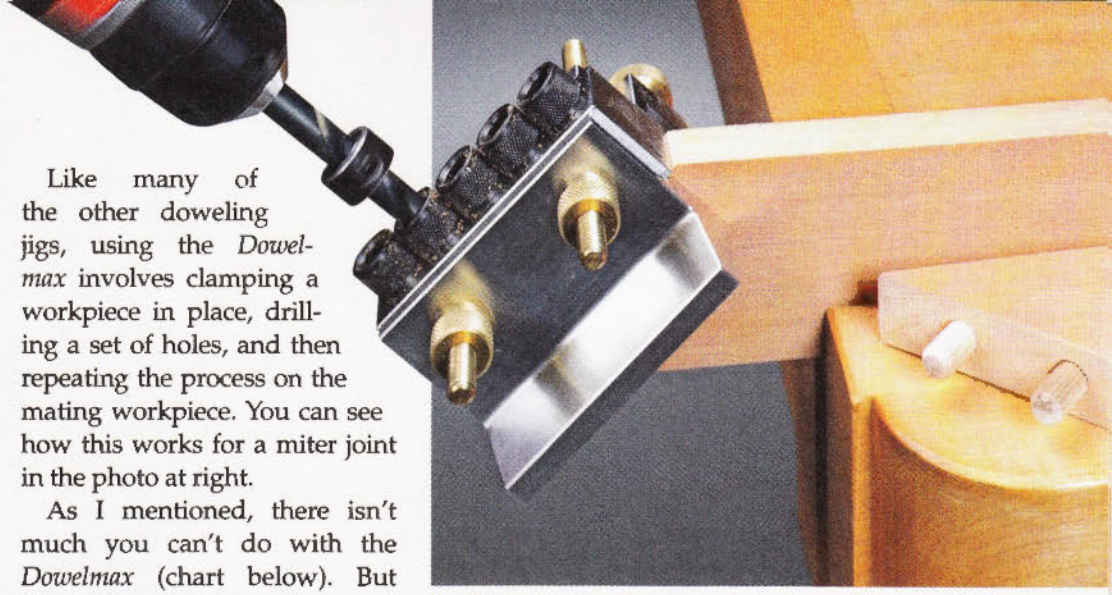
I'll get right to the point — there probably isn't much the *Dowelmax* can't accomplish when it comes to joinery. Plus, it takes a lot of the frustration out of the process. And if you do have questions, there's an included DVD covering its many uses.

Built-In Precision. The main reason the *Dowelmax* works so well has to do with its precisely machined aluminum parts. Every part fits perfectly. And the main parts can be rearranged to suit the task at hand.

Like many of the other doweling jigs, using the *Dowelmax* involves clamping a workpiece in place, drilling a set of holes, and then repeating the process on the mating workpiece. You can see how this works for a miter joint in the photo at right.

As I mentioned, there isn't much you can't do with the *Dowelmax* (chart below). But it's really a *joinery* system, so it didn't fare as well drilling a centered hole in dowels of different diameters. Dowels up to 1" can be made to work. Considering everything else it can do, that's a pretty small price to pay.

Conclusions. If you're thinking about adding a doweling jig to your arsenal of shop tools, many of the jigs detailed in the chart below are worthy of consideration. Which one you select will depend on the tasks you expect to face most often.



▲ ***Dowelmax.*** *The precision machining of the Dowelmax guarantees a perfect fit of every assembly. It excelled at just about every task thrown at it, like the miter joint shown above.*

Overall, I had to say I liked the *Rockler* doweling jig. It's an inexpensive option and the perfect choice for face frame construction. But if my doweling jig has to be at the ready for just about any task, the *Dowelmax* is the hands-down winner. Exactly what I would expect for a tool with a base price of $310.

Brand/Model	Cost (Appr.)	Face Frames	Miters	Edge/End Joints	Case Corner	Case T-Joint	Mortises	Round Stock	End Grain	Accessories	Comments
Rockler	$12	Y	Y	Y	L	N	L	N	L	N	Handles basic joinery
Self-Centering	$59	Y	Y	Y	N	N	Y	L	L	Y	Good, basic jig for many tasks
General EZ Pro	$26	L	L	L	L	N	L	N	N	Y	Too difficult to use
General Pro	$31	L	L	L	L	L	L	L	Y	Y	Limited usefulness for joinery
Veritas	$95	Y	Y	Y	N	N	Y	N	L	Y	Good, basic jig
Wolfcraft	$41	Y	Y	Y	Y	L	N	N	L	Y	Mating holes drilled in both workpieces installed in jig
Dowelmax	$310	Y	Y	Y	Y	L	Y	L	Y	Y	Excels at almost every task

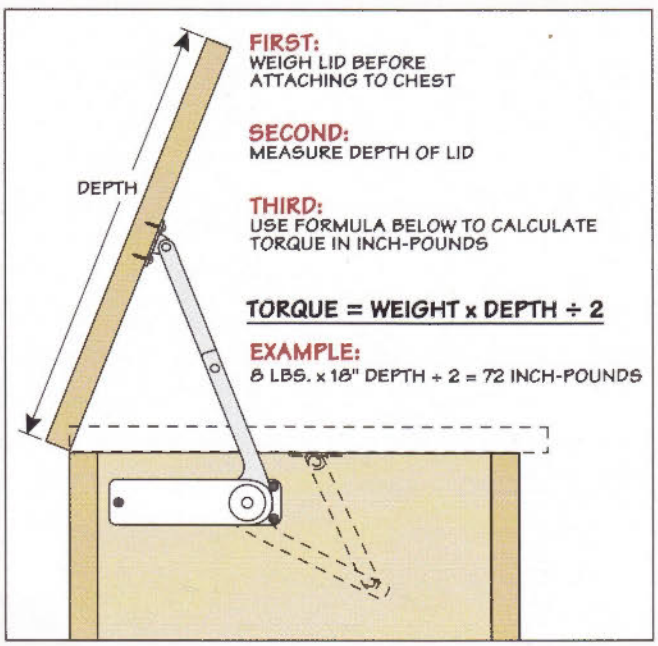
NOTES: Y: Works with ease for task, **L**: Can accomplish task with effort or jig has limited capacity for task, **N**: Can't accomplish task. To see each jig and the included accessories, as well as optional accessories, check out ShopNotes.com

load-lightening Lid Stays

The key to a smooth-closing lid is this uniquely designed hardware.

A question I hear a lot from readers building a chest is how to control the closing of the lid so it doesn't drop down too fast and hard — especially on your fingers. The answer is to use a lid stay. A well-designed lid stay should not only hold the lid open but allow the lid to slowly close.

Lid stays come in an endless variety of styles and finishes. So choosing the proper type depends on a number of factors.



TORQUE RATING

When you start shopping for lid stays, you'll notice some models include a torque rating in their specifications. This rating is often listed as inch-pounds. But what does this really mean to you?

Defining Torque. To allow a lid to close slowly or with gentle pressure, a lid stay has to counteract the amount of torque generated by the lid. There are two factors that play into the torque rating — the depth of the lid in inches (front to back) and its weight in pounds.

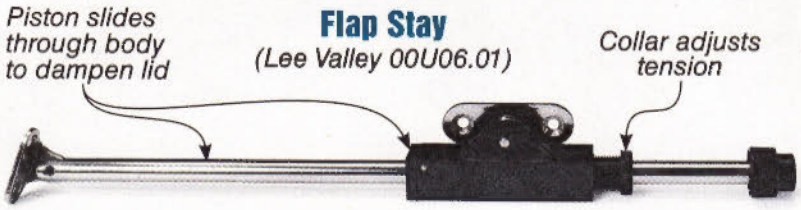
So the first thing you'll need to do is get out the bathroom scale and weigh the lid. Using the formula in the drawing at left, it's easy to calculate the torque rating of your lid in inch-pounds.

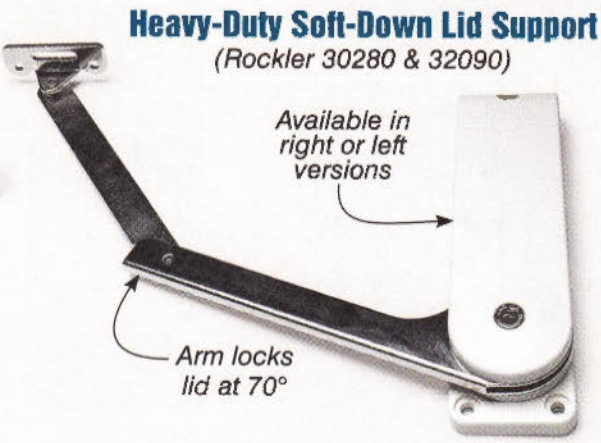
Time To Shop. With this number in hand, you can start shopping for a lid stay that will be appropriate for your lid. But finding the torque rating on some stays can be a frustrating exercise. You sometimes need to contact the vendor or manufacturer to get this information. And you might have to convert metric measurements to find exactly what you need. One of the more informative sources I've found is online at *TheHardwareHut.com*.

ONE OR TWO

You could soon find that a single lid stay won't be rated high enough to support the lid. In this case, it's perfectly fine to use two of them — one on the right side of the chest and the other on the left. (Some stays aren't designed to be installed in the center.)

Getting It Right. But you'll want to be careful when select-





ing lid stays. If the total torque rating of the stays you install is more than the lid requires, it may not close all the way. And if the lid stays are too light-duty, the lid may still close too fast and hard.

Trial & Error. The bottom line is that selecting the right lid stays can sometimes be a trial-and-error process. Even with the right calculations, you may find the stay isn't doing the job. So I often order a couple different types to get the right combination.

DESIGN VARIATIONS

Another feature you'll have to take into account as you shop for lid stays is the type. By that I mean how it's designed to do its job. You can see some of the more common types on this page.

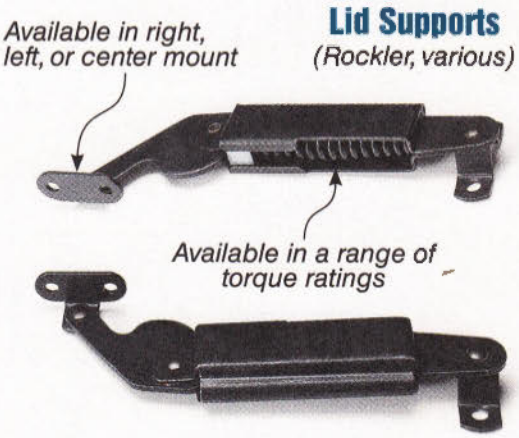
Shock Absorber. The piston-type stay you see on the top left acts a lot like a shock absorber. But instead of using air, it relies on friction. As the lid closes, inner coils grab the shaft to resist the force of the lid. A collar on the end of the housing allows you to adjust the amount of tension for a range of torque requirements. This lets the lid close slowly.

Spring-Loaded. Another common type of lid stay you'll find makes use of a heavy spring. A few examples are shown in the right margin. The tension on the spring counteracts the torque of the lid. Some of these allow you to adjust the amount of tension by simply turning a screw. Others are designed for a specific torque rating, so you'll need to choose the one that best matches the torque of the lid.

Most spring-loaded stays are designed to hold the lid all the way open (usually at 90°). They only need a gentle push to overcome the tension in the spring to close the lid. This type of lid stay is also the least expensive.

Hingeless. Of the lid stays shown here, none are designed to act as hinges for the lid. For an easy solution that solves the problem of choosing hinges and stays, see the box below.

The Right Choice. With the endless variety of lid stays listed in the catalogs, it's easy to be overwhelmed. But with the information I've detailed above, you should be able to narrow down your choices to the right type, style, and finish that complements your project. The satisfaction of a lid that closes softly and gently is worth the effort.

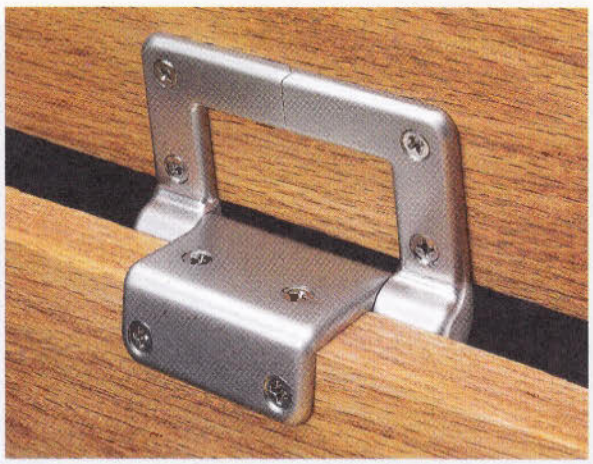


rockler lid-stay Torsion Hinge

If you're looking for a fast, easy solution for fastening a lid to a chest, the *Lid-Stay Torsion Hinges* from *Rockler* can't be beat. With these hinges, you don't have to worry about installing a separate lid stay. Their friction mechanism serves double duty as a stay, too.

As with other lid stays, you'll need to calculate the torsion of the lid on the chest to select the right combination of hinges. They're available in 30, 40, and 60 inch-pound capacities.

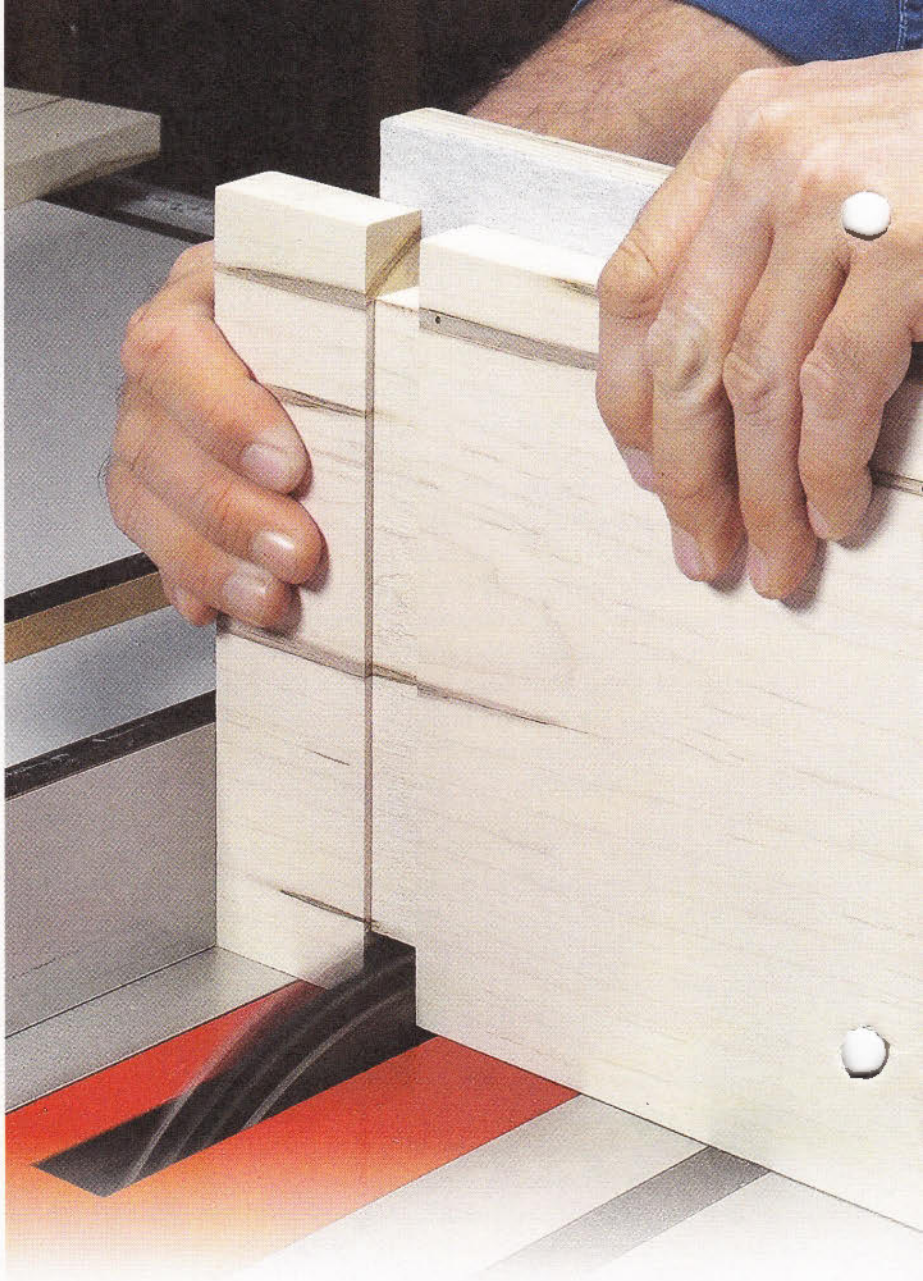
The hinges are designed for ¾" material. And they'll support the lid in any open position. Closing the lid requires a gentle push, which makes it safe for young and old fingers alike.



HANDS-ON
Technique

notch & tenon Joinery

Create this distinctive joint with a few simple techniques.



Cutting a workpiece while holding it on edge can be a real challenge. And making an accurate cut while balancing it on end is even trickier. The narrow edge of the workpiece provides limited support. And the small face on a standard miter gauge really doesn't help out all that much.

You're faced with both these tasks when cutting the notch and tenon joints used to build the tool cabinet on page 24. Notch and tenon joinery is used to connect the sides of the case with the top and bottom. The solution to the problem is simple — provide better support for the workpiece. All that's needed is a miter gauge and a tall auxiliary fence.

Tall Auxiliary Fence. Attaching a tall fence to the miter gauge gives additional support to the workpiece when making a cut. Plus, it backs up the cut to prevent chipout on the workpiece. This way, you can make your cuts safely and accurately.

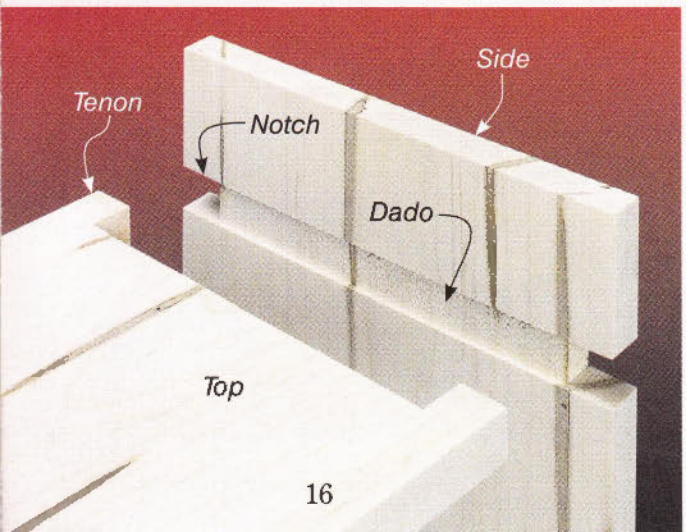
The size of the auxiliary fence is the key. It needs to be tall enough to provide support for the workpiece while on edge or end. But it also needs to provide a place to securely grip the workpiece. Since the sides of the case are 8" wide, I made my fence 8¾" tall. You can use any straight, flat piece of material. (I used ¾" Baltic birch plywood.)

Since the fence also helps to reduce chipout on the workpiece, it should extend beyond the right side of the blade (⅝" in my case). And although it's not critical, I like to attach adhesive-backed sandpaper to the face of the fence. It helps keep the workpiece from shifting during a cut.

Setup. The workpieces that make up the top and bottom of the case fit inside dadoes and notches cut in the sides. You can see what I mean in the photo on the left. This makes for a strong joint, but in order to have a tight fit, the dadoes and notches need to line up perfectly. A simple solution is to use the rip fence as a stop to locate the cuts.

Since you won't be cutting through the workpiece, this is safe and more accurate. And the great thing is that the dadoes and notches are the same distance from both ends of each side, so you only have to set your rip fence once. They're also the same

▼ ***Perfect Fit.*** *The goal is tenons that fit snugly in the notches.*



width, so once you have your dado blade installed to match the thickness of your workpieces, you can begin making the cuts.

Dadoes. I started by cutting the dadoes first, since they're only ⅛" deep. Starting with the shallow cuts and then progressing to the deeper cuts helps minimize chipout by ensuring that the top of the cut is always supported by the auxiliary fence. The photo at right shows how it's done. Once all the dadoes are complete, you can move on to the notches.

Notches. As I mentioned, the dadoes and notches in the edge are aligned, so there's no need to adjust the rip fence. All you have to do is adjust the height of the dado blade for the notches (¾" for the tool cabinet) and you're ready to make the next cuts.

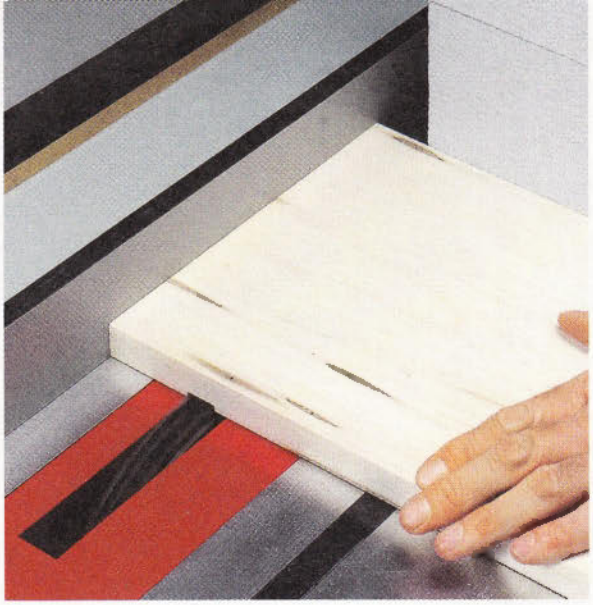
This is where the tall auxiliary fence really starts to come in handy. With the workpiece on edge, you can hold it firmly against the face of the tall fence. If you look at the main photo on the previous page, you'll see what I mean. Now you're ready to make the cuts. Just be sure that the end of the workpiece is against the face of the rip fence.

Tenons. With the notches cut, the next step is to mark the layout lines for the tenons. And that's pretty straightforward. If you look at the photo at the upper right, you can see how I did this. Simply lay the sides over the top and bottom pieces and use the notches in the sides to accurately mark the inside edge of the tenons. You'll want to mark lines on both sides of each workpiece. I'll explain why in a second.

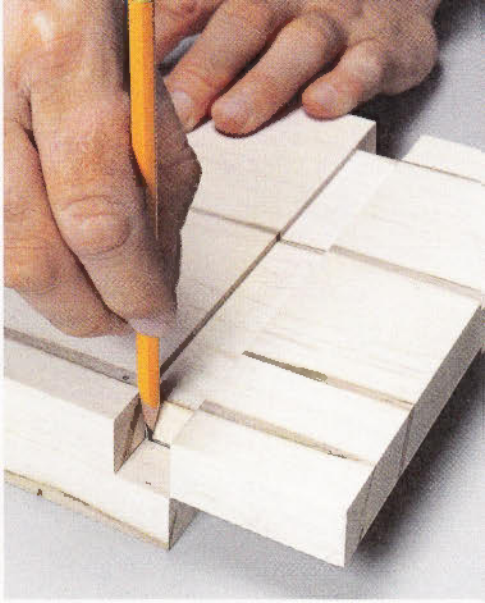
Rather than cutting the cheeks of the tenons first, I prefer to start in the middle of the workpiece and work my way out towards the tenons. The photo below shows you how. This lets me sneak up on the fit of the tenons in the notches. You don't need the rip fence for this, so move it out of the way. Also, the design of the tool cabinet calls for the tenons to stand proud of the case sides. So I don't have to adjust the height of the dado blade for these cuts.

You'll really appreciate the tall fence when you set the workpiece on end. A firm grip holding both edges of the workpiece against the fence is all you need to make the cuts safely. As I mentioned, start in the middle of the workpiece and work towards one of the tenons. Don't cut to the layout line just yet. Flip the workpiece and use the layout line on the other side as a reference mark to cut towards the other tenon.

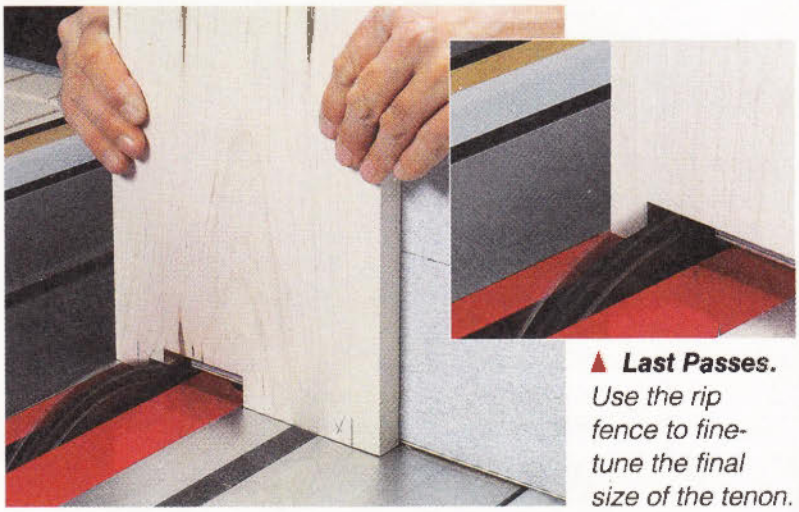
You'll want to use the rip fence to make the final skim cuts. This ensures that the tenons are centered and identical in size. Check the fit and adjust the fence as necessary until the tenons fit snugly in the notches. Once the fit is secure, the joinery is complete.



▲ ***Cut Dado.*** *The rip fence acts as a stop when making the cuts. This ensures that the dadoes and notches line up perfectly.*



▲ ***Mark Layout Lines.*** *The notches in the side help to mark the layout lines for the tenons.*



▲ ***Remove Waste.*** *Start near the middle and remove waste towards one tenon. Flip the workpiece around and work toward the other tenon.*

▲ ***Last Passes.*** *Use the rip fence to fine-tune the final size of the tenon.*

Solid Joint. *A snug fit creates a solid connection between both workpieces.*

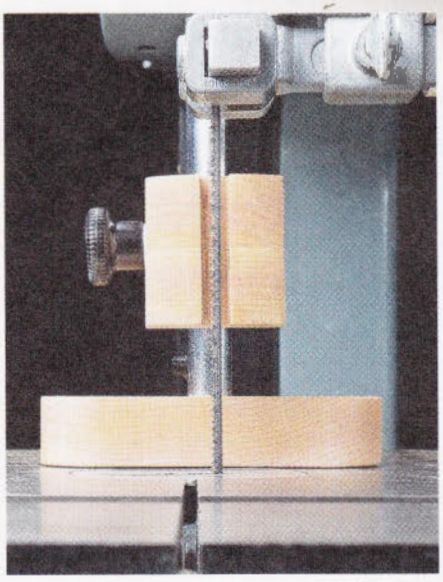
band saw Template Jig

Cutting multiple, identically shaped parts has never been easier. This simple jig is the key.

Whenever I have a project that calls for identically shaped, contoured parts, I like to use a template to quickly lay them out. Another benefit is the template can also serve as a cutting guide to rough out multiple parts on the band saw, as you can see in the photo above. And after the parts are cut, you can clean up the cut using a flush trim bit in your router table.

The trick to quick and easy results is to use a jig to help guide the workpieces through the blade. The simple jig you see here does the job. It works because the blade is nestled between two contact points on the curved guide (photo at right). These points guide the template (and workpieces) as you cut.

Simple Jig. If you take a look at the Exploded View, you'll soon



▲ **Guide.** *The template is steadily guided by a contact point at the front and rear of the blade.*

realize that the template jig is a quick build. A hardwood base supports two steel rods and an adjustable guide. A set of rare-earth magnets keeps the jig secure on your saw's table.

Magnetized Base. To start building the jig, cut the base to size, as shown in Figure 1. The next few steps are going to require some time at the drill press.

It's important that the jig doesn't slip out of position in the middle of a cut. Three large rare-earth magnets and cups securely lock the jig to the saw table. You'll have to drill a set of three counterbores to accept the magnet cups. Those cups increase the strength of the rare-earth magnets.

The key to drilling the counterbores is getting the depth right. For maximum "grab," you want the magnets to sit flush with or just a hair proud of the base, as you can see in Figure 1a. You can make use of the depth stop on the drill press to help you accomplish this goal. After completing the counterbores, you can install the cups and magnets.

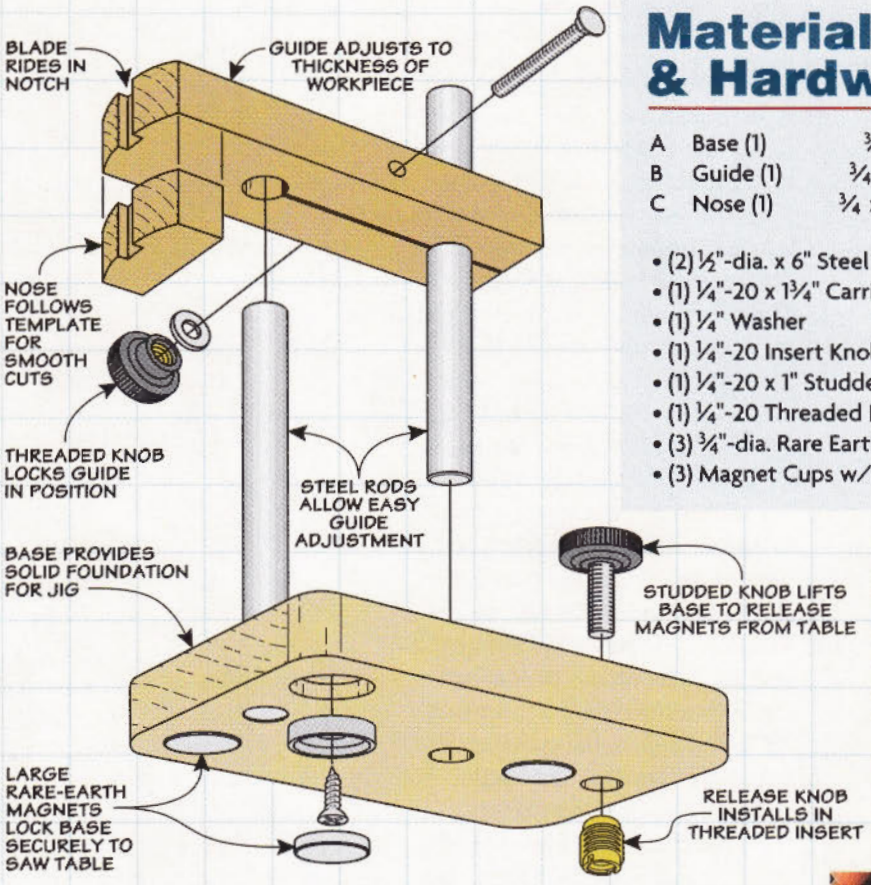
Designing a Release. The challenge with using these types of magnets is they're so strong I found they made the jig difficult to remove from the saw. I had to find an easy way to release the magnets without damaging the jig. A studded knob in a threaded insert does the trick. You simply turn it to "pry" the magnets off of the saw's table. I filed the end of the stud smooth to prevent marring the saw table. While you're at the drill press, it's a simple task to drill the hole for the threaded insert (Figure 1).

There's a trick I use to install threaded inserts. I use a bolt with the head cut off as an installation tool (margin photo). Just chuck the smooth end in your drill press. Spin a pair of hex nuts and threaded insert onto the bolt. You can snug the nuts tight against the top of the insert.

Then with the power off, use one hand to spin the chuck while using the other hand to apply downward pressure with the quill lever. Finally, loosen the chuck to remove the bolt from the threaded insert.

Exploded View Details

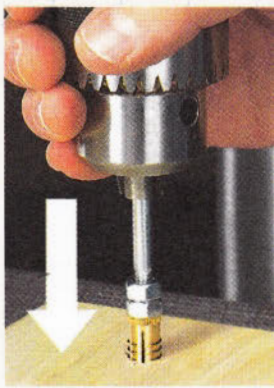
OVERALL DIMENSIONS: 4"W x 7"D x 6"H



Materials & Hardware

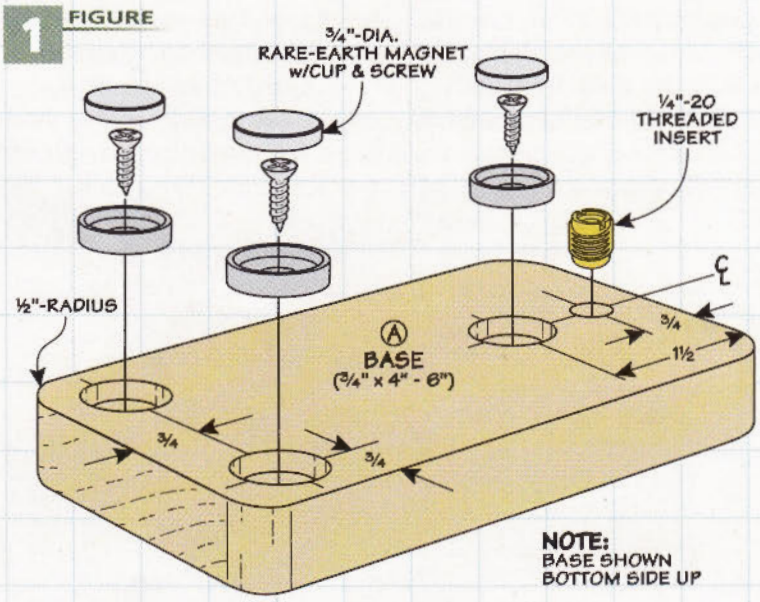
A	Base (1)	¾ x 4 - 6
B	Guide (1)	¾ x 1½ - 5
C	Nose (1)	¾ x 1½ - ¾

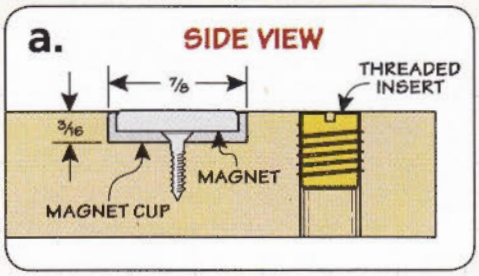
- (2) ½"-dia. x 6" Steel Rods
- (1) ¼"-20 x 1¾" Carriage Bolt
- (1) ¼" Washer
- (1) ¼"-20 Insert Knob
- (1) ¼"-20 x 1" Studded Knob
- (1) ¼"-20 Threaded Insert
- (3) ¾"-dia. Rare Earth Magnets
- (3) Magnet Cups w/Fh Screws



▲ ***Straight.*** *Use the drill chuck to ensure the threaded insert is installed straight.*

1 FIGURE





creating the Guide

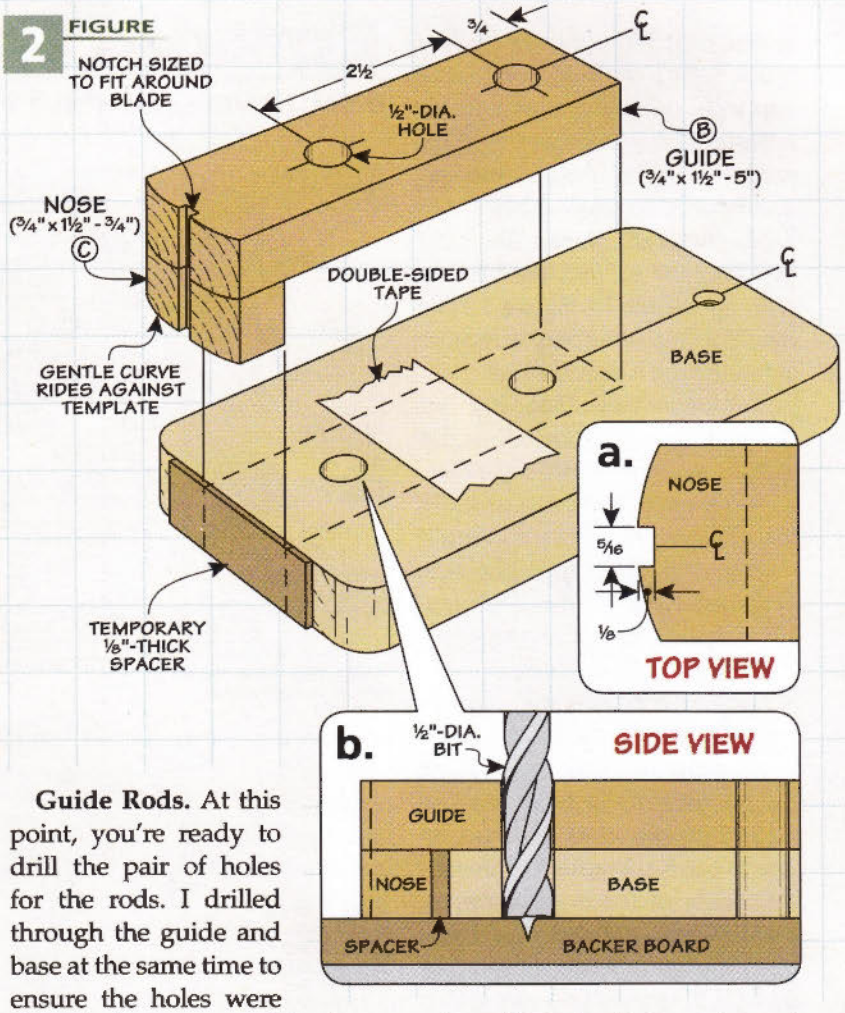
To complete the jig, the next step is to install two steel rods and make the adjustable guide. Figures 2 and 3 provide the details.

Two-Piece Guide. The guide is made from a long blank that's drilled to fit over the steel rods. The guide adjusts up and down to accommodate thick or multiple workpieces. A short "nose" piece adds contact area to the guide and allows you to lower the guide to cut thin workpieces.

I started by cutting the guide to length and gluing on the nose. Then form a gentle curve that allows you to follow a contoured template, as shown in Figures 2 and 2a. The shape of the curve can be modified to suit your project — the tighter the curve on the guide the smaller the radius it can follow on the template.

I used a narrow blade on the band saw to form the notch shown in Figure 2a. This creates the two contact points for the template — one each at the front and rear of the band saw blade.

2 FIGURE



Guide Rods. At this point, you're ready to drill the pair of holes for the rods. I drilled through the guide and base at the same time to ensure the holes were aligned. To create a little clearance between the back of the nose and the base, I used a ⅛"-thick spacer to locate the guide on the base (Figures 2 and 2b). After securing the guide with tape, you're ready to drill.

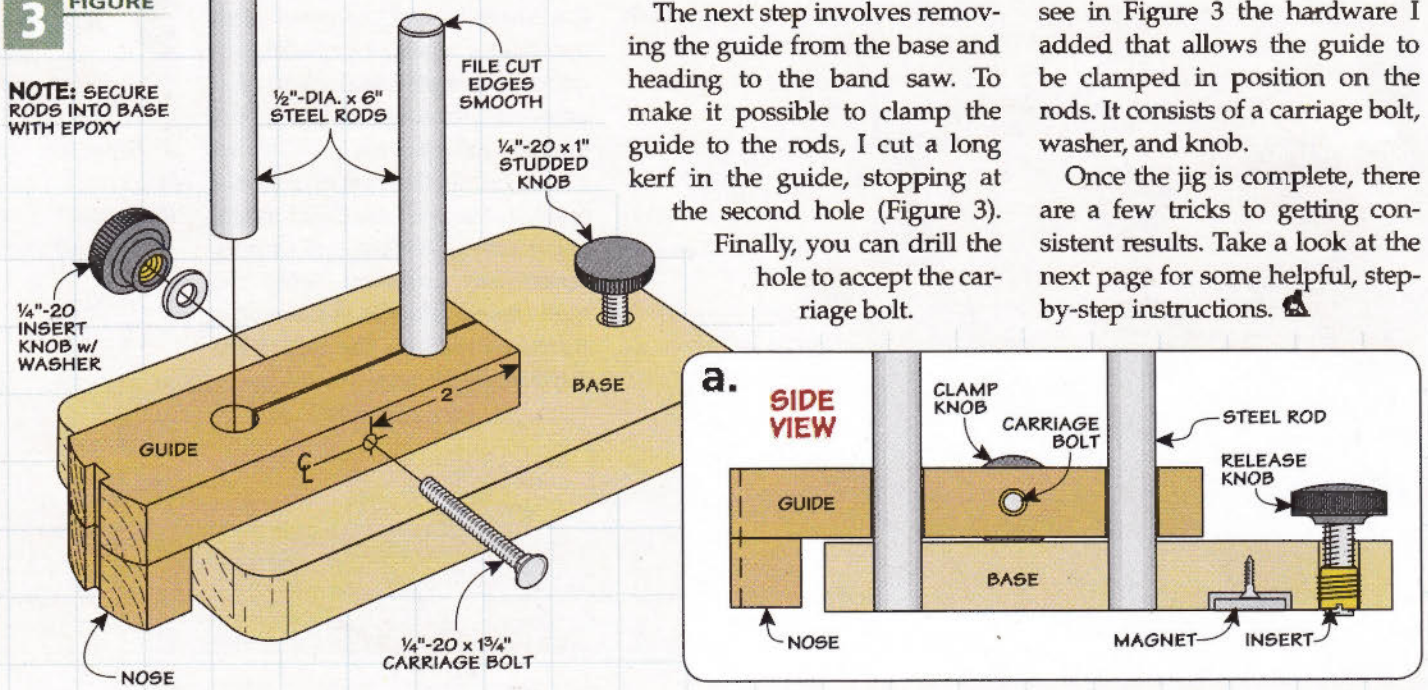
The next step involves removing the guide from the base and heading to the band saw. To make it possible to clamp the guide to the rods, I cut a long kerf in the guide, stopping at the second hole (Figure 3). Finally, you can drill the hole to accept the carriage bolt.

Install the Rods. I cut the steel rods to length and filed the ends smooth before securing them in the base with epoxy. All that's left is to install the hardware before you can put the jig to good use.

Hardware. You can also see in Figure 3 the hardware I added that allows the guide to be clamped in position on the rods. It consists of a carriage bolt, washer, and knob.

Once the jig is complete, there are a few tricks to getting consistent results. Take a look at the next page for some helpful, step-by-step instructions.

3 FIGURE



Using the Template Jig

When it comes to cutting identically shaped workpieces, the template is the key. First, the template is used with the jig at the band saw for cutting the parts to rough shape. Then you can use the same template to finish smoothing the workpieces at the router table.

The photos here step you through the process I used to cut a set of small corbels, like the ones shown on the right. The process starts by stacking the blanks for the parts and the template using double-sided tape (Photo 1).

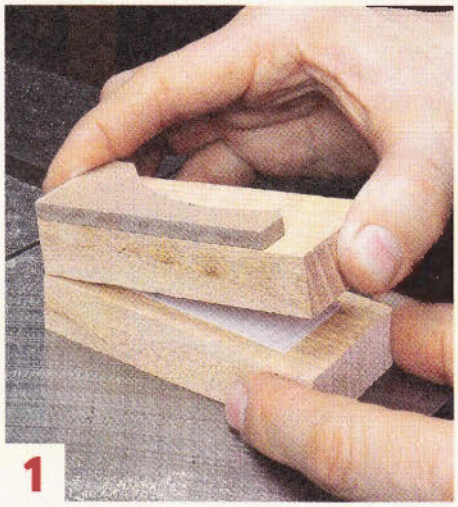
For the next step, I like to make a rough cut to remove the bulk of the waste, as shown in Photo 2. Doing this makes it easier to maneuver the template along the jig for the finish cut. You don't have to be too exact here. This step should go fairly quickly.

Now you're ready to set up the jig on the band saw. You can see how this is done in Photo 3. The goal is to set the jig so the contact points on the guide are about 1/16" beyond the blade.

The next step involves adjusting the height of the guide. For this, I use the workpiece as a gauge (Photo 4).

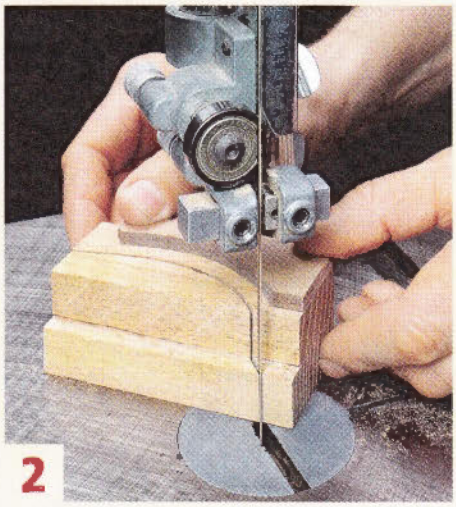
With the jig set up, you're ready to make your final pass at the band saw to trim the workpiece closer to its final shape (Photo 5). The key is to keep the template riding against the contact points of the guide as you go.

Finally, you can head over to the router table and use the same template for final shaping. For this, I use a flush trim bit. The template rides on the bearing of the bit for a smooth cut (Photo 6). After a little sanding, you're ready to put your parts to use on your project.



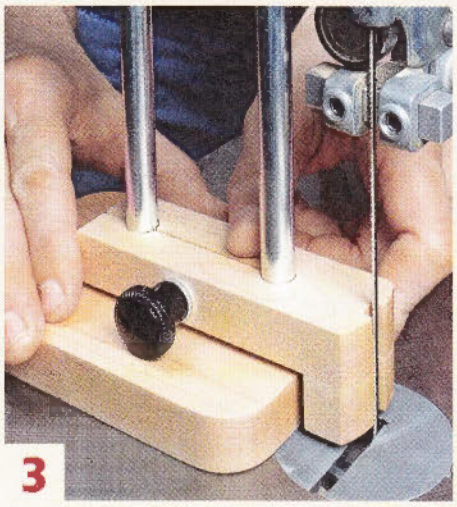
1

Stick & Stack. *Use double-sided tape to stack the workpieces and fasten the template in place.*



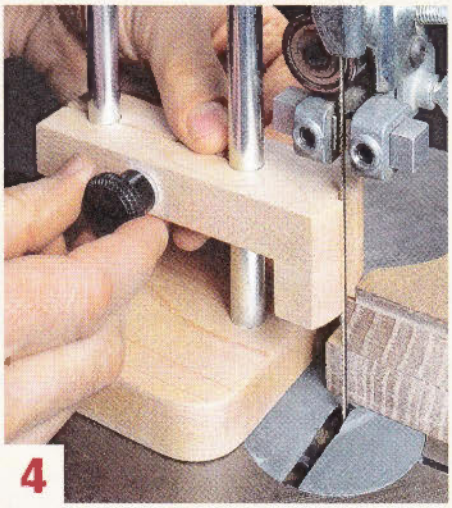
2

Roughing to Shape. *To allow the workpiece to clear the base of the jig, you may have to remove some waste.*



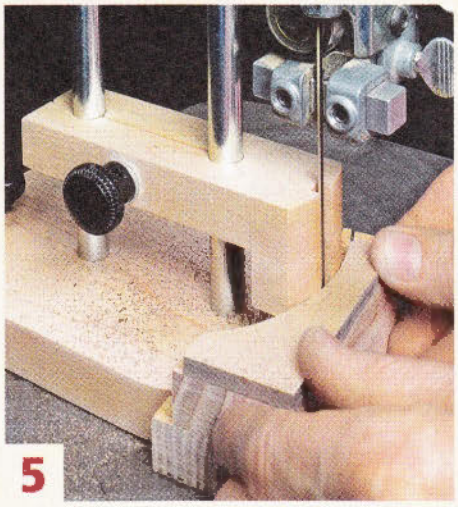
3

Jig Position. *The blade fits in the notch on the guide. The points of the nose should extend 1/16" beyond the blade.*



4

Guide Height. *Adjust the guide so it contacts the template, making sure it doesn't contact the workpiece.*



5

Cutting to Shape. *Keep the template in contact with both points of the guide as you move through the cut.*

6

Final Trimming. *With the template still attached, use a flush-trim bit to create a smooth, finished shape.*

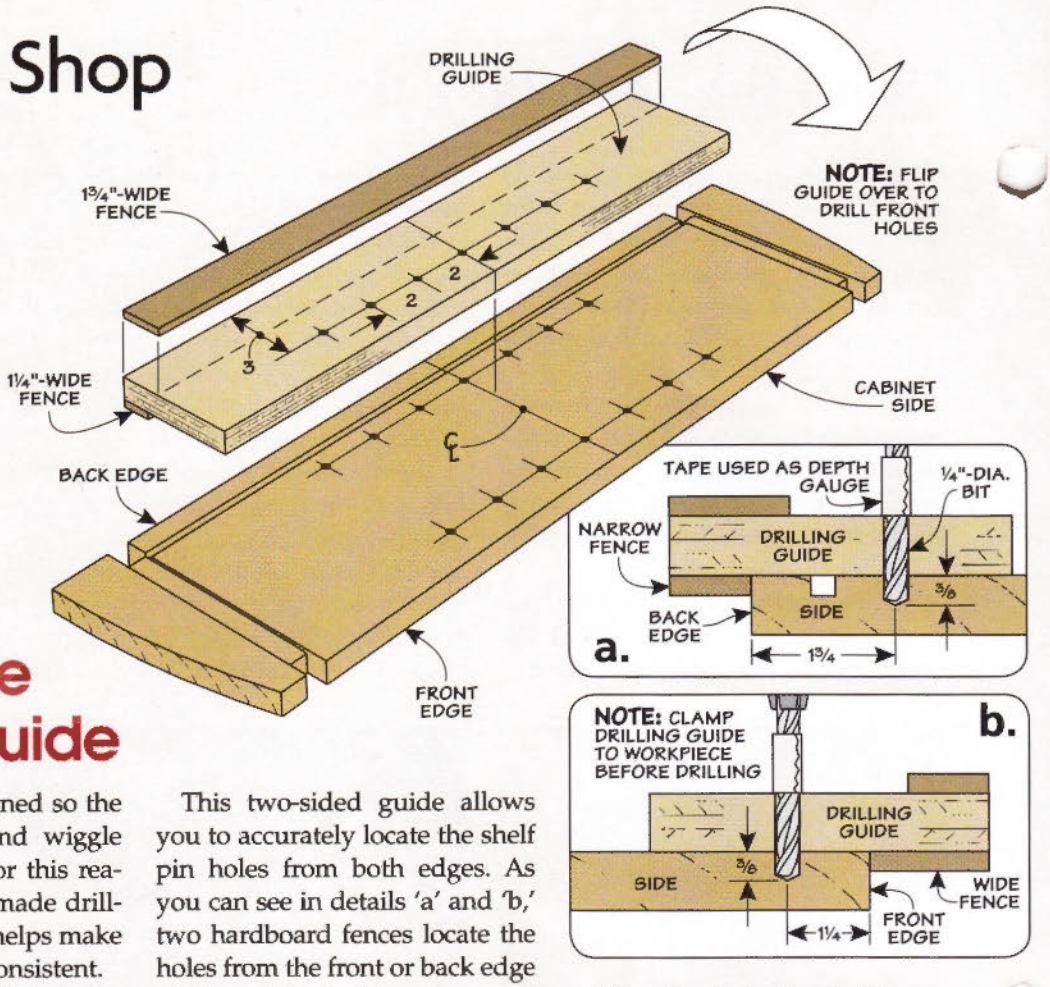
Shop Short Cuts

Reversible Drilling Guide

Getting shelf pins aligned so the shelves don't rock and wiggle can be a challenge. For this reason, I turn to a shop-made drilling guide. The guide helps make sure all the holes are consistent.

I used a guide to drill the holes in the cabinet sides for the tool cabinet (page 24). The problem is the holes are offset a different distance from the back edge and the front edge.

This two-sided guide allows you to accurately locate the shelf pin holes from both edges. As you can see in details 'a' and 'b,' two hardboard fences locate the holes from the front or back edge of the cabinet side. The wide fence is used when drilling the holes along the front edge. A narrow fence on the other side of the gnide is used to located the holes further in from the back edge.



Using the jig is simple. Line up the centerlines of the jig and cabinet side (drawing above). After clamping the jig in place, you can drill the holes. Then just repeat the process for the other set of holes.

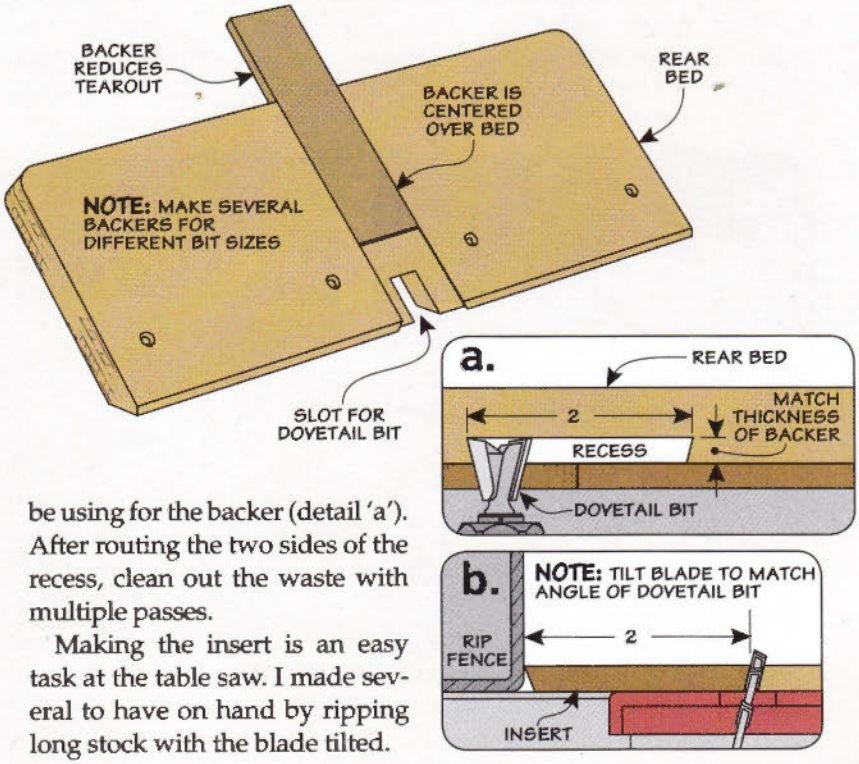
Dovetail Key Backer

When routing the slots for the dovetail keys on the tool tote shown on page 30, it's important to support the back of the workpiece as the bit exits. This way, you'll reduce tearout and leave a nice, clean edge to highlight the dovetail keys.

The jig I used for cutting the slots incorporates a replaceable hardboard backer just for this purpose. It slips into a dovetailed recess (main drawing).

I cut the recess at the router table using a dovetail bit. The depth of cut should equal the thickness of the hardboard you'll be using for the backer (detail 'a'). After routing the two sides of the recess, clean out the waste with multiple passes.

Making the insert is an easy task at the table saw. I made several to have on hand by ripping long stock with the blade tilted.



Cutting Half Laps

The broad, face grain gluing surface of half laps makes for a solid joint. That's why I chose it for the tool cabinet doors shown on page 24. I wanted joinery that would last as long as my tools.

Creating tight-fitting half lap joints is easy to do at the table saw. A wide dado blade makes quick work of removing the waste. But there are a few techniques to point out that will help you along the way.

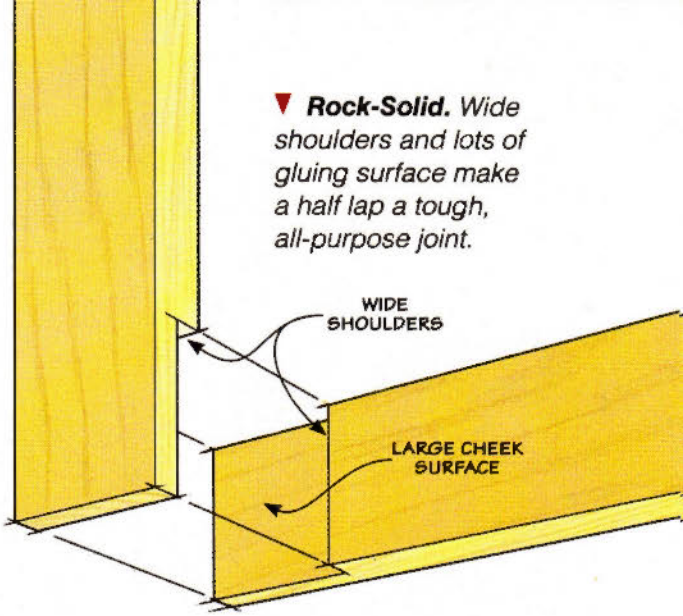
Blade Height. The key to getting joints that are flush is the depth of cut. The goal is to remove exactly half the thickness of the workpiece, as you can see in the drawings at right.

To work toward this goal, I use test pieces that are the exact thickness of my workpieces to adjust the blade height. Figure 1 shows how this works.

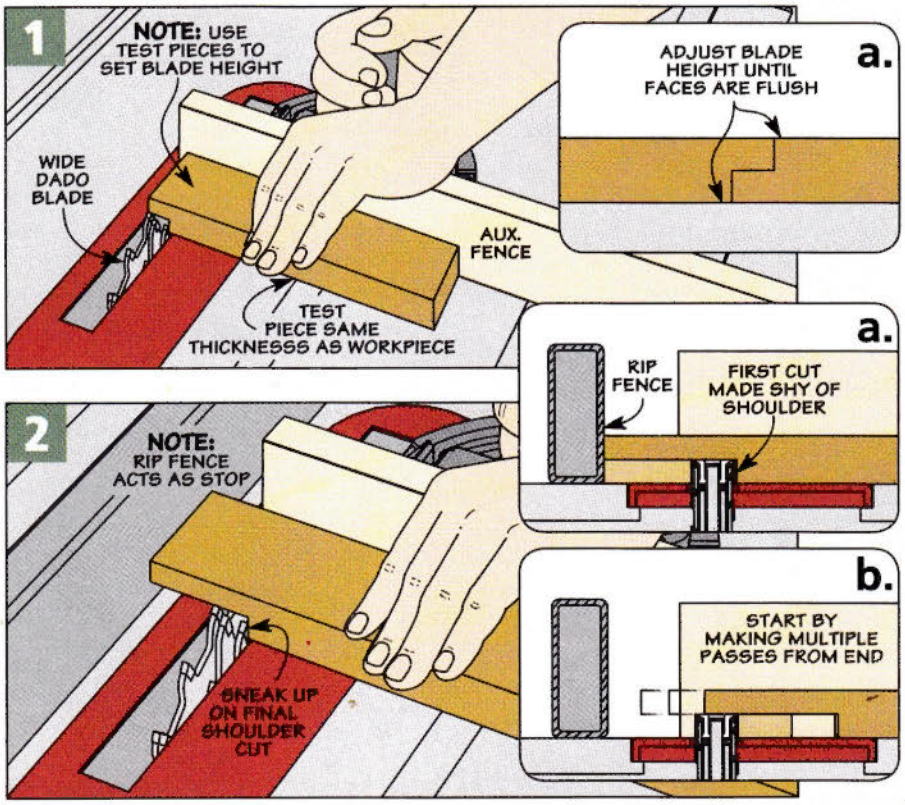
Mark a "halfway point" on each piece and then set the dado blade height to be a little bit below the mark. After you make a cut across the end of each piece, simply overlap them to check the result. Raise the blade slightly and repeat the process until the faces fit flush, as in Figure 1a.

Length of Cut. With the blade height set, all you need to do is set the length of the cut. First, set the rip fence so that the distance from the outside edge of the blade to the fence is about 1/16" shy of the final length. Then make your first pass on one workpiece, as shown in Figure 2a. Make multiple passes cutting away the waste from the end, as shown in Figure 2b.

Since the fence isn't set to cut the cheek to final length, the end won't be flush. But now it's easy see how far to cut back the shoulder for a perfect fit. Just sneak up on the final cheek length by adjusting the fence away from the blade until the fit is flush.



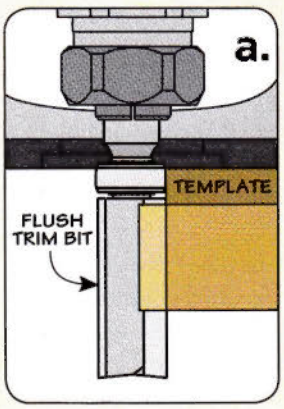
▼ ***Rock-Solid.*** *Wide shoulders and lots of gluing surface make a half lap a tough, all-purpose joint.*

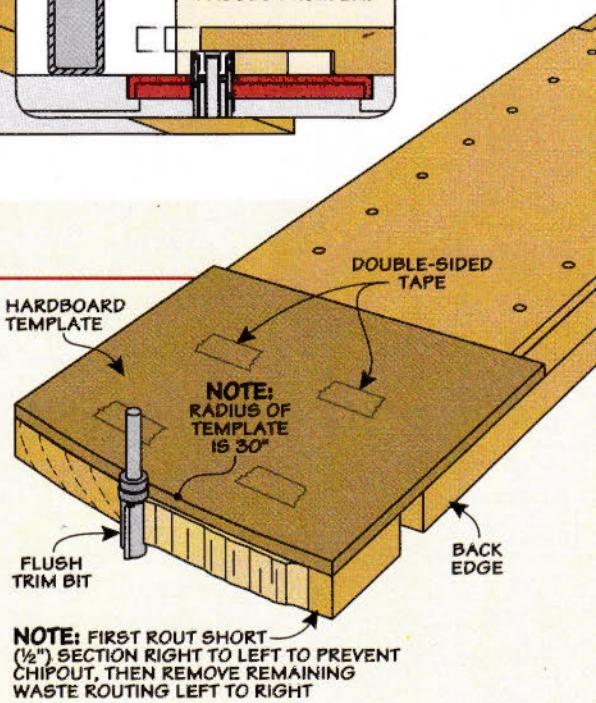


Flush Trim Template

Sanding the large radius on the ends of the tool cabinet sides (page 24) can be time-consuming. And it can be difficult to cut each end identical to the others. The solution to making a nice smooth cut that doesn't require a lot of sanding is to use a hardboard template, your router, and a flush trim bit.

Getting a smooth layout and curve is a lot easier on a piece of 1/4" hardboard. And once that's done, you're guaranteed identical curves on the ends of the cabinet sides. Just stick the template down with double-sided tape, use a band saw to remove most of the waste, and then trim it flush with the router.





storage solutions

wall-mounted Tool Cabinet

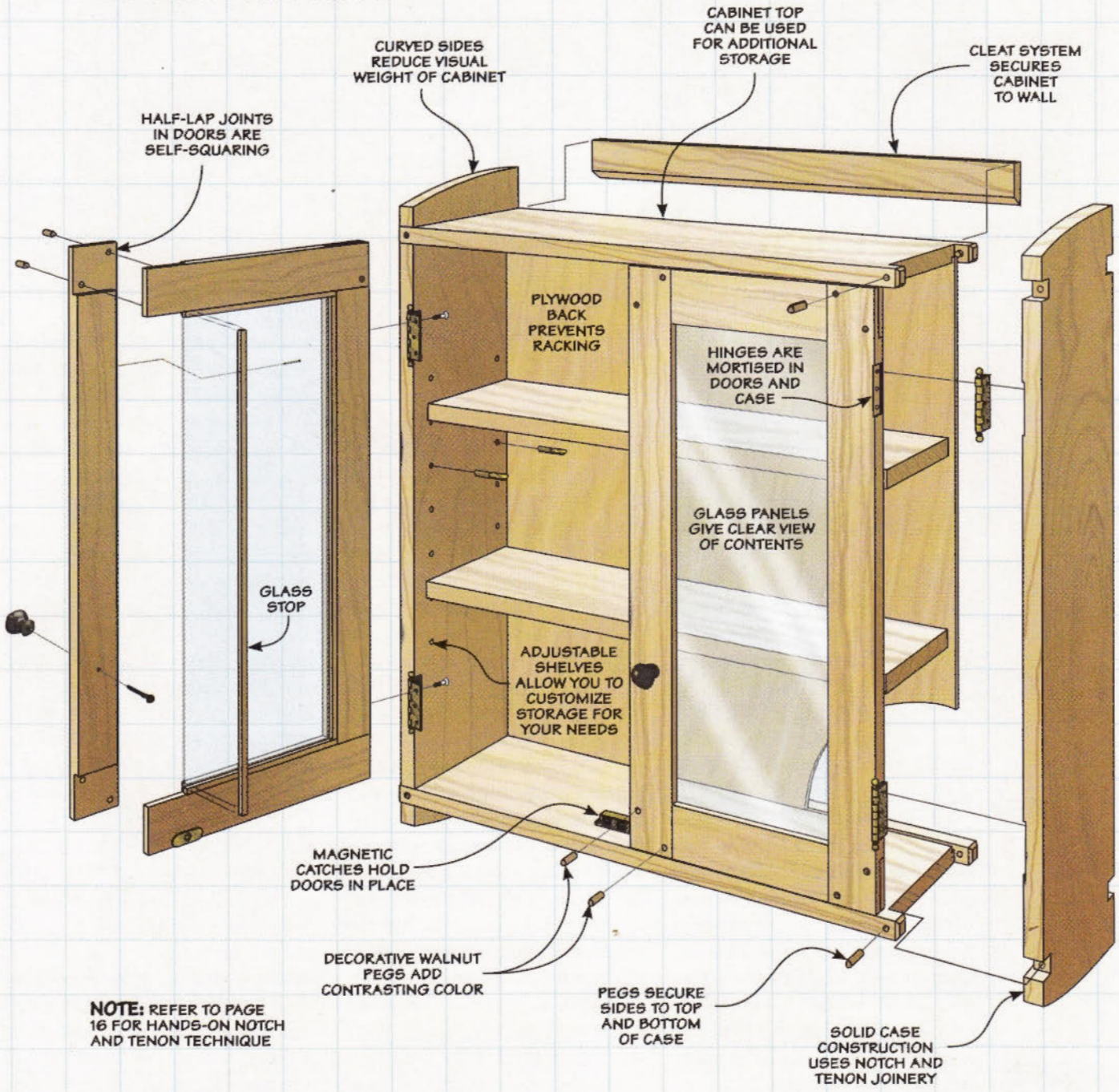
Store and display your favorite tools in a cabinet that breaks the mold of traditional storage.

Some of my tools have been handed down through the generations. So when I design a cabinet to store and display them, I want it to share the same level of detail and craftsmanship as the tools themselves. I think you'll agree that this design fits the bill.

The cabinet features ample space for some of your favorite tools and the glass doors make it easy to see the contents. Decorative details such as highly figured wood and gentle curves really make it stand out. Finally, unique joinery brings it all together.

Exploded View Details

OVERALL DIMENSIONS: 8"D x 24"W x 30"H



NOTE: REFER TO PAGE 16 FOR HANDS-ON NOTCH AND TENON TECHNIQUE

Materials & Hardware

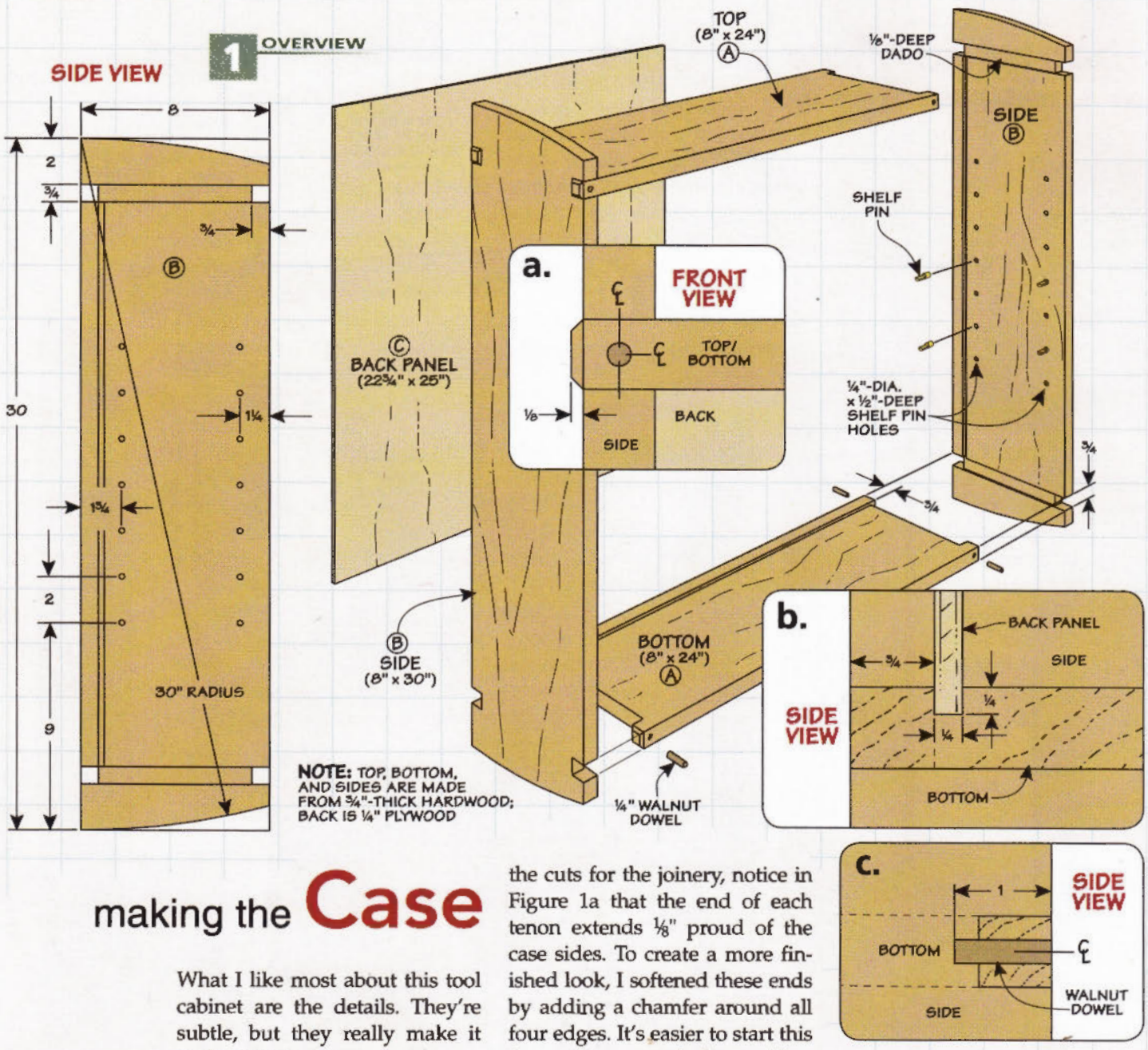
CASE

A	Top/Bottom (2)	¾ x 8 - 24
B	Sides (2)	¾ x 8 - 30
C	Back Panel (1)	22¾ x 25 - ¼ Ply.
D	Rails (4)	¾ x 2¼ - 11
E	Stiles (4)	¾ x 2 - 24⅜
F	Glass Stop (1)	¼ x ¼ - 11' Rgh.
G	Shelves (2)	¾ x 6 - 22⅛
H	Hanging Cleats (2)	¾ x 2 - 22¼

- (1) ¼" - dia. x 36" Walnut Dowel
- (4) 1½" x 2" Hinges
- (2) 1" - dia. Knobs
- (2) ⅛" Glass Panel (7 7/16" x 20 5/16")
- (2) Magnetic Catches w/Screws
- (8) ¼" - dia. Shelf Pins
- (32) Brads

ShopNotes GO ONLINE EXTRAS

To download a free cutting diagram for the Tool Cabinet, go to: ShopNotes.com



making the Case

What I like most about this tool cabinet are the details. They're subtle, but they really make it a showpiece for some of your favorite tools. The first thing you may have noticed is the wood selection. I chose ambrosia maple because of its distinctive color and figure characteristics.

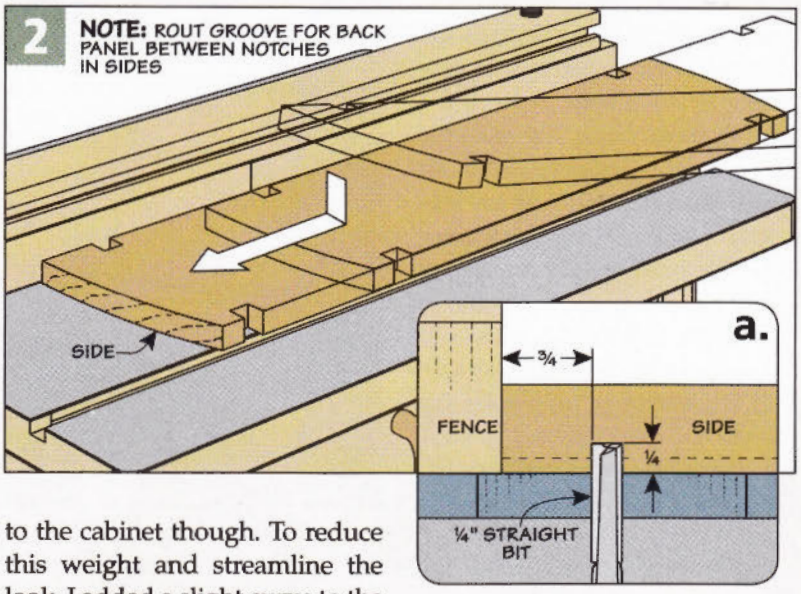
Another detail worth noting is the joinery used to assemble the case. It begins with tenons cut on the ends of the top and bottom. As you can see in Figure 1, these fit into notches cut in the sides. This joinery not only makes for a strong case, but adds visual interest that you don't see in a lot of basic tool cabinets.

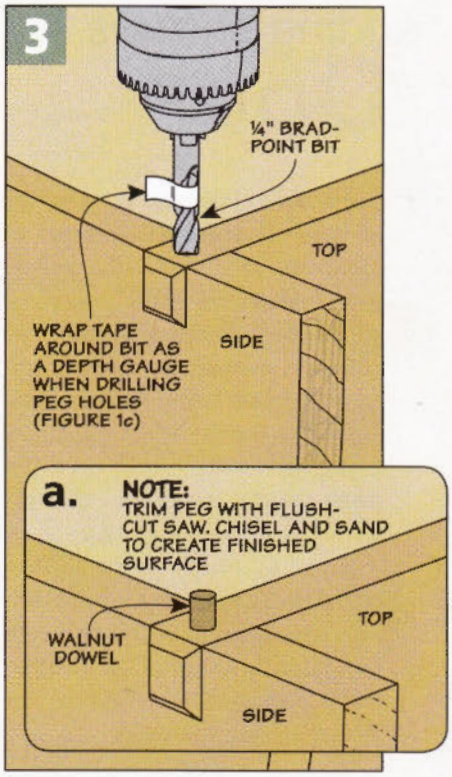
Chamfers. I started building the case by cutting the sides, top, and bottom to final size at the table saw. Before making the cuts for the joinery, notice in Figure 1a that the end of each tenon extends ⅛" proud of the case sides. To create a more finished look, I softened these ends by adding a chamfer around all four edges. It's easier to start this three-step process before making the cuts for the tenons.

Take a look at the box at the bottom of the next page. You'll see that I started by routing a chamfer on the ends of the pieces that make up both the top and bottom of the case. This takes care of the chamfers on three sides of each tenon. You'll add the fourth chamfer to the inside edges after the tenons have been cut.

Joints. Now it's time to get started on the joinery. With a dado blade in your table saw, you begin by cutting the dadoes and notches in the sides first. With these cut, you can make the tenons for the top and bottom. Once you've made all the cuts, use a sanding block to create the chamfer on the inside edge of the tenons. Making cuts while standing a board on end can be challenging, but I came up with a straightforward technique that will give you perfect results. Take a look at page 16 for more details.

Curves. You can see in Figure 1 that the case sides extend above the top. I designed the cabinet this way because I wanted to use the top of the cabinet as an additional shelf for open storage. And I didn't want to risk having a tool fall off the sides. To balance the look of the cabinet, I extended the sides below the bottom as well. This added a lot of visual weight





to the cabinet though. To reduce this weight and streamline the look, I added a slight curve to the top and bottom of each side.

Notice that the curve starts from the back of the cabinet and curves down towards the front. The radius of the arc is 30", which just happens to be the full length of the sides. This makes it easy to lay out the line using a beam compass. Just adjust your compass to extend the full length of the side. To get the desired arc, place the fixed end on the back corner, then draw an arc from the opposite back corner to the front edge. Repeat this process for the remaining three curves.

A band saw makes it easy to cut the curves. When making the cuts, be sure to stay just to the waste side of your layout line. When you're done, a little work with a sanding block and you'll have a nice smooth finish.

I included another technique for making the curves on page 23. You'll find that both methods create great results.

Grooves. All that's left to complete the case is to cut grooves in each piece for the back panel (Figure 1b). Figure 2 above shows you how to rout the groove between the dadoes in the sides. Drill holes for the shelf pins and you're ready for assembly. There are details for a jig on page 22 to help you with that.

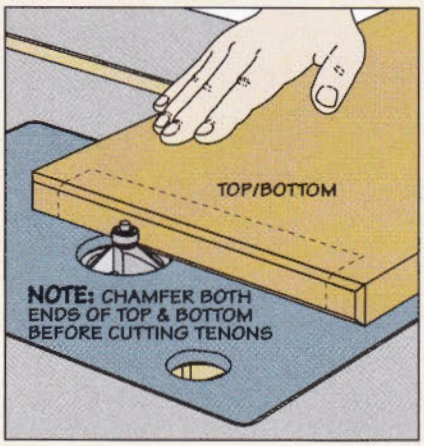
Assembly. After you cut the back panel to final size and assemble the case, you can drill a hole through each tenon for the pegs. I used a handheld drill and attached tape to my bit as a depth guide, as illustrated in Figure 3.

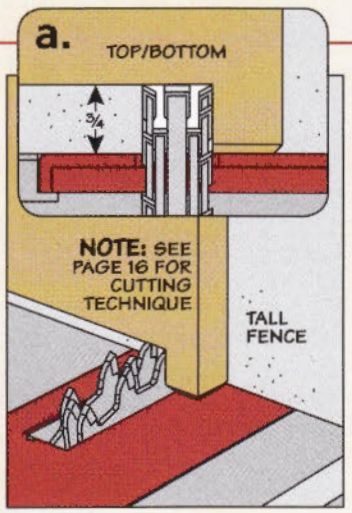
The pegs in the tenons add a decorative detail, but they also help secure the top and bottom to the sides of the case (Figure 1c). I used walnut dowels to create contrast with the light color of the maple used in the case.

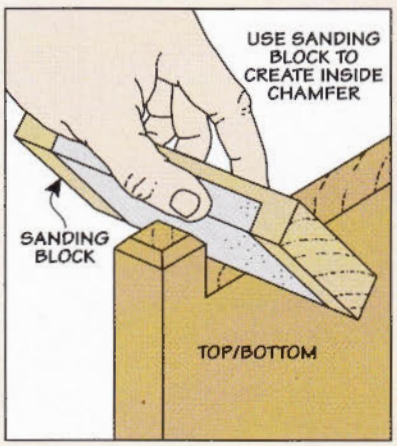
With a mallet, drive the dowels into the holes until they seat fully. A flush-cut saw allows you to trim most of the excess waste. Some work with a chisel and sanding block will bring the dowels flush and leave a nice smooth surface.

While the glue dries on the case, you can turn the page and begin work constructing the shelves and doors.

Chamfer Tenons







SHOP TIP

adding shelves & Doors

Being able to display your favorite tools is what this cabinet is all about. That's why the panels in the doors are glass instead of solid wood. And to keep the construction simple, the door frame is constructed using half-lap joinery. To tie the design of the doors to the rest of the case, I used the same walnut dowels as decorative pegs in the door frames.

Rails & Stiles. Construction of the doors starts by ripping the rails and stiles to width and cutting them to length. One thing to make note of is that the rails are ¼" wider than the stiles.

Next, you can install a dado blade. Adjust the height of your dado blade using test pieces the same thickness as the door frame. The goal here is to sneak up on the final height of the blade by slowly raising it until both sides of the joint fit flush. Once you have the blade height dialed in, you can set the rip fence to 2" and use it as a stop while making the joinery cuts. For more details on cutting perfect half-lap joinery, refer to Shop Short Cuts on page 23.

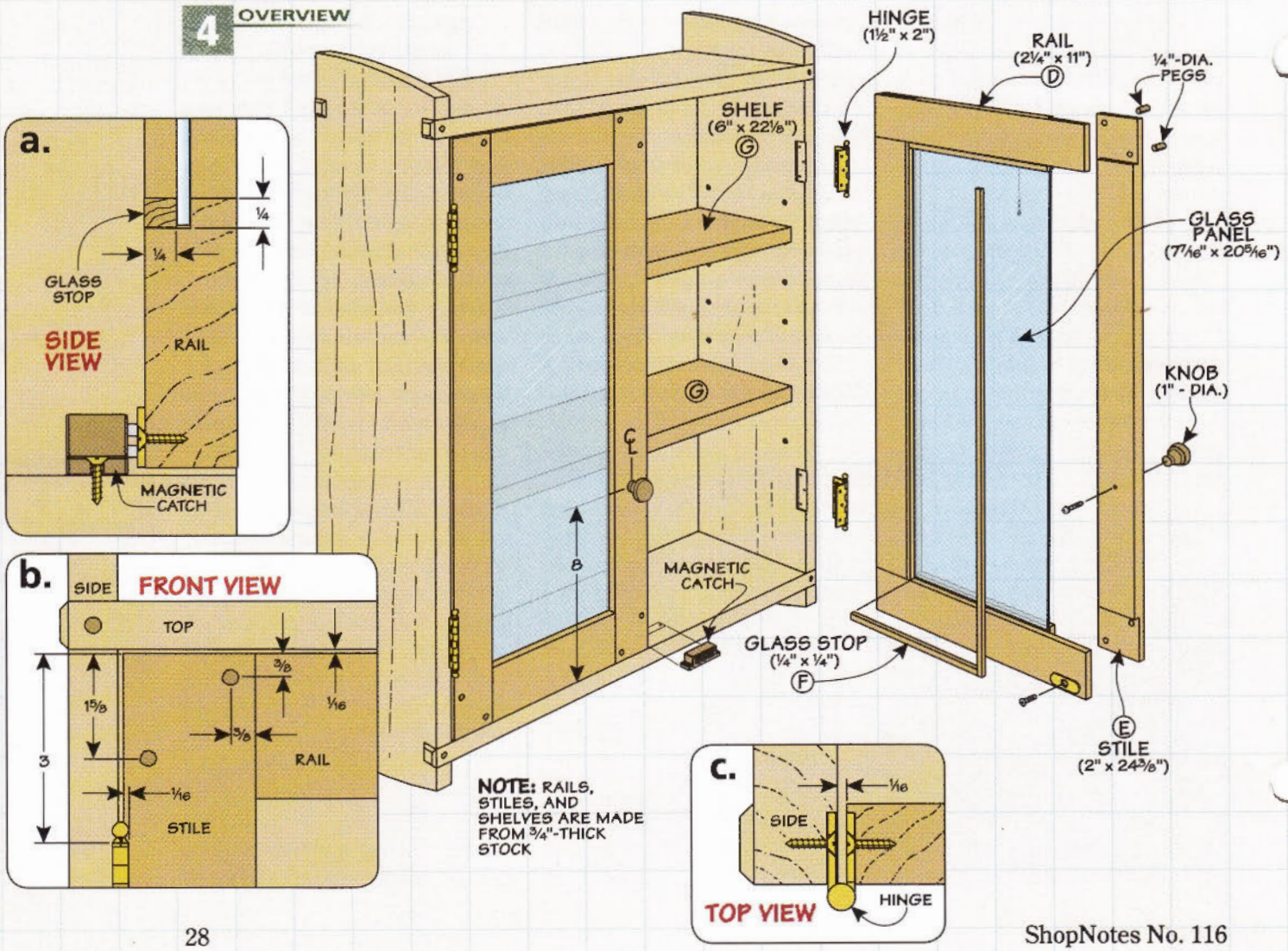
Finish the doors by cutting rabbets to secure the glass panels. An auxiliary fence clamped to your rip fence allows you to bury the dado blade in the fence. This lets you control the width of cut.

Assembly. Assembling the frame is straightforward because the half laps help square up the frame automatically (Figure 5). You'll want to use large clamps to pull the joints together across the ends and smaller clamps directly across the half laps.

After the glue dries, you can add the pegs to the door frame.

▲ ***Decorative Pegs.*** *Dowels in the case and doors enhance the design of the cabinet.*

Unlike on the case, these pegs are purely decorative. In other words, they don't go through both the stile and rail (Figure 5b). The process is basically the same though. The only difference is the depth of the holes (⅜").



Hinges. To attach the doors, you need to cut mortises for the hinges. I find that it's easiest to start with the case first. I use the hinges to mark the locations on the case and a small palm router to remove most of the waste. Clean up the corners with a chisel and you're ready to attach the hinges. You can find additional information about locating hinges on page 36.

Now you can transfer the hinge location to the doors and cut the mortises for the other side of the hinges. Then attach the doors and make adjustments as necessary to get a good fit. What you're looking for is a consistent gap of 1/16" around each door. Once the doors are fit, you can drill holes for the knobs to attach later.

Glass Stops. You'll install the glass after you apply a finish, but go ahead and cut the stops used to secure the glass to the doors. They're just small strips cut on the table saw. The box at the bottom of the page shows how it's done. Now is also a good time to cut the shelves to fit.

Cleat. Fully loaded, the cabinet is going to be fairly heavy. That's why I secured the case to the wall with a two-part cleat. Figure 6 shows that it's made from two identical beveled strips. The degree of the angle isn't critical (I used 30°), just be sure to attach each piece correctly. The cabinet hangs on the cleat and the sides of the case keep it from sliding sideways on the wall.

Complete the case by installing the glass panels and adding the knobs. You'll notice that the knobs are attached low on the door. So the magnetic catches are screwed to the bottom of the case instead of at the top. I did this to reduce any racking that may occur when opening the door.

I finished the cabinet with two coats of spray lacquer. That's all it needs to bring out the beauty of the wood and complete a cabinet you can be proud of.

FIGURE 5

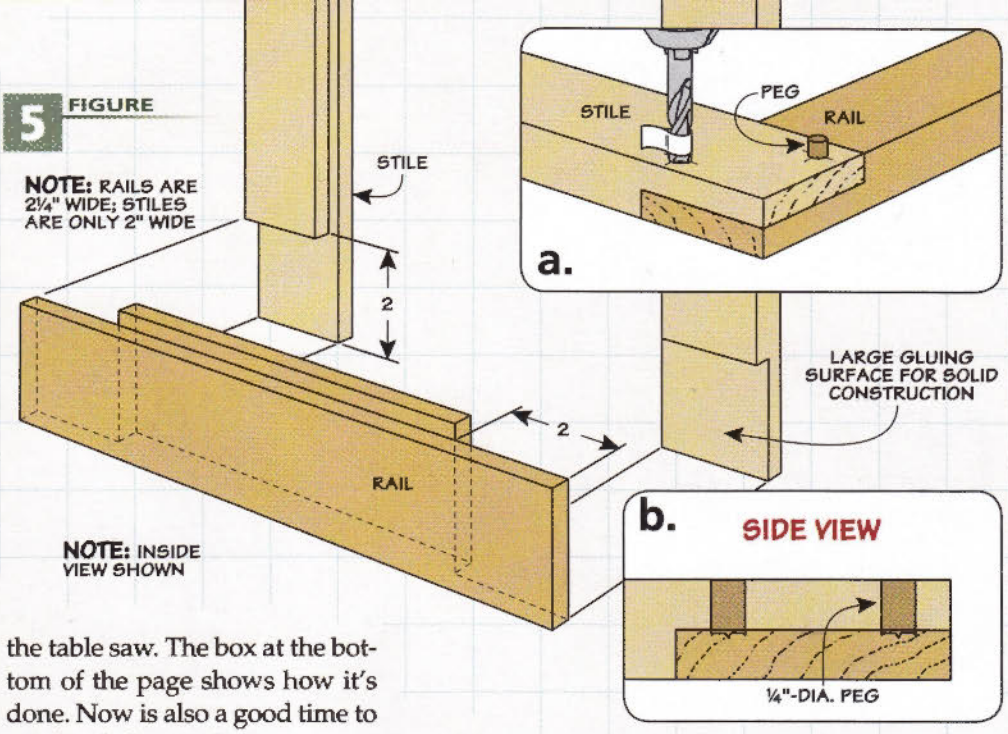
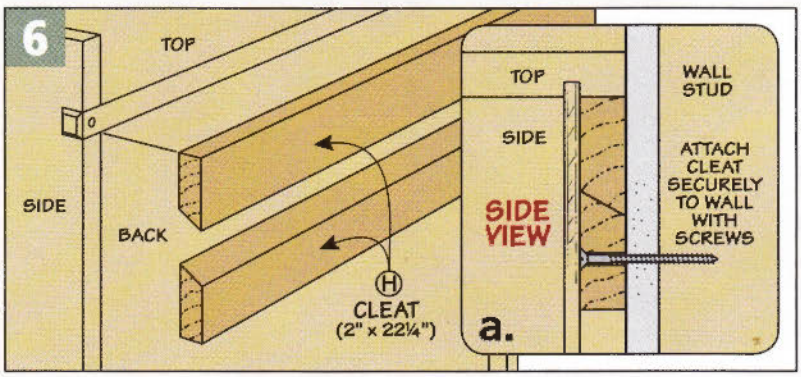
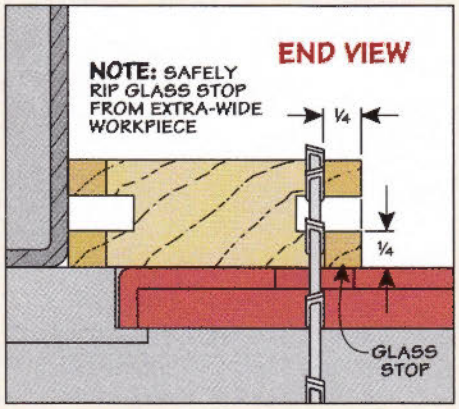


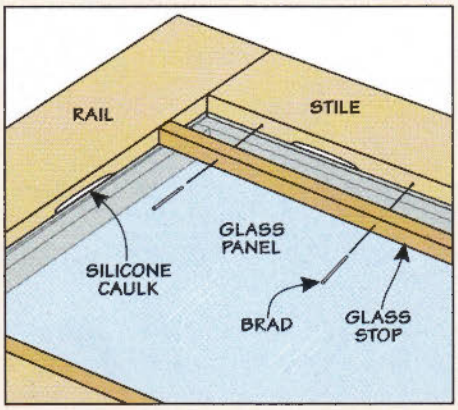
FIGURE 6



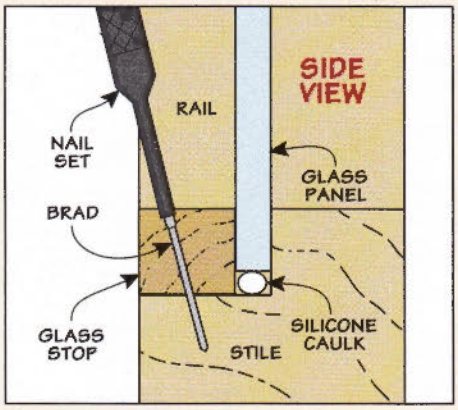
Installing the Glass



▲ ***Making the Stops.*** *After cutting grooves in the edges of a wide workpiece, cut the glass stop free.*

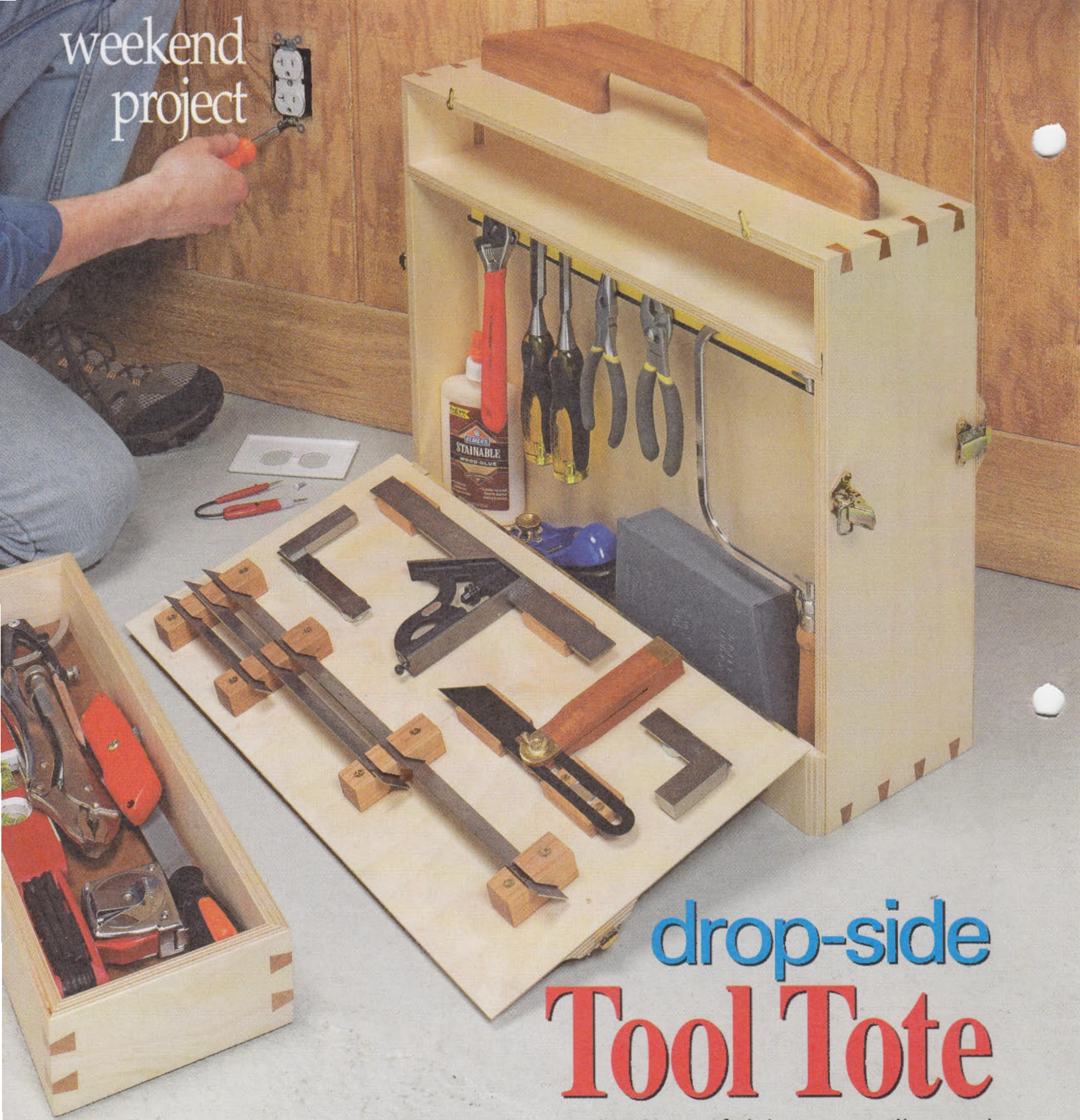


▲ ***Add Silicone.*** *Silicone caulk holds the glass panel secure while allowing for easy replacement if necessary.*



▲ ***Secure Stops.*** *Use a nail set to install the brads that secure the stops to the rails and stiles.*

weekend project



drop-side Tool Tote

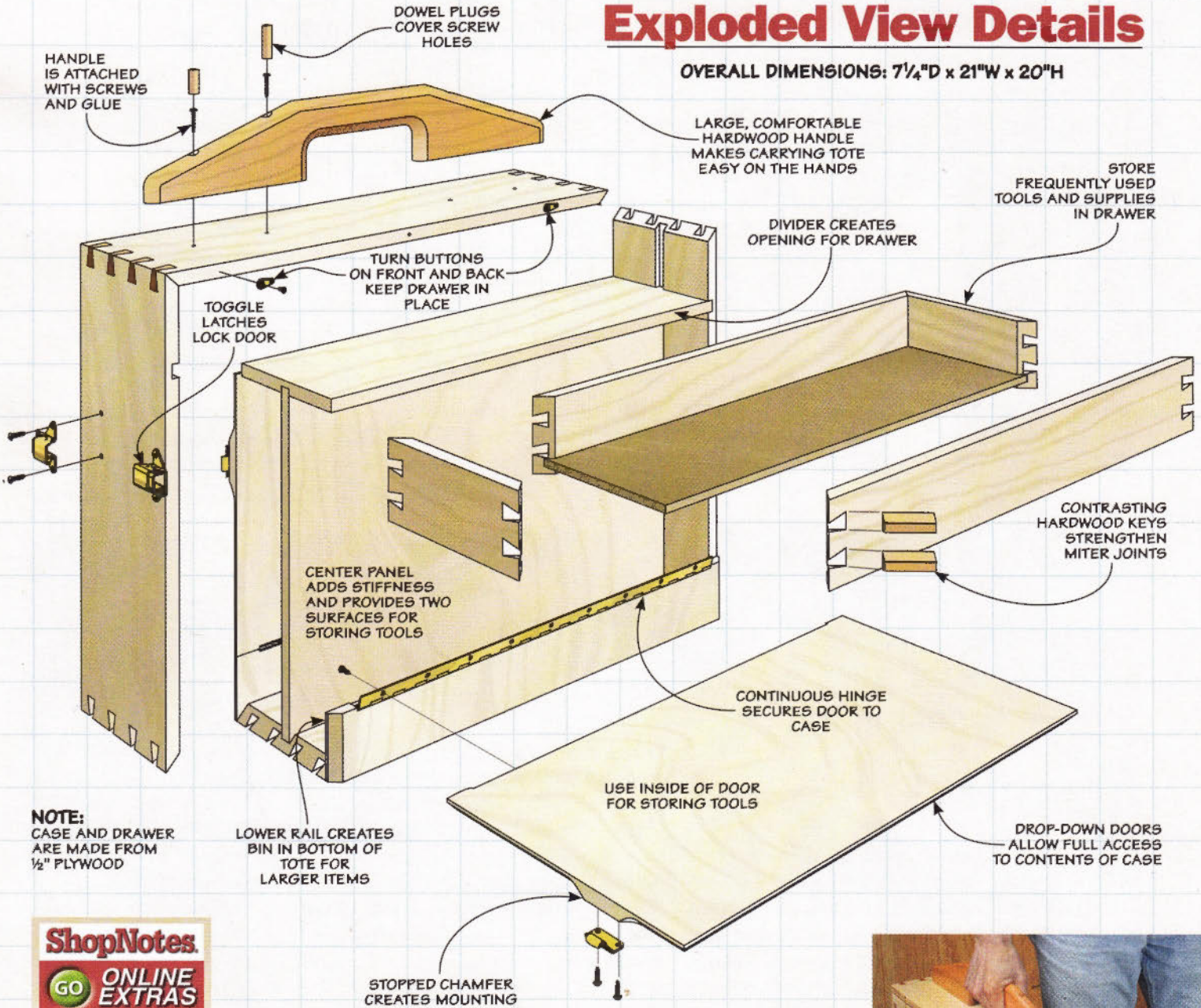
The unique design of this versatile tool carryall gives you easy access to everything inside.

Many portable tool boxes take a top-down approach to storing tools. This works fine for storing just a few things. The problem is that the items on the bottom can be hard to find, easily damaged, or forgotten.

The tote you see here uses a different method. Instead of access from the top, the sides fold down. This gives you access to all of the contents without having to move tools out of the way. And to keep the tools organized and prevent damage, they're held securely on simple racks and custom holders. Best of all, you can build this tote in an easy weekend from common materials.

Exploded View Details

OVERALL DIMENSIONS: 7¼"D x 21"W x 20"H



NOTE: FOR HARDWARE SOURCES, TURN TO PAGE 51

ShopNotes GO ONLINE EXTRAS

To download a free cutting diagram for the Tool Tote, go to: ShopNotes.com

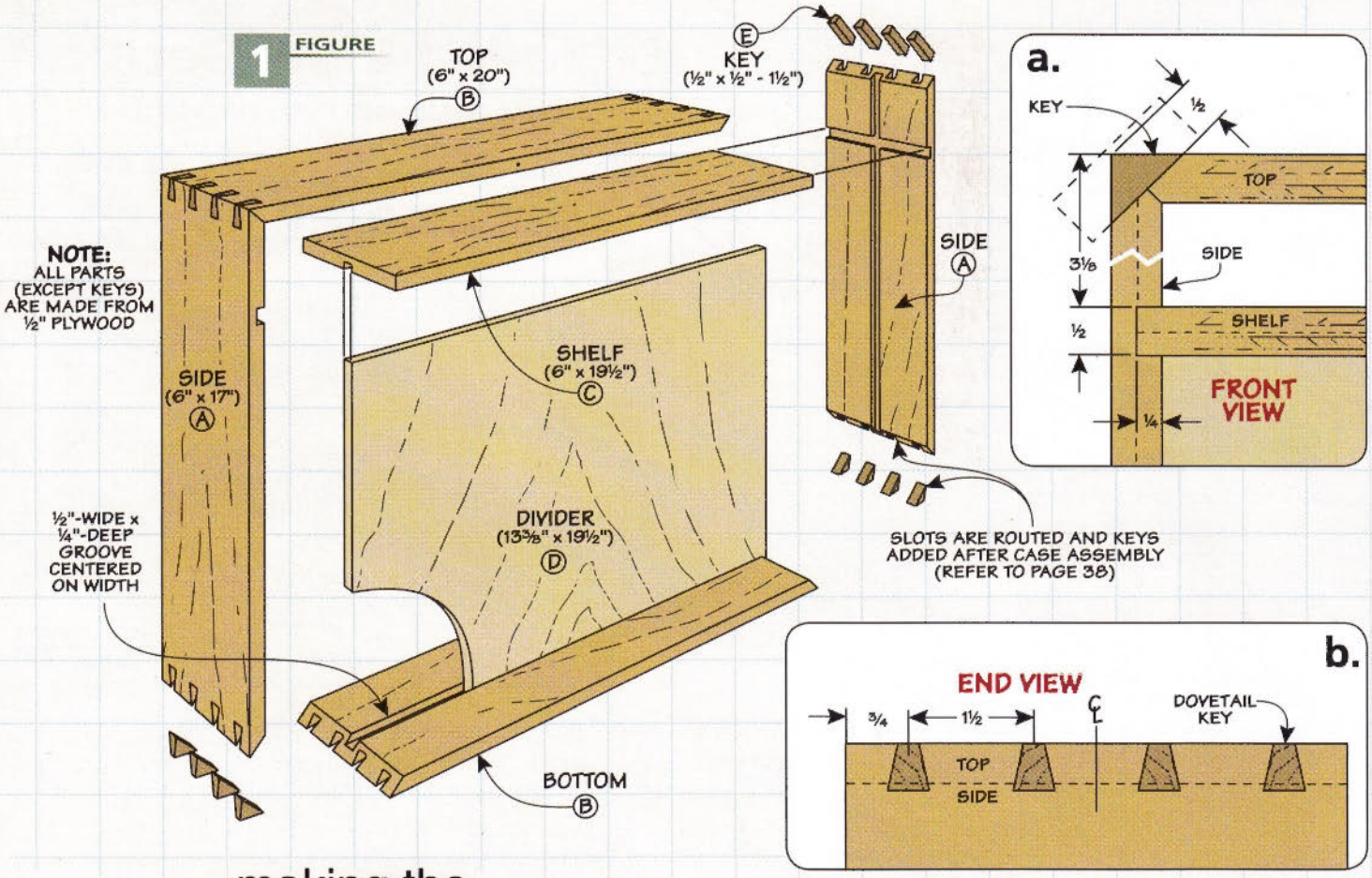
Materials & Hardware

A	Sides (2)	6 x 17 - ½ Ply.
B	Top/Bottom (2)	6 x 20 - ½ Ply.
C	Shelf (1)	6 x 19½ - ½ Ply.
D	Divider (1)	13⅜ x 19½ - ½ Ply.
E	Keys (24)	½ x ½ - 1½
F	Rails (2)	2½ x 20 - ½ Ply.
G	Doors (2)	11 x 20 - ½ Ply.
H	Drawer Front/Back (2)	2½ x 18⅞ - ½ Ply.
I	Drawer Sides (2)	2½ x 6 - ½ Ply.
J	Drawer Bottom (1)	5½ x 18⅜ - ¼ Hdbd.
K	Handle (1)	¾ x 3 - 18

- (2) 1" x 18" Continuous Hinge w/Screws
- (4) Toggle Latches w/Screws
- (4) Toggle Strikes w/Screws
- (4) #8 x 1½" Fh Woodscrews
- (1) ⅜"-dia. x 12" dowel (for plugs)
- (4) Turn Buttons
- (Var.) 16" Magnetic Tool Bar
- (Var.) ¾"-dia. Rare-Earth Magnets
- (Var.) ⅞" O.D. Magnet Cups w/Screws

NOTE: Number of tool bars and magnets depends on your storage needs.

▲ ***Take It Anywhere.*** *The narrow profile and hardwood handle make it easy to take tools and supplies to the job site.*



making the Case

One of the main reasons I built this tote is for the times when I need to do an odd job or two outside the shop. So it had to have a few important design features. First, it needed to be easy to carry around. To do this, the case is narrow enough to be at my side without bumping into my leg.

Versatile Storage. Another thing the tote needs is the ability to hold and organize a wide variety of tools. This is accomplished by including a few types of storage. At the top of the tote is a small drawer for holding frequently used items. Inside the main case, the vertical surfaces of the divider and doors can be used to hang tools. And finally, the bottom of the case is a bin for holding bigger items.

Quick & Easy Construction. The final feature of the tote is a straightforward construction process that doesn't take a lot of time. You can see how this works in Figure 1. The tool tote is built from ½" plywood to minimize weight without sacrificing stability and strength. I used Baltic birch plywood because I like how the thin, consistent layers look.

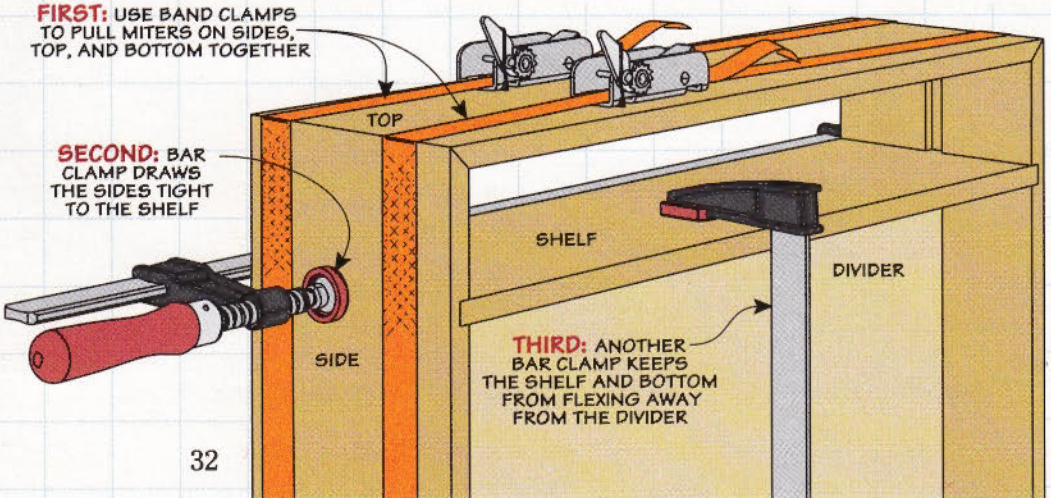
There's a catch, though. At first glance, the tote looks like it's assembled with dovetails — an odd detail for a plywood case. But if you look again, the dovetails are actually hardwood keys that reinforce (and dress up) the miter joints in the case.

As for the rest of the case, the joinery is pretty simple. The shelf and divider rest in dadoes and grooves. Later on, you'll see that building the drawer echoes this same construction process.

Begin Building. The case is where the construction begins. I started by cutting plywood pieces for the top, bottom, shelf, and sides to size, as in Figure 1. (Note the top, bottom, and sides are mitered on each end.) The key is making sure the pieces are the same width and that corresponding parts are the same length.

The next step is to add some joinery that divides the case, making it easier to use. I cut a

CASE ASSEMBLY



centered groove in each side, the shelf, and the bottom, as shown in Figure 1. This accepts a center divider that increases the rigidity of the case. It also creates a pair of surfaces for mounting tool holders. The groove is cut at the table saw with a dado blade sized to match the plywood.

With the dado blade still set up, I cut a dado across the sides to accept the shelf, as you can see in Figure 1a. The shelf creates a space for a drawer.

You'll need to make one final part before you can assemble the case. And that's the center divider. It's simply cut to size to fit between the grooves in the sides, bottom, and shelf.

Case Assembly. Gluing up the case is probably the most challenging part of building the tool tote. That's because all the main parts need to come together at the same time. But, don't worry. All you need to do is follow the right assembly sequence. It's also a good idea to use slow-setting glue. This will give you enough time to get the pieces aligned before the glue tacks up.

You can see my clamping setup in the Case Assembly drawing on the facing page. I set the center divider on the bottom, then placed the shelf on the divider. After bringing the sides and top in place, I laid the case on its side and applied band clamps. A couple bar clamps pull the shelf and divider tight into the grooves.

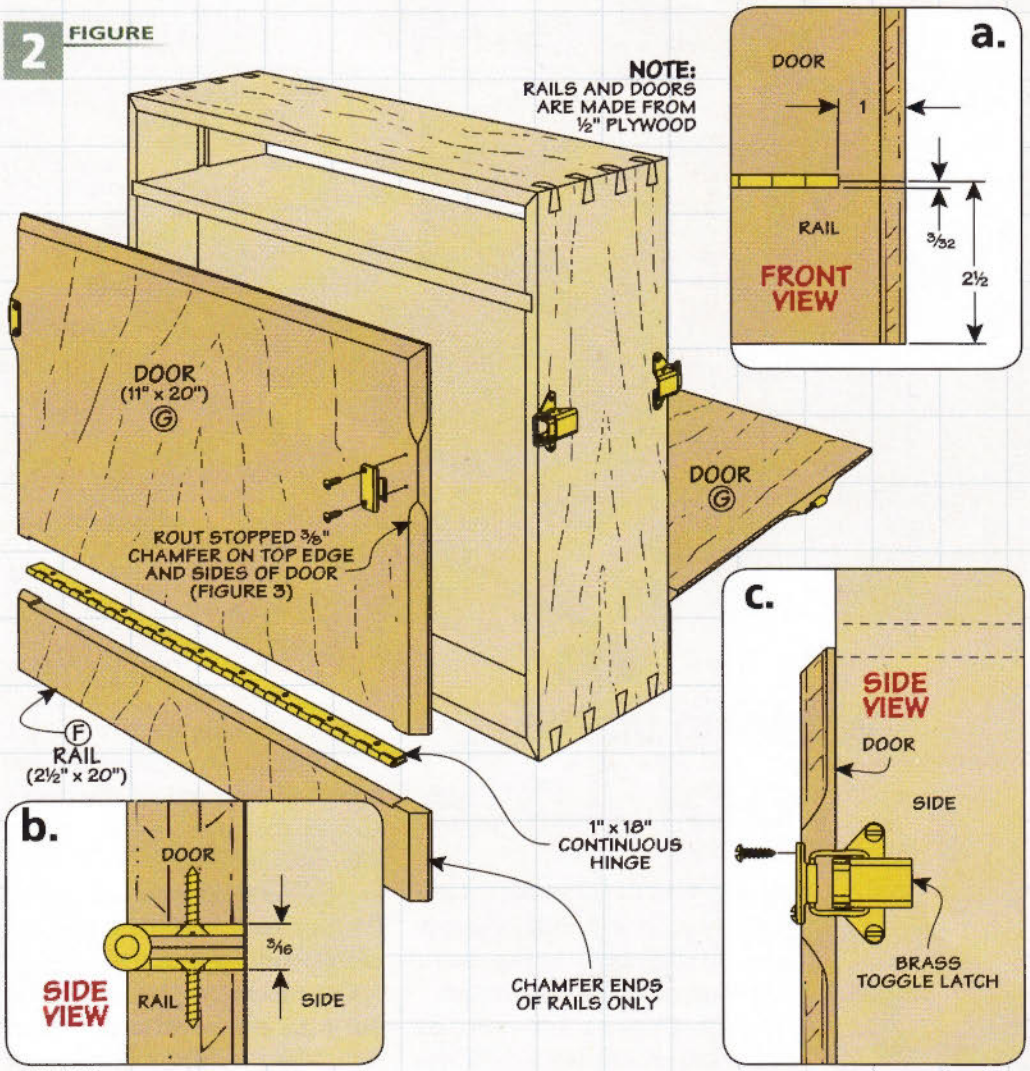
Dovetail Keys. When the clamps come off, you're ready to add the dovetail-shaped keys. This is a two-step process. In the first step, you rout dovetail-shaped slots across the miter joints with a jig. The second step is to create the matching keys that fit the slots. The details for all this can be found on page 38.

Enclosing the Case. With the basic framework of the case complete, you can get to work on closing it in with the drop-down doors. The doors are hinged to rails added along the bottom of the case, as in Figure 2.

To accommodate the continuous hinge, you need to cut a wide notch in the lower edge of the door and upper edge of the rail (Figures 2a and 2b). I've found the best way to do this is to use a dado blade in the table saw. Support the workpiece on edge with a tall auxiliary fence on the miter gauge, then make multiple passes to complete the notch.

To complement the mitered corner joints and soften the edges, I chamfered the ends of each rail along with the sides and top of the doors. Take a moment to note that a section on each side isn't chamfered. This creates a flat spot to attach the toggle latch. You can see how to rout the stopped chamfers in Figure 3.

FIGURE 2



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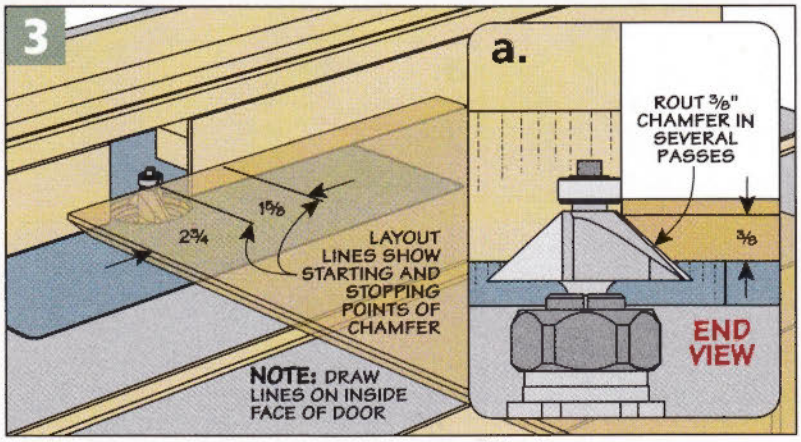


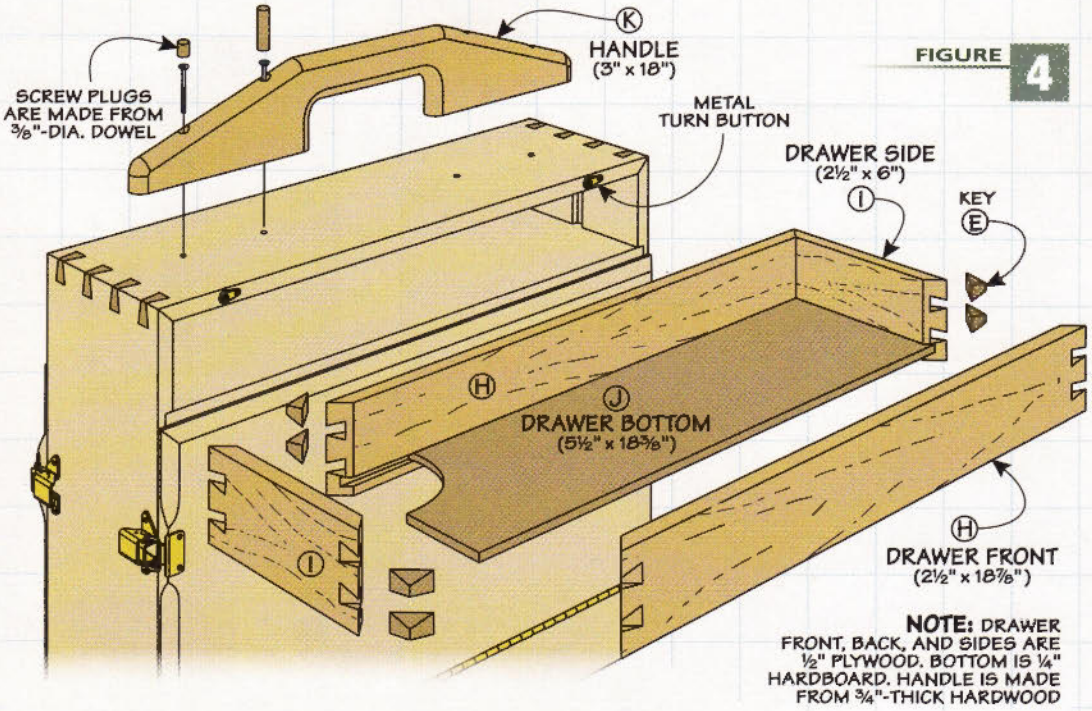
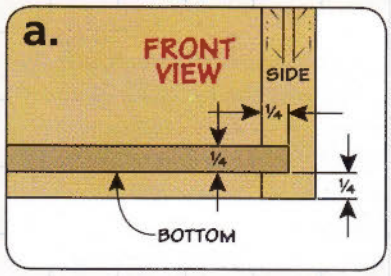
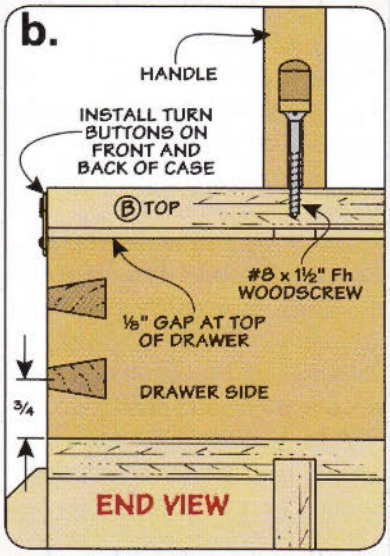


FIGURE 4





wrapping up the
Tool Tote

The work on the main part of the tool tote is done. All that remains is to add some more storage and a handle to carry the tote around.

Small Drawer. I mentioned earlier that the upper part of the tote has an opening for a small drawer. This way, you can get to the contents of the drawer without having to open the doors first. The slide-out drawer also makes a great tray for corralling items during work on a project.

By this point, the construction of the drawer should be pretty familiar. The front, back, and sides are joined with miters and then I added the same dovetail key detail used on the case (Figure 4b).

When making the drawer, it's important to size the parts accurately. The length of the sides should match the width of the tote. And the length of the front and back should leave a small gap (1/16") on each end. This way, the drawer will operate smoothly.

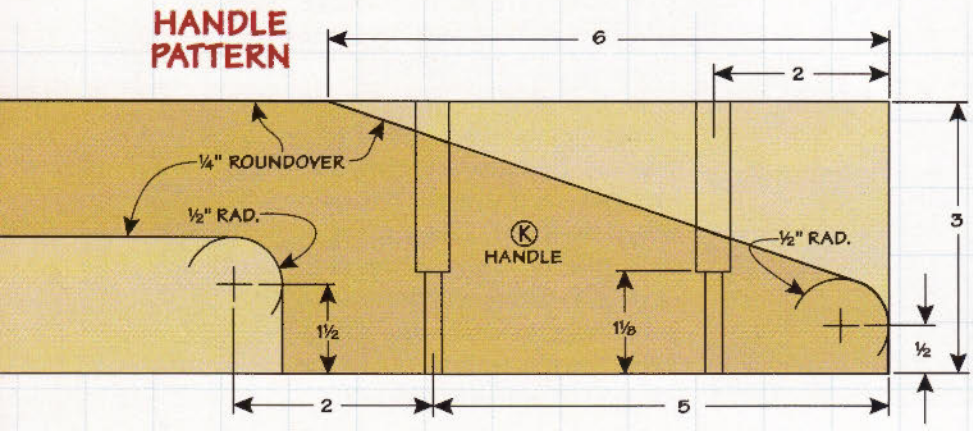
One other thing I want to point out is the groove cut near the bottom edge to accept the drawer bottom. You can find the dimensions for this groove in Figure 4a.

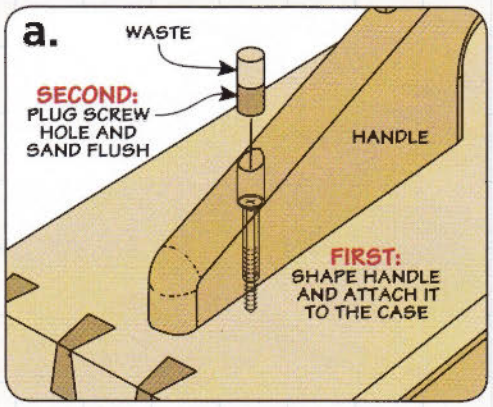
Once again, you add the dovetail keys after gluing up the drawer. As in Figure 4, there are only two keys at each corner.

Turn Buttons. Since the drawer is designed to be removed from the case, you need a way to keep it in place. To solve this problem, I attached a pair of metal turn buttons to the front and back of the tote. To remove the drawer, all you need to do is pivot one set of turn buttons out of the way and push the drawer out from the opposite side.

Hardwood Handle. The final piece of the tote to add is the handle. I made the handle out of hardwood to stand up to heavy loads. I cut it to the shape shown in the drawing below. Roundovers on all the edges make it more comfortable. The handle is glued and screwed to the tote. Finally, I plugged the screw holes with short pieces of dowel, Figure 4b and detail 'a' below.

To get the most out of the space inside the tote, I added a few storage options. You can learn more about those on the next page.





Tool Storage

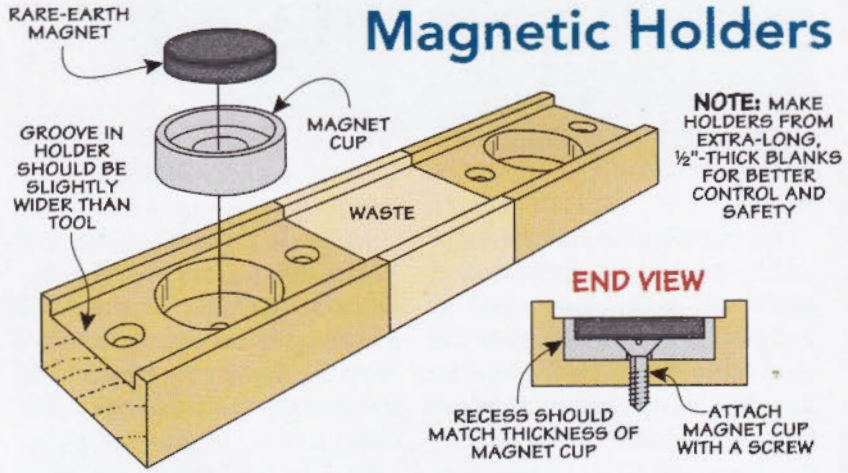
The key to making the most of the storage space in the tool tote is organizing your tools so you can get to them easily. To do that, I came up with a combination of custom tool holders and some general-purpose racks.

Magnet Racks. Versatility is one of the main advantages of this tote. So the storage inside should be versatile, too. For the general-purpose tool racks, I turned to magnets. A magnet bar attached to the divider (lower right photo) is perfect for storing a variety of tools. On the doors, I used strong rare-earth magnets to hold small tools (middle photo).

Custom Racks. Magnets even come in handy when making custom tool holders (drawings below). Finally, the ruler supports in the bottom drawing work with gravity. They capture the rulers in angled slots and hold them in place whether the door is open or closed.

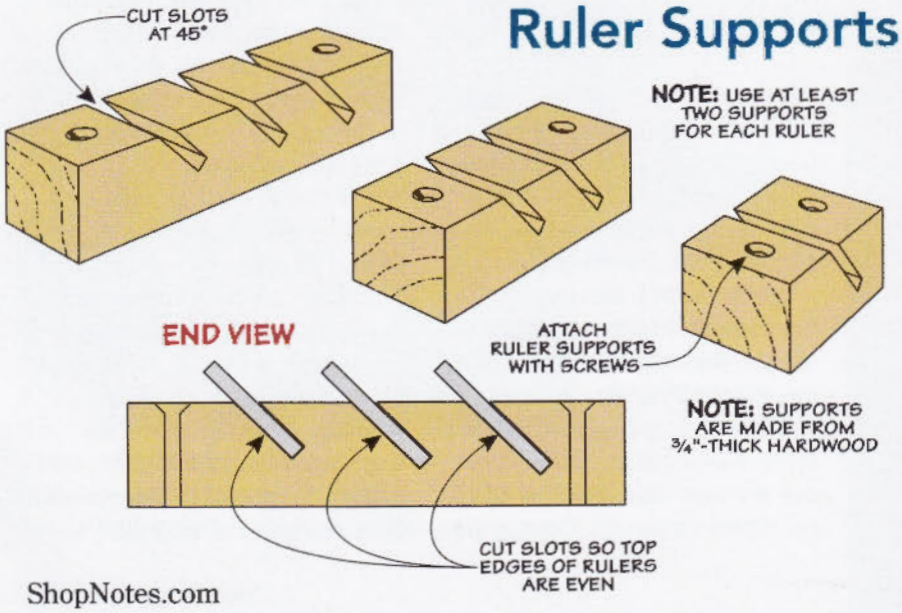
◀ ***Custom.*** *Create easy-to-make custom holders to take advantage of the space on the drop-down doors.*

Magnetic Holders



◀ ***Small Magnet.*** *To hold small tools in place, attach a single rare-earth magnet to the door with a magnet cup and screw.*

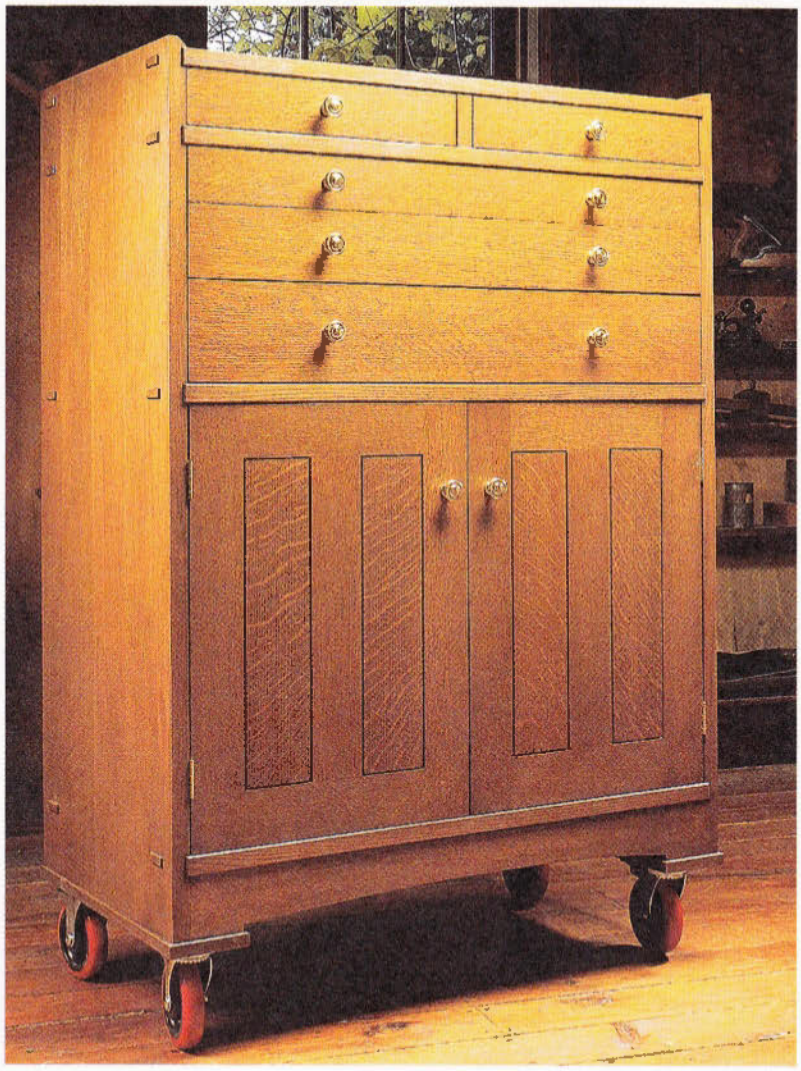
Ruler Supports



Magnetic Bar. *A magnetic tool bar is an inexpensive way to organize tools in the tote.*

secrets to Locating Hinges

Selecting the right hinges for your project is only half the battle. Placing them properly adds the professional touch.



When I'm building a project, it's easy to get caught up in the nitty-gritty construction techniques. I want to make sure everything works out right. Sometimes, it pays to step back and figure out why and how one piece of furniture looks good and another can be a little "off." This is especially true when it comes to hardware.

▼ ***Centered.*** *Centering the hinges on the edge of the rails provides a pleasing look on small, square doors.*

The right hardware can really add to the look of a project. But that's only if it's placed well on the piece. One example of this is the hinges on the doors. Knowing the best location to place hinges may seem like a mystery, but there are some secrets you can use to solve the puzzle.

BASIC GUIDELINES

Figuring out where to locate the hinges on a door doesn't have to be a guessing game. While these aren't hard and fast rules, I have a few guidelines that I use as a starting point for placing hinges.

Symmetrical Placement. The first rule of thumb is to place the hinges the same distance from the top and bottom ends of the door. To me, this gives the project a more balanced look. You can see how this looks in all the examples shown on these pages.

Align With Rails. The real trick is figuring out just what the distance should be. For this, I use the design of the door as a guide. Most of the doors I build are frame and panel assemblies with either a wood or glass panel. So I usually align the end of each hinge with the inside edge of the rails. You can see this in the tool chest shown above. As your eye follows along the horizontal edge of the rail, the hinge seems to be in a "natural" spot.

But that doesn't mean it works for every door. For example, take a look at the cabinet in the left photo. The doors are shorter and they're nearly square in shape. Aligning the hinges with the rails would place them too close together. And the resulting space between the hinges would look too tight. Instead, I centered the hinges with the inside edge of the rails.

SPECIAL SITUATIONS

The previous guidelines work well on uncomplicated doors. When the doors are more complex, I'll use some variations to the basic principles.

Decorative Details. One way to dress up a door is to add decorative details. The cabinet doors on the right have contrasting plugs. If the hinges were aligned with the rails, both elements would compete with each other. The solution is to step the hinges towards the center slightly. This allows the plugs and hinges to stand out on their own.

Different Rail Widths. There's no rule that says both rails on a door need to be the same width, as shown in the lower left photo. Aligning the hinges with the rails would result in an uneven hinge placement top to bottom.

The answer is to choose one of the rails as the guide for locating both hinges. Since the upper rail is relatively narrow, I used the wider lower rail as my guide.

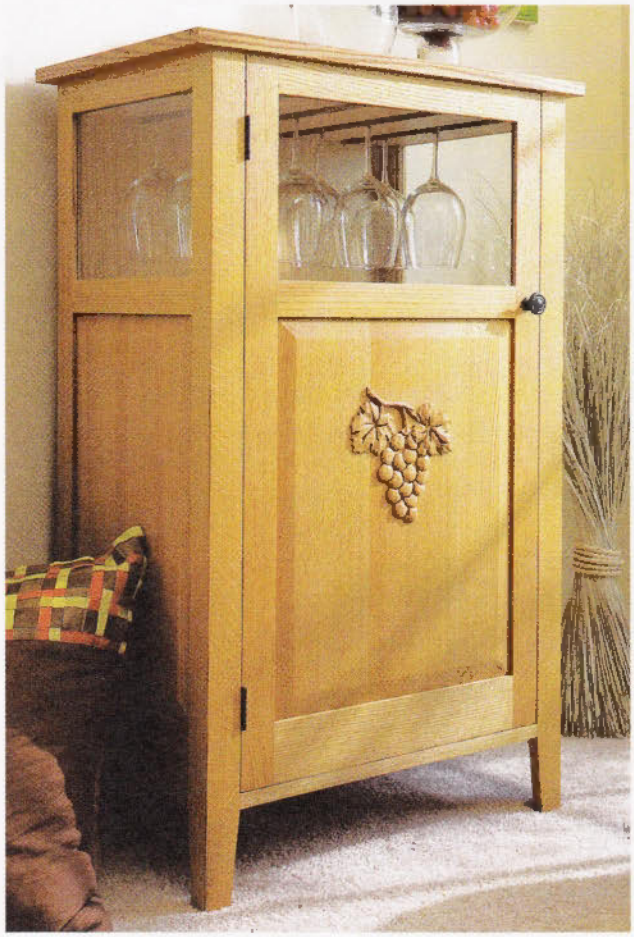
Large Doors. The doors on the bookcase in the lower right photo are highly detailed: uneven rails, decorative plugs, divided lights, and they're pretty large. Locating the hinges here is a challenge.

First, for more support, I added a third pair of hinges centered on the doors. Then I used the narrower upper rail as the basis for locating the top and bottom hinges. This also centers the bottom hinge on the lower rail.

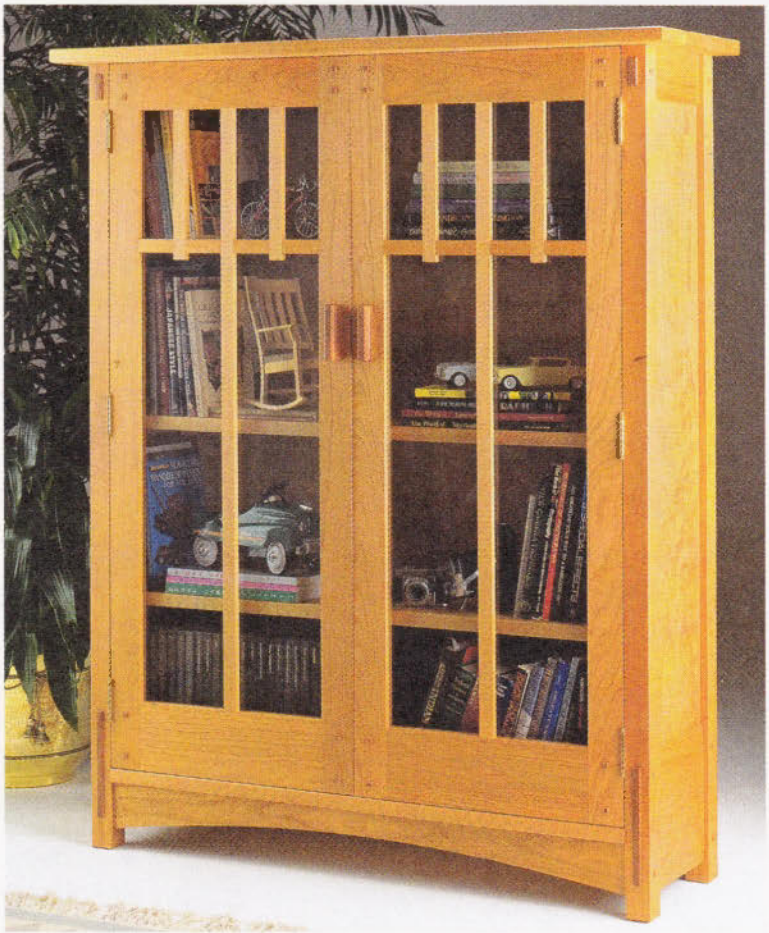
Test Run. Before you commit to the location of the hinges, it's a good idea to tape them to the door temporarily. This way, you can see for yourself how a given approach will look.

Locating hinges isn't mysterious. All it takes are some simple principles and the flexibility to bend them when necessary.

▲ ***Avoid Clutter.*** *In the design of this project, shifting the hinges away from the decorative plugs keeps the doors from looking too busy.*



▲ ***Choose a Rail.*** *When the rails aren't the same width, select one rail as the guide for both hinges. For this cabinet the lower rail worked best.*



▲ ***Tall Doors.*** *Larger doors like this need a combination of solutions. First, an additional hinge provides extra support. Then, the hinge position is determined by the upper rail.*

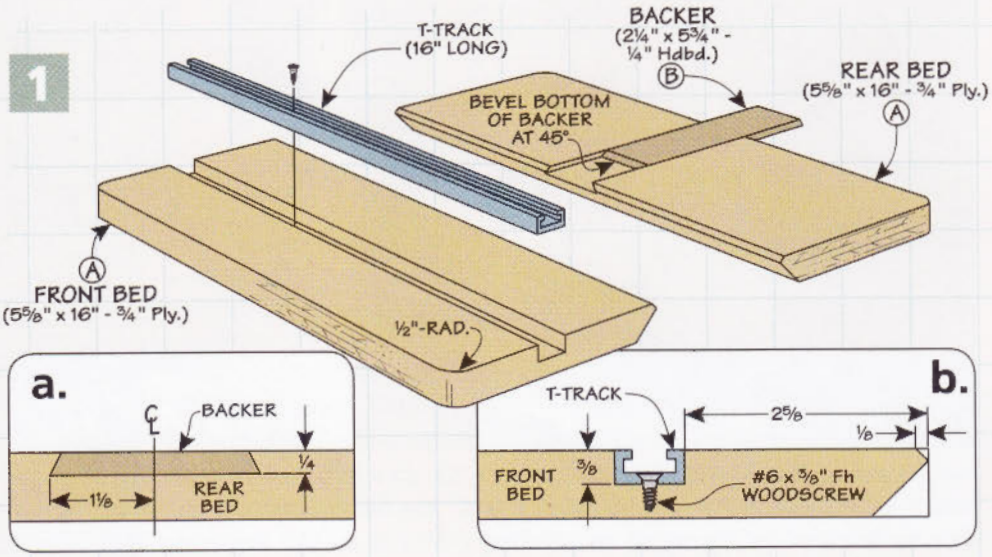
router table Dovetail Key Jig

Dovetail keys are a great way to strengthen a miter joint. This jig takes the hassle out of cutting the slots for the keys.

The mitered corners used on the tool tote on page 30 give it a nice, clean look. But a glued up mitered joint isn't all that strong. A great way to provide extra strength, along with good looks, is to add dovetail-shaped hardwood keys across the corners.

The challenge comes in accurately positioning and cutting the slots for the dovetail keys. The solution is the jig you see above. It securely holds the project at the correct angle while you make the cuts on the router table.

1



The Jig. The jig is just a pair of angled bed assemblies that support both sides of the project. They're attached to a hardboard base. A runner attached to the base guides the jig in the miter slot of your router table. Note: If your table doesn't have a slot, you can leave the runner off and guide the jig using your router table fence.

A piece of T-track that rests in a groove in the front bed is used to lock in a pair of stops that keep the workpiece in position during the cut. In the rear bed, I cut a dovetail-shaped dado to accept a replaceable backer that helps prevent tearout, as in Figure 1a. You can read more about this addition in Shop Short Cuts on page 22.

Finally, I rounded the top outside corners and shaped the inside edge of each bed, as illustrated in Figures 1 and 1b.

Jig Assembly. Once the bed supports are completed, you can glue and screw them to beds using braces, as in Figure 2. Like the beds, the outside corners of the supports are rounded.

The two beds are attached to the base to create a cradle assembly. I sized the base so that when the beds were glued in place, it created a small dust relief (Figure 2b).

Before moving on and adding the runner, there's one thing to do at the table saw. And that's to cut a centered slot in the jig to provide clearance for the dovetail bit, as you see in Figure 2a.

Runner & Stops. With the slot cut for the bit, you're ready to add the runner that guides the jig (Figure 3). It's just a strip of hardwood cut to fit the miter slot of your router table.

You'll need to locate the runner to center the slot over the bit and install it square to the front edge (Figures 3 and 3b). Finally, I added the stops. Each is simply two small pieces of plywood glued and screwed together at a right angle. They're locked in place using a flange bolt, washer, and knob, as in Figure 3a.

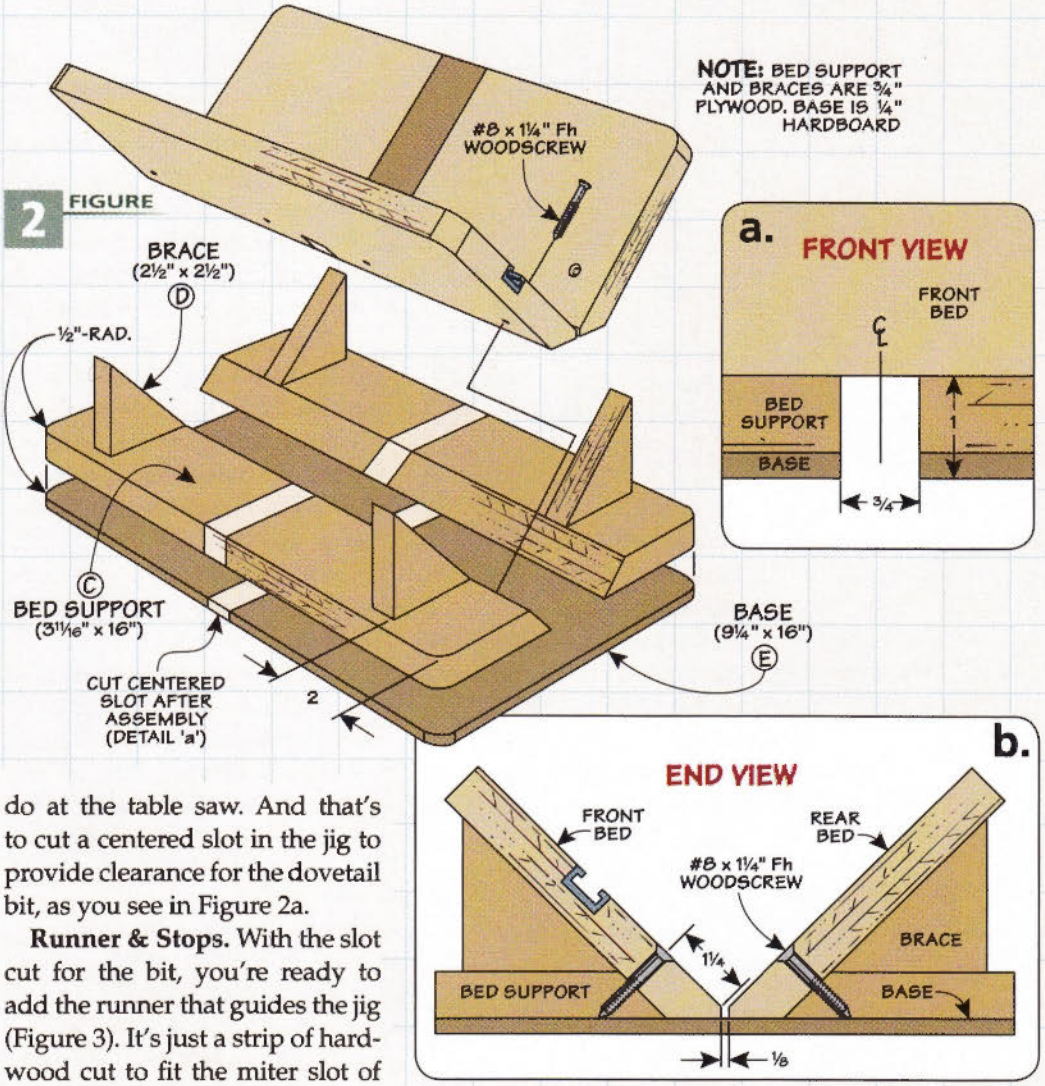


FIGURE 2

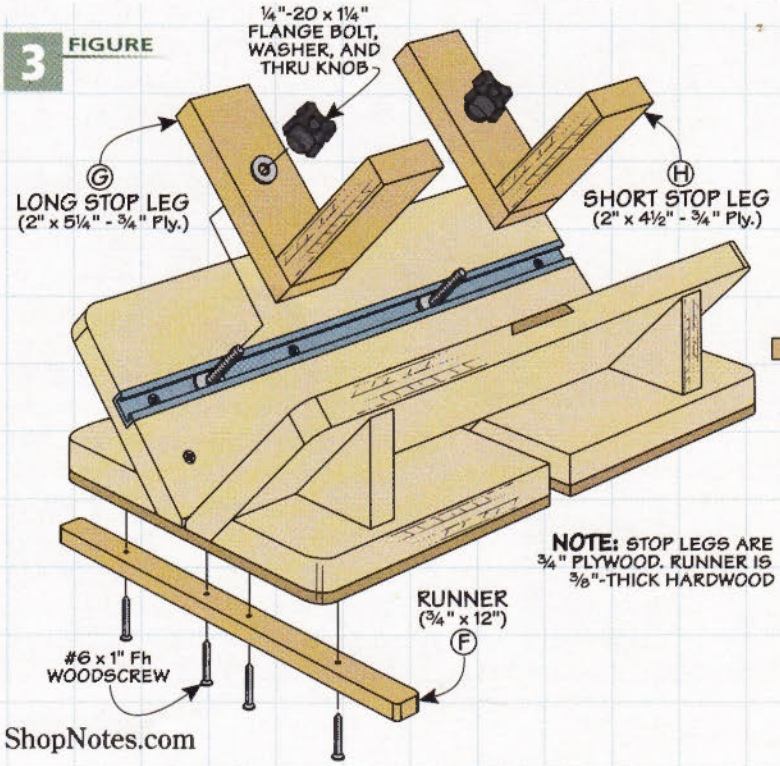
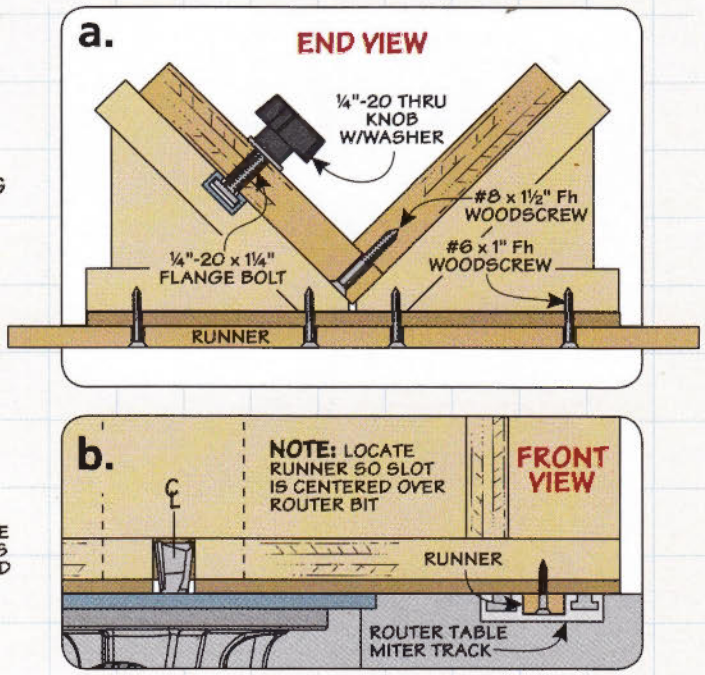


FIGURE 3



Using the Jig

Once you have the jig completed, cutting the slots for the keys, like the ones you see in the photo at right, is a snap. It's a simple step-by-step task that only takes a few minutes. To complete the joint, you'll make the dovetail-shaped keys and glue them in place. And finally, trim and sand them flush.

ROUTING THE SLOTS

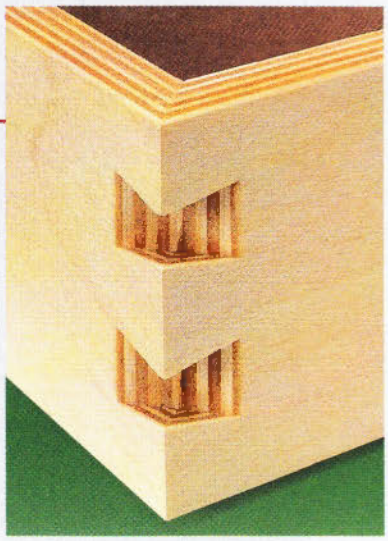
As I mentioned, the jig makes routing the slots for the keys easy. The first step in doing this is setting the depth of cut.

Setting the Depth. I've found that the easiest way to do this is to install the dovetail bit and position the jig over it. In Figure 1 you can see a layout line drawn across one corner of the project. This line represents the desired depth of the key slot and provides an easy reference for adjusting the height of the bit to match.

Positioning the Project. That takes care of the depth of cut, so you can move on to the next step — positioning the project in the jig. To do this, you need to know exactly where the bit will cut. As illustrated in Figure 2, I marked a layout line along the top edge of the backer to indicate the centerline of the bit.

Now that you know where the centerline is, you're ready to position the project using the stops. They'll keep it from shifting side to side. To do this, you'll need to make additional layout lines on the sides of the project.

Each layout line indicates the center of a slot. The number and spacing of the lines will depend on the project. The main goal is to mark the layout lines on one side so they extend above the top edge of the jig, as in Figure 3. This makes it easy to position the project to align with the centerline on the backer. Then, simply slide the stops against the sides of the project to lock it in place.



▲ ***Cut Slots.*** *The jig positions the project securely to cut a dovetail-shaped slot for a key.*

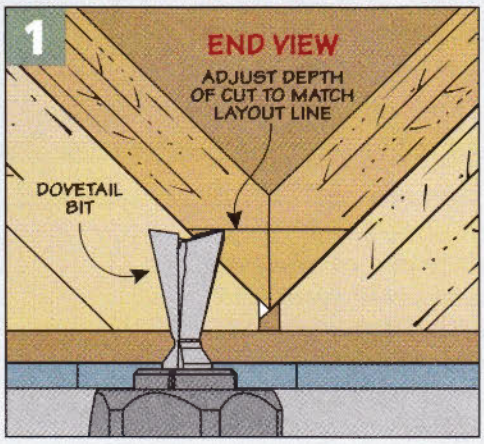
Routing a Slot. At this point, creating a slot is just a matter of turning on the router and making a single pass. All you have to do to cut a slot on the other three corners is rotate the project and make an identical pass.

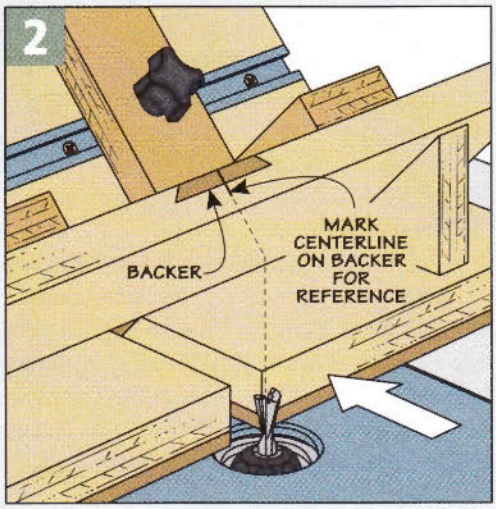
If your slot layout is symmetrical along the corner of the project, you won't always need to reposition the stops to cut a slot. As you can see in the example in Figure 4, flipping the project takes care of locating the slot identically for the next four passes. If you have more slots to cut in a different location, simply readjust the stops and repeat the process.

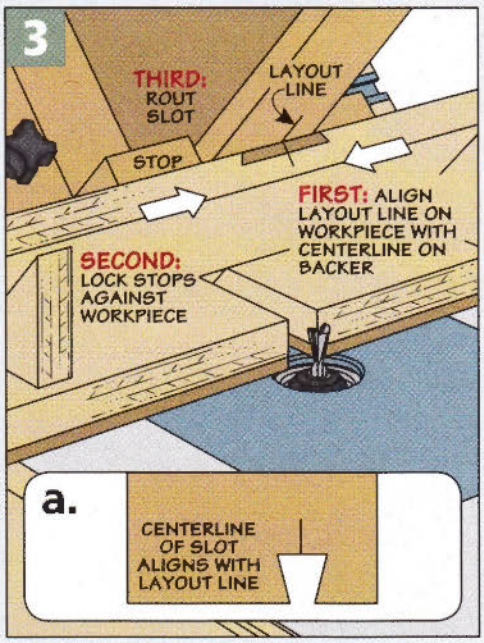
CREATING THE KEYS

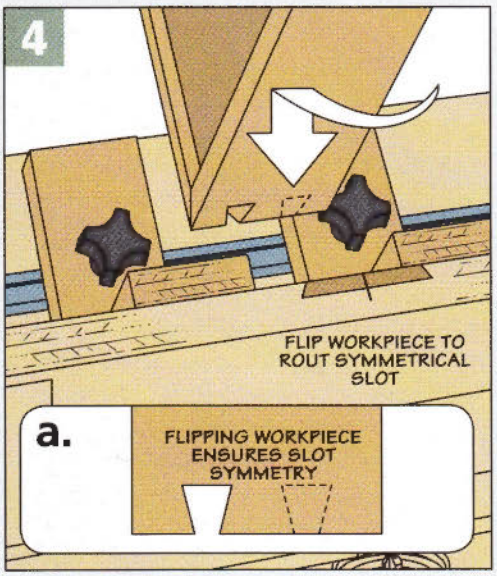
Cutting the slots is just half the job. The final task is to add the dovetail-shaped keys. The nice thing is you'll stay right at the router table and use the same bit.

Safety First. Because the keys are small, it's best to start with a long, extra-wide blank. This way, you can work safely and more accurately. The goal is to rout







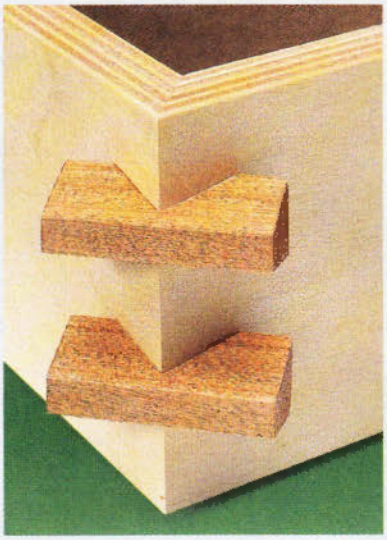


dovetails along the edges of the blank that fit snug in the slots, as illustrated in Figure 5.

Sizing the Key. To start with, adjust the height of the bit to cut slightly deeper than the depth of the slot. Then, sneak up on the size of the key by making a series of passes. The extra width of the blank allows you to rout a key along both edges of the blank. Just be sure to check the fit frequently, as detailed in Figure 5b.

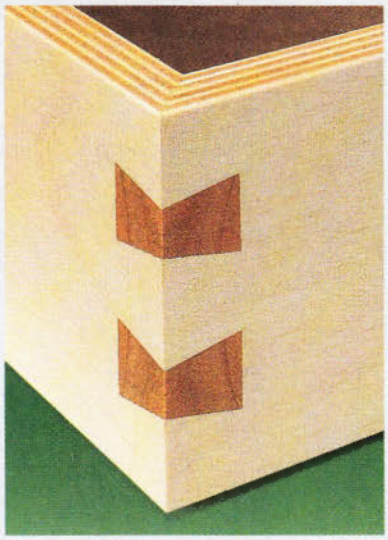
Rip the Key Strips. When you have a good fit, you're ready to rip the keys from the edges of the blank (Figure 6). I positioned my rip fence to cut the strip free right along the shoulder line, as you see in Figure 6a.

Glue in the Keys. After cutting individual keys free from the strips, double check the fit of each key before you glue any of them in place. You may find you have to sand one side of each key lightly to get a perfect fit. To avoid installing a key in the wrong slot, I found it easiest to fit and glue each key in one at a time, as shown in Figure 7.



▲ ***Check the Fit & Glue.*** *Check the fit of the keys as you make them, then glue them in place.*

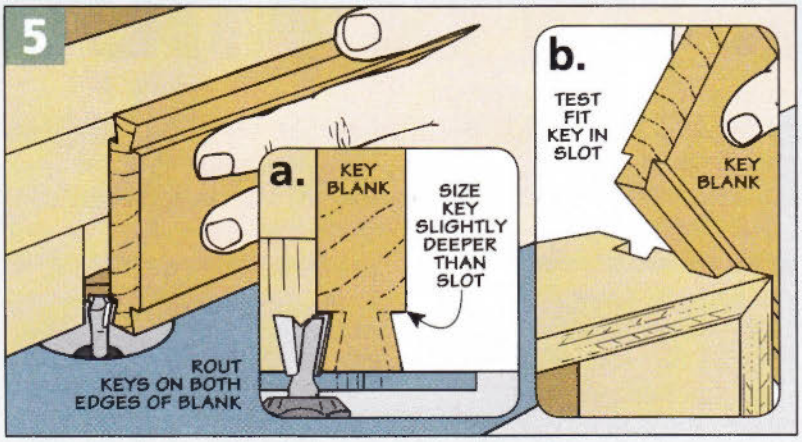
Final Details. Give the glue time to dry and then use a hand saw to remove most of the waste from each key, making sure not to mar the sides of the project. I like to use a flush-cut saw, like the one shown in Figure 8. It's the simplest way to avoid marring the sides as you make the cut.

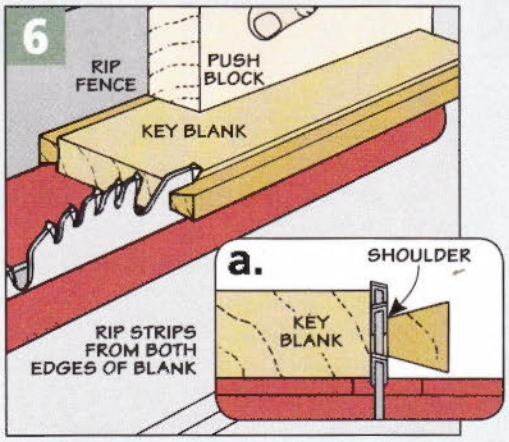


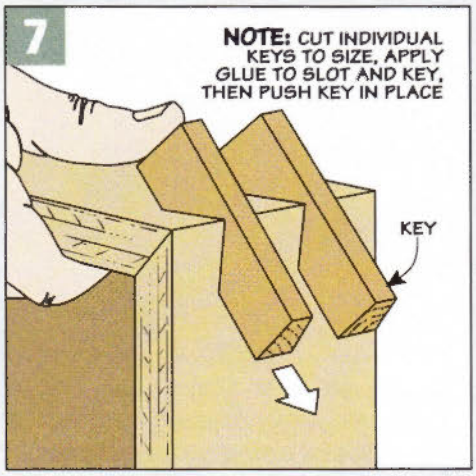
▲ ***Trim & Sand Flush.*** *Once the glue dries, trim off the waste and sand the keys flush.*

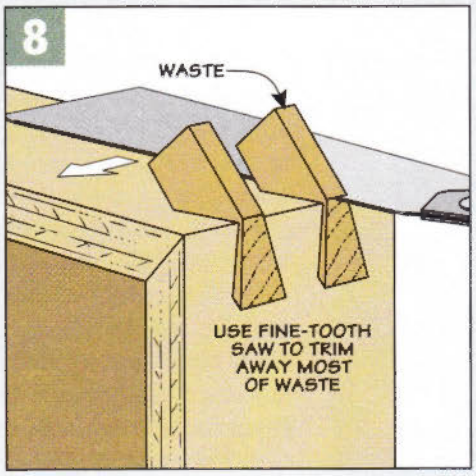
All that's left is sanding any remaining waste flush with the sides. To ensure a smooth, flat surface, I like to sand with the grain and back my sandpaper with a hardwood block, as in Figure 9.

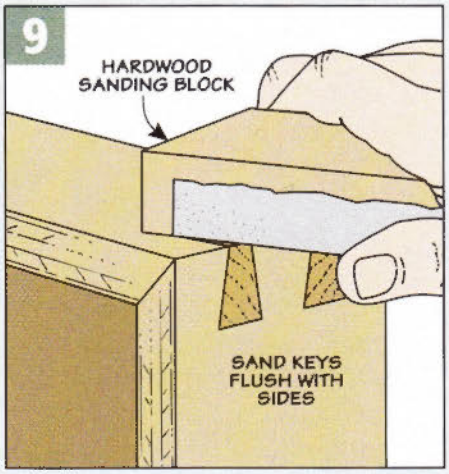
Dovetail keys are a great way to strengthen a mitered joint and give it a great decorative look. The jig makes the whole process quick and easy.











versatile

Riffler Rasps & Files

Create fine details and fine-tune joinery with these multipurpose shaping and smoothing tools.

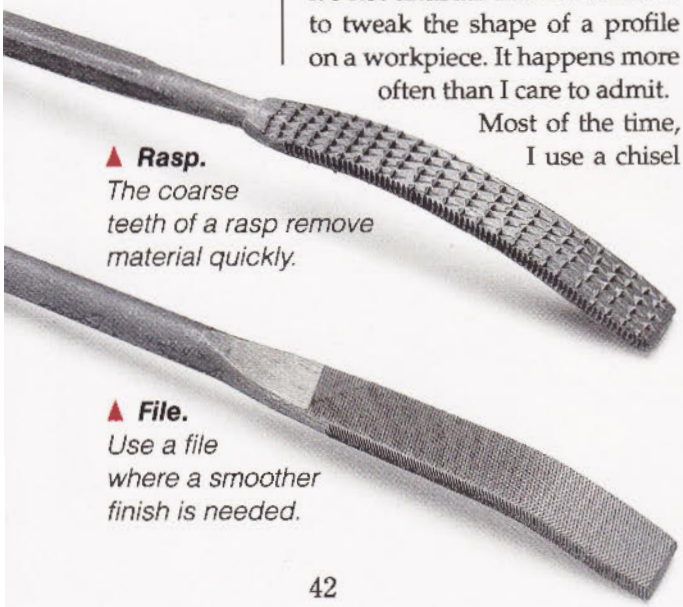
I'll be honest, sometimes the joinery on my projects needs a little fine-tuning to get everything fit together just right. And it's not unusual that I often have to tweak the shape of a profile on a workpiece. It happens more often than I care to admit.

Most of the time, I use a chisel or sandpaper to remove small amounts of material. Every so often though, I need to get into a tight or curved spot where a chisel can't reach or isn't practical. And using sandpaper can take too much time.

That's when I turn to my riffler rasps and files. Long used by carvers for detail work, rifflers have found a place in my shop for shaping, smoothing, and cleaning up hard-to-reach joints and details on my projects.

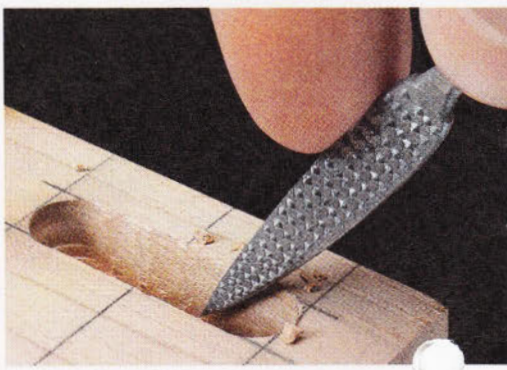
Rasps & Files. As you can see in the photo to the left, rifflers are available as either rasps or files. A rasp has coarse teeth to remove material quickly, and generally leaves a rougher finish than the slow, fine cut of a file. I typically use riffler rasps on unseen areas of my projects. For cleaning tight profiles cut on a band saw, I turn to my riffler files.

Features. A few distinguishing characteristics make rifflers



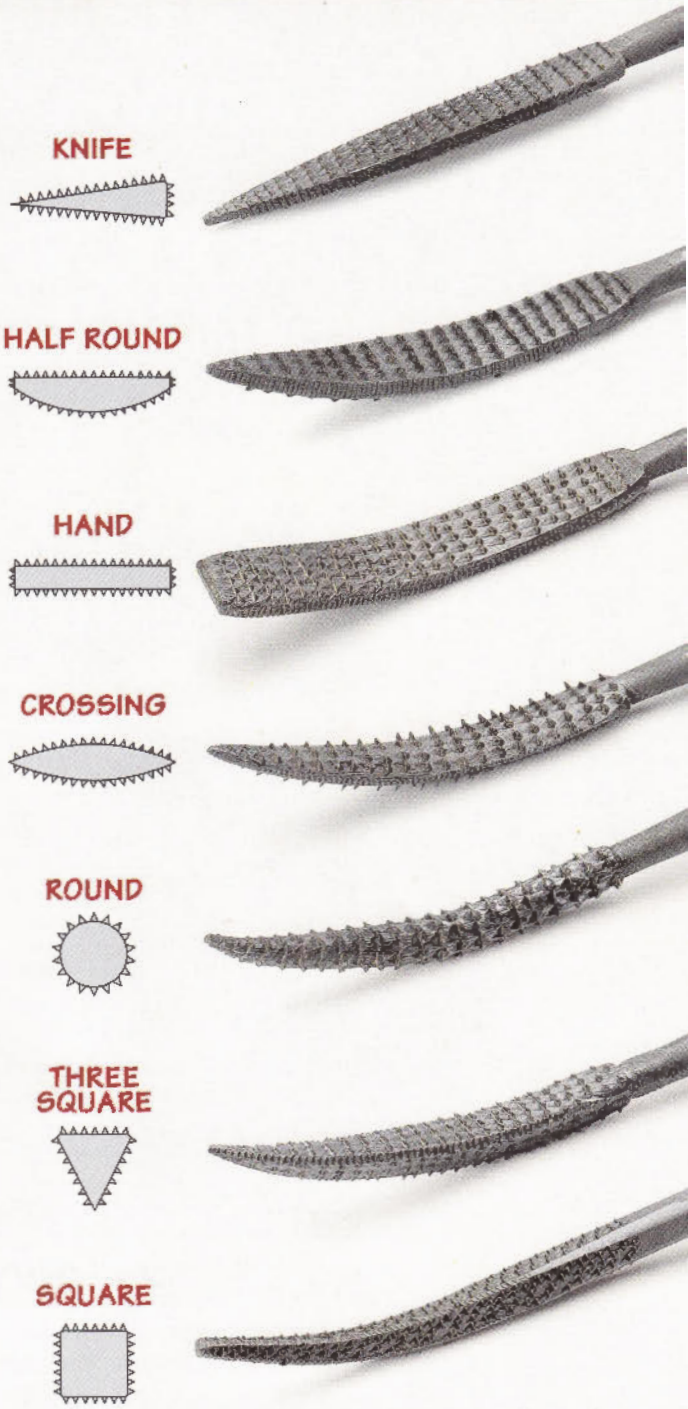
▲ ***Rasp.*** *The coarse teeth of a rasp remove material quickly.*

▲ ***File.*** *Use a file where a smoother finish is needed.*



▲ ***Mortise Clean-Up.*** *Use a riffler rasp to quickly clean up mortises made on a drill press.*

Curved Surfaces. *Quickly shape and fine-tune curved surfaces with just a few strokes.*



unique from other rasps and files. First, rifflers are small and designed to be an extension of your finger. Unlike other rasps, rifflers have working surfaces on each end with a smooth handle in between. This makes them comfortable to use and gives you greater control because your hand is much closer to the workpiece.

Another distinctive feature is the various shapes available. Knife, hand, crossing, three square, and half round are just a few of the shapes offered in sets or individually. (For sources, turn to page 51.) You can see examples of these in the photos on the right. Having the right shape really comes in handy.

Some rifflers have the same shape on both ends. Others are basically two tools in one by having different profiles on each end. These different shapes make it easy to create just the right profile on your workpiece.

Another thing you'll notice in the photos is that the working surface on most rifflers is curved. This doesn't mean that they can only be used on a curved surface. Rather, the curved profile creates a very small contact point with your workpiece. This means that you can zero in on a very small area without marring the surrounding surface.

Random Teeth. A riffler rasp works better if the teeth are cut in a random pattern. The idea behind this is to minimize score marks on the workpiece. Not all rifflers are created equal however. You can read more about the differences in the box below.

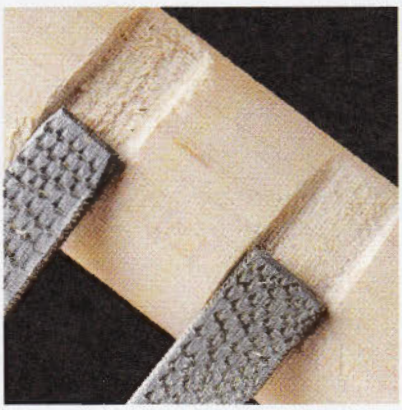
I don't use rifflers on every project I build, but when I do, there is really no substitute for their versatility. You may want to consider keeping a few rifflers in your shop. I suspect you'll be glad you have them on hand for the next project you build.

hand-cut Riffler Rasps

Rasps with teeth cut by hand are prized for the smooth surface they leave. This is a result of the tooth pattern being more random than on machine-cut rasps. A random pattern also makes the tool easier to use since it's less likely to create and follow deep score lines like some machine-cut rasps often do.

The results are noticeable, as is the price. A single, hand-cut riffler rasp can cost as much, if not more than, a complete set cut by machine. Your needs will determine what's best for you.

▲ ***Hand vs. Machine.*** *The tooth pattern of the hand-cut rasp on the left results in improved control when removing material.*



▲ ***Smooth Finish.*** *Machine cut teeth (left) can leave a rough finish with deep score marks.*

handy, hardworking Awls

Simple in design and use, awls tackle all kinds of layout tasks and deserve a place in your tool box.

When it comes to precision layout tools, an awl probably isn't the first tool you think of. Most woodworkers are more likely to reach for a sharp pencil to mark layout lines. But there are some good reasons for having an awl or two in your tool kit.

▲ ***Round Scratch Awl.*** *This tapered round awl makes a good all-around marking and layout tool.*

First of all, the line created by a sharp awl is much finer than any pencil line. That can often mean the difference between a joint that fits tightly and one that *almost* fits. A second advantage with using an awl is that the mark can be used as a positive starting point for a saw, chisel, or a drill bit. You can even use one to quickly create a pilot hole for a screw.

What's nice is that awls are inexpensive. You can find sources for these awls on page 51.

Care & Use. Since the line (or point) left by an awl can't be erased, using an awl for layout may be a little intimidating. So what I like to do is use a pencil for the initial layout and to check my numbers. Then I can go back and use an awl to scribe lines for the most critical parts.

As you do this, be sure to keep the same part of the awl against your square, as in the photo above, to prevent marking an inconsistent line. And to make the finest lines, keep your awl sharp. I periodically touch up the edge on some fine sandpaper glued to a hardwood block.

AWL TYPES

You might be surprised to learn that there is more than one type of awl. Some awls are multipurpose tools. Others are designed

for a specific task. Which style you choose will depend on the type of woodworking you do.

Scratch Awl. The most common awl is a round scratch awl (photos on the facing page). This general-purpose design is good for marking lines and centerpoints in wood, brass, and aluminum.

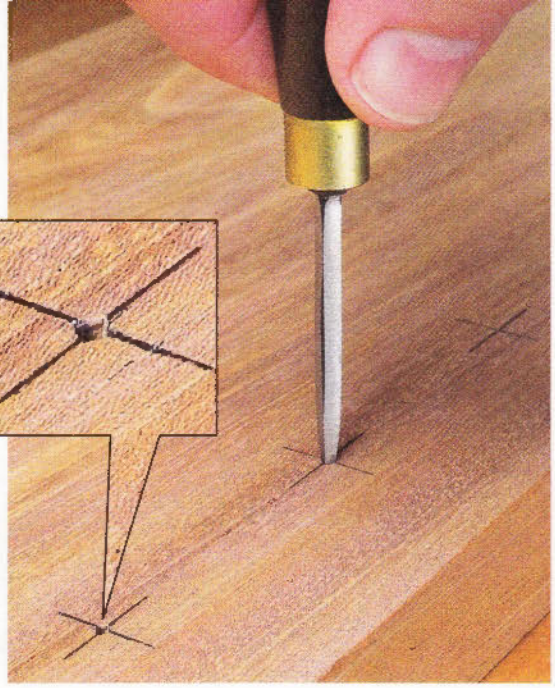
I tap mine with a mallet to create a starter hole for screws in both soft and hard woods. The downside is that the round tapered blade can split a workpiece when used near the end.

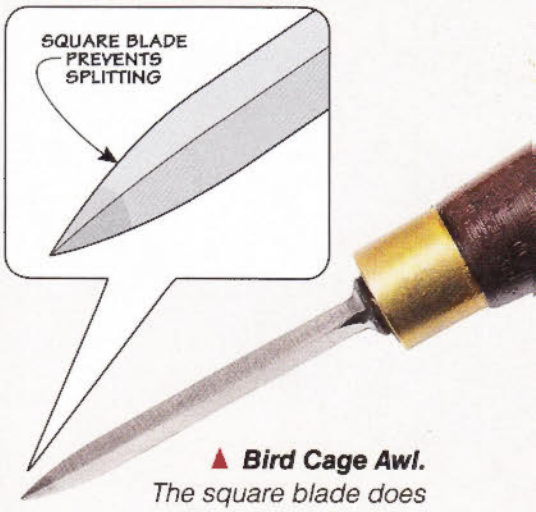
Bird Cage Awl. The bird cage awl shown in the upper right photo has a square blade. It was originally used to drill small holes for making cages.

When used with a twisting motion, the sharp edges sever the fibers to create a pilot hole. So splitting isn't an issue.

Bradawl. The third type is a bradawl. Like a bird cage awl, this specialized tool is designed for creating holes (lower right photo). Instead of a point, it has a blade that you set across the grain. Then by plunging and twisting, you can work your way into the wood. It works best for shallow holes.

These awls will take care of most of your marking needs and provide an easy way to make pilot holes. For deeper holes, take a look at the box below.



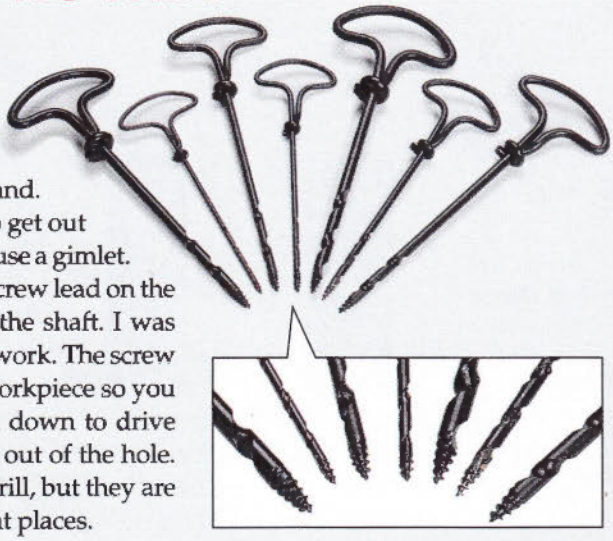


▲ ***Bird Cage Awl.*** *The square blade does a better job of starting holes than a round awl.*

▲ ***Bradawl.*** *The chisel-like tip on this awl is designed to drill holes without splitting the wood.*

starting screws with Gimlets

An awl works fine to make a couple of pilot holes, but after a while, you can get a sore hand. That doesn't mean you need to get out a power drill. Instead, you can use a gimlet. These traditional tools have a screw lead on the tip and drill bit-like flutes up the shaft. I was surprised at just how fast they work. The screw threads pull the tool into the workpiece so you don't need to constantly push down to drive it in. Plus, the flutes pull chips out of the hole. They won't replace my hand drill, but they are perfect for drilling holes in tight places.



Do The Twist. *With just a few turns, you can drill pilot holes for screws.*

choosing the right Rip Blade

Here's what you need to know to make the tough task of ripping easier.

Of all the things I do with my table saw, like cutting joinery and sizing parts, I still spend quite a bit of time on a basic task — ripping. Making good rip cuts requires the right technique and setup. But one thing that's often overlooked is the blade.

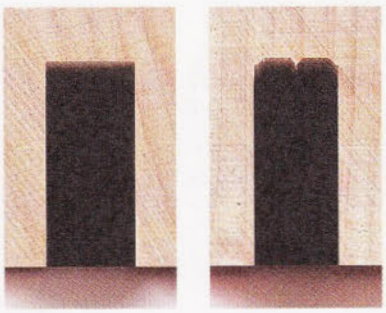
The best advice I ever received after buying a table saw was to get a high-quality combination blade. This kind of blade does a good job ripping and crosscutting both hardwoods and plywood.

However, when I have a lot of ripping to do, I find that using a combination blade takes more time and can result in burning in thick stock. That's why I now have a second blade dedicated to ripping.

Priorities. Here's the problem: There's more than one way to rip a board and more than one type of rip blade. This means that before you get a blade, you have to decide what's the most important goal when you make a rip cut.

You can find blades that cut quickly. Other blades leave a nearly perfect edge. And some can even reduce the strain on your table saw and save lumber.

The blades you see here offer different combinations of speed, quality of cut, and sawing effort. So you can find a style that matches your needs.

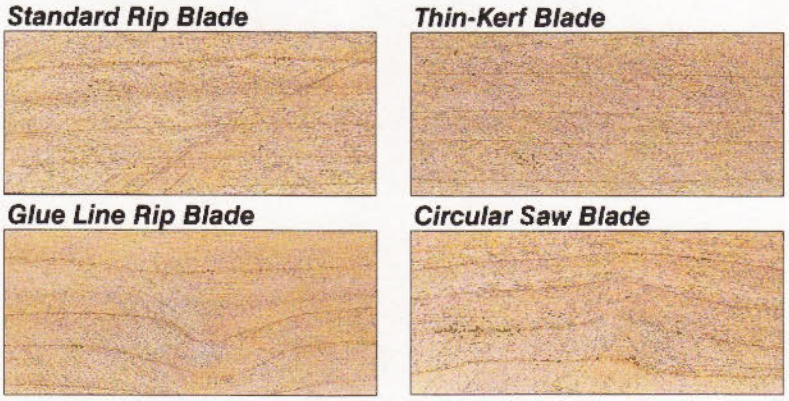


▲ ***Joinery.*** *After two passes, a standard rip blade leaves a flat-bottom groove for plywood. A glue line rip blades leaves ridges.*

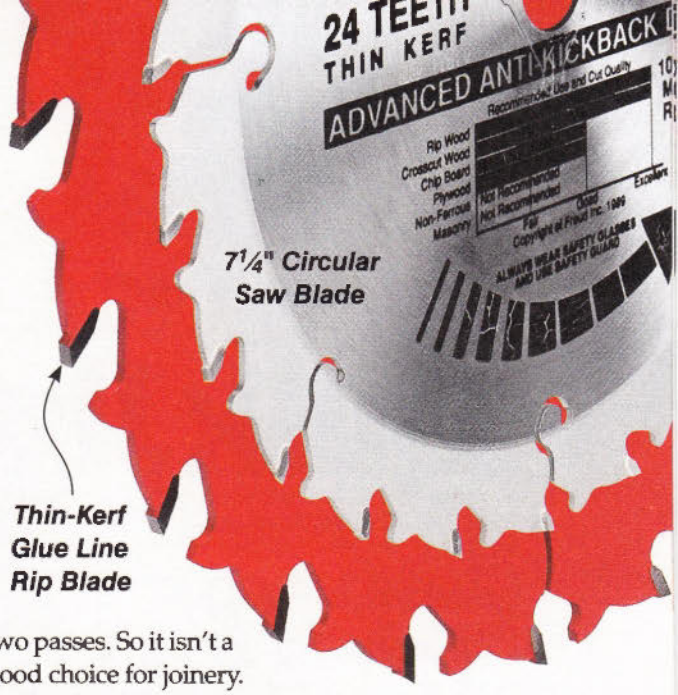
Start With The Standard. For years, the only dedicated rip blade option was a standard rip blade (left blade in the left margin). This blade has a flat-top tooth design with a low number of teeth (usually 24). This results in a fast, efficient cutting action. Plus, the large gullets between the teeth clear away sawdust and keep the blade running cool.

Joinery Blade. Honestly though, I use a standard rip blade more for cutting joinery than I do ripping lumber. One benefit of the tooth shape is that it works great for some joinery tasks. As you can see in the left photo, the blade cuts flat-bottomed grooves for frame and panel assemblies or splined miter joints. And you can create custom-sized grooves for ¼" plywood in just two passes.

That doesn't mean it's the perfect choice, however. A standard blade like this can tax smaller, low-powered saws. And you'll most likely end up with blade marks on the cut edges that will require some kind of clean up (upper left photo on the next page).



▲ ***Cut Quality.*** *Standard rip blades leave the roughest edge. Glue line rip blades make almost blemish-free cuts. Thin-kerf and circular saw blades offer results similar to full-thickness blades.*



Glue Line. A more recent option for ripping is a blade that leaves a smoother cut edge. A glue line rip blade is shown in the margin photo on the facing page. It's touted as leaving the cut edge so clean you can go straight from the saw to gluing up a panel without jointing the edges. While the cut isn't perfectly smooth, it's quite a bit cleaner than a standard rip blade (photo above).

What's even more impressive is that cutting with this blade goes just about as fast as using a standard rip blade. So it's ideal for cutting parts to final size or preparing boards for edge gluing.

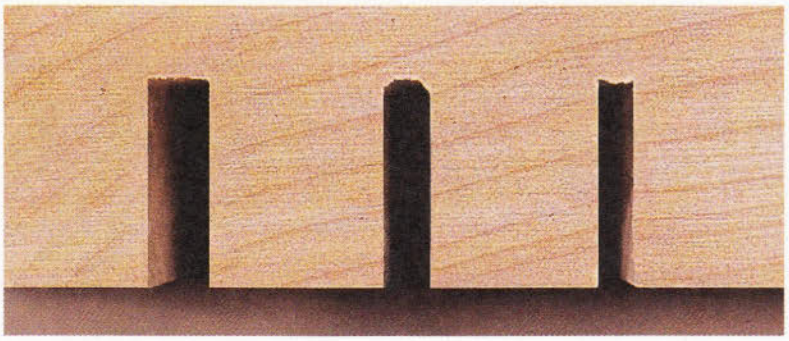
However, the teeth won't leave a flat-bottomed groove for joinery work. And I've found that these blades can bog down while cutting thick or hard lumber.

Thin-Kerf Blades. In an effort to help a smaller table saw perform better, blade makers offer thin-kerf blades in the same styles as full-thickness blades, as shown in the upper right photo. Thin-kerf blades are usually 3/32" thick. At first, this doesn't sound like much of a difference. But that results in a kerf that's 25% narrower, which makes it less demanding on the saw motor. In addition, it "wastes" less wood. Which can be a benefit when you're trying to get the most out of your lumber.

The first thin-kerf blades had a reputation for vibrating and deflecting in a cut. This isn't true any longer. Current models run straight and true, even while cutting thick material.

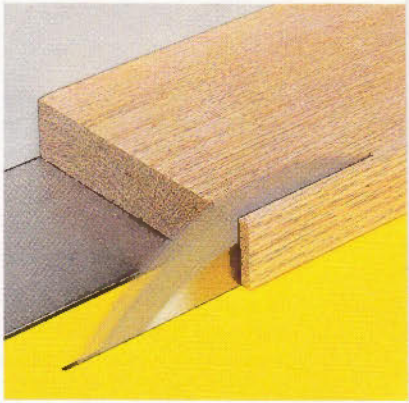
If you switch to a thin-kerf blade, one thing to keep in mind is the splitter on your saw. Some stock blade guard/splitters and aftermarket splitters may be too thick for a thin-kerf blade. So you may need to make a custom splitter to match the reduced thickness.

One last thing. The downside of a thin-kerf blade is that you can't cut a ¼"-wide groove in two passes. So it isn't a good choice for joinery.



▲ ***Kerf Size.*** *In this side-by-side comparison, you can see the different kerfs created by a standard-width blade (left), a thin-kerf blade (center), and a circular saw blade (right).*

Circular Saw Blade. There's one more blade that I want to mention that you may not have even considered. For the ultimate thin kerf, you can use a 7¼"-dia. circular saw blade. This extra thin blade allows any saw to cut through wood in a hurry. The narrow kerf results in less waste — something you'll really notice this when cutting thin hardwood strips for edging plywood or for bent laminations (right margin photo).



▲ ***Thin Strips.*** *The thin kerf of a circular saw blade allows you to cut more strips from a board.*

The smaller diameter effectively increases the cutting power of your saw. On the flipside, it also decreases the maximum cutting height. You're limited to about 1½"-thick stock. However, these blades are more prone to deflection, so I find they work best on materials up to 1" thick.

Circular saw blades are inexpensive. But it pays to spend a little more to get a blade from a well-known maker. It'll be better balanced and leave a cleaner edge. Finally, just like a thin kerf blade, standard splitters will be too thick to work properly.

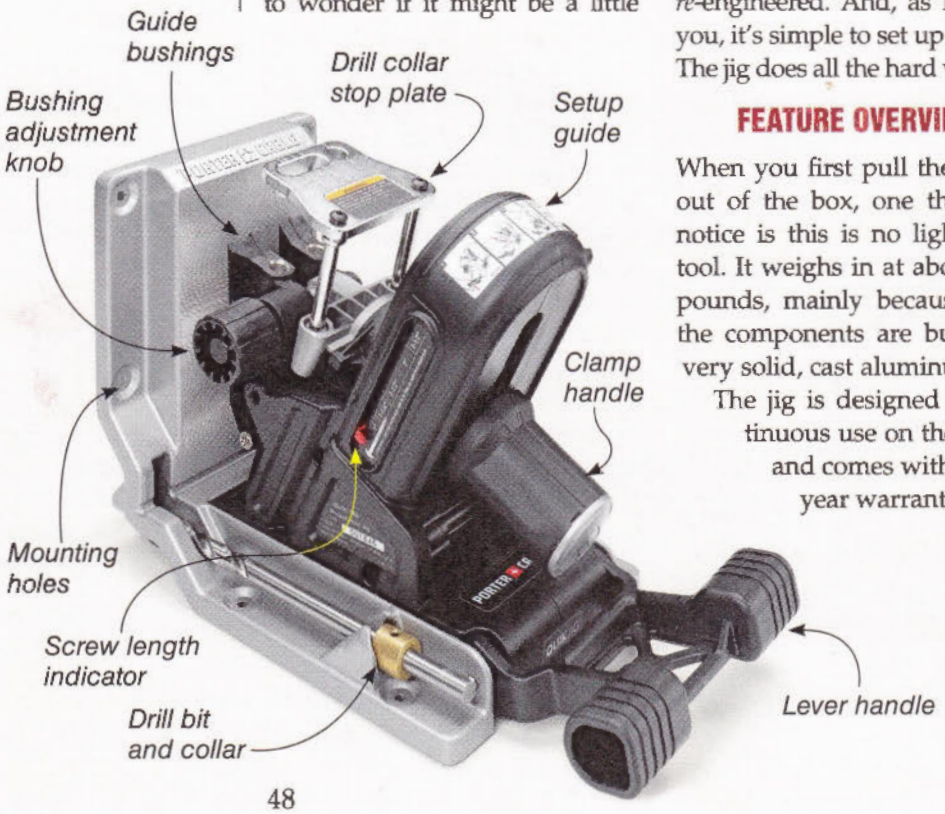
Understanding how different rip blades balance speed, cut quality, and efficiency is important. This way, you can easily find one that suits your needs.

porter-cable QuikJig

Create strong joinery in quick fashion with this new pocket hole system.

One of my favorite methods for assembling furniture and cabinet projects is pocket hole joinery. While this type of joint is certainly not "traditional," nothing beats its speed and ease. So when *Porter-Cable* recently released their new *QuikJig* pocket hole joinery system (model 560), I had to give it a try.

Don't Be Deceived. I've used a number of pocket hole jigs, so the first time I saw this one I had to wonder if it might be a little over-engineered. You're likely to have the same reaction I did — this jig looks way too complicated. But after giving the jig a workout, I came to the conclusion that it's really pocket hole joinery *re*-engineered. And, as I'll show you, it's simple to set up and use. The jig does all the hard work.



FEATURE OVERVIEW

When you first pull the *QuikJig* out of the box, one thing you notice is this is no lightweight tool. It weighs in at about eight pounds, mainly because all of the components are built on a very solid, cast aluminum base. The jig is designed for continuous use on the job site and comes with a three-year warranty.

The photos above and at the left show you some of the key features of the *QuikJig*. I'll talk about them as I show you how to use the jig to drill pocket holes.

Clamp in Place. To start using the jig, the first thing you'll need to do is clamp it to a solid worksurface, as you can see at the bottom of the opposite page. The base also has mounting holes you can use for a more permanent installation on a benchtop.

Drilling Depth. The next thing to do is position the stop collar on the drill bit. As you'll notice in the photo at left, the base has a built-in gauge for this purpose. The nice thing about this design is once you set it, you never need to change it — even if you drill stock of different thicknesses. I'll talk more about this in a minute.

Setting the Jig. At this point, you're almost ready to insert your workpiece. The first time you do this, you'll need to adjust the jig to the thickness of the workpiece. This is a two-step process that

automatically locates the drill guide bushings.

The T-shaped handle at the base of the jig acts as a toggle clamp. The lever needs to be in the down position before inserting a workpiece between the base and bushings (photos at right).

After the workpiece is in place, you'll set the jig for its thickness. To do this, loosen the large, round clamp handle and slide it down. This forces the guide bushings against the workpiece. Rotating the knob clockwise locks the bushings in position, as you can see in the upper right photo. You won't need to make this adjustment again unless the workpiece thickness changes.

Setting the clamp handle also locates the stop plate. This automatically sets the drilling depth and compensates for the thickness of the workpiece. In addition, there's a handy chart on the side of the jig that indicates the recommended screw length to use for the joinery (photo on bottom of opposite page.)

Finally, you can adjust the distance between the two pocket holes using the bushing adjustment knob. You can see how this is done in the left photo above.

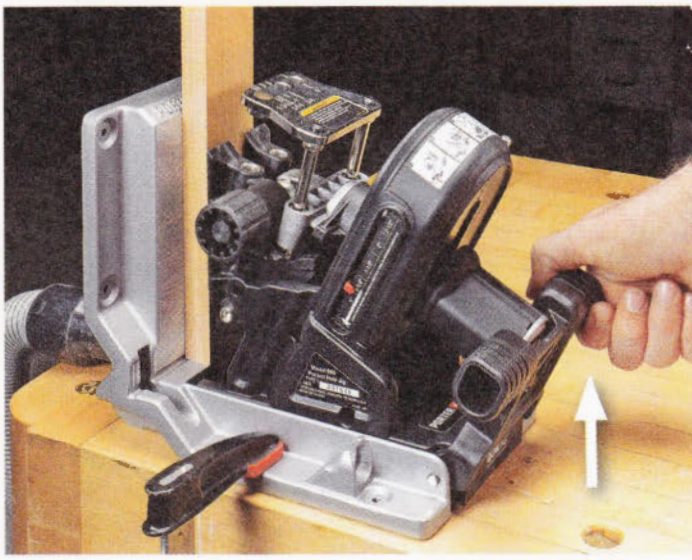
Drilling. Since you've already positioned the stop collar on the drill bit and adjusted the jig to the workpiece, you're ready to drill. When you drill, the spring-loaded stop plate moves downward as the stop collar comes into contact with it. When the drill bit reaches the proper depth, the stop plate no longer moves.

To release the workpiece, simply lift the lever handle up. For subsequent workpieces, all you need to do is insert the workpiece and move the lever handle down to clamp it. It's a quick process that's easy to master.

Dual-Purpose Jig. One of the problems I've had with some pocket hole jigs is drilling extra-long workpieces. The *QuikJig* provides an easy solution.

All you need to do is rotate the jig 90°, as you can see in the photo below. *Porter-Cable* calls this the "flatback" position. Since the base of the jig is 1½" thick, you can use short lengths of "two-by" stock to support a long workpiece along the benchtop.

▲ ***Hole Spacing.*** *The adjustment knob controls the spacing between the guide bushings.*



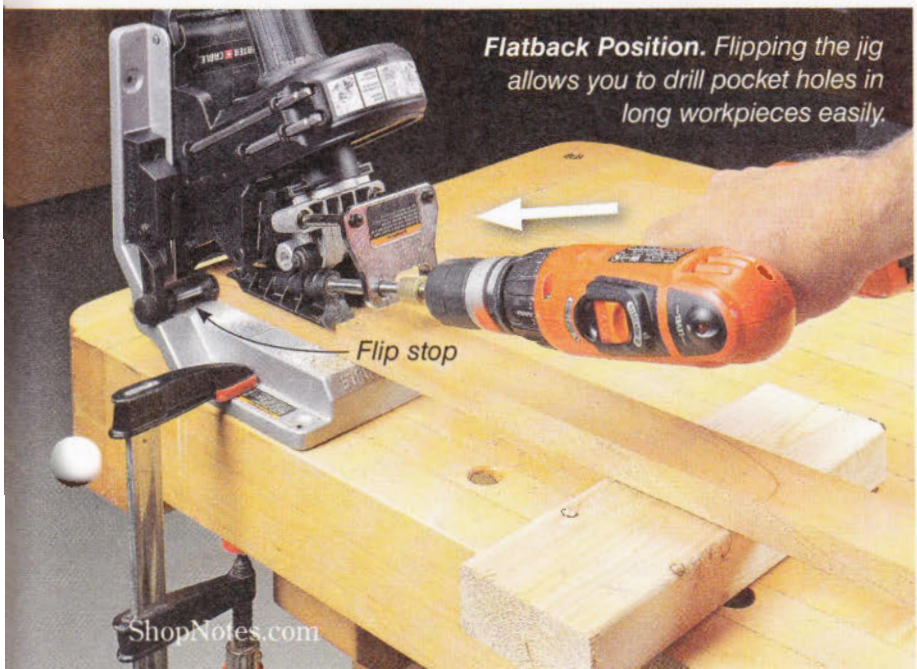
▲ ***Setup.*** *With the lever handle in the down position, you can set the jig for the workpiece thickness (upper photo). To remove and replace the workpiece, flip the lever handle up (bottom photo).*

Other Features. The *QuikJig* comes with a removable dust collection tray. This makes it easy to hook up to your shop vacuum. There's one thing to note: You can't use the tray with the jig in the flatback position (as you see in the photo below).

In the photo at the lower left, you'll see a handy little flip stop along the lower edge of the jig. This allows you to precisely locate pocket holes on identically sized workpieces.

Accessories. The *QuikJig* is ready to use out of the box. And it comes with everything you need for pocket hole joinery — two driver bits, an adjustable clamp, a drill bit with stop collar, an assortment of screws, and easy-to-understand instructions with a Quick Start Guide.

At a little over $200, the *QuikJig* isn't for everyone. But if you like to use pocket hole joinery, it's a winner in my book.



Flatback Position. *Flipping the jig allows you to drill pocket holes in long workpieces easily.*

Q&A

questions from
Our Readers

creating better Glueups

I've always had a hard time keeping workpieces aligned when I glue them together to create thicker stock. What's the best way to do this so I get the best results with the least hassle?

Ben Nelson
Ankeny, IA

Every type of glueup has its challenges, but even more so when you're trying to glue a couple of pieces face to face. They tend to slide out of alignment as soon as you tighten the clamps.

Alignment Jig. One solution is to install a couple of short brads in one workpiece and snip off the heads (inset above). These cutoff brads "bite" into the mating piece and keep it from shifting.

But you have to be careful that the brads don't grab before the workpieces are properly aligned. To avoid this, I use a simple jig along with the brads to align everything (photo above).

The jig consists of two sides and a base that are screwed together to form a 90° corner. The idea is to set the workpiece with the cutoff brads in the corner. Then hold the mating workpiece against the sides and press it onto the brads.

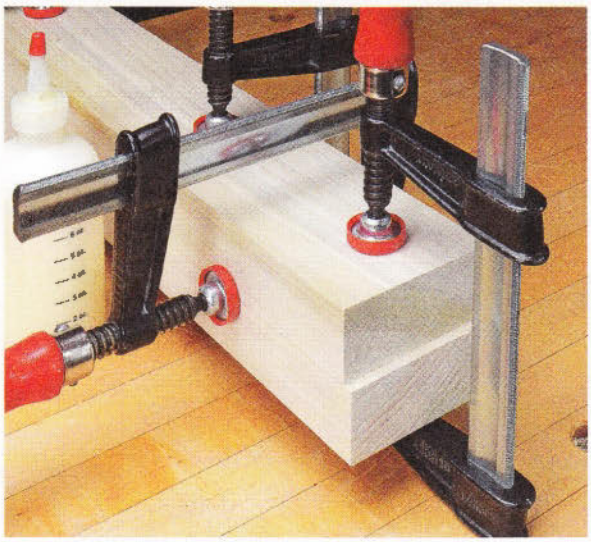
The tiny indentations that are formed are easy to find when you glue up the two workpieces. This helps keep all of the edges aligned when you add the clamps.

Clamps. I only use the brads when I don't have to worry about cutting into the glueup later. Sometimes I can work around the brads, but if they might create a problem, I use another method that involves more clamps. You can see what I'm talking about in the photo at the far left.

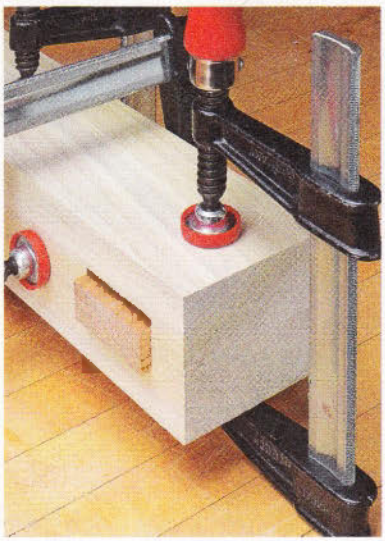
When I start gluing up the two workpieces, I first apply clamps lightly across the joint line. This keeps the edges of the two workpieces aligned while additional clamps press them together. As you can see, I don't worry about the ends, because that problem will be taken care of when I cut the workpiece to final length.

Keys. But there are times where I cut joinery in the workpieces and they have to stay aligned along their length as well. I still use the same method, but I slip a waxed key into the joint, like the near left photo shows.

The key keeps the ends aligned. Then once the clamps are tight and the glue starts to set up, you can tap the key out.



▲ ***A Basic Glueup.*** *Clamps across the joint line keep the edges flush. Then, it's just a matter of adding a few clamps to bring the two pieces together.*



▲ ***Key the Joint.*** *For assemblies with pre-cut joinery, a key keeps the two pieces flush at the ends.*

Sources

Most of the materials and supplies you'll need for projects are available at hardware stores or home centers. For specific products or hard-to-find items, take a look at the sources listed here. You'll find each part number listed by the company name. Check out the right margin for contact information.

The *Woodsmith Store* in Des Moines, Iowa is an authorized *Rockler* dealer. They carry many of the hardware items used in our projects. And they ship nationwide. Their customer service representatives are available for your calls from 8am – 5pm Central Time, Monday through Friday.

DOWELING JIGS *(p.10)*

Doweling jigs are available from a number of mail-order sources. The jigs used in the testing were obtained from the following sources.

- **Lee Valley**
  Veritas Doweling Jig . . . 05J08.01
  Self-Centering Jig 25K64.01
- **OMS Tool Company**
  Dowelmax . . . . . Dowelmax Kit
- **Rockler**
  ⅜" Doweling Jig 35242
  Wolfcraft Dowel Pro Kit . . . 65730
- **Woodsmith Store**
  General EZ Pro (841) 219102
  General Pro Kit (840) 278430
  Self-Centering Jig 310050

BAND SAW DUPLICATOR *(p.18)*

- **Lee Valley**
  1" Studded Knob 00M56.21
  Insert Knob 00M56.20
  Magnet Cups 99K32.54
  Rare-Earth Magnets 99K32.11

TOOL CABINET *(p.24)*

- **Horton Brasses**
  1½" x 2" Hinges PB407B
  1"-dia. Knobs K-12

DROP-SIDE TOOL BOX *(p.30)*

- **The Home Depot**
  Tool Magnetic Bar 790510
- **Lee Valley**
  Rare-Earth Magnets 99K32.11
  Magnet Cups 99K32.54
- **Reid Supply**
  Toggle Latch DTL-803B
  Toggle Strike DTL-800-9
- **Rockler**
  Turn Buttons 27912

DOVETAIL KEY JIG *(p.38)*

- **Reid Supply**
  ¼"-20 Through Knob DK-81
- **Rockler**
  24" T-Track 22104
  ¼"-20 x 1½" Flange Bolt . . . 38002

RIFFLERS *(p.42)*

You can find rifflers individually or in sets from several online suppliers including *Lee Valley* and *Rockler*.

AWLS *(p.44)*

- **Lee Valley**
  Bird Cage Awl 35N13.01
  Chisel Point Bradawl . . 05N60.01
- **Sears**
  Scratch Awl 41028

RIP BLADES *(p.46)*

- **The Home Depot**
  7¼"-dia. Blade D0724R
- **Rockler**
  Glue Line Rip Blade 64078
  Thin Kerf Rip Blade 64618
- **Woodcraft**
  Heavy-Duty Rip Blade . . . 127238
  Thin Kerf Glue Line 842617

GREAT GEAR *(p.48)*

- **Tools Plus**
  QuickJig . . . . . .P-C 560
- **Amazon.com**
  QuickJig B004ADJQTO

MAIL ORDER SOURCES

Woodsmith Store
800-444-7527

Rockler
800-279-4441
rockler.com

Amazon.com

The Home Depot
800-466-3337
homedepot.com

Horton Brasses
800-754-9127
horton-brasses.com

Lee Valley
800-871-8158
leevalley.com

McMaster-Carr
630-600-3600
mcmaster.com

Reid Supply
800-253-0421
reidsupply.com

Sears
800-697-3277
sears.com

Tools Plus
800-222-6133
tools-plus.com

OMS Tool Company
877-986-9400
dowelmax.com

Woodcraft
800-225-1153
woodcraft.com

ShopNotes

wall-mounted Tool Cabinet

Materials List

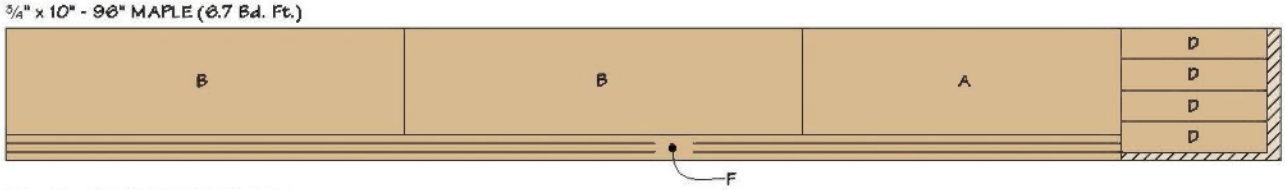
CASE

A	Top/Bottom (2)	¾ x 8 - 24
B	Sides (2)	¾ x 8 - 30
C	Back Panel (1)	22¾ x 25 - ¼ Ply.
D	Rails (4)	¾ x 2¼ - 11
E	Stiles (4)	¾ x 2 - 24⅜
F	Glass Stop (1)	¼ x ¼ - 132
G	Shelves (2)	¾ x 6 - 22⅛
H	Hanging Cleats (2)	¾ x 2 - 22¼

- (1) ¼"-dia. x 36" Walnut Dowel
- (4) 1½" x 2" Hinges
- (2) 1"-dia. Knobs
- (2) ⅛" Glass Panel (7 7/16" x 20 5/16")
- (2) Magnetic Catches w/Screws
- (8) ¼"-dia. Shelf Pins

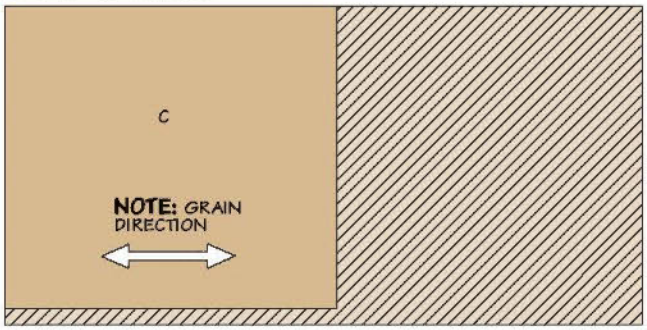
Cutting Diagram

¾" x 10" - 96" MAPLE (6.7 Bd. Ft.)



¾" x 9" - 96" MAPLE (6 Bd. Ft.)

24" x 48" - ¼" PLYWOOD



ShopNotes

drop-side Tool Tote

Materials List

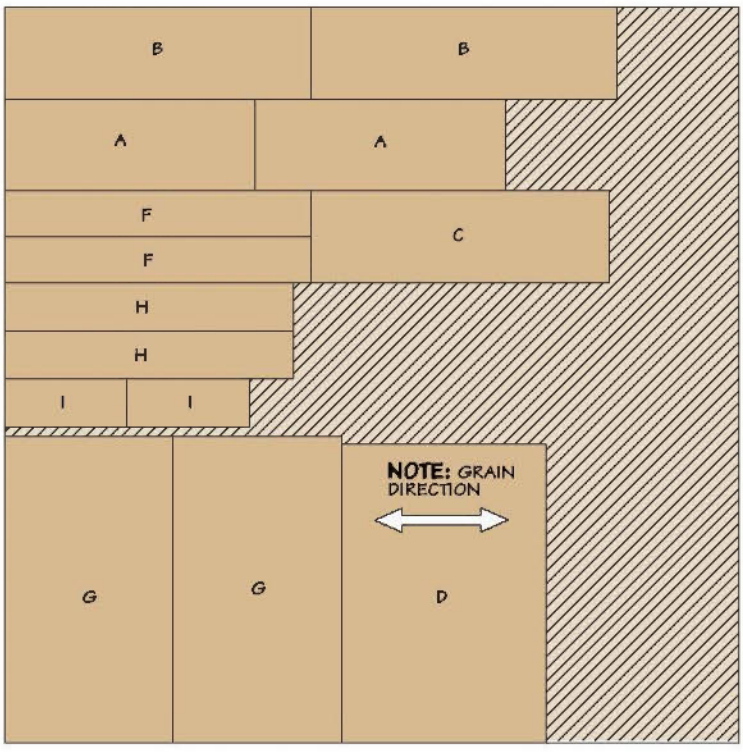
A	Sides (2)	6 x 17 - ½ Ply.
B	Top/Bottom (2)	6 x 20 - ½ Ply.
C	Shelf (1)	6 x 19½ - ½ Ply.
D	Divider (1)	13⅜ x 19½ - ½ Ply.
E	Keys (24)	½ x ½ - 1½
F	Rails (2)	2½ x 20 - ½ Ply.
G	Doors (2)	11 x 20 - ½ Ply.
H	Drawer Front/Back (2)	2½ x 18⅞ - ½ Ply.
I	Drawer Sides (2)	2½ x 6 - ½ Ply.
J	Drawer Bottom (1)	5½ x 18⅜ - ¼ Hdbd.
K	Handle (1)	¾ x 3 - 18

- (2) 1" x 18" Continuous Hinge w/Screws
- (4) Toggle Latches w/Screws
- (4) Toggle Strikes w/Screws
- (4) #8 x 1½" Fh Woodscrews
- (1) ⅜"-dia. x 12" dowel (for plugs)
- (4) Turn Buttons
- (Var.) 16" Magnetic Tool Bar
- (Var.) ¾"-dia. Rare-Earth Magnets
- (Var.) ⅞" O.D. Magnet Cups w/Screws

NOTE: Number of tool bars and magnets depends on your storage needs.

Cutting Diagram

48" x 48" - ½" PLYWOOD



¾" x 5" - 24" (.83 Bd. Ft.)

ALSO NEEDED:
24" x 24" - ¼" HARDBOARD FOR DRAWER BOTTOM

ShopNotes

quick & easy

Cove Calculations

Setting up your table saw to create custom coves is easy to do with this handy calculator.

Cutting coves at the table saw involves passing the workpiece over the blade at an angle. With this handy calculator, you can figure the angle to use when clamping the fences to the saw top, as shown in the drawing below.

To use the calculator, simply enter the width of your workpiece, the desired cove height and width, and blade thickness in the boxes on the right. When you press the "Calculate" button, the results needed to cut the cove will show up in the boxes in the drawings below. Then you can print this document and take it to your shop.

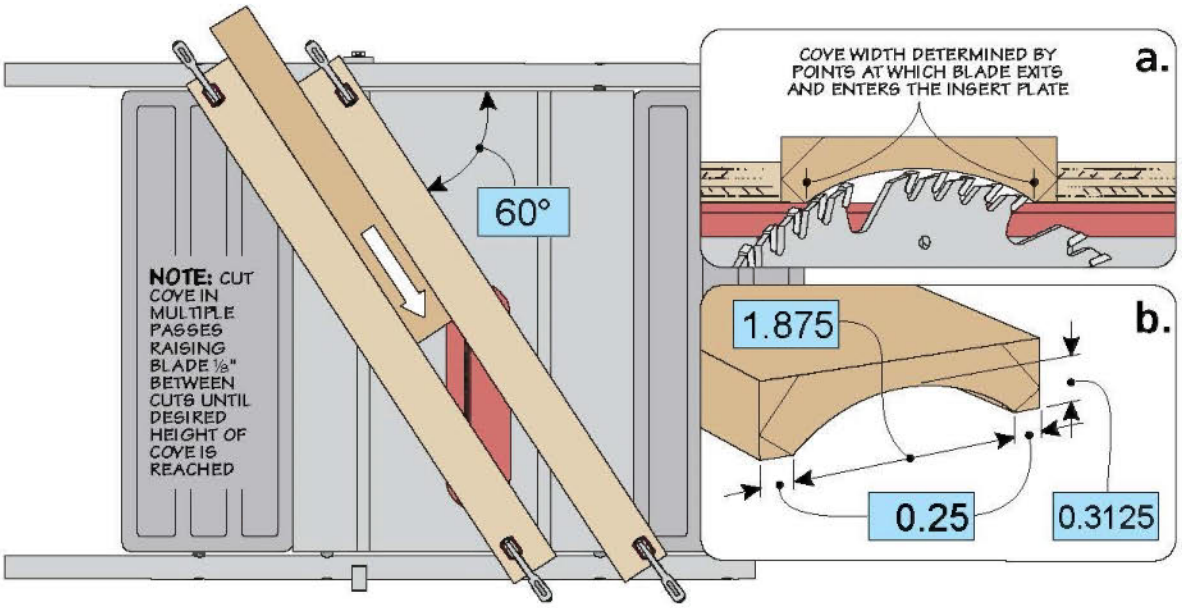
When setting up the fence locations, make sure the blade is raised to the desired cove height. This way, you can locate the fences based on where the blade enters and exits the insert plate on the final pass. Then lower the blade height to ⅛" and make the first cove pass.

2 3/8	=	*Width of Workpiece*
1 7/8	=	*Width of Cove*
5/16	=	*Height of Cove*
1/8	=	*Blade Thickness*

Calculate

$$\text{Fence Angle} = \cos^{-1}\left\{\frac{W_c - T_b}{10 * \sin(\cos^{-1}(1-H_c/5))}\right\}$$

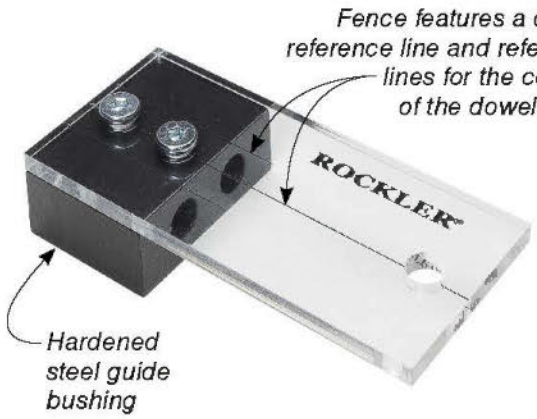
Where:
H_c = Height of finished cove
W_c = Width of cove
T_b = Thickness of blade



taking a look at Doweling Jigs

On the next few pages, you'll see each of the doweling jigs we looked at in ShopNotes No. 116 (photo at right).

The standard accessories for each jig are shown along with some of the optional accessories available from the manufacturer. Note: Any accessories that are available but not shown are detailed in the text.



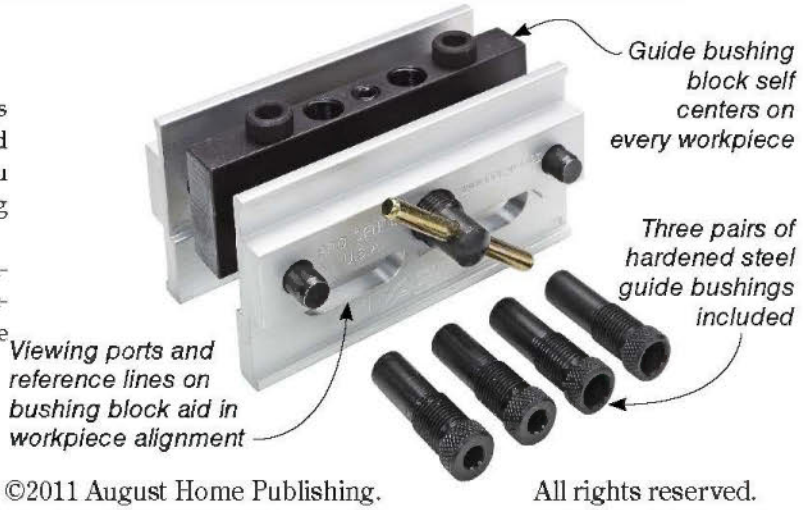
ROCKLER 3/8" DOWELING JIG

Simple and to the point, this jig from *Rockler* is designed to be clamped in place and used with a 3/8" drill bit and stop collar. Fine reference lines indicate both the center of each hole and the center of the pair and aid in aligning the jig.

TASK SELF-CENTERING JIG

The drill guide accepts replaceable bushings and automatically centers the bushings, and therefore the holes, on the workpiece as you tighten the jig in place. The fences travel along steel rods as you turn the crank.

The guide features four holes for guide bushings so you can center the dowel holes on spacings of 3/4", 1 1/4", 2", or 2 3/4". Three pairs of guide bushings are included (1/4", 5/16", and 3/8").



GENERAL EZ PRO

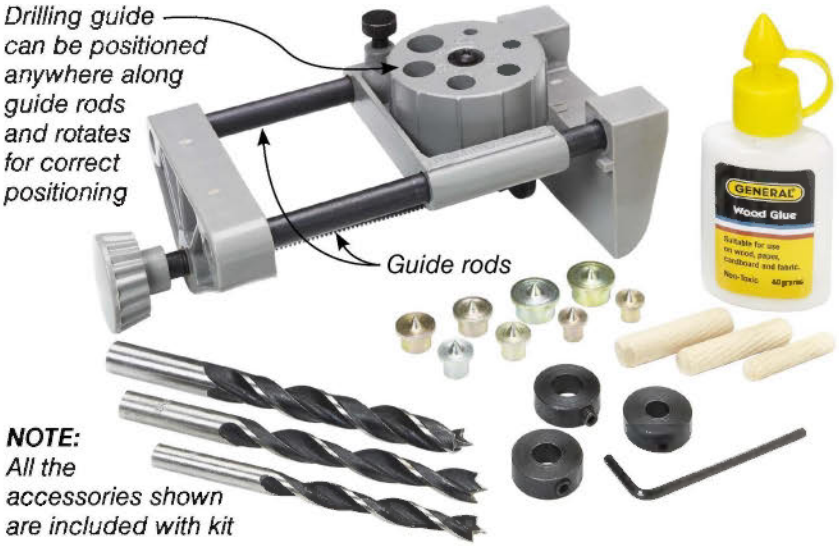
The *EZ Pro* comes with a number of accessories, like three sizes of guide bushings, drill bits, dowel centers, stop collars, and a set of dowel pins.

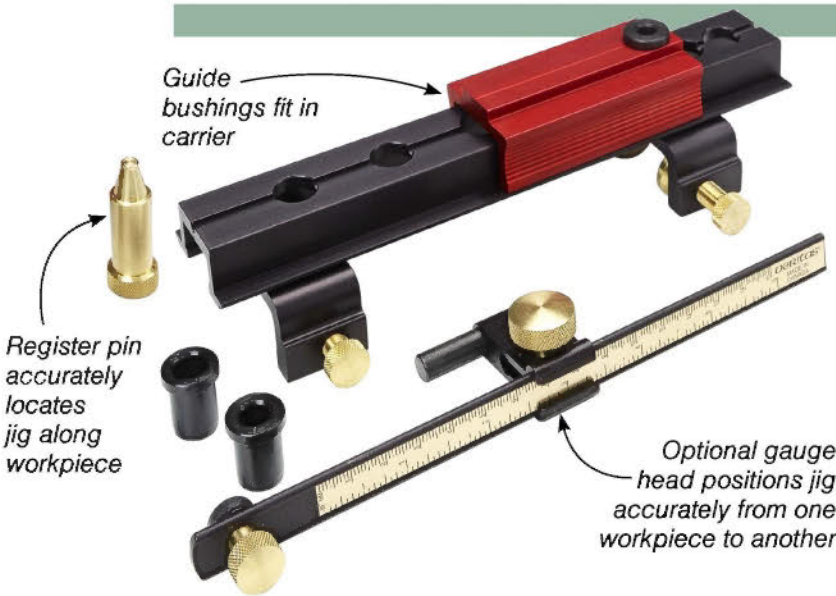
Each guide bushing can be threaded into one of six locations depending on the thickness of the workpiece and the orientation of the joint.

GENERAL PRO DOWELING KIT

Like the *EZ Pro*, this model from *General* comes with three sizes of drill bits (¼", 5/16", and 3/8"), matching stop collars, dowel centers (in matching sizes plus an extra pair of ½" centers for good measure), and packages of dowel pins. They even throw in a small bottle of glue to get you started on assembling a joint.

You'll have to supply the drill bits and the stop collars for the 3/16", 7/16", and ½" holes in the guide.





VERITAS DOWELING JIG

Based on the *Veritas 32mm Cabinet Making System*, this doweling jig is well-made and works with workpieces up to about 1 1/16" thick. The basic jig comes with a bushing carrier, a register pin, and three hardened guide bushings (¼", 5/16", and 3/8").

Optional accessories include a gauge head to accurately position the jig, a spare bushing carrier, and a spare register pin.

Metric bushings are available in sizes of 5, 6, 6.75, 7, 9, and 10mm. A 7/32" bushing and an unhardened bushing with a 3/32"-dia. hole that you can drill out to create a custom-size bushing are also available.

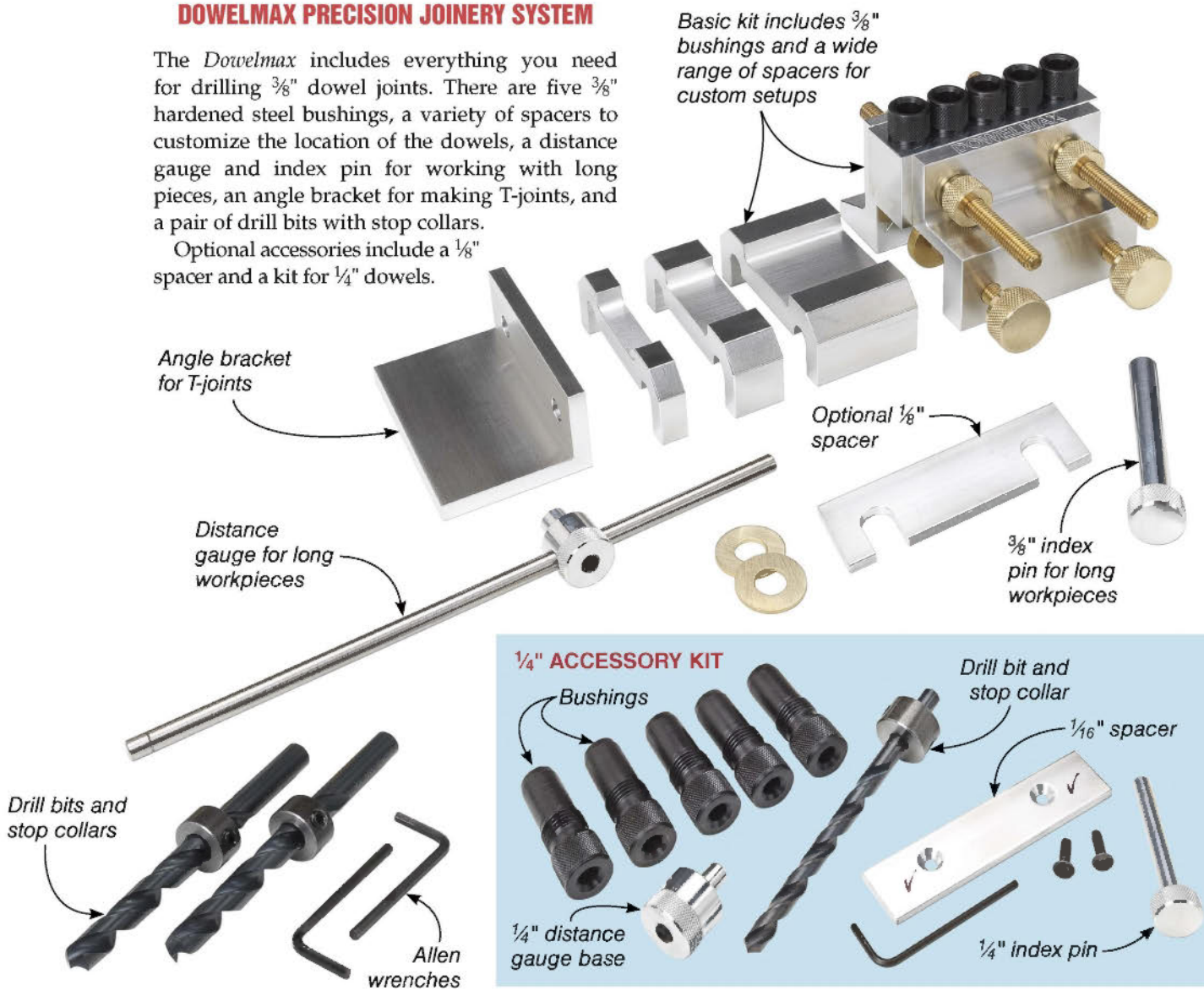
WOLFCRAFT DOWEL PRO KIT

The *Wolfcraft Dowel Pro* allows you to drill the mating holes in two workpieces without a separate setup. For that reason, the jig comes with a drilling jig, a separate doweling clamp, three stop collars (¼", 5⁄16", and ⅜"), and a few dowel pins.

DOWELMAX PRECISION JOINERY SYSTEM

The *Dowelmax* includes everything you need for drilling ⅜" dowel joints. There are five ⅜" hardened steel bushings, a variety of spacers to customize the location of the dowels, a distance gauge and index pin for working with long pieces, an angle bracket for making T-joints, and a pair of drill bits with stop collars.

Optional accessories include a ⅛" spacer and a kit for ¼" dowels.



Scenes from the Shop

Dovetail-shaped keys add strength and style to miter joints. This router table jig makes the process quick and easy. Detailed plans and tips start on page 38.

The secret to accurate and strong dowel joints is a jig that's right for the task. Turn to page 10 to find out how well the ones shown here work.

Whether it's smoothing and shaping details or fine-tuning a joint, riffler rasps and files are versatile problem-solvers for your shop. Learn more on page 42.