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Vol. 19 Issue 109

SPACE-SAVING WORKSHOP

PLUS!

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5 Thickness Planer Master Tips pg. 44

Simple, Hidden Joinery Secrets pg. 34

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Cutoffs

Storage solutions are one of the most requested projects we receive. And for good reason. We all need great storage ideas that will stand the test of time.

We've answered the request with all-new, innovative storage projects. For starters, there's the space-saving workshop that begins on page 24. Built from a few sheets of inexpensive plywood, it turns a single wall into a storage and workspace powerhouse. Your major power tools tuck inside a couple of large cabinets, which also provide a ton of storage for hand tools and shop supplies. And there's a workbench and drop-down router table that make it easy to accomplish a wide range of tasks.

Another storage challenge in just about any shop is lumber and sheet goods. Especially when you stock up to start a new project. The lumber racks on page 42 offer a simple solution. They don't take up any wall space, yet keep your materials close at hand. And when you're finished, the racks fold away for easy storage.

Getting more from your tools is important, too. So you'll want to be sure to take a look at the articles on using a plunge router to "drill" shelf pin holes (page 8) and the handy jigs and fixtures for doing more with your planer (page 44). This issue is packed with even more, so turn the page and dig in.

Terry

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This symbol lets you know there's more information available online at ShopNotes.com

from our Readers

THE WINNER!

Tips for Your Shop

Hinged Workstations

Having my workshop in the garage means I can't always leave things set up. My solution is a set of hinged, fold-up workstations (photos above). You can mount the tools permanently or make them easy to remove. This way, workstations mounted at the same height can double as supports for long workpieces.

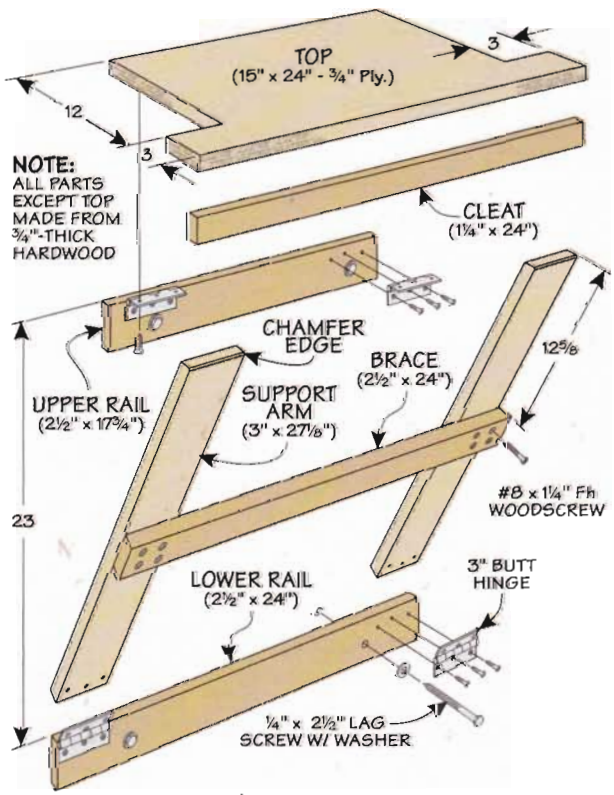
The hinged workstation consists of two hardwood rails that are mounted to the wall. The top is connected to the upper rail with a pair of butt hinges. The support arms are connected to the lower rail with hinges as well.

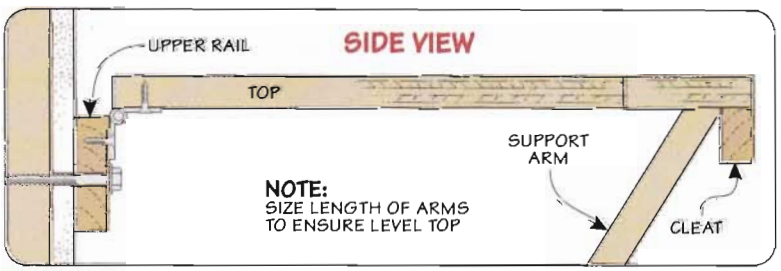
You can customize the workstation for the tool you'll be mounting to it. The size shown in the drawings below works well for grinders and sharpening stations. You may want a larger size for tools like a miter saw or router table.

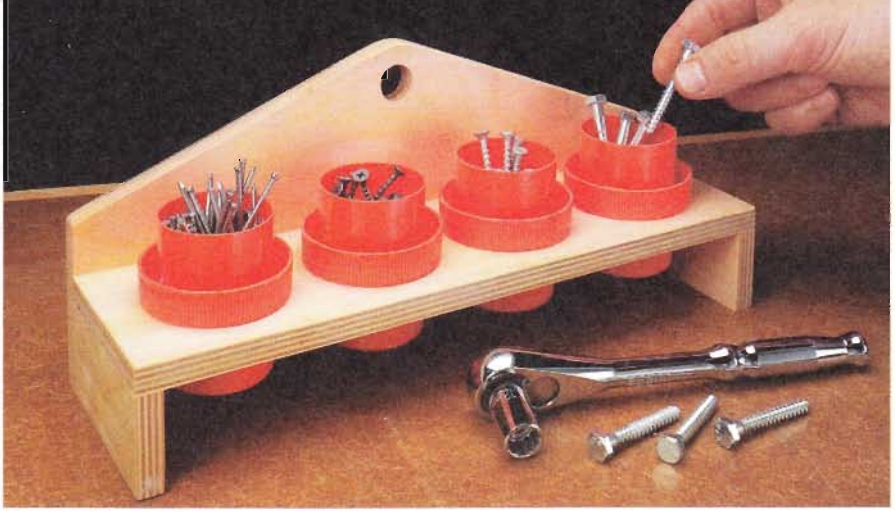
After making the rails and mounting them to the wall, you can work on the top. The drawings show how the top is notched on the sides to allow clearance for the support arms as they're folded into position. A small cleat on the underside of the top "captures" the arms to support the top.

Once you have the top attached to the upper rail, you can get to work on the support arms. You may need to adjust their length so that the top will be level. After attaching the brace, mount the arms to the lower rail. Make sure that the arms fold without interference. All that's left is to mount your tool securely with bolts, washers, and nuts and get to work on your next project.

Jeff Jackson
Elkhorn, Nebraska





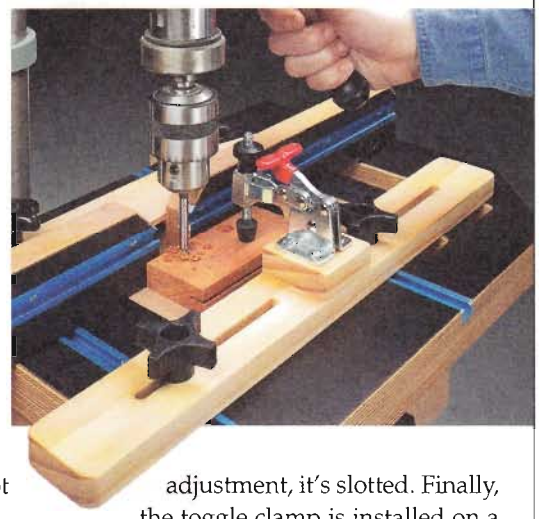


Portable Storage

I'm always on the lookout for ways to recycle household items. The storage rack you see above is one example. I use caps from liquid laundry detergent bottles for storing screws and other hardware. The simple plywood rack can be stored on a shelf or transported to the workbench to keep often-used hardware at hand. It's an easy, low-cost solution that's quick to build.

Ken Konstalid
Chocowinity, North Carolina

Drill Press Hold-Down



I used to use a simple hold-down on my drill press. It consisted of a toggle clamp mounted to a piece of plywood and locked into a T-track with a single knob and bolt. It worked okay, but the improved one you see on the right is a more flexible clamping solution.

First, I upgraded the toggle clamp using a *Quick Set Pressure Adapter* from *Rockler*. This makes setting the height of the pressure foot much easier and quicker.

Next, I made a long base. Its length matches the width of my drill press table. And to allow for side-to-side adjustment, it's slotted. Finally, the toggle clamp is installed on a small block, as you see above.

Bill Tumbleson
Halstead, Kansas

Submit Your Tips Online!

If you have an original shop tip, we would like to consider publishing it. Go to

ShopNotes.com
and click on the link
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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Edge Sander

I use a sanding drum on my drill press to smooth curved edges. But on larger projects, it's easier to bring the drum to the workpiece.

The edge sander you see at right uses a corded drill to power the sanding drum. A cradle holds the drill square to the workpiece. With a few pieces of hardwood, plywood, a dowel, and a couple of hose clamps, you can build your own portable edge sander.

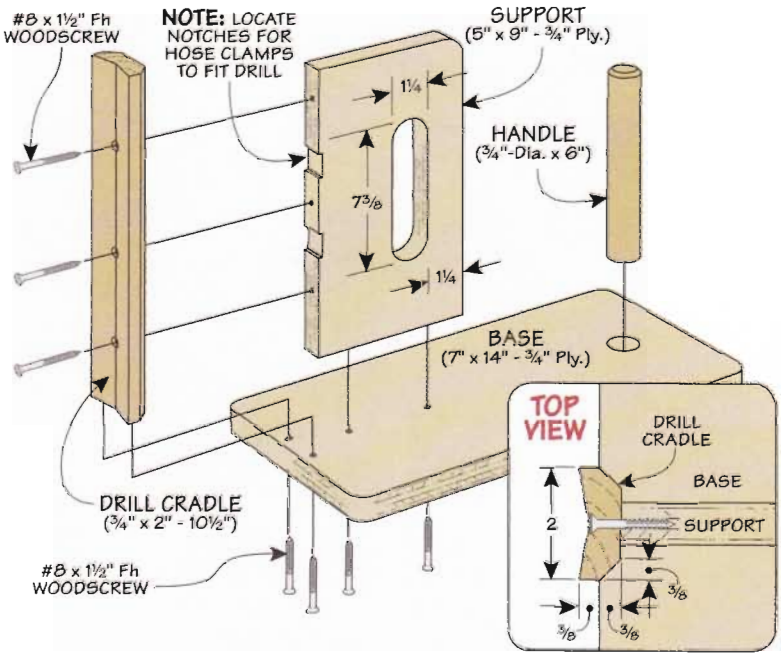
The drawing on the right shows you how the sander is put together. It starts with the base that provides a large platform for steadying the sander when smoothing an edge.

After adding a dowel to act as a handle, you can work on the cradle that holds the drill. Two shallow bevels form a "V" to hold the drill. A third piece acts as a support and forms another handle for additional control.

Finally, two large hose clamps securely lock the drill into position. Just make sure the sanding drum is square to the base (use shims if necessary to adjust the drill's position).

This edge sander will become one of your go-to tools in the shop for getting smooth edges.

Serge Duclos
Delson, Quebec



Quick Tips

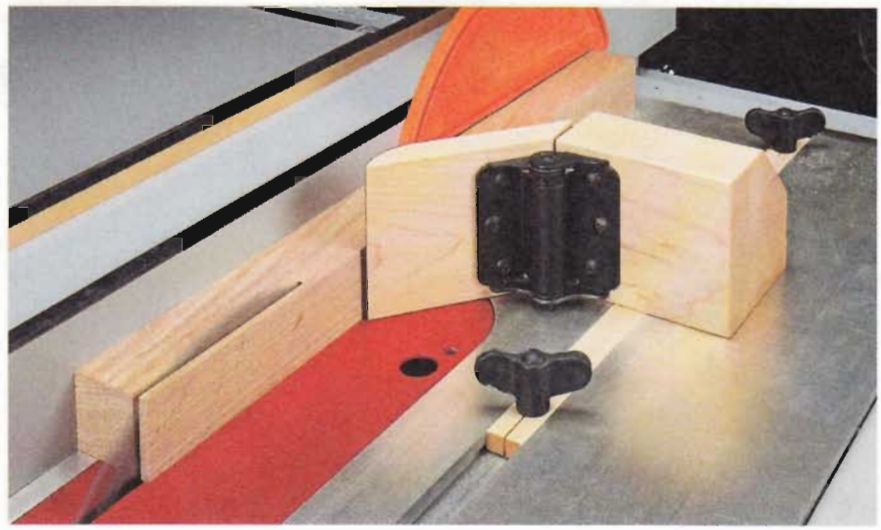
► *With a scrap of plywood and a few rare-earth magnets installed in counterbores,* ***Michael Silane*** *of Pelham Manor, New York fashioned a magnetic stop block for his table saw. Placed ahead of the blade and against the rip fence, it provides a positive stop for making short, repetitive cuts using a miter gauge. The arc creates a small contact area to prevent the stop block from shifting as you butt the workpiece against the stop block and then make the cut.*

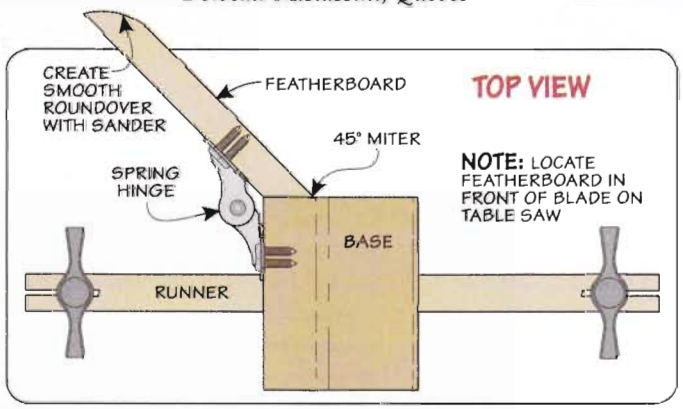
Spring Featherboard

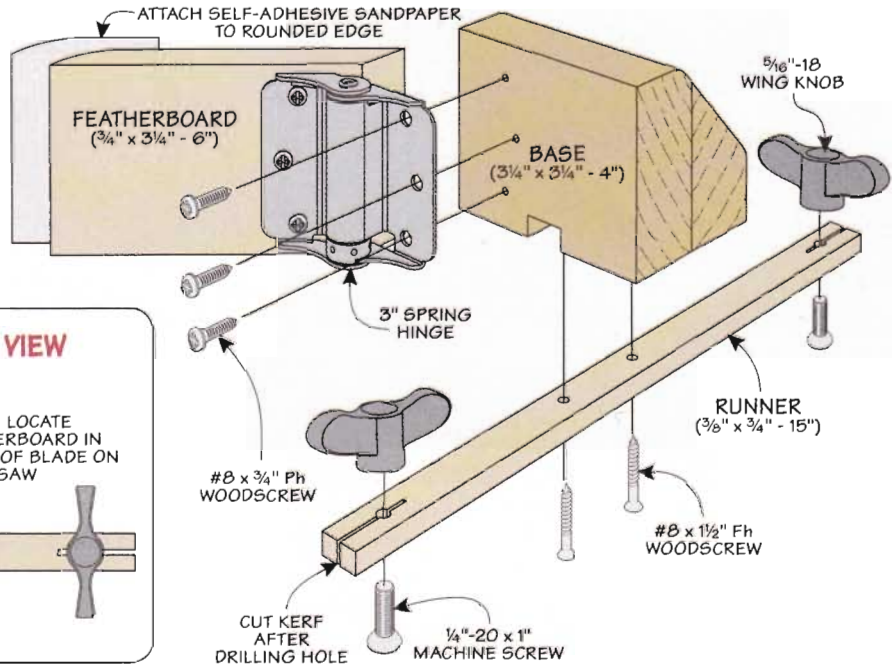
The problem with any featherboard is having to adjust its position for the proper pressure on a workpiece. The featherboard you see at right does this task for you. It's made from a spring hinge used on storm doors. (Some spring hinges have a mechanism for adjusting the tension.)

This featherboard starts with a thick base block fastened to a runner that fits in the miter slot of your table saw. The "featherboard" is mitered at one end and rounded over at the end that makes contact with the workpiece. This allows the featherboard to maintain contact with the workpiece at a wide range of angles. (You may need to adjust the length to fit your saw.) I added a piece of self-adhesive sandpaper to give it a little extra grip to reduce the chance of kickback. Finally, attach the spring hinge to connect the featherboard to the base.

Marcellin Perron
Dolbeau-Mistassini, Quebec



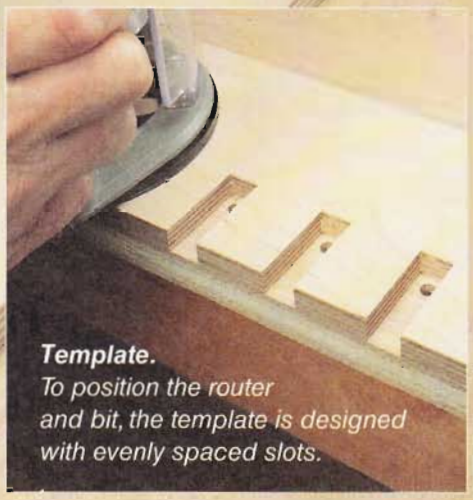




▲ ***Art Hawkins*** *of Orangevale, California cuts up plastic milk cartons to use as disposable glue spreaders. The flexible material makes it easy to create custom sizes and shapes for many gluing tasks.*

plunge router Shelf Pin Template

With a simple template and your plunge router, you can create perfectly spaced shelf pin holes time after time.



Template. *To position the router and bit, the template is designed with evenly spaced slots.*

Adding shelf pins to a cabinet or bookcase is a great way to make it versatile. By adjusting the position of a shelf, you can customize the setup to accommodate any size book or display object.

Accurately locating all of those shelf pins in a cabinet can be a challenge. The last thing you want is for the shelf to wobble, tilt, or fall under the weight of several books or a beloved family keepsake.

When to Drill. I always prefer to drill my shelf pin holes before I've assembled the case. This way, I don't have to worry about how much access I have inside the case. And I feel it helps me locate the holes more accurately.

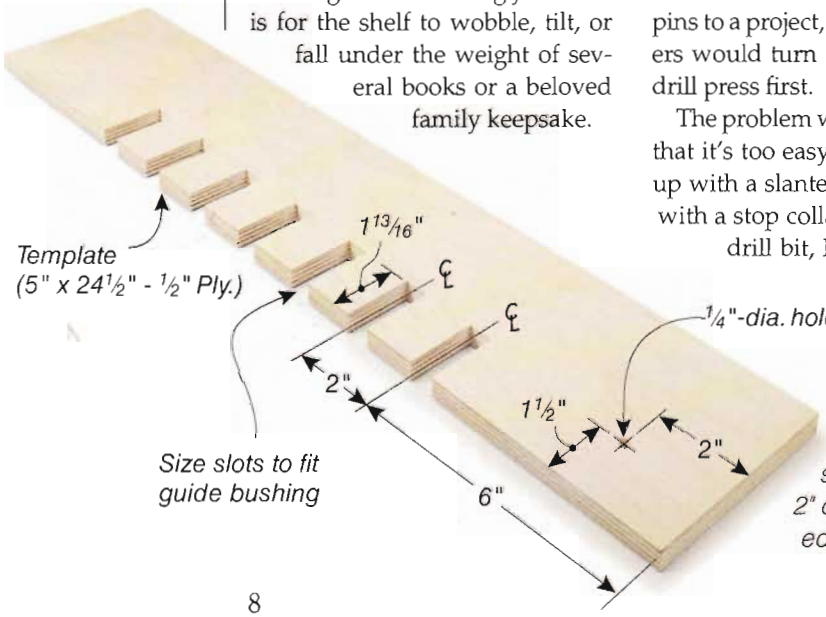
Drilling Options. When it comes to adding holes for shelf pins to a project, most woodworkers would turn to a hand drill or drill press first.

The problem with a hand drill is that it's too easy to tilt it and end up with a slanted hole. And even with a stop collar attached to my drill bit, I'm always afraid it might slip and I'll end up drilling through the side of the case. A drill press can solve those problems. But if you're working with large workpieces, a drill press isn't always the best option either.

My solution is to use my plunge router and a simple template, as shown in the photo above. With a plunge router and template, I can combine the portability of a hand drill and the accuracy of a drill press into a single process.

Template. As you can see in the photo at left, the template is similar to a dovetail jig. It has a series of comb-like fingers and slots that allow you to quickly create perfectly spaced holes.

Bushings & Bits. As with a dovetail jig, you'll need a guide bushing and a bit to make it work. I chose a bushing with a $\frac{5}{8}$" outside diameter, as shown in the drawing at the top of the opposite page. The larger bushing and slot make



Template. *The template is designed to drill shelf pin holes on 2" centers, 1½" from edge of workpiece.*

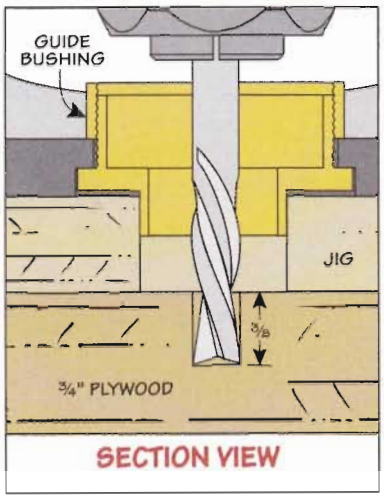
it easier to locate and position the router while you're using it.

For clean, crisp holes, you'll want to choose the right bit. I've found that either a ¼"-dia. straight mortising bit or a spiral down-cut bit work great (upper and middle margin photos at right). Or, if you want to drill shelf pin holes for Euro-style cabinets, a 5mm-dia. router bit is also available (lower margin photo). For sources, you can refer to page 51.

Make the Template. The template is made from a piece of ½" plywood. To build it, cut it to size and then lay out a series of slots on 2" centers. Since it's unlikely you'll ever need a shelf pin less than 6" from the case top or bottom, that's the best place to locate the first slot.

There are two dimensions to keep in mind when laying out the slots. First, the location for a shelf pin hole is usually 1½" in from the front and back edges. Plus, you'll have to take the size of the bushing into account when you set the depth of the slot in the template. In my case, the slots are $1^{13}/_{16}$" deep.

I used a dado blade in my table saw to cut them. There shouldn't be any slop between the bushing and the walls of the slots that could lead to misalignment. So I cut a slot on a scrap piece and checked the fit of the guide bushing before cutting the slots in my template.



▲ ***Stopped Holes.*** *Set your plunge router to drill holes to half the thickness of the workpiece.*

Using the Template. The first step in using the template is to set the depth adjustment on your router. For most shelf pins, that will mean drilling down about half the thickness of a ¾" workpiece.

Next, align the template onto your workpiece with the slots facing out and flush with the edge. After making sure the end of the template is aligned with the end of the workpiece, clamp it in place.

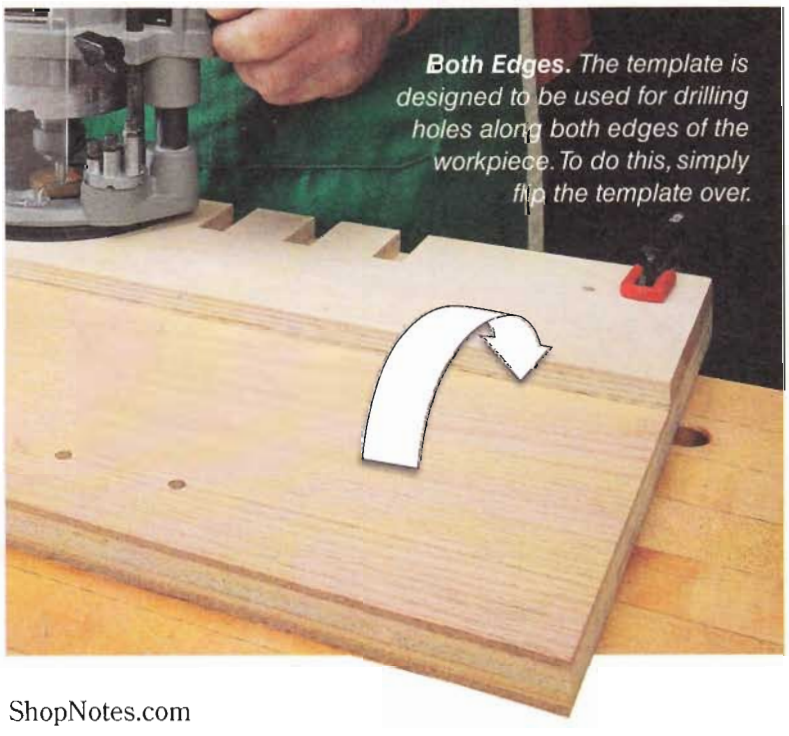
To drill the first hole, you simply position the router in the slot, making sure to press the bushing firmly against the bottom of the slot. Then it's just a matter of making a plunge cut to drill the hole.

To complete the remaining holes, continue the process of moving the router along the template almost like you would with a dovetail jig. For the holes on the opposite edge, flip the template over and repeat the process (left photo below).

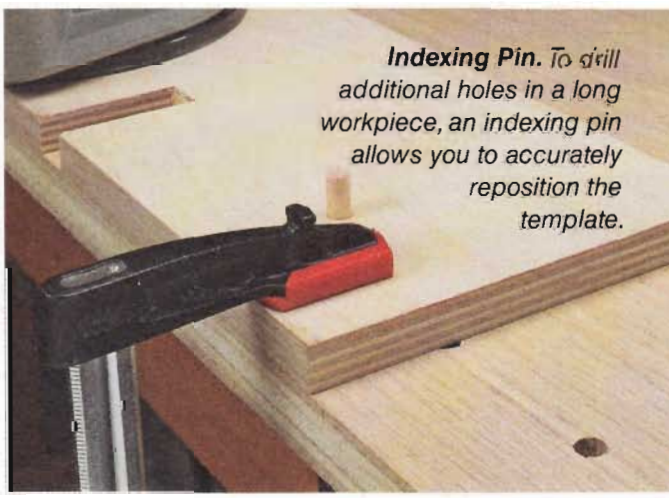
Index Pin. For long workpieces with more than one adjustable shelf, you need a way to reposition the template to continue drilling properly spaced holes. To do this, I added a hole for an index pin. Simply set the index pin in the last hole you drilled and clamp the jig in place (right photo below).

There you have it, perfectly aligned shelf pin holes with guaranteed accuracy every time.

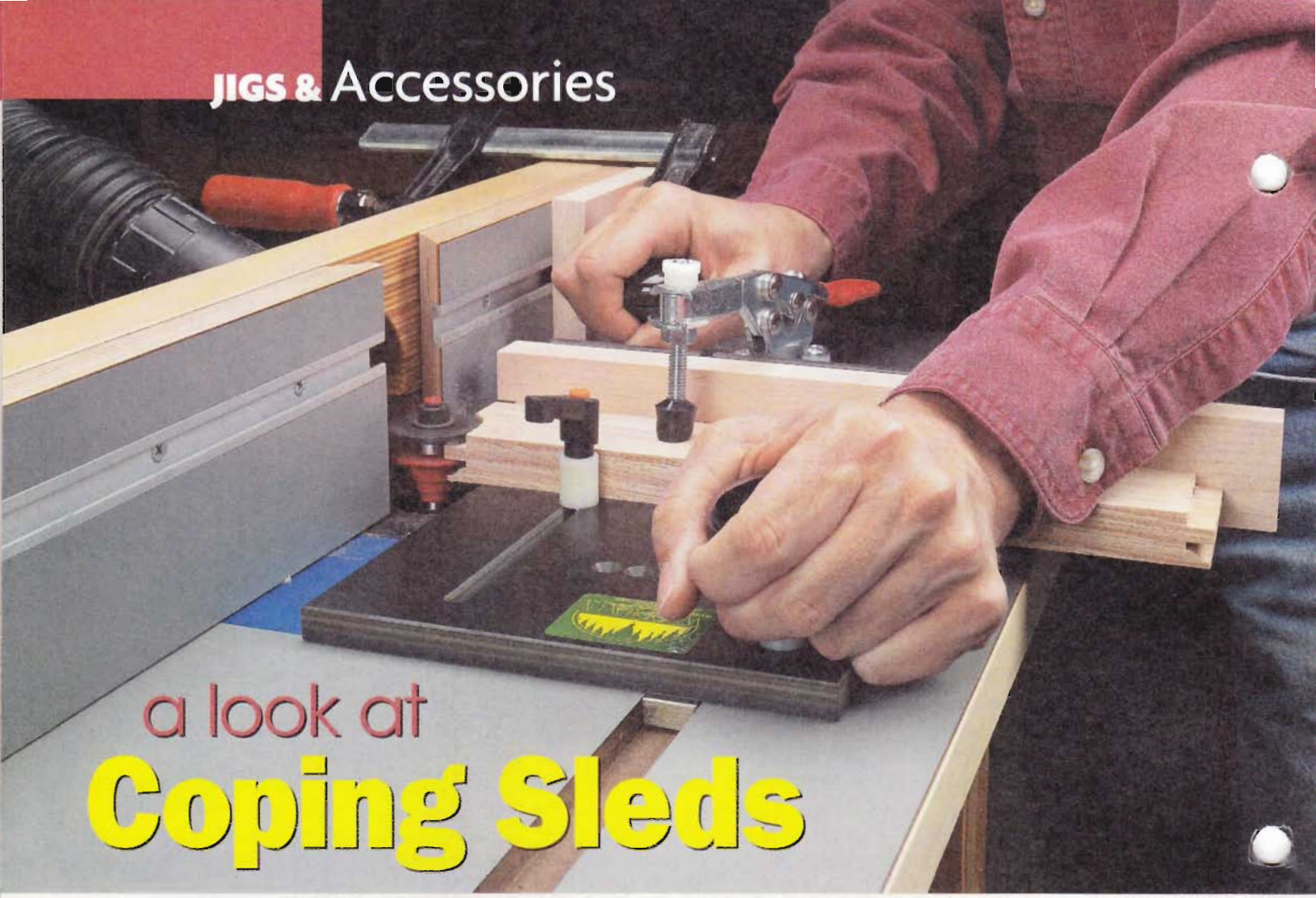
▲ ***Clean "Drilling."*** *The three bits shown drill clean holes in most materials for the two sizes of shelf pins. Use a guide bushing to position the router bit.*



Both Edges. *The template is designed to be used for drilling holes along both edges of the workpiece. To do this, simply flip the template over.*



Indexing Pin. *To drill additional holes in a long workpiece, an indexing pin allows you to accurately reposition the template.*



a look at Coping Sleds

These handy jigs make it easier to rout across the end grain of a rail. But which one does the best job?

Using a rail and stile bit set to build a frame and panel door has one big challenge — cutting across the ends of the rails to create coped profiles that mate with the stiles.

In the past, I've relied on a simple backer board made of MDF or plywood to support and back up the cut. But I've always been intrigued by full-featured, commercial coping sleds. So I decided to take a look at a few coping sleds that sell for under $100.

What's Available. The sleds you see here fit the price limit. (For sources, turn to page 51.) Each of these sleds is up to the basic task of securely holding a workpiece square to the bit during a cut. But I did find a few things you need to be aware of if you're considering buying one.

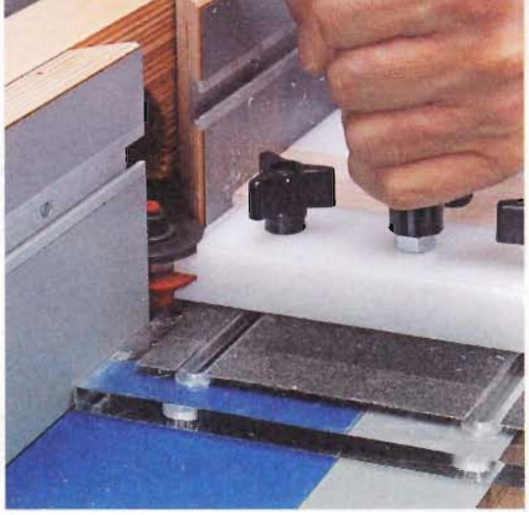
With each of the coping sleds shown here, it's easy to see what makes one better than a simple backer board. All these sleds feature the same essential components: a base with a hold-down clamp to secure the workpiece, a set of fences for support, and handles or knobs for control and safety.

Base & Clamps. The degree of control offered by a sled starts with the base and clamp design. To make an accurate cut, the clamp has to press the workpiece tightly to the base and hold it in the proper position.

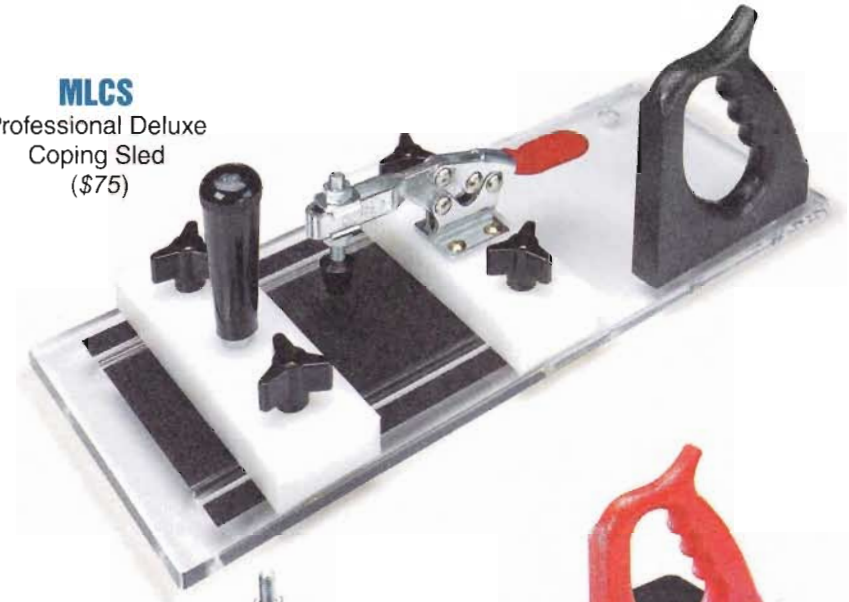
All of the clamping systems provide more than enough pressure to secure a workpiece. Unfortunately, the stress was too much for some of the bases to handle.

Since most deflected slightly (lower right photo on opposite page), it can be a challenge to get

Woodhaven
528 Small Coping Sled
($97)



▲ **Base Reference.** *The fence of the router table provides a solid, accurate reference for guiding a coping sled as you make a cut.*



MLCS
Professional Deluxe
Coping Sled
(*$75*)

Eagle America
Model 2100
(*$76*)

the setup just right for a consistently accurate cut on all your workpieces. The ½"-thick phenolic base of the *Woodhaven* was the only one that stayed perfectly flat.

To avoid flexing the base you can reduce the clamping pressure, but then I found out there wasn't enough pressure to prevent the workpiece from shifting.

All of the bases are designed to ride against the fence of the router table as a reference to guide the cut. Depending on the bit you're using, it may cut slightly into the base. But I didn't find that to be much of an issue. As you can see in the main photo, you have the option of positioning the *Woodhaven* sled away from the fence by using the miter slot and a miter bar (included with the sled).

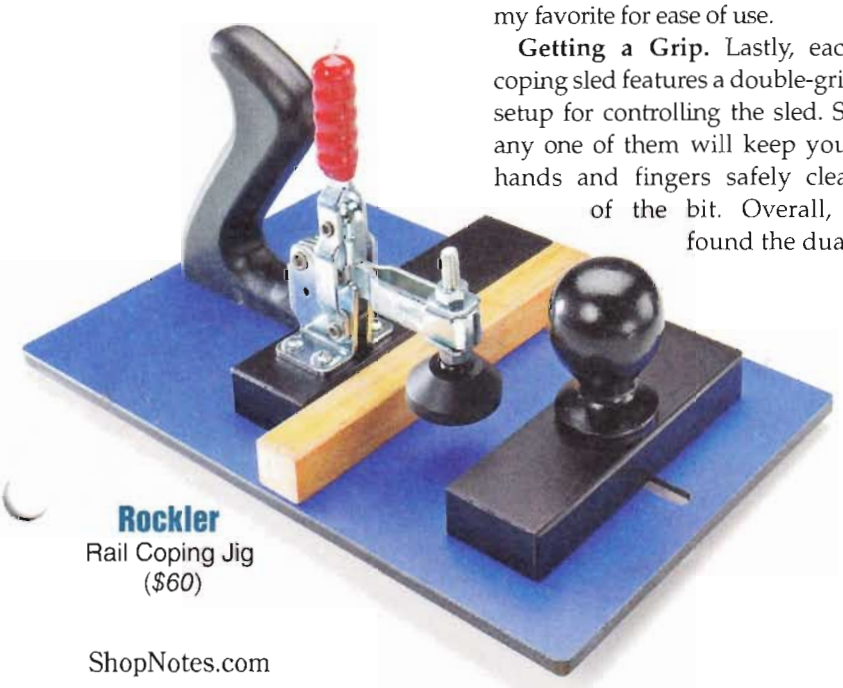
Fence. Another important component is the fence system. All the sleds use a pair of fences (or posts) to keep the workpiece square to the bit. The rear fence is the most important as it also backs up the cut.

The fences on the *MLCS* and *Eagle America* sleds aren't easily replaceable. And after fine-tuning the height or changing to a different bit, replacing the fence is important in preventing chipout.

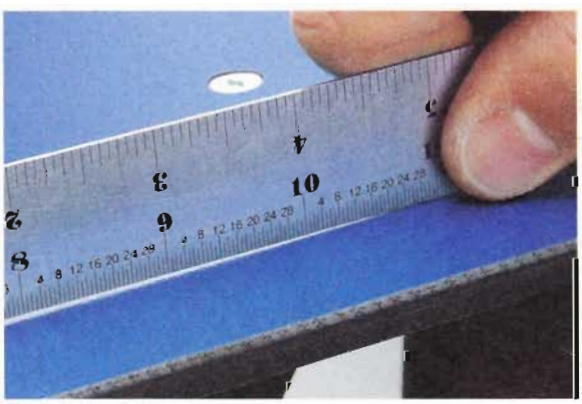
The *Rockler* sled comes with a basic wood fence that's easy to replace. And the extruded aluminum and phenolic sub-fence on the *Woodhaven* is designed to quickly accept a shop-made wood face (main photo). It was hands-down my favorite for ease of use.

Getting a Grip. Lastly, each coping sled features a double-grip setup for controlling the sled. So any one of them will keep your hands and fingers safely clear of the bit. Overall, I found the dual, adjustable knobs on the *Woodhaven* sled to be the most comfortable to use.

Choosing a Sled. Any of these coping sleds will provide better results than a scrap board acting as a backer during a cut. But for me, the small extra cost of the *Woodhaven* sled is great investment for a step up in performance. It provides you with a truly outstanding product you'll be using for years.



Rockler
Rail Coping Jig
(*$60*)



▲ **Lack of Support.** *A thin phenolic or plastic base bows under clamping pressure and won't provide an accurate reference for positioning the workpiece.*

HANDS-ON
Technique

using a Gel Varnish

Looking for an easy-to-apply finish? A gel varnish will give you a traditional look in a short time.

A classic varnish finish is hard to beat. It provides long-lasting, tough protection for most furniture projects. And the amber color of the finish adds a warm tone that brings out the best in wood.

To get that look and protection, varnish can be applied in one of two ways. You can brush on a standard varnish. Or, wipe on a special "wiping" varnish. But each method has some drawbacks.

A standard varnish takes a long time to dry. And you can end up with sags on vertical surfaces.

Wiping varnish, on the other hand, dries quickly. But it's so thin it takes a number of coats to get a good amount of protection.

However, there's another type of varnish that addresses these problems — gel varnish.

What Makes It Different. Gel varnish combines the best qualities of wiping varnish and regular varnish. Instead of being thinned down like wiping varnish, gel varnish contains an additive that gives it the consistency of jelly. You apply it with a rag and it dries pretty quickly. So in just a few hours, you can apply another coat. This means you're less likely to get dust nibs and you can finish a project in a fairly short time.

The thicker consistency has a few advantages. First, the gel is "sticky." So it isn't likely to just run

▼ ***A Simple Finish.*** *Gel varnishes are available from several manufacturers.*

▲ ***Satin Look.*** *Gel varnish provides a soft, satin finish and amber color to "warm up" the wood.*

off vertical surfaces or soak in too quickly, as you can see in the photo at right. In fact, gel varnish doesn't soak into the wood much at all. So you'll get a quicker build.

Satin Only. Giving varnish this extra body does have a downside. The thickening additive means that the finish will only dry to a soft, satin sheen. But that's a trade off I can easily live with.

Easy Application. As I mentioned earlier, gel varnish is easy to apply. But since it's different from either regular or wiping varnish, there are a few things to keep in mind as you go along.

I start by scooping some onto the surface (main photo on the facing page). Then work it around with a rag. The thick consistency provides plenty of working time before it starts to get tacky. So I don't need to worry about lap marks.

Go over the surface thoroughly to get an even coat. After making sure all surfaces are covered, let the varnish stand for a few minutes. Then wipe off any excess (left photo below). Here again, the thick consistency is an advantage. You can easily see areas where there's too much or not enough.

When wiping off the excess, your goal is to leave an even wet sheen. But there shouldn't be any visible ridges or thick spots. Working on flat surfaces is a pretty simple task.

▲ ***No Runs, No Drips.*** *A gel varnish (left) will stay put on a vertical surface. Standard varnish (center) can leave thick sags. And wiping varnish (right) quickly runs down, leaving little protection.*

Where you might run into some difficulty is in tight corners, as in the middle photo below.

I like to use a fresh, foam brush to clean out the nooks and crannies. After each stroke, I wipe off the brush with a rag.

(Safety Note: To avoid a fire, be sure to allow any rags with finish to dry flat before disposing of them.)

Fast Drying. In a few minutes, the varnish will dull down as the solvent evaporates. You'll want to let the varnish dry for a few hours before applying another coat. This drying period will depend on the temperature and humidity.

Follow-On Coats. Once you've sealed the wood with the first coat, the next coat will require a lot less finish. And it glides on effortlessly to create a smooth surface.

Again, after applying the finish, wipe away the excess. After the second coat dries, I like to level the surface with an abrasive pad, as shown in the right photo below.

I find that three coats are usually all that's necessary. And the final coat goes on just like the other two.

Once you're done, you can rub out the surface for an even sheen. And then you can stand back and admire the results.

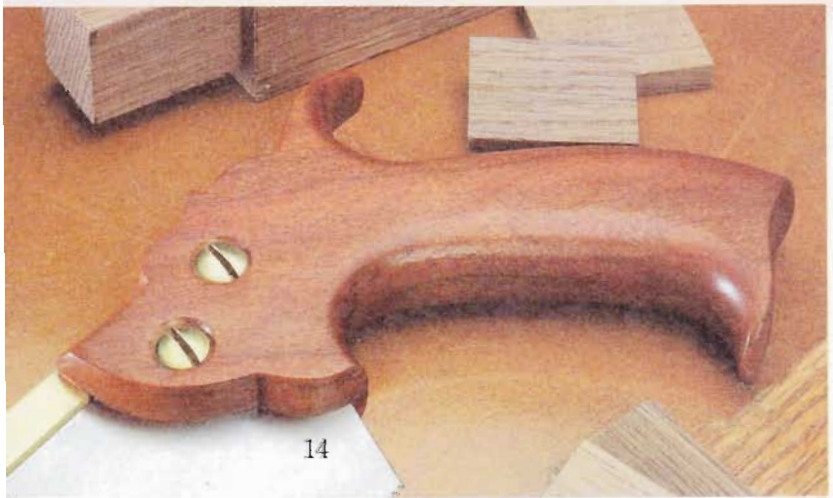
▲ ***Wipe Off.*** *Remove the excess varnish with a clean rag working in the direction of the grain.*

▲ ***Dry Brush.*** *Use a fresh brush to get varnish out of tight corners. Wipe the brush after each pass.*

Scuff Between Coats. *After the second coat, rub down the finish with an abrasive pad to remove any dust nibs.*

shop-made Back Saw

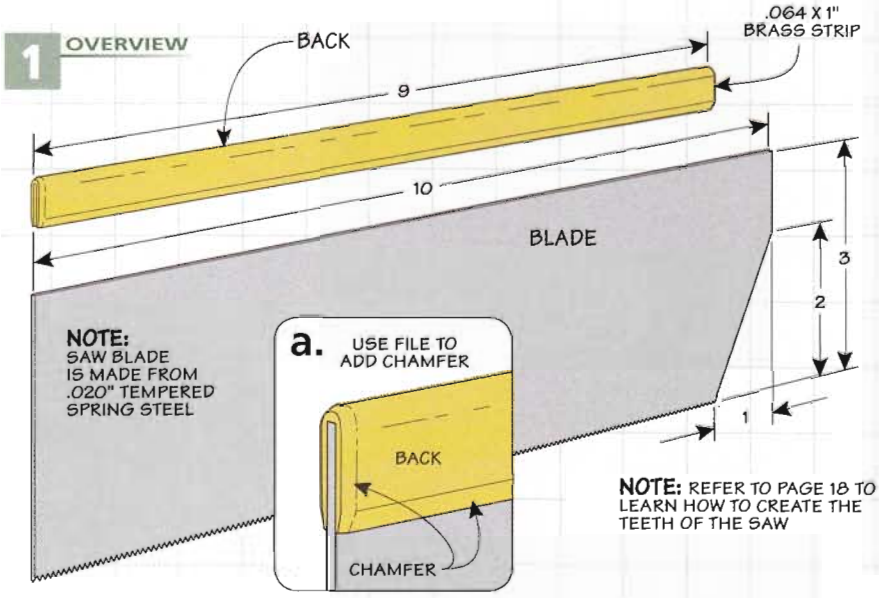
Get precision cuts with a shop-made back saw that has all the features of a quality heirloom tool.



There's something very satisfying about making your own tools. Over the years, I've made hand planes, marking gauges, and other hand tools. Recently, I decided to tackle my biggest challenge yet — a back saw. What I learned *is* that the process isn't that difficult. Like many other projects, it's just a matter of finding the right materials and getting started.

Now, I know what you're thinking, "How do I create the teeth?" Don't worry. A simple sharpening jig and a file take care of that. (To learn how to build the jig, turn to page 18.) If you decide to build your own saw, I think you'll agree it's well worth the effort.

start with the Blade



One of the most important features of any fine hand saw is the blade. To make mine, I used a piece of tempered spring steel that I cut to size and sharpened myself. I'll get to making the teeth later, but for now I'll explain how to make the back saw blade from scratch.

I found all of the hardware and saw parts I used online or at a local hardware store. A pre-cut blade blank, a folded back, nuts, bolts, and files can also be bought as a kit or individually online. (See Sources on page 51.)

Blade Blank. Starting from scratch means cutting a piece of steel down to size with a hacksaw, (drawing at right and the upper left photo below). I used a file to remove the rough spots left from sawing the blank and I also sanded away all of the bluing with an abrasive pad (upper right photo).

Once you have your blade cut to size and sanded, you can go ahead and sharpen the teeth. It's easy to do if you use the filing jig and follow the steps starting on page 18.

Make the Back. After forming the teeth, the next step is to make the back. The back prevents the saw from buckling during use. It's just a piece of solid brass that's "folded" along its length.

To do this, lay out a centerline on the brass and clamp it in a machinist's vise. Then, simply fold it in sections using a heavy-duty hammer. A piece of steel helps soften the blow and protects the brass from dents and scratches.

Work your way along the brass a little at a time, reclamping it in the vise as you go (lower left photo). Once you have the back folded 90° along its entire length, position it in the vise, as shown in the lower middle photo below. Then continue bending a little at a time by squeezing it between the vise jaws.

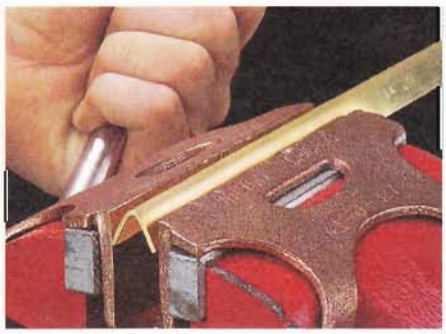
To complete the back, slip it over the blank and finish the bending (right photo). You want a snug fit, but the back should still slip off.

Finally, remove the back and file a shallow chamfer along the bottom and front edges (Figures 1 and 1a). Some fine sandpaper works well to remove any marks.

▲ ***Use a Hacksaw.*** *Clamping the blank between two pieces of plywood makes it easy to cut the blade to size.*

▲ ***Clean Up.*** *After filing away the rough edges, sand the bluing from the entire blade.*

▲ ***Initial Bending.*** *Use a hammer and a piece of steel to gradually bend over the back in a vise, a small section at a time.*



▲ ***Bend It Flat.*** *Clamp the folded back in the vise and bend it until it's almost flat. Jaw liners protect the brass from marks.*

▲ ***Crimp the Back.*** *Finally, use the hammer and bar to crimp the brass back around the blade for a snug fit.*

pistol grip
Handle

Now that the back saw blade is ready, it's time to make a handle for it. I made mine with an open grip. It's comfortable and I like the way it fits my hand. Plus, it's designed to keep my hand in line with the saw blade, giving me better control when lining up a cut.

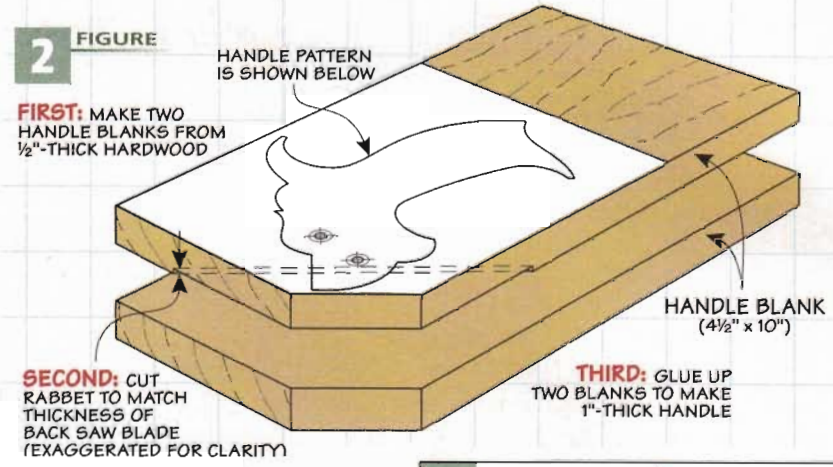
Two Blanks. As you'll see, making the handle is pretty straightforward. For starters, it's made from two oversized pieces of ½"-thick hardwood. You'll want to attach the pattern to the outside face of one blank with spray adhesive. (For a full-size pattern, go to *ShopNotes.com*.)

Next, you can miter a corner of each blank, as in Figure 2. The miter makes it easier to hold the blank while you cut the wide, shallow rabbet for the saw blade.

You'll only need to shave a razor thin rabbet in one blank to make room for the blade. To do this, add an auxiliary rip fence to your table saw, exposing just a thin portion of the blade. Then cut a rabbet in a test piece, checking the fit with the blade before cutting it in your blank. A rabbeted push block helps to do this safely (Figure 3).

ShopNotes GO ONLINE EXTRAS

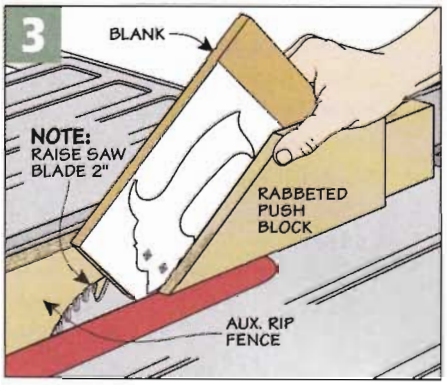
To download a full-size pattern of the handle, go to: ShopNotes.com



With the rabbet added, go ahead and glue up the two blanks. Just make sure not to get any glue inside the rabbet.

Handle Pattern. Once the glue dries, you're ready to drill the holes for the blade. I started by clamping the handle and blade to the drill press table (lower right photo). To support the blade, I placed a piece of scrap beneath it. And I used masking tape to protect the teeth.

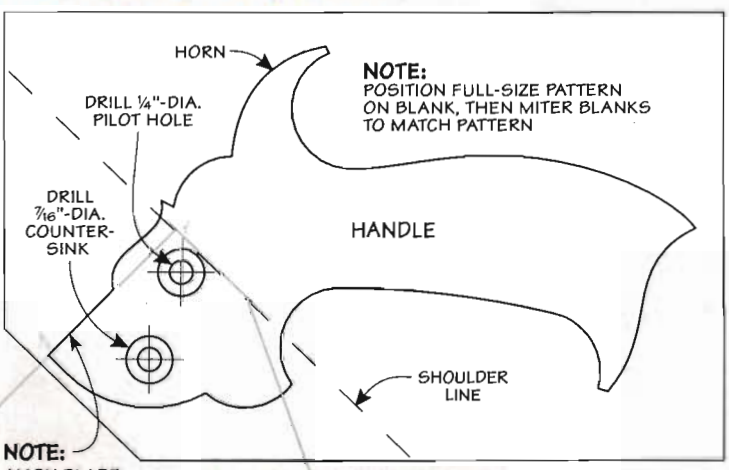
What's important is that the blade is properly aligned inside the rabbet before you start drilling any holes. To do that, draw a line from the top of the handle pattern down the mitered edge of the handle blank (lower right photo). Then, butt the blade up against the shoulder created by the rabbet. Just be sure to align the top edge of the blade with the line.



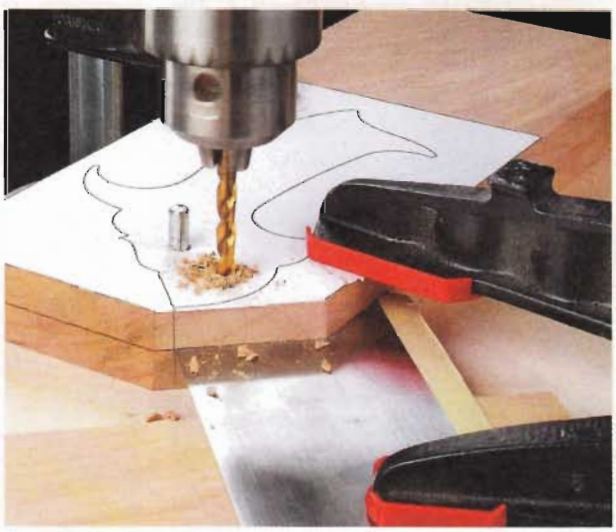
After the first hole is drilled, place a pin in the hole to keep everything aligned while drilling the second hole. Once both holes are drilled, set the blade aside.

Initial Shaping. As you can see in the photos and drawings at the top of the opposite page, there are several steps to shaping the handle. I began by cutting out the top part from the blank, but I left the bottom

Handle Pattern



▲ ***Pattern for Handle.*** *To use this pattern to make your saw handle, you must first enlarge it by 200% on a copy machine.*



▲ ***Drill Holes.*** *Clamp the workpiece and blade to the drill press table. Drill the first hole, then use a small pin to keep the blade positioned as you drill the second hole.*

portion attached. This provides clearance for your hands while sanding and shaping the blank.

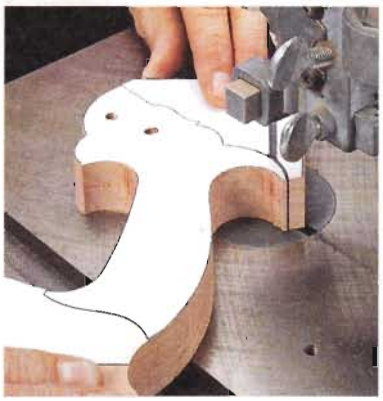
After cutting the initial shape at the band saw, use a sanding drum to remove the saw marks. You can refine the shape and add the different edge profiles with chisels, files, and sandpaper.

Refine the Shape. A look at the drawing at right shows the steps used to refine the shape of the handle. First, use a 3/8" roundover bit to soften the edges on the grip (drawing and far right photo). Then simply file and sand the away the bullnose areas (drawing at right).

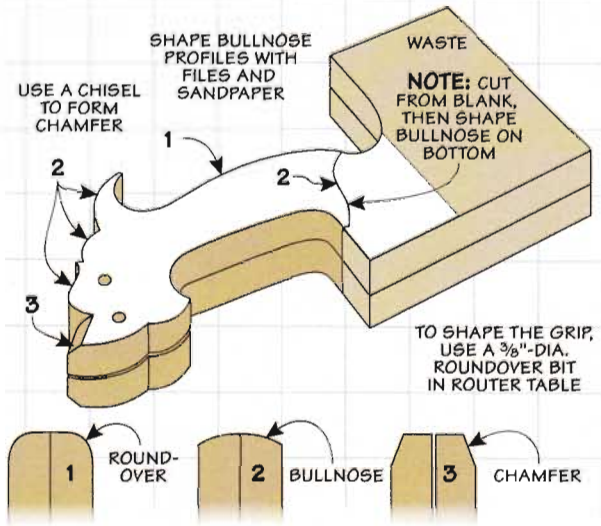
When shaping the "horn," the part of the handle that fits between your thumb and finger, you'll want to use a file to taper it gradually along its width and thickness. You can see how it fits my hand in the main photo on page 14.

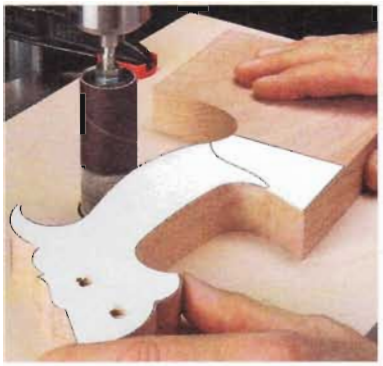
Before cutting the handle from the blank, use a chisel to add the chamfer. Then finish shaping the handle by filing a bullnose along the bottom edge (drawing at right).

The last step is to create a slot in the handle for the back. To do this, first clamp the handle to your drill press fence (left photo below). A scrap block keeps the handle from tipping while drilling the holes. And a chisel works well to clean things up.



▲ ***Band Saw.*** *Cut the blank to rough shape using a band saw, but leave the bottom portion attached.*





▲ ***Smooth Edges.*** *Before refining the shape of the handle, remove saw marks with a sanding drum.*

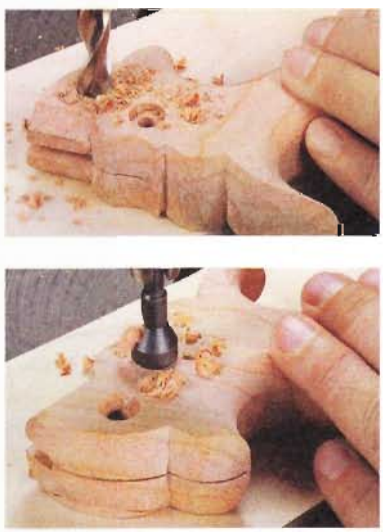
▲ ***Shaping.*** *A 3/8"-dia. roundover bit in a router table does a good job of softening the sharp edges of the handle grip.*

Hardware. I bought the knurled nuts and machine screws for my saw at a hardware store. The head of the nut was the right size, but I had to modify the threads to fit the screw. For more on this, turn to Shop Short Cuts on page 23.

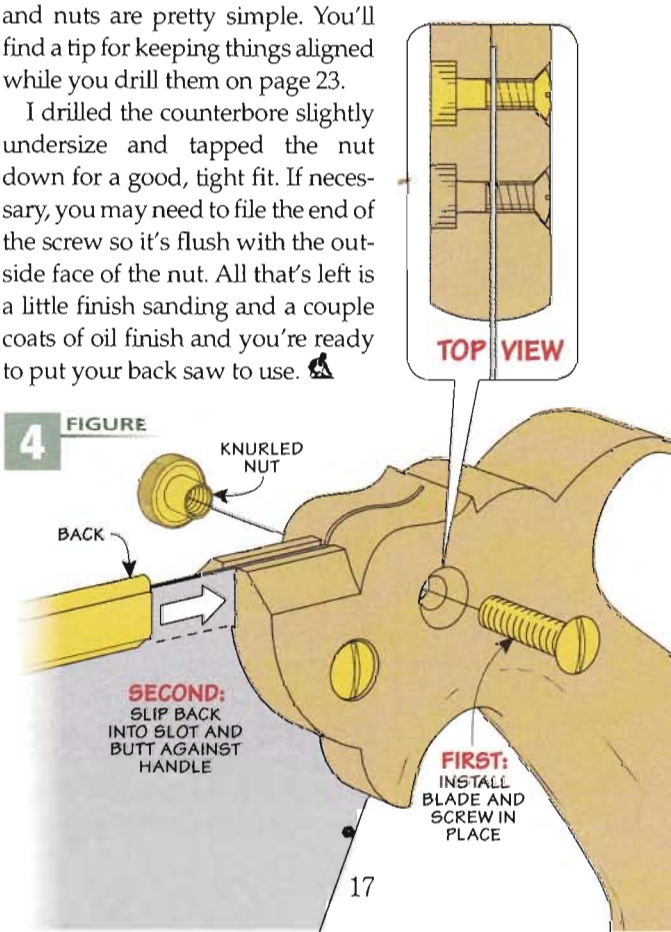
The steps for adding the counterbore and countersink for the screws and nuts are pretty simple. You'll find a tip for keeping things aligned while you drill them on page 23.

I drilled the counterbore slightly undersize and tapped the nut down for a good, tight fit. If necessary, you may need to file the end of the screw so it's flush with the outside face of the nut. All that's left is a little finish sanding and a couple coats of oil finish and you're ready to put your back saw to use.

▲ ***Slot for Back.*** *To provide clearance for the back, rough out the waste at the top of the handle. Then, use a chisel to clean things up.*



▲ ***Final Details.*** *The knurled nut fits into a counterbore on one side of the handle. And the screw head fits in a countersink.*



saw blade Filing Jig

▲ ***Consistent Results.*** *Here you can see the consistent results you'll get by using the filing jig. The end result — quick, clean cuts for most tasks.*

Sharpening a fine saw blade may seem like a challenging task. But, this filing jig makes it easy.

Cutting a large steel blank into the shape of a blade is the easy part. The biggest challenge in making a back saw is coming up with a way to file evenly spaced teeth with a consistent angle and depth.

The answer lies in a jig that not only helps keep a file square to the steel, but uses a threaded rod to guarantee even spacing simply by turning the handle. The best part is the jig takes all the guesswork out of adding teeth to a brand new saw blade. It's pretty simple to build and using it is even easier.

It's designed to create rip-style teeth with a negative 5° rake (inset photo). The teeth have just a small amount of set and there are 13 teeth per inch (TPI). This provides a good balance between quick cuts and smooth results. Of course, it still takes a little elbow grease to file all the teeth, but it's worth the effort.

Filing Jig. The most important part of the filing jig is the adjustment mechanism that allows you to accurately position a file to cut the teeth. The heart of this mechanism is the threaded rod, the crank

handle, and a square nut. Essentially, these parts ensure that a single full crank of the handle repositions the guide assembly you'll add later to file perfectly spaced teeth on the blade.

Build the Base. Building the jig is pretty simple. It's made from plywood and a few pieces of hardwood. It has three main sections — a base assembly, a guide assembly, and a simple file block.

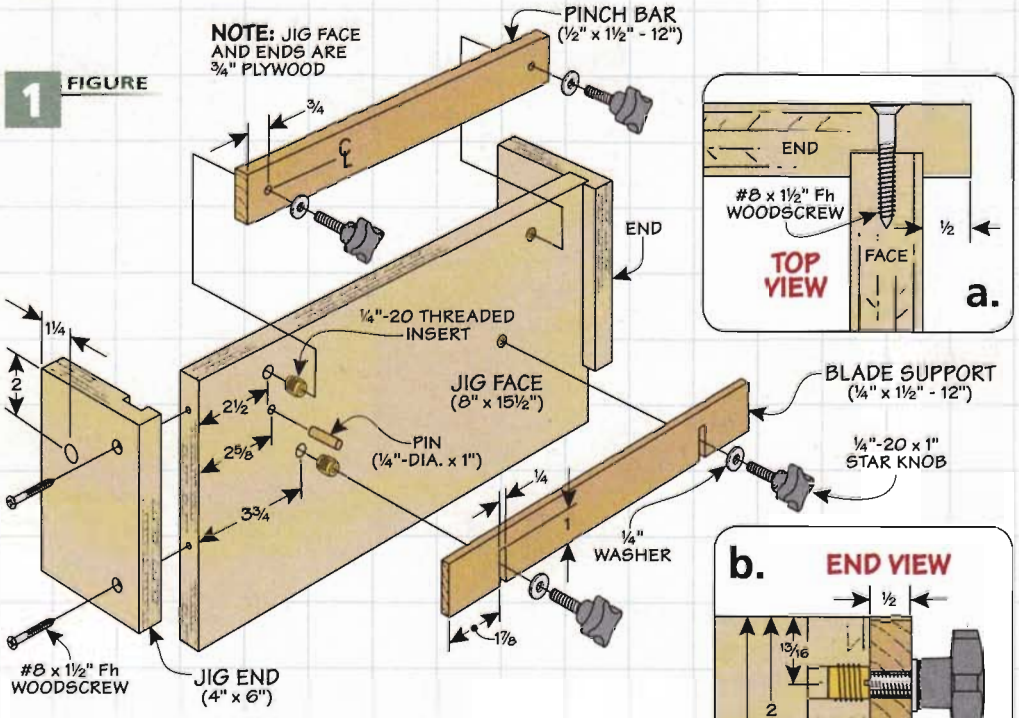
The main part of the base is made up of a plywood face and two ends. A hardwood blade support and pinch bar clamp the blade in place and position it for filing.

After cutting the parts to size, lay out and drill the holes for the support and pinch bar hardware (Figure 1). You'll also need to drill a stopped hole for a dowel that acts as a positioning pin.

If you take a look at Figures 1 and 2, you'll see that the ends are attached to the face with grooves and a few woodscrews. Before you attach the ends though, you'll want to carefully lay out and drill a hole in each one for a threaded rod.

With all the holes drilled and the sides attached, you can turn your attention to adding the guide assembly and hardware, including the threaded rod (Figure 2).

FIGURE 1

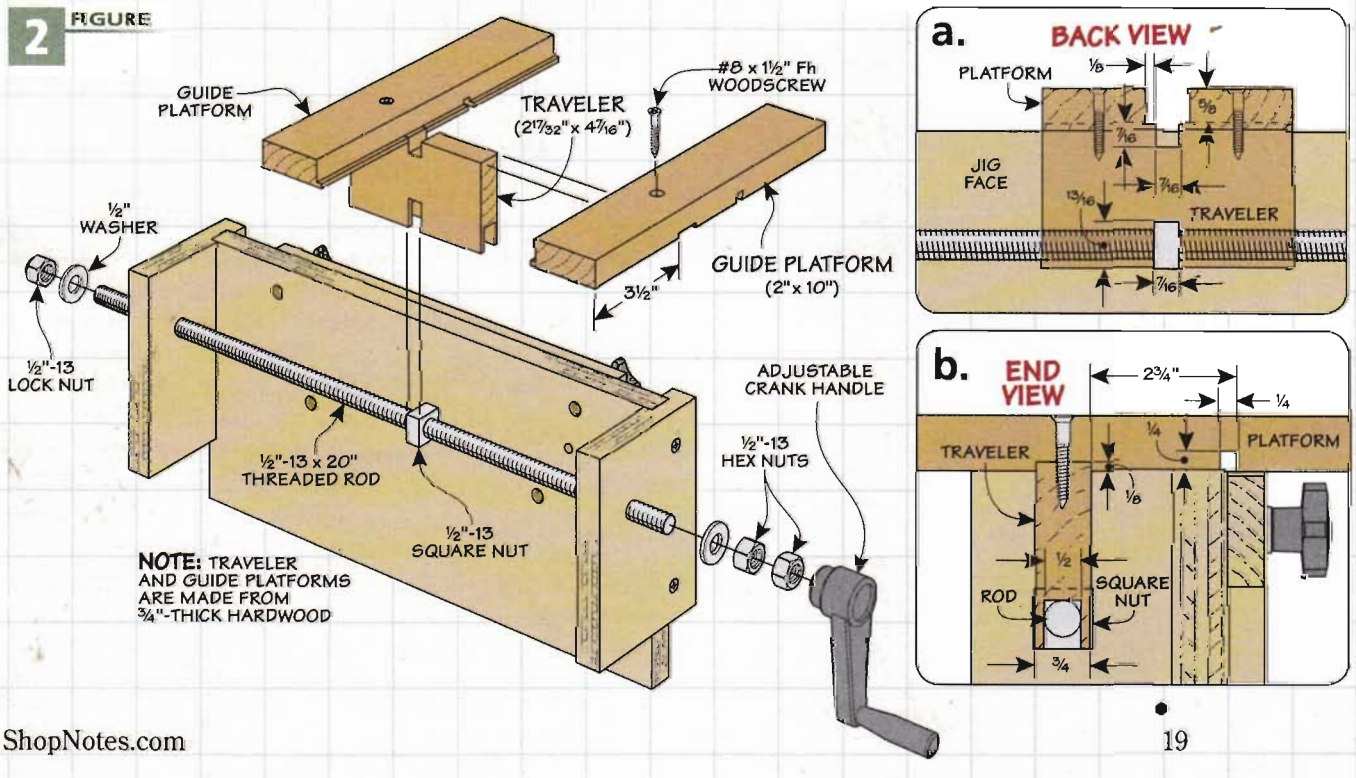


Guide Assembly. The guide assembly has three parts — a traveler that fits down over the rod and a square nut, and two separate platforms that rest on the top edge of the base. Deep rabbets on one edge of each platform create a "channel" to hold the file block in position for sharpening.

I made the platforms from a single, oversized blank, cutting the rabbet first. Then I cut a couple of dadoes before trimming them to size, as shown in Figure 2a. Now you can drill the countersunk holes for attaching the traveler in place.

To make the traveler, start with an extra-long blank and cut a deep groove along one edge. After cutting the traveler to size, you can cut the notches in the top and bottom edges (Figures 2a and 2b). To complete the guide assembly, go ahead and screw the traveler to the platforms. All that's left to complete the filing jig is to make a block to hold the file.

FIGURE 2



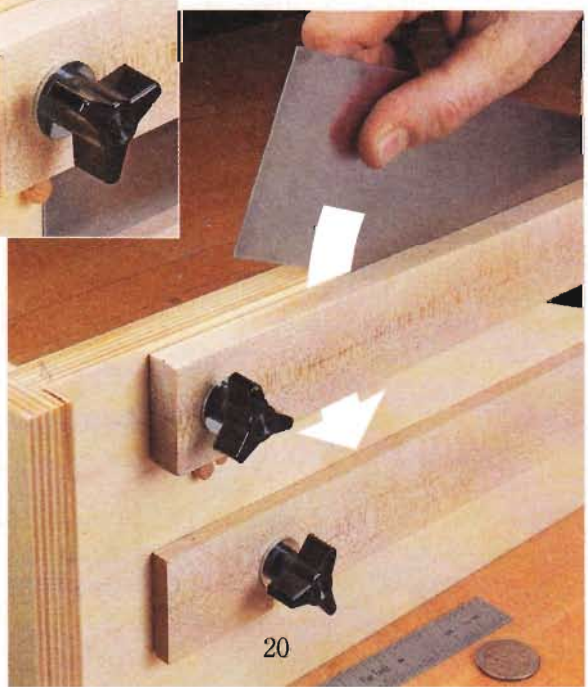
making & using the

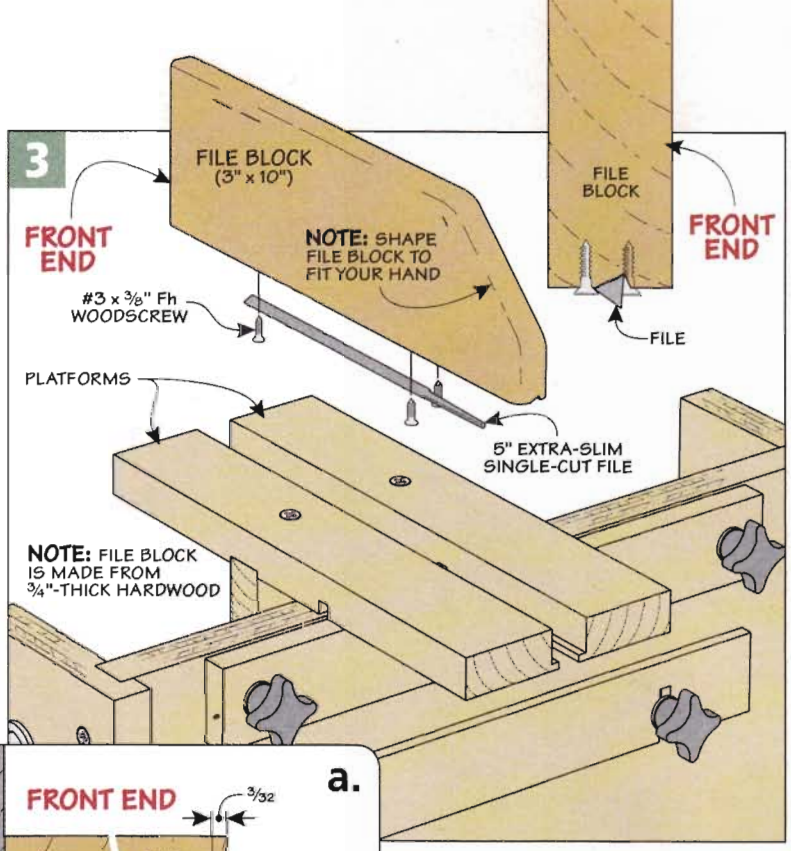
File Block

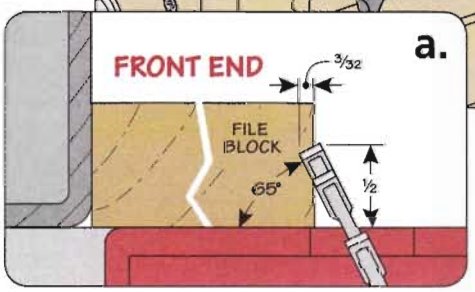
Now that you have the main parts of the filing jig completed, you can get started on the block that holds the file. The block is just a piece of hardwood with a groove cut in one edge to hold a file. You'll find sources for the file on page 51. The file block is a simple design, but it's important to position the file accurately in the bottom edge of the file block.

Make the Block. As I mentioned earlier, the teeth on my blade have a negative 5° rake angle. That means to cut the teeth, the cutting edge of the file needs to match that angle. And to make building and using the jig as simple as possible, the file block has to ride perpendicular to the guide assembly. Finally, the guide also has to sit square to the blade to file rip-style teeth.

What all this means is the cutting edge of the file needs to be held exactly 5° off vertical in order to cut the teeth — not an easy thing to do by hand with such a small file. But don't worry, all the information you need to create the file block is illustrated in Figures 3 and 3a. It's just a matter of cutting a small "V-shaped" groove in the block.







Once you have the block sized and the groove cut, you can shape the top so it's comfortable in your hand (Figure 3). A band saw works well to miter the corner and I sanded a roundover on the top edges. Finally, attach the file to the block with screws (photo at right).

▲ ***Attach File.*** *Position the screws to trap both ends of the triangular file to hold it securely in place on the block.*

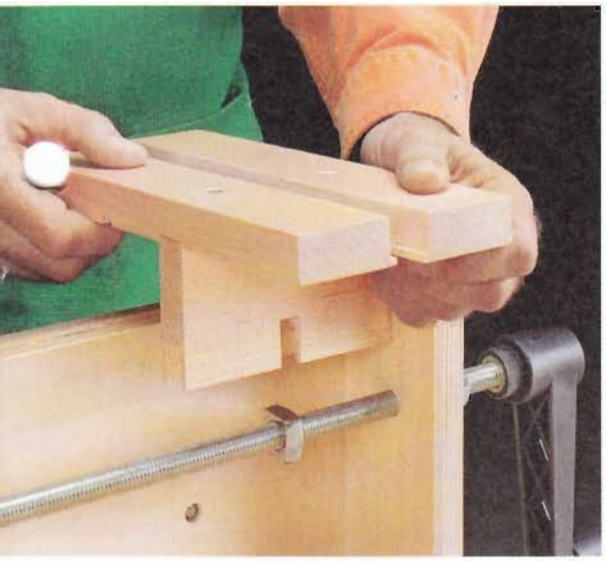
USING THE JIG

You'll find that the jig is easy to use. There's one thing to remember though before you get started. The file only cuts on the push stroke. So you don't want to pull the file back across the blade. If you do, the file will dull more quickly, which makes filing more difficult than it has to be. Just remember to lift the block up slightly on the back stroke as you work.

◀ ***Adjust Blade Height.*** *Place blade behind pinch bar and against pin. Use a quarter to set the blade to the correct height.*

Mount the Blade. Start by clamping the jig in your bench vise and mount the blade in the jig. The photo at left shows you how to do this. Just be sure to slide the "square" edge of the blade tight against the positioning pin.

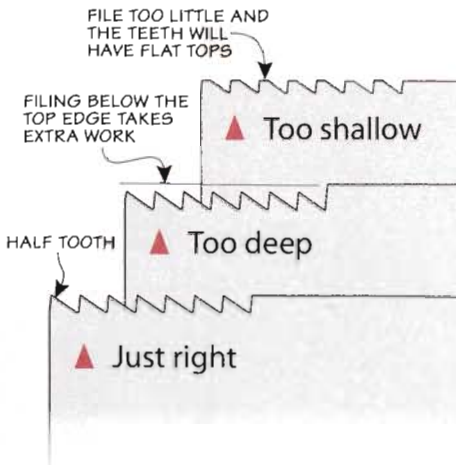
Before you tighten down the pinch bar, you need to raise the blade to the correct height above the top edge of the base. An easy way to do this is to use a quarter as a gauge (inset photo at left). Just remember, this is just a starting point. You may need to make minor adjustments once you begin cutting the teeth.



▲ ***Guide Assembly.*** *Position the traveler nut to the far left. Then place the guide assembly over the threaded rod and nut.*

▲ ***File The Teeth.*** *Forming a tooth to the exact depth should take about four strokes. Always file on the push stroke.*

Just Right Depth



Get It "Just Right." You'll start sharpening at the far left end of the jig and work your way to the right. So you need to move the traveler nut most of the way to the left. Once you have the nut close, place the guide assembly over the blade with the notch slipped over the nut (left photo above).

The goal is to position the nut so that your first cut leaves a single half tooth (lower drawing in the margin at right). A full turn of the handle advances the nut the exact distance to file the next tooth, so position the handle straight down to make it easier to know when you've made a full turn. Now you can start cutting the teeth. Use steady passes with downward pressure.

File the Teeth. Once you start filing, it's important to check your progress often. As long as the blade is raised above the base the correct height, it only takes about four strokes to cut a tooth. Once the first tooth is cut, turn the handle one full turn (left photo below).

After you file the second tooth, you'll be able to gauge whether you need to adjust the height of the blade. If your teeth look like the top drawing in the margin, your blank is too low and you'll need to raise it. If the tops of the teeth are below the top edge, your blank is too high (middle drawing). You'll know you have it right when it looks like the lower drawing.

Continue filing until you've cut all the teeth. To make best use of the file, rotate it in the block a third of the way along. And then rotate it one more time for the last third.

At this point, the blade is complete, except for setting the teeth. For more on this, see the box below. All that's left is to go to page 16 to finish building the handle.

▲ ***Perfect Spacing.*** *One full turn of the crank handle moves the traveler the exact distance for creating the next tooth.*

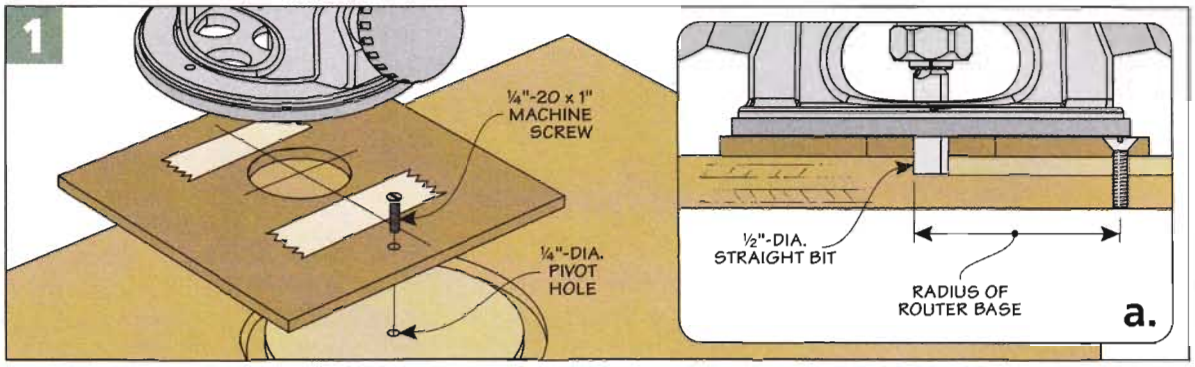
Setting the Teeth

The final step is to "set" the teeth to keep the blade from binding. To do this, you can use a saw set to bend every other tooth slightly in one direction. Instead of investing in a saw set, I came up with a quick and easy solution. And that's to use a large dowel as a mallet and bend the teeth with a nail set. You'll need to grind the dimple on the nail set to a dull point.

These are fine teeth, so it can be tough to keep track of which tooth to set next. To make it easier, I placed a piece of masking tape along the blade and marked every other tooth (photo and inset at right). All it takes is a light tap with the mallet to get the set you need.

► ***Setting the Teeth.*** *To set each tooth identically, let the dowel "drop" onto the nail set. A piece of hardboard provides support underneath the blade.*

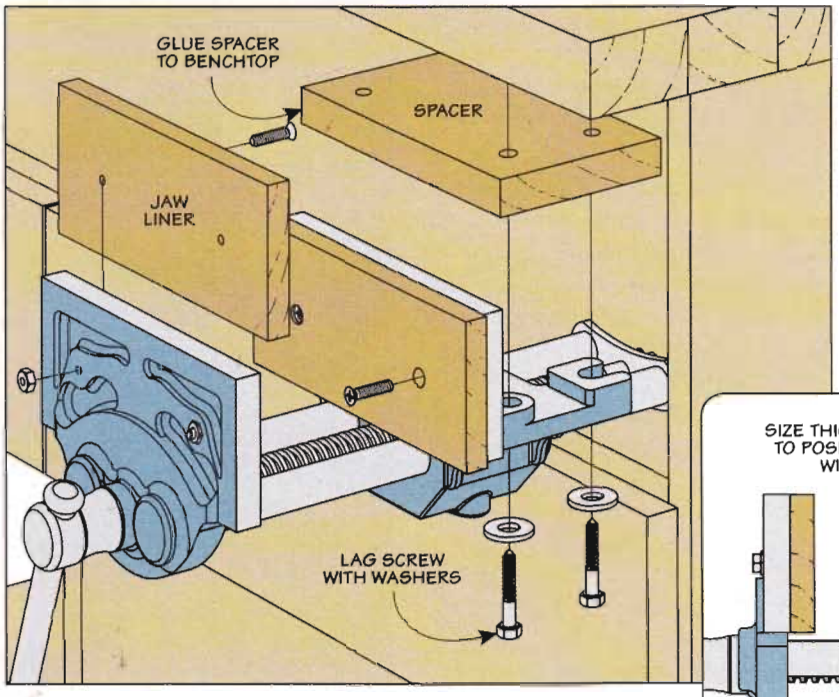
Shop Short Cuts



Routing a Recess

To cut out the circular recesses for the router on the router table and cabinet (page 30), I made a simple trammel from a piece of hardboard. After drilling a hole for a pivot pin (I used a machine screw), attach the router to the jig with double-sided tape (Figure 1).

Position the router so the distance from the pivot point to the outside edge of the ½"-dia. bit is half the diameter of your router base. After drilling a ¼"-dia. pivot hole, rout a ¼"-deep circle. Once that's complete, you can drill a 2"-dia. clearance hole for the router bit. Then all that's left to do is rout away the rest of the waste from the recess (Figure 2).

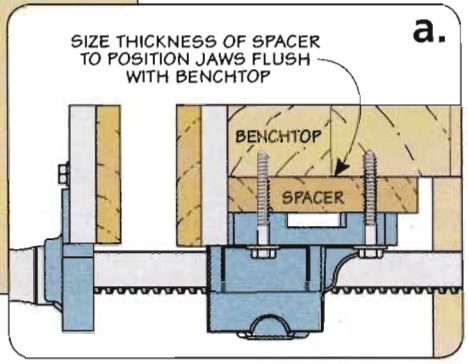


Installing a Vise

Installing a woodworking vise on a bench isn't difficult, but you do need to keep one thing in mind. The vise jaws need to be flush with (or just below) the top of the bench. In most cases, this requires installing a spacer between the vise carriage and benchtop.

To figure out the proper thickness of the spacer, I like to temporarily clamp the vise in position with the jaws sticking above the top of the bench. This way, you can measure exactly how far the jaws extend above the benchtop. This will give you the thickness of the spacer you need to add to the underside of the bench.

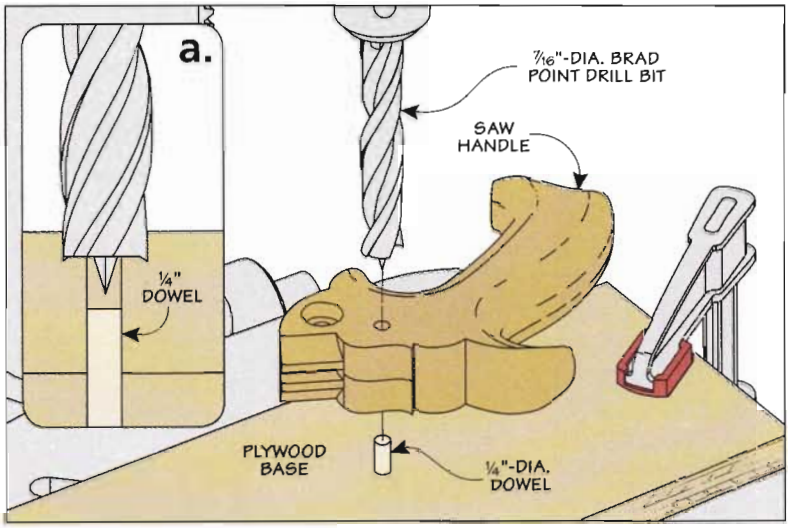
After gluing the spacer in place, drill pilot holes and then attach the vise with lag screws and washers.



Counterbore Alignment

Centering and drilling a counterbore on the saw handle (page 14) *after* the pilot hole has been drilled can be tricky. Here's the solution.

Clamp a piece of plywood to the drill press table and drill a hole to match the diameter of the pilot hole. Insert a short piece of dowel to serve as a locator pin. Place the saw handle over the pin to automatically center the counterbore (drawing at right).



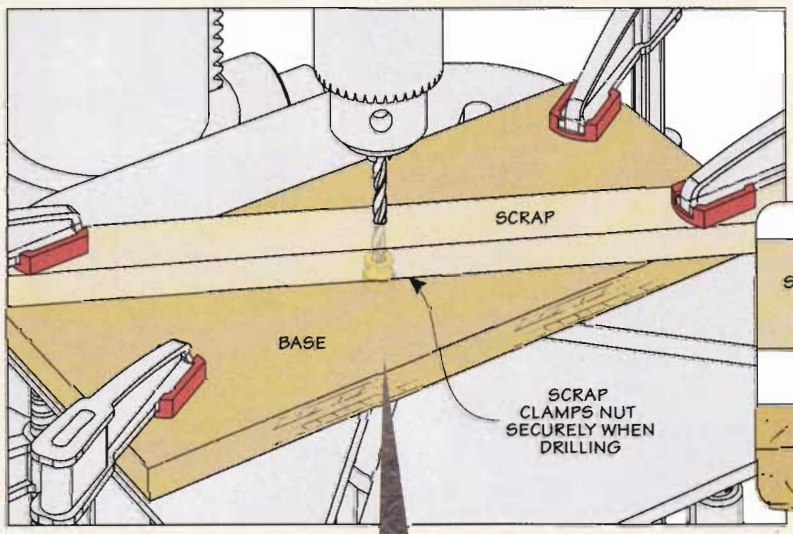
Shop-Made Saw Nut

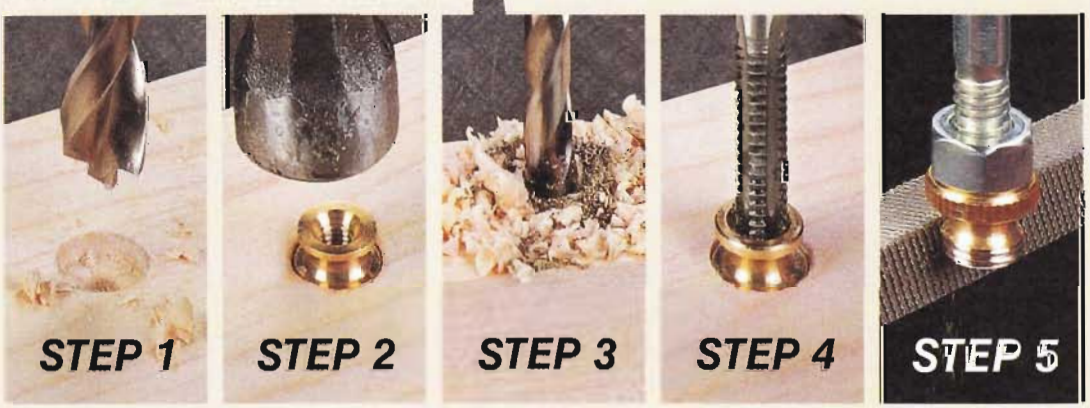
When fastening the handle of the back saw (page 14) to the blade, I looked around for a fastener that matched the diameter of the head of the brass bolt. A knurled, brass nut from the hardware store had the right diameter, but I needed to make a couple of modifications.

Drill & Tap. First, the threaded hole in the nut was too small for the bolt. So I needed to drill and tap threads to match the 1/4"-20 bolt. The drawing and photos step you through the procedure.

The first step requires drilling a hole in a piece of scrap to match the diameter of the knurled nut head. After tapping the nut into the hole upside down (Step 2), drill through the nut with a 3/16"-dia. bit in preparation for tapping the larger threads, as you can see in Steps 3 and 4.

A Smaller Neck. The final modification requires a little bit of filing. The neck at the bottom of the nut needs to be filed down to fit into the pilot hole in the saw handle. But holding the nut securely while you do this can be a challenge. Instead, I used the drill press to shape the neck, as you can see in Step 5.





To securely mount the nut, I used a bolt with the head cut off. Step 5 shows how a hex nut serves as a jam nut to keep the brass nut from spinning off the bolt as you file down the diameter of the neck.

With your drill press running at its slowest speed, gently place the file against the spinning nut and work the file over the nut. Finish up with some fine sandpaper to remove the rough edges.

Organizing your shop is one of the best things you can do to improve your woodworking. Having a place to store tools and supplies creates a more relaxing and efficient shop environment.

The storage solution you see here proves you don't have to spend a fortune or a lot of time to create a comfortable work area. This space-saving workshop is made from readily available cabinet-grade plywood. Simple joinery makes it a quick build.

The workshop is designed to accommodate your stationary tools as well as your smaller, benchtop tools. And the drop-down router table (page 30) is the icing on the cake. You'll find all the details on the next page.

space-saving Workshop

Simple construction and inexpensive materials add up to organized storage and an efficient work area.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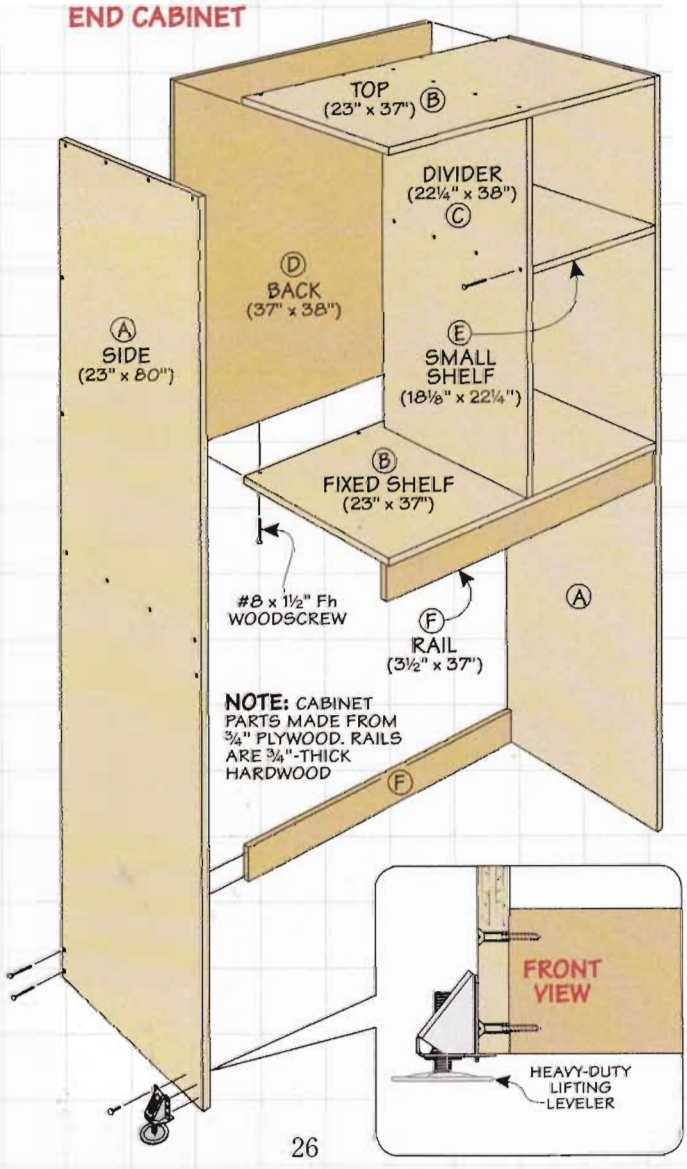
end & center Cabinets

The best part about building this workshop is how quickly it goes together. The end and center cabinets are simple boxes with a back. But instead of having a bottom like a conventional cabinet, a middle fixed shelf provides storage and creates the open space underneath for your large power tools.

The end cabinet is sized so you can tuck the wing of your table saw underneath (refer to page 24). You may need to adjust the width of the cabinet so it fits the depth of your saw plus a few extra inches.

▲ ***Planer Tray.*** *Providing out-of-the-way storage yet a solid platform during use, this pullout tray fills the bill. The heavy-duty slides do all the work to keep the planer stable during use.*

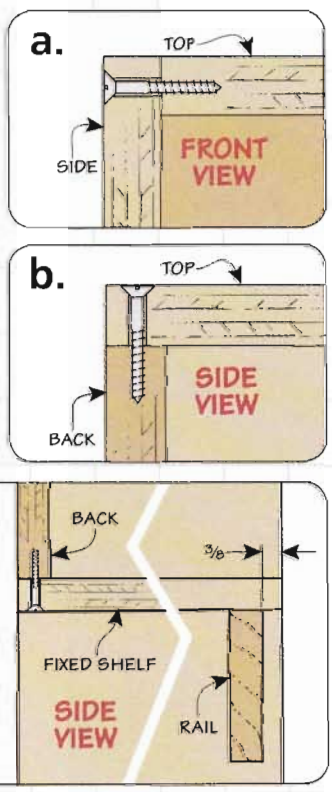
FIGURE 1



The center cabinet is wide enough to store a small jointer out of the way. Again, you can adjust the width of the cabinet to fit the size of the tool you wish to store underneath.

The two cabinets are similar in how they're put together, as Figures 1 and 3 show. I'll cover the basics of both cabinets first, then point out the differences as I go.

Sides First. The first thing to do is cut the sides to size. Each pair is ripped from one sheet of plywood and then cut to length.



Top & Shelf. Using the same rip fence setting, you can go ahead and cut the top and fixed shelf for each unit.

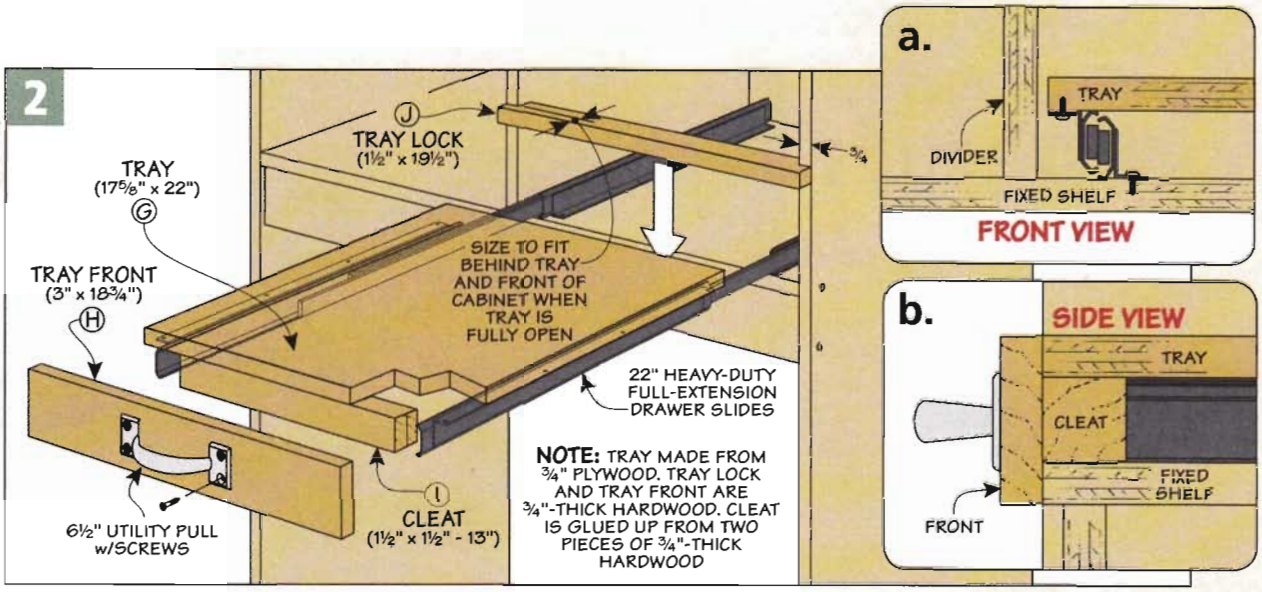
Divider. Both cabinets have a vertical divider. I cut this to size before assembling the cabinet so I could use it as an assembly aid.

Assembly. All of the joints are glued and fastened with screws. I found that clamping squares in each corner helped hold the joints together as I drilled the holes and installed the screws.

Divider as a Spacer. Now here's where the divider comes into play. I used it as a spacer to locate each end of the fixed shelf while attaching it to the sides. With the shelf in place, go ahead and install the divider so it's centered, keeping the front edge flush with the front edge of the cabinet.

Small Shelf & Rails. The end cabinet has another small fixed shelf that needs to be installed in the right storage bay. Again, it's flush with the front of the cabinet. Once that's installed, you can cut the front and bottom rear rails and attach them to the cabinet. While you're fastening the bottom rail, it's the perfect time to install the heavy-duty levelers.

Back Panel. To add strength to the cabinets and keep them square, the back is cut to fit snugly inside the case. A few screws through the top, sides, and fixed shelf will lock the back panel in place.

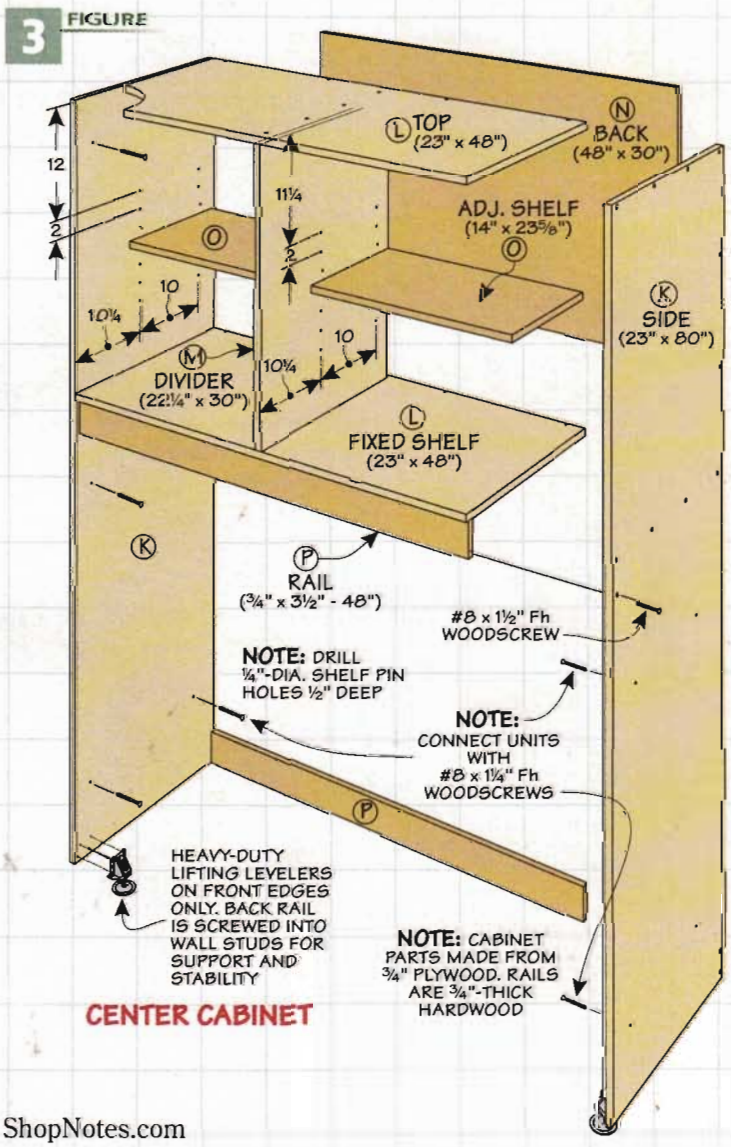


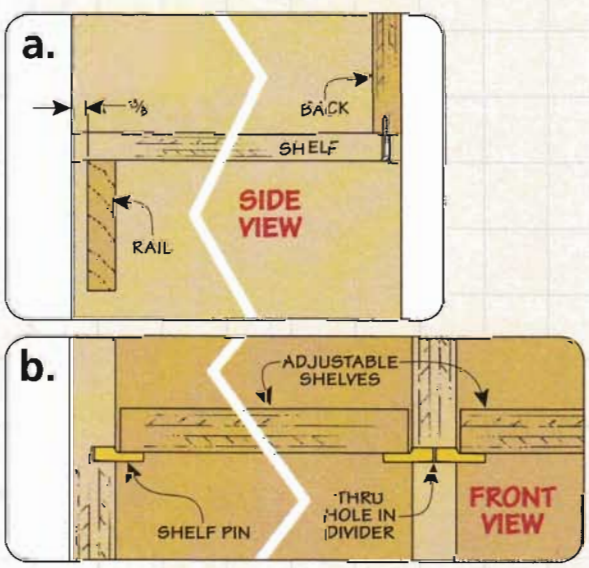
Adjustable Shelves. For more efficient storage, I added adjustable shelves to the center cabinet. Simply drill holes for the shelf pins, cut the two shelves to size, and set them in place.

Planer Tray. As you can see in the photo on the opposite page, there's a pullout tray designed to store your benchtop planer in the end cabinet. It consists of a hardwood front and utility pull attached to a plywood shelf mounted on a unique pair of heavy-duty, undermount slides. (For sources, refer to page 51.) To get started, I installed the slides in the cabinet first, keeping the front of the slides flush with the front of the cabinet.

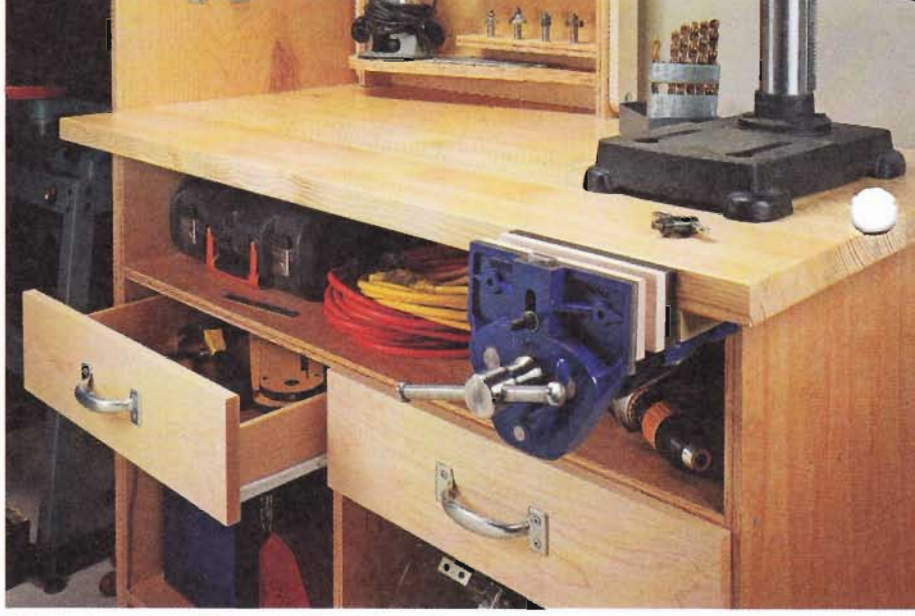
After attaching the front to the tray, I added a hardwood cleat to strengthen the joint between the two parts. Then you can install the tray on the slides.

Tray Lock. The planer needs to be rock-solid when it's in use. With the tray pulled out, the slides need to lock in place to keep the tray from moving. The simple tray lock you see in Figure 2 is notched on each end to slip in behind the tray after it's pulled out. Now you can set the cabinets in place and start on the workbench.





efficient storage in a Workbench



Work Area Efficiency. *Don't let the compact size fool you. This super-efficient workbench has big-time features like a solid-wood top, a woodworking vise, and plenty of storage for all your tools and supplies.*

After building the two cabinets and setting them in place, you can start on the workbench. By now, the construction techniques won't be new to you. They follow a similar procedure as the cabinets. You'll start by building a basic case with a fixed shelf and divider. After adding the adjustable shelves, all that's left is to complete the workbench is to add the drawers, solid-wood top, and vise.

A Basic Case. Like the two cabinets, you can start by cutting the top, bottom, sides, fixed shelf, and divider to size. After drilling shelf pin holes in the sides and divider, you can start some assembly.

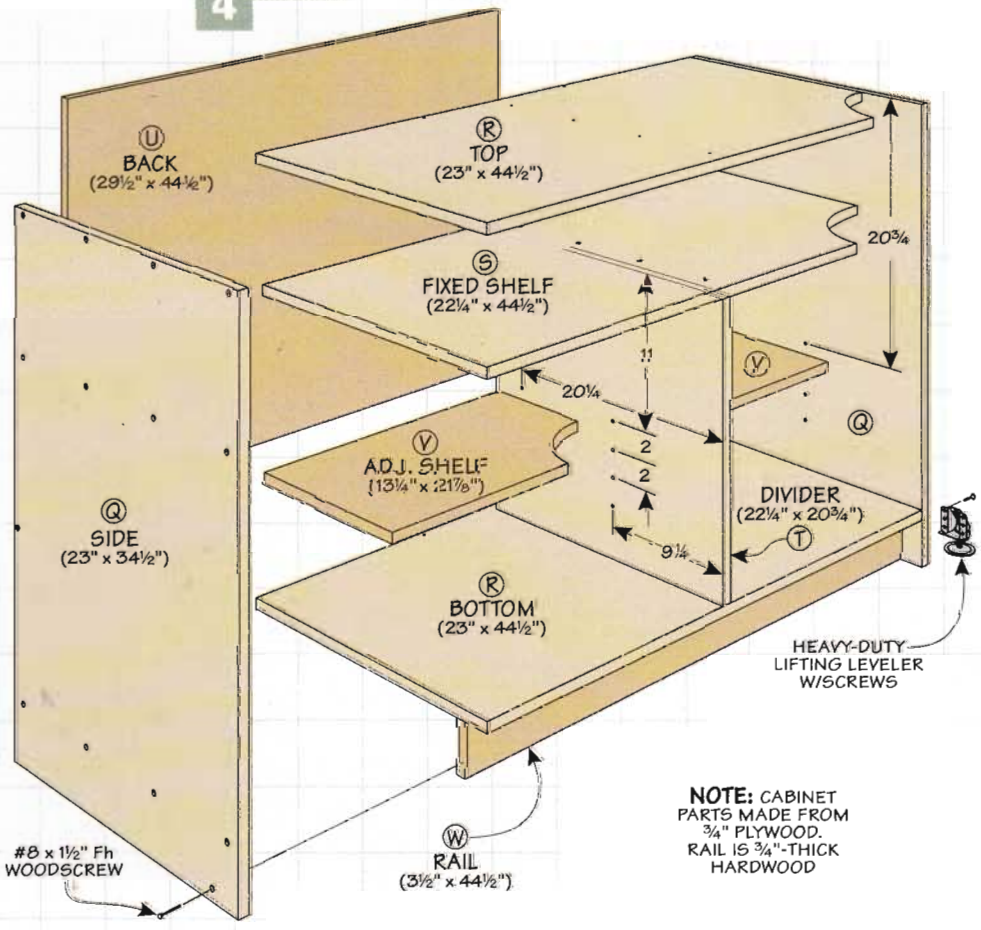
Because there's limited clearance between the top and fixed shelf, you'll need to install the fixed shelf and divider before adding the top. Here again, I used the divider as a spacer to locate the fixed shelf.

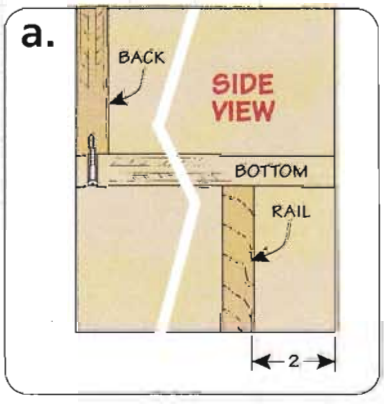
Rail & Back. With the case of the workbench complete, the back and front rail come next. Besides adding overall strength, the back also prevents the bottom from sagging. The bottom is fastened to the back panel with screws. And the front rail supports the bottom. This combination makes a stiff and stable cabinet to stand up to heavy shop use. At this point, you can go ahead and install the levelers on the front edges before getting to work on the drawers.

Two Drawers. To expand my storage options and provide a place for smaller items, I added two drawers, as you see in the photo above. The simple, rabbeted joinery on the drawer box is reinforced with screws. A hardwood false front completes the look. Each drawer is installed on a pair of full-extension metal slides.

Rabbet Joints. If you take a look at Figure 5, you'll see how the drawer box is made from ½"-thick stock. After cutting the sides, front, and back to size, I used a dado blade to form the rabbets in the sides that connect the front

FIGURE 4





and back. Then you'll need to cut a groove on the inside faces to hold the ¼" plywood drawer bottom.

Drawer Assembly. Assembling the drawers is a breeze. With a little glue applied to the rabbets, a couple of screws draw the joint tight without the need for clamps. You just need to make sure the assembly is square.

Drawer Slides. Now that the drawers are ready to go, you need to install the four drawer slides in the bench cabinet. Once the slide components are installed in the cabinet and on the drawer box, you can insert the drawers into the cabinet and work on the false fronts.

False Fronts. The hardwood drawer fronts are cut to size and fastened to the drawer box from the inside with screws. The false fronts overlay the edges of the fixed shelf and sides. And there's a ⅛" gap between the false fronts (Figure 5a). After attaching the false fronts, you can screw the utility pulls in place.

Benchtop. The solid-wood top is one of the key elements of the workcenter. Not only does it provide a solid worksurface, but it also incorporates the look and feel of a traditional woodbench in this compact modern design.

The top is glued up from 1½"-thick strips. I used straight-grained stock and arranged the strips with the edge grain up to minimize any chance of warping. After sizing the top and sanding it smooth, you can attach it to the cabinet.

Add A Vise. No workbench is complete without a good woodworking vise. And with the solid-wood top on the workcenter, adding a heavy-duty vise is no problem.

I used a 7" vise that fastens to the benchtop from underneath. But to align the top of the vise jaws with the top of the bench, you need to add a spacer. Shop Short Cuts on page 22 shows an easy way to mount the vise and keep everything aligned. You can see how it works in Figure 6.

With all the storage and worksurfaces positioned along a single wall, this workcenter is ideal for a garage shop. You just load it up with tools and get to work. At the end of the day, it's easy to put everything back in its place and clean up, with plenty of room left for cars and bikes. Turn the page to add a router table for even more shop efficiency.

FIGURE 5

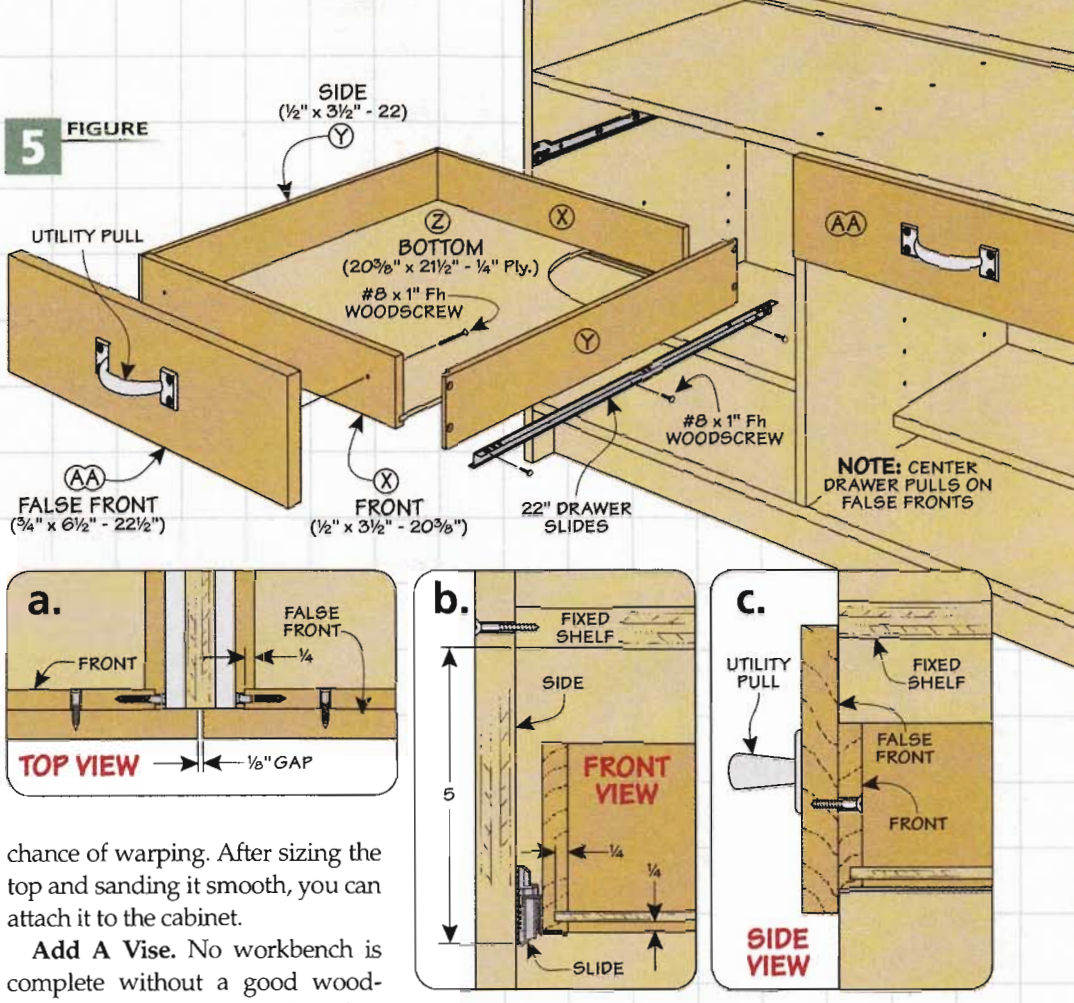
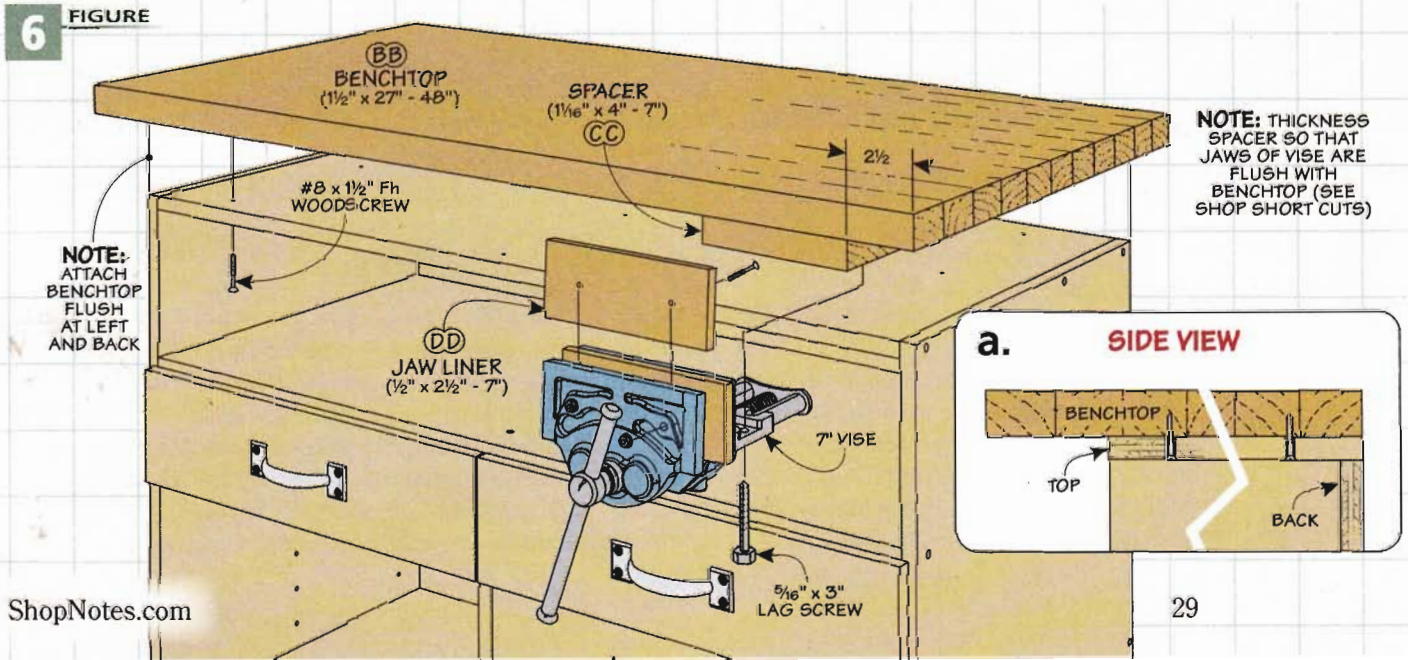


FIGURE 6



storage solutions

flip-down Router Table

This compact project proves you don't need a large, expensive router table to get big-time results.

Following the theme of maximizing space in the workshop featured on page 24, I added this flip-down router table. The small size means it doesn't take up a lot of space. And the built-in features provide all the benefits of a larger router table.

It all starts with the simple wall-mounted cabinet. Built for storage, your router, bits, and table fence all stow out of the way when not in use.

Since the table does all the work, the benefits continue there, as well. The T-tracks give you all the adjustment you need for the compact fence. And powerful toggle clamps underneath hold your router securely, yet allow quick removal for storage.

If your shop is tight on space, this router table may be just the solution you're looking for. Plus, it doesn't take a lot of material or time to build.

◀ Compact Storage. *When not in use, the router table folds up against the wall while the fence and router tuck neatly inside.*

Exploded View Details

OVERALL DIMENSIONS:
7½"D x 25½"W x 42¼"H (STORED SIZE)

SLIDE BOLT LOCKS TABLE IN STORED POSITION

SIMPLE JOINERY MAKES ASSEMBLY A BREEZE

CLEATS SUPPORT ROUTER TABLE FENCE FOR STORAGE

SHELVES ALLOW FOR AMPLE ROUTER BIT STORAGE

PLYWOOD BACK PROVIDES STRENGTH TO THE CABINET

CABINET BOTTOM NESTLES ROUTER FOR STORAGE

ADJUSTABLE PLYWOOD FENCE LOCKS INTO POSITION ON T-TRACK

SIMPLE HARDWARE SECURES FENCE DURING USE

TOGGLE CLAMPS SECURE ROUTER TO TABLE

TABLE PIVOTS UP TO STORE AGAINST WALL WHEN NOT IN USE

FILLER ADDS SUPPORT UNDER T-TRACK

TABLE RESTS ON BENCHTOP DURING USE

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To download a 3-D model of the router table, go to ShopNotes.com

wall-mounted

Router Table

Building the router table starts with the wall-mounted cabinet. The cabinet provides the anchor point for the flip-down table and plenty of storage for your router and all the bits — and even the fence. Later, you'll add the table.

Cabinet Frame. The router cabinet is a simple frame assembled with butt joints. A plywood back provides a solid surface for mounting the finished cabinet to the shop wall. Figure 6 gives you all the details you need.

What's unique about this cabinet is the bottom. It's designed with a recess to stow your router away when not in use. For this reason, you may need to size the recess to fit your router. (Mine was designed to fit a *Porter-Cable 690/890* router.) To find out details on how to create this recess (and the one on the underside of the router table), refer to page 22.

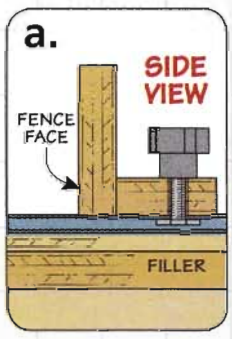
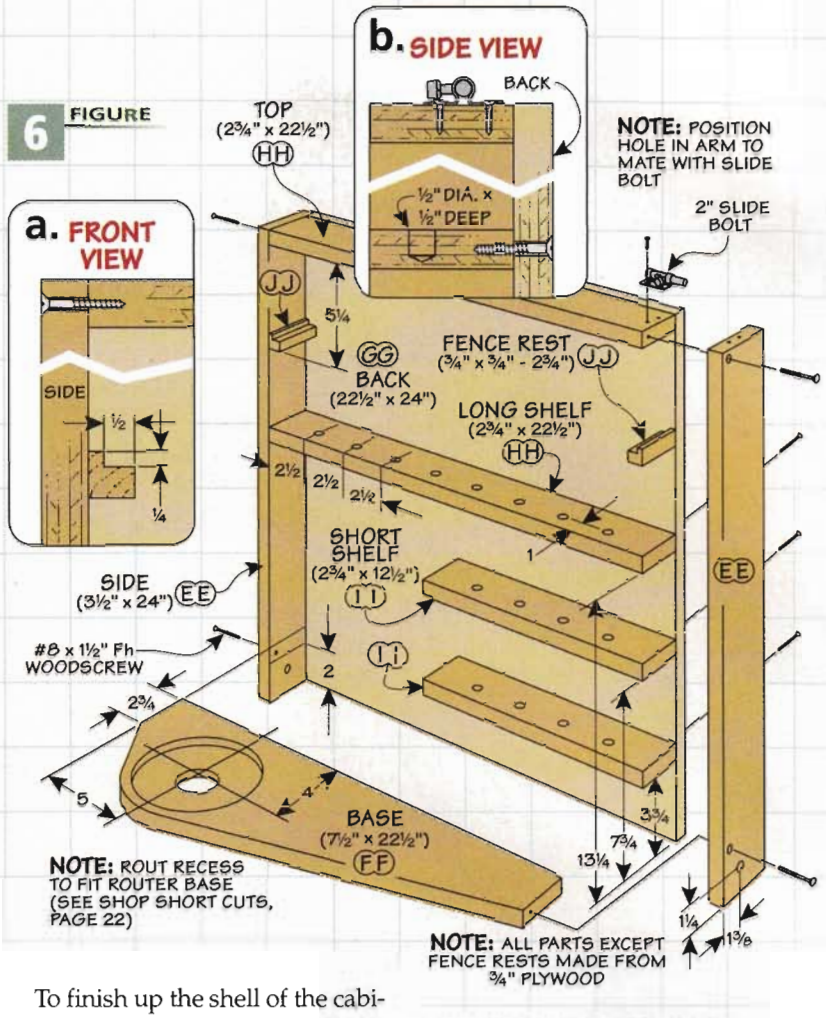


FIGURE 6

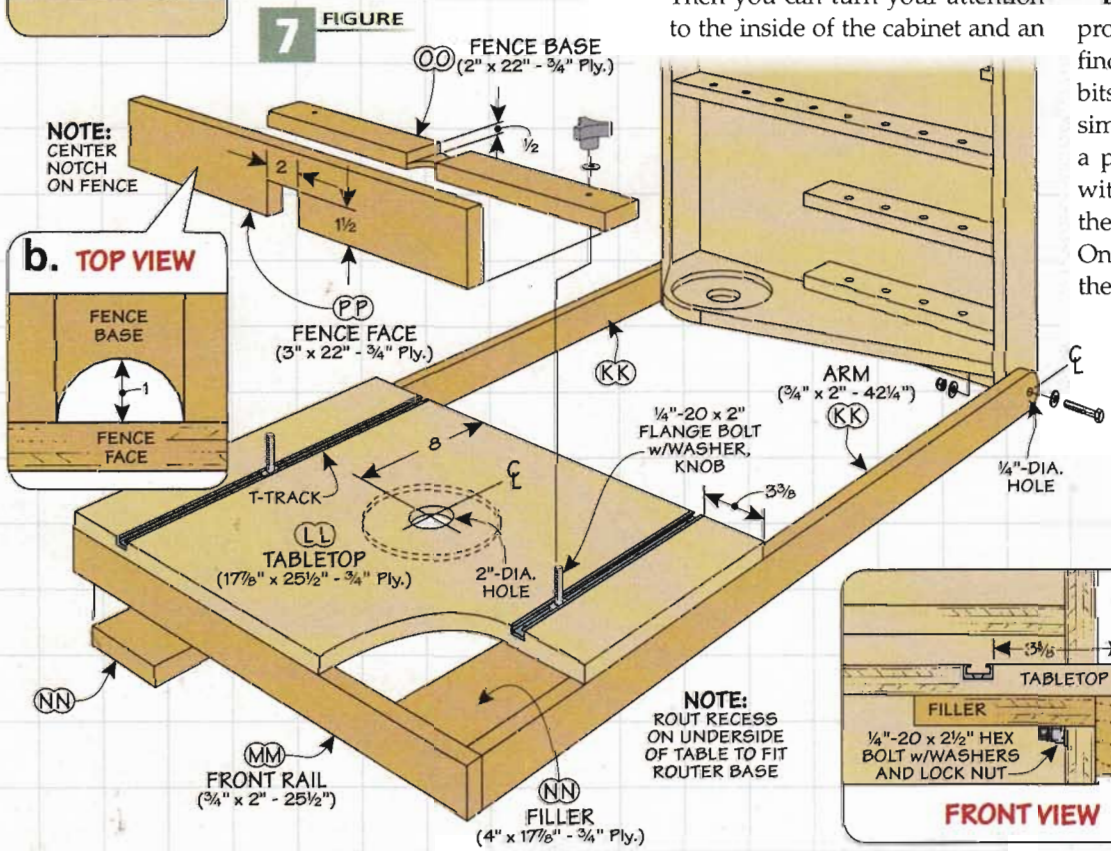


To finish up the shell of the cabinet, you can cut the plywood back to size and attach it with screws. Then you can turn your attention to the inside of the cabinet and an easy solution for bit storage, as detailed in Figure 6.

Bit Storage Shelves. One of the problems with most router tables is finding a place to store your router bits. With this design, it couldn't be simpler. One full-length shelf and a pair of shorter ones are drilled with stopped holes sized to match the shank diameter of your bits. Once you have that done, attach the shelves to the back with glue and screws.

Fence Rests. The last things to add to the case are the rabbeted hardwood cleats used for storing the fence. For these, I rabbeted

FIGURE 7



an oversize blank and then cut the cleats to size and installed them.

Installation. With the case complete, you're ready to hang it on the wall. To install the cabinet, simply place it on top of your workbench and slide it back against the wall. Secure it to the wall with lag screws into the wall studs.

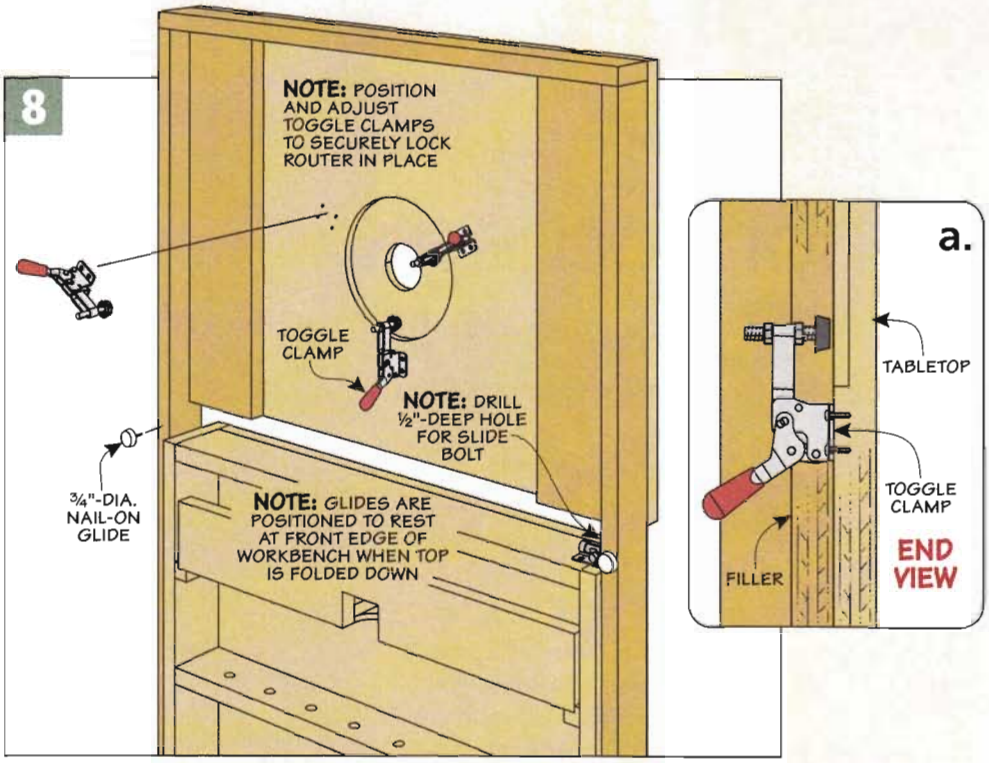
Router Table. Next, you can take a look at Figure 7 to find out what's involved in building the router table. Two long arms connect to the case and form the sides of the table. A front rail connects the arms. A plywood top and fence complete the assembly.

Arms. To get started, cut the arms to length. Then drill a pivot hole (Figure 7) for the arms so they can move freely. Using the pivot hole as a centerpoint, mark the arc on the ends of the arms and cut them to shape on the band saw.

Tabletop. The plywood top comes next. After cutting it to fit on top of the frame arms and front rail, cut the dadoes for the two pieces of T-track. Then you'll need to create a recess on the underside to fit your router (refer to Shop Short Cuts on page 22 and Figure 8).

After installing the toggle clamps that secure the router, you can glue the top to the arms and front rail. To reinforce the top under the T-track, I added plywood fillers.

After installing the nylon glides, attach the arms with bolts, washers, and lock nuts. A simple slide bolt keeps the table in the stowed position against the wall. Install the slide bolt on top of the case first to locate the hole in the arm for the bolt. Now you can move on to making the fence.



Router Table Fence. The last piece to finish up is the simple plywood fence for the router table. You can see how it's made in Figure 7. The fence is attached to the table with flange bolts, washers, and knobs.

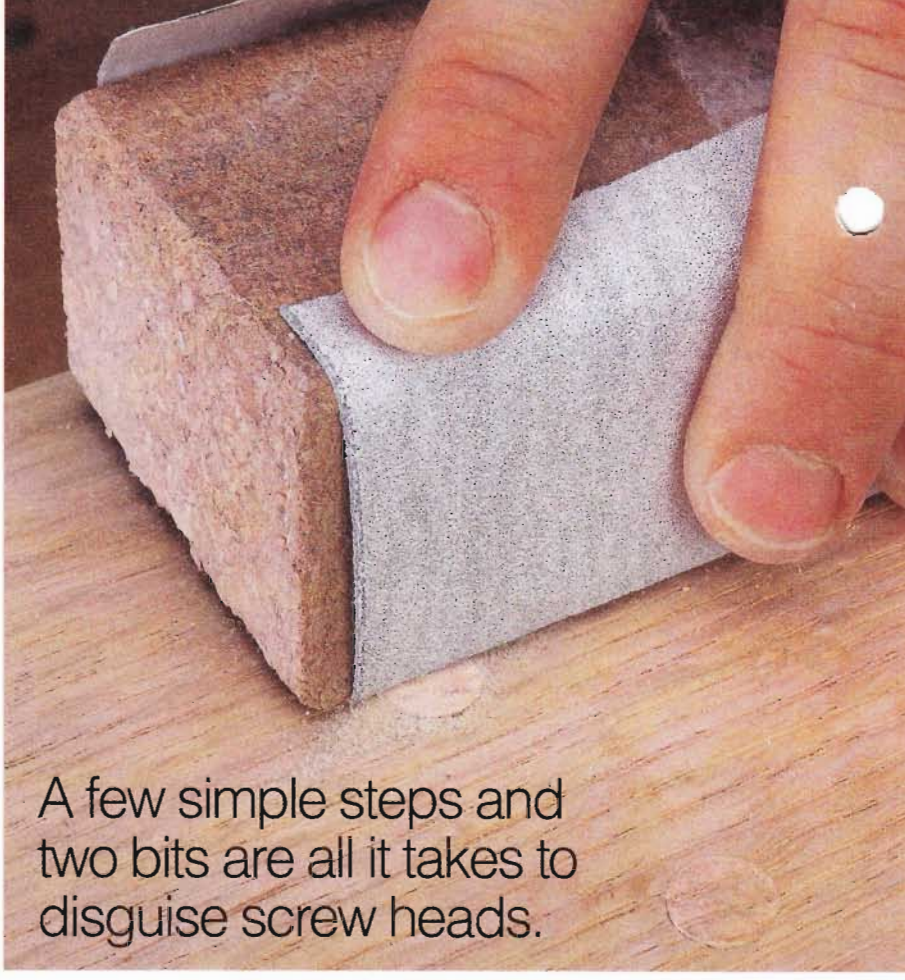
Now you're ready to install your router and give your new router table a test run. I think you'll find it can handle just about any routing task you can throw at it.

Materials & Hardware

END CABINET		
A	Sides (2)	23 x 80 - ¾ Ply.
B	Top/Fixed Shelf (2)	23 x 37 - ¾ Ply.
C	Divider (1)	22¼ x 38 - ¾ Ply.
D	Back (1)	37 x 38 - ¾ Ply.
E	Small Shelf (1)	18⅛ x 22¼ - ¾ Ply.
F	Rails (2)	¾ x 3½ - 37
G	Tray (1)	17⅝ x 22 - ¾ Ply.
H	Tray Front (1)	¾ x 3 - 18¾
I	Tray Cleat (1)	1½ x 1½ - 13
J	Tray Lock (1)	¾ x 1½ - 19½
CENTER CABINET		
K	Sides (2)	23 x 80 - ¾ Ply.
L	Top/Fixed Shelf (2)	23 x 48 - ¾ Ply.
M	Divider (1)	22¼ x 30 - ¾ Ply.
N	Back (1)	48 x 30 - ¾ Ply.
O	Adjustable Shelves (3)	14 x 23⅝ - ¾ Ply.
P	Rails (2)	¾ x 3½ - 48
WORKBENCH		
Q	Sides (2)	23 x 34½ - ¾ Ply.
R	Top/Bottom (2)	23 x 44½ - ¾ Ply.
S	Fixed Shelf (1)	22¼ x 44½ - ¾ Ply.
T	Divider (1)	22¼ x 20¾ - ¾ Ply.
U	Back (1)	29½ x 44½ - ¾ Ply.
V	Adjustable Shelves (2)	13¼ x 21⅞ - ¾ Ply.
W	Rail (1)	¾ x 3½ - 44½
X	Drawer Front/Back (4)	½ x 3⅛ - 20⅜
Y	Drawer Sides (4)	½ x 3½ - 22
Z	Drawer Bottom (2)	20⅜ x 21½ - ¼ Ply.
AA	False Front (2)	¾ x 6½ - 22½
BB	Benchtop (1)	1½ x 27 - 48
CC	Vise Spacer (1)	1 1/16 x 4 - 7
DD	Jaw Liners (2)	½ x 2½ - 7
ROUTER TABLE		
EE	Sides (2)	3½ x 24 - ¾ Ply.
FF	Base (1)	7½ x22½ - ¾ Ply.
GG	Back (1)	22½ x 24 - ¾ Ply.
HH	Top/Long Shelf (2)	2¾ - 22½ - ¾ Ply.
II	Short Shelves (2)	2¾ - 12½ - ¾ Ply.
JJ	Fence Rests (2)	¾ x ¾ - 2¾
KK	Arms (2)	¾ x 2 - 42¼
LL	Tabletop (1)	17⅞ x 25½ - ¾ Ply.
MM	Front Rail (1)	¾ x 2 - 25½
NN	Fillers (2)	4 x 17⅞ - ¾ Ply.
OO	Fence Base (1)	2 x 22 - ¾ Ply.
PP	Fence Face (1)	3 x 22 - ¾ Ply.

- (136) #8 x 1½" Fh Woodscrews
- (28) #8 x 1" Fh Woodscrews
- (2) ¼"-20 x 2½" Hex Bolts
- (6) ¼" Washers
- (2) ¼"-20 Lock Nuts
- (2) 6½" Utility Pulls
- (1 pr.) 22" Full-Ext. Drawer Slides
- (1) 36" T-Track
- (2) ¼"-20 x 2" Flange Bolts
- (2) ¼"-20 Knob w/Insert
- (3) Toggle Clamps
- (2 pr.) 22" Full Extension Drawer Slides
- (1) 7" Bench Vise
- (6) Heavy-Duty Lifting Levelers
- (1) 2" Slide Bolt
- (2) ¾"-dia. Nylon Nail-On Glides
- (4) 5/16" x 3" Lag Screws w/Washers

concealing Screw Joints



A few simple steps and two bits are all it takes to disguise screw heads.

Using screws to assemble a project not only makes for strong joints but it also saves time. For example, reinforcing rabbet or dado joints with screws guarantees a long-lasting joint and allows you to skip the clamps and the time waiting for glue to dry. But, in most cases this technique does require a method of hiding the screw heads.

One tried-and-true approach is to cover the screws with matching wood plugs. With a good grain and color match, you can make the plugs nearly invisible, as you can see in the photo below.

A benefit of adding plugs is that it only takes a few steps. Instead of merely countersinking the screw flush with the surface, it's recessed slightly below the surface. You can see how this works in the inset photo below. Then a wood plug is created to fit the counterbore, glued into place, and trimmed flush.

As basic as that sounds, there are some key things to keep in mind as you work. First, you need to start with a strong screw joint. And that means you need to drill an accurate and perfectly aligned counterbore, shank hole, and pilot hole.

Combination Bit. It's possible to do this in three separate steps. However, it's quicker and more accurate to simply use a combination countersink bit, like you see in the left margin photo.

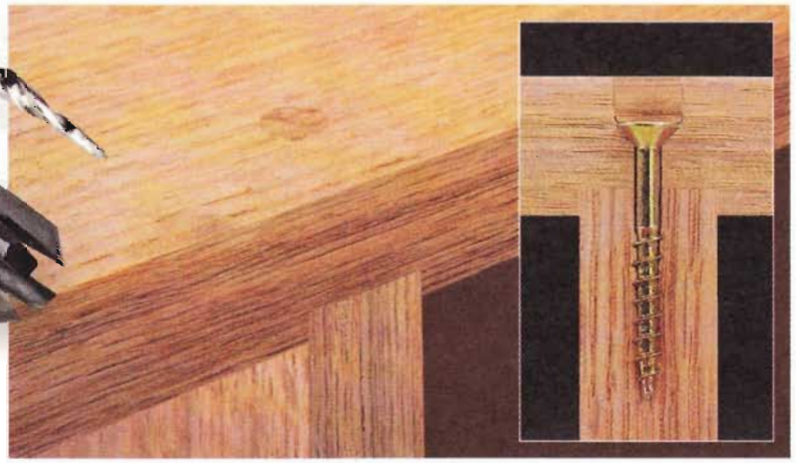
One big advantage of this style of bit is a stop collar that controls the depth of the counterbore. If the counterbore is too deep, you can weaken the joint. This is especially true if you're using screws to reinforce a rabbet or dado. In ¾"-thick material, the counterbore shouldn't be more than ¼" deep.

Tapered Plugs. After securing the joint with glue and screws, you can turn your attention to making the plugs. Once again, I turn to a special bit. I prefer to use cutters that create a slightly tapered plug. You can find them at most online woodworking retailers. (Several are listed in the margin on page 51.)

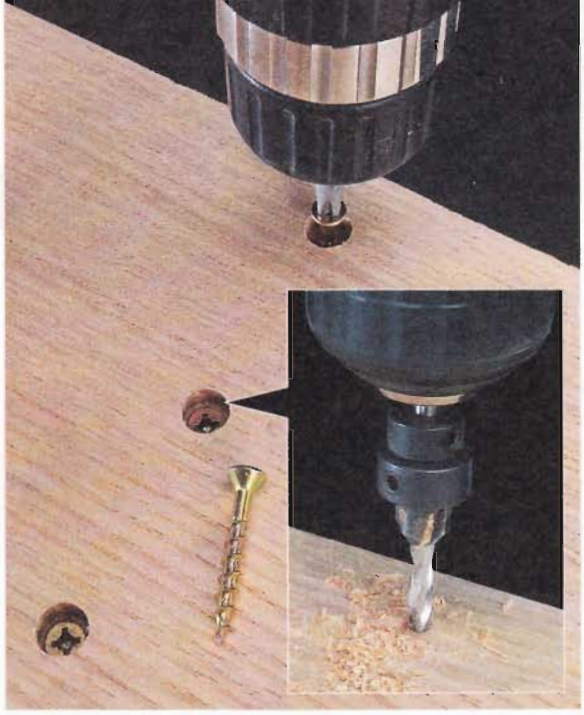
The angled flutes on these cutters create a rounded, cone shaped plug that fits in a hole like a cork in a bottle. The result is a tight fit for a nearly seamless look.

A plug cutter is designed to be used in a drill press. And to make sure you end up with smooth,

▲ ***Right Bits.*** *A countersink bit (top) and a tapered plug cutter (bottom) are all you need to create and hide screw joints.*



▲ ***Nearly Invisible.*** *A tapered plug wedges snugly into a shallow counterbore. Below the plug, a screw rests in a matching shank hole and pilot hole to reinforce the joint, as you can see in the inset photo.*



▲ ***Install Screws.*** *Use a combination bit to drill pilot holes and counterbores (inset). Then drive the screws to secure the joint.*

▲ ***Create The Plugs.*** *Make plenty of plugs from some scrap material used on the project (inset). Then cut them free at the band saw.*

even sides, it's best to use a relatively slow speed (500-600 RPM).

Make a Match. As I said earlier, the goal is creating an invisible plug. So you want to take extra time in selecting a wood for the plugs. I like to use a scrap piece from some of the same material I used for the other parts of the project.

A tapered plug needs to go into the counterbore "topside down" to wedge tightly into place. So you can't necessarily go by the face grain of the board to get an exact match. The solution is to create plenty of extra plugs so you end up with the best grain match, as shown in the upper right inset photo.

There's one other thing to note about making the plugs: In order to get full advantage from a tapered plug, you'll need to drill down to the full depth of the cutter.

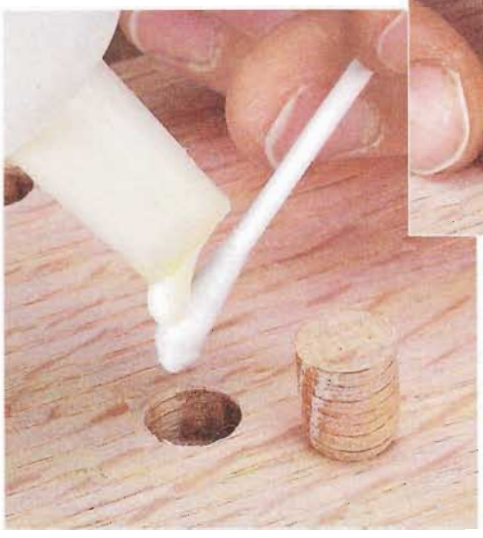
To remove the plugs from the blank, head over to the band saw. Use a fence to set the length of the plugs. They should be longer than the depth of the counterbore, as in the upper right photo.

The next step is to match both the grain pattern and color as closely as possible. So gather up the plugs and start comparing plugs with the surrounding wood near the screw holes.

Glue in the Plugs. One of the benefits of using tapered plugs is that they wedge into place with a few, light taps. But I still like to add a small of dab glue just to be sure (lower left photo). What you want to avoid is squeezeout. Excess glue can affect the finish you apply later and draw attention to the plug.

Trim the Plugs. At this point, you have plugs that are still proud of the surrounding surface. Trimming them flush is done in several quick steps. Start by cutting each plug close to the surface with a hand saw. As you cut, be careful to protect the surface, as shown in the lower right photo.

This will leave the plugs a little proud. So I like to use a sanding block with some 120-grit sandpaper to level the plugs with the surface (main photo on the opposite page). The result is a screw hole that's nearly invisible.



▲ ***Match Plugs & Glue.*** *Choose a plug with grain and color that's a good match with the surrounding wood (inset). Glue it in with a small dab of glue.*

◀ ***Cut It Close.*** *Use a hand saw to trim away most of the plug. A business card keeps the teeth of the saw from marring the surface.*

super-charge Your Shop Vacuum

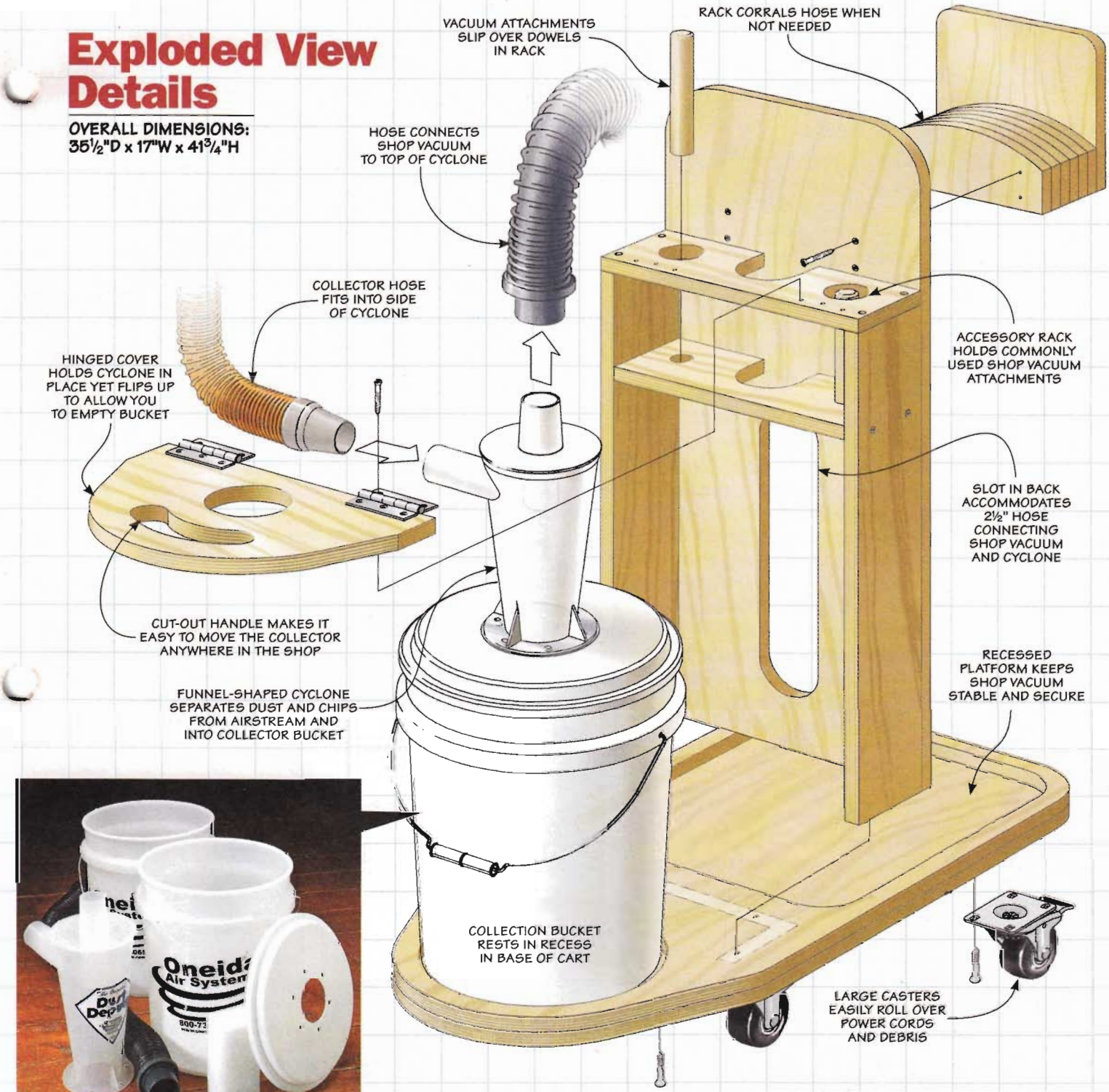
A low-cost cyclone kit and this simple cart turn a shop vacuum into a top-notch dust collector.

A shop vacuum comes in handy to collect dust and chips from power tools and for all-around shop cleanup. But it doesn't take long for the filter inside the canister to clog with dust, which reduces its effectiveness.

To prevent this from happening, *Oneida Air Systems* designed its *Dust Deputy* kit shown above. It features a small, plastic cyclone separator to direct most of the dust and chips into a five-gallon bucket. The kit shown in the photo on the facing page includes some foam blocks and an extra bucket to attach the cyclone directly to the side of the vacuum canister. As the bucket fills with chips though, things can get unbalanced. So I designed the roll-around cart shown above to create a stable, compact dust collecting center.

Exploded View Details

OVERALL DIMENSIONS:
35½"D x 17"W x 41¾"H



▲ ***Oneida Cyclone Kit.*** *The Dust Deputy kit includes the cyclone, two buckets, mounting hardware, foam blocks, and connector hose. For sources, turn to page 51.*

Materials & Hardware

A	Bottom and Rim (2)	17 x 35½ - ¾ Ply.
B	Sides (2)	4½ x 25 ¾ - ¾ Ply.
C	Top (1)	4½ x 14 - ¾ Ply.
D	Shelf (1)	4½ x 12½ - ¾ Ply.
E	Back (1)	14 x 36 - ¾ Ply.
F	Attachment Rods (2)	1 x 1 - 6½
G	Cover (1)	9¼ x 14 - ¾ Ply.
H	Hose Holder (1)	9 x 4 - 4½ Ply.
I	Holder End (1)	9 x 9 - ¾ Ply.

- (4) 3" Swivel Casters w/Screws
- (28) #8 x 1½" Fh Woodscrews
- (7) #8 x 3" Fh Woodscrews
- (1 pr.) 3" Utility Hinges w/Screws
- (1) Dust Deputy Cyclone Kit

roll-around Cart

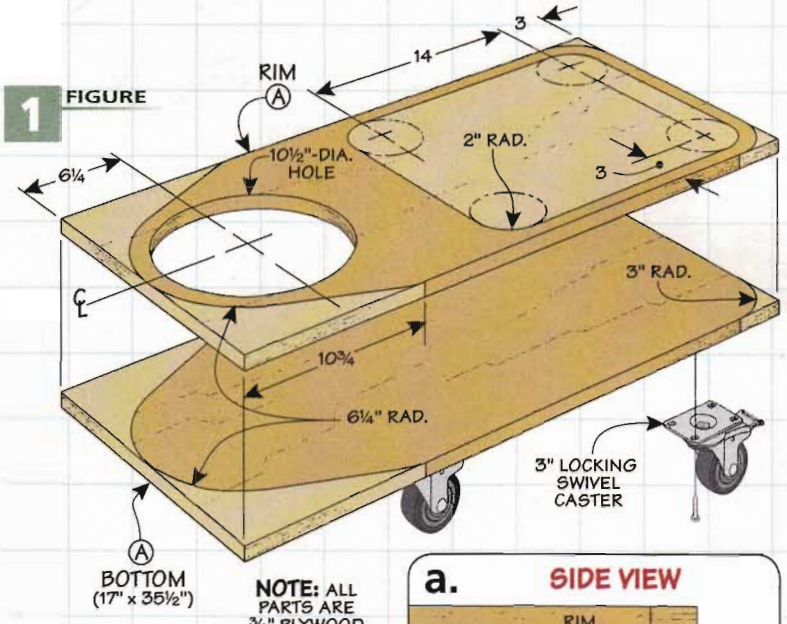
The main purpose of this simple cart is to provide a single platform for both a shop vacuum and the *Dust Deputy* system. But you'll find there are a few other features as well. For starters, a flip-up cover adds stability to the tall, slender cyclone. Pulling on the hose could cause the cyclone to tip over without this extra support.

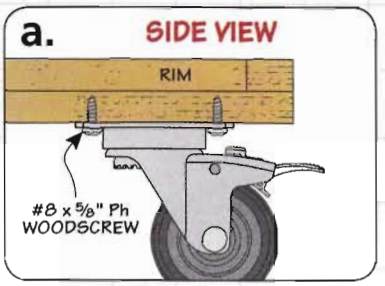
Another feature is the center column. On one side, there's a rack for storing a couple commonly used shop vacuum accessories. Then on the other side, there's a rack that's designed to hold the vacuum hose.

Additionally, the rounded base won't catch on your tools or workbench. And the large, 3" casters aren't likely to get caught on power cords or cracks in the floor.

Finally, the cart is made from ordinary, inexpensive plywood. And due to its straightforward joinery, you can build it and put it to use in a weekend.

FIGURE 1





STABLE BASE

I began building the cart from the base up since all the other parts are attached to it. The base is sized to hold the cyclone, bucket, and vacuum, as shown in Figure 1.

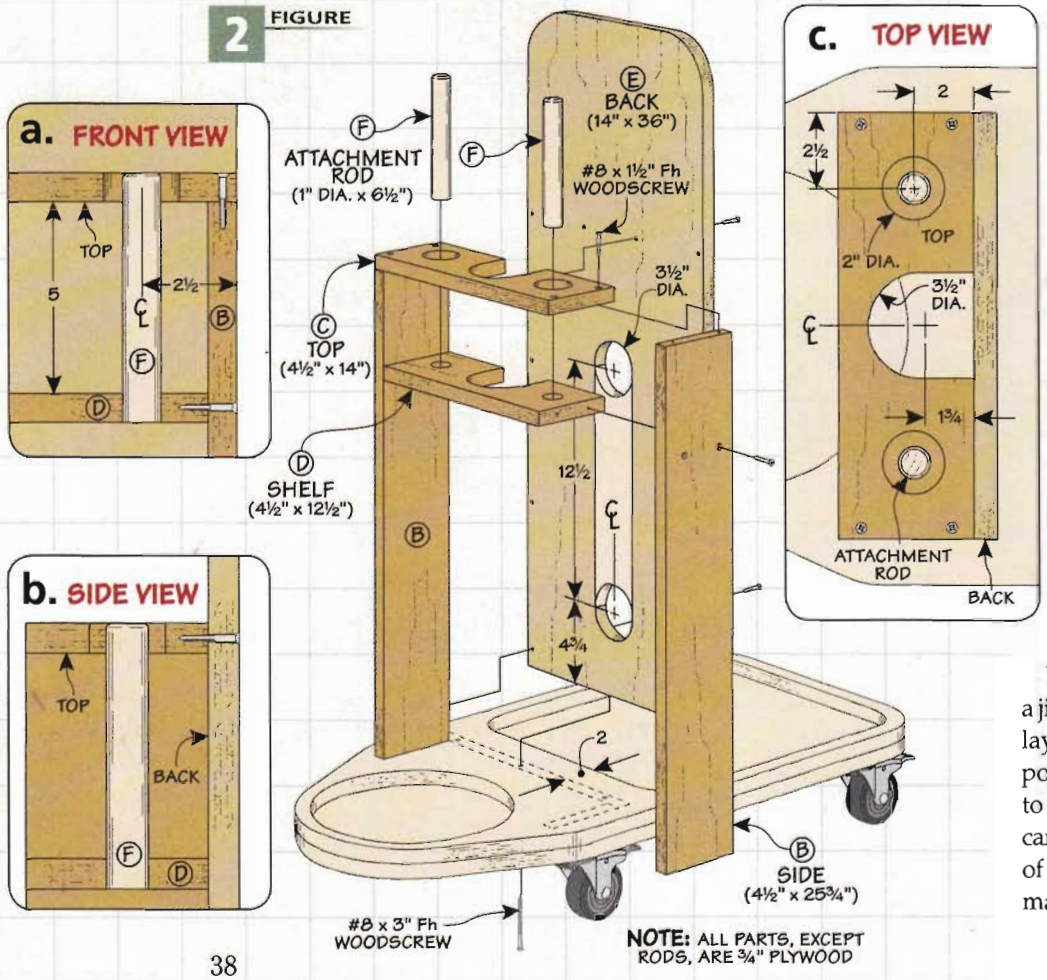
Two-Layer Base. The base actually consists of two layers of plywood. The first layer is solid. The second layer has a pair of cutouts. The cutout on one end captures the five-gallon cyclone bucket. On the other end, the cutout creates a rim to keep the shop vacuum from rolling off the base.

To create the cutouts, I started by cutting two rectangular blanks at the table saw to match the width and length shown in Figure 1.

I set one of the blanks aside for the time being and marked the location and size of the cutouts on the other blank. The cutout for the shop vacuum is sized to accommodate most models, but it's a good idea to check the overall "footprint" of your vacuum before moving on.

You can create the cutouts with a jig saw. Drill a hole just inside the layout lines to provide a starting point for the jig saw. Cut as close to the waste side of the line as you can. This will reduce the amount of time it takes to sand away blade marks and clean up the edges.

FIGURE 2



Final Size. With the cutouts complete, you can lay out the final shape on the blank. Here again, I used a jig saw to make the cuts and then sanded everything smooth.

Now that one layer is complete, you can use it as a template to shape the other one so they're identical. I glued the two pieces together making sure to align the square end and long edges. Simply rough cut the bottom layer then trim it flush using a handheld router and a pattern bit.

The final step to complete the base is to attach the casters to the bottom with screws (Figure 1a).

ACCESSORY COLUMN

Located between the two cutouts in the base is the column. As I mentioned before, it provides stability to the cyclone and has racks for vacuum attachments and the hose.

The column is made up of a pair of sides. These are connected by a top and shelf (Figure 2). Both the top and shelf have a cutout on one edge to accept the hose that connects the cyclone to the shop vacuum.

Accessory Rack. These pieces also have a pair of holes to hold the shop vacuum accessories. Just keep in mind that the holes aren't the same size, as shown in Figure 2a. The lower holes accept a length of dowel that supports the hose attachments (Figure 2b).

Back. The next piece to make is the back of the column. It's rounded on the top to soften the corners. There's a slot cut in it to allow the connecting hose to pass through, as in Figure 2. You can make this slot the same way as you made the cutouts in the base.

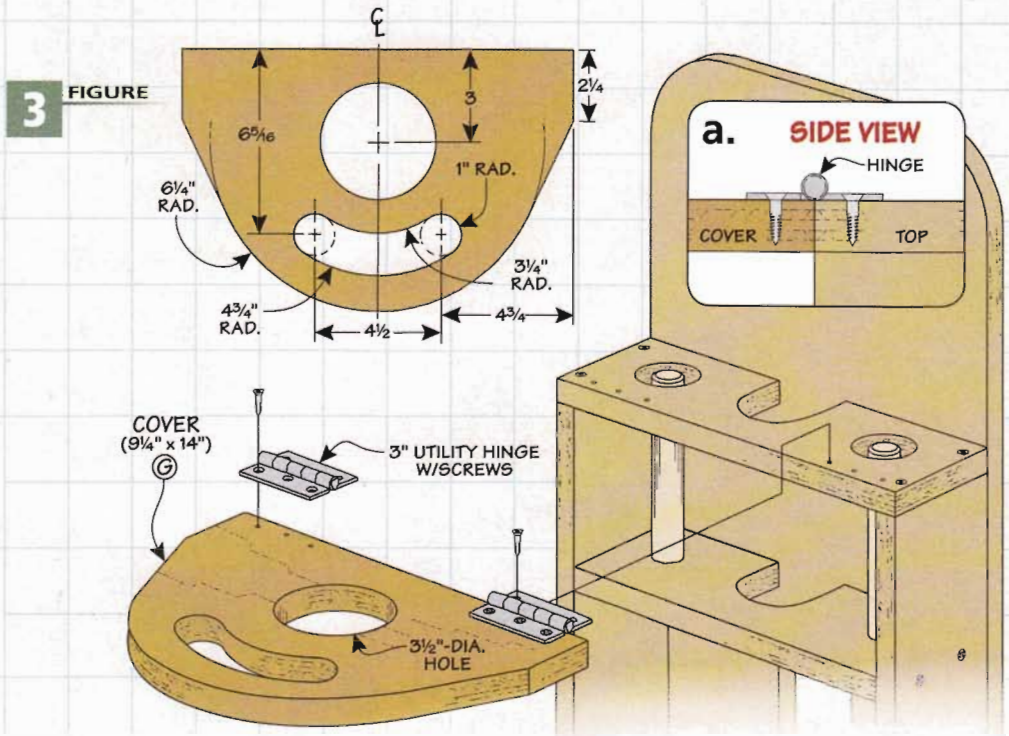
Cover. On the front of the column I added a hinged cover. It's rounded to match the shape of the base, as you can see in Figure 3.

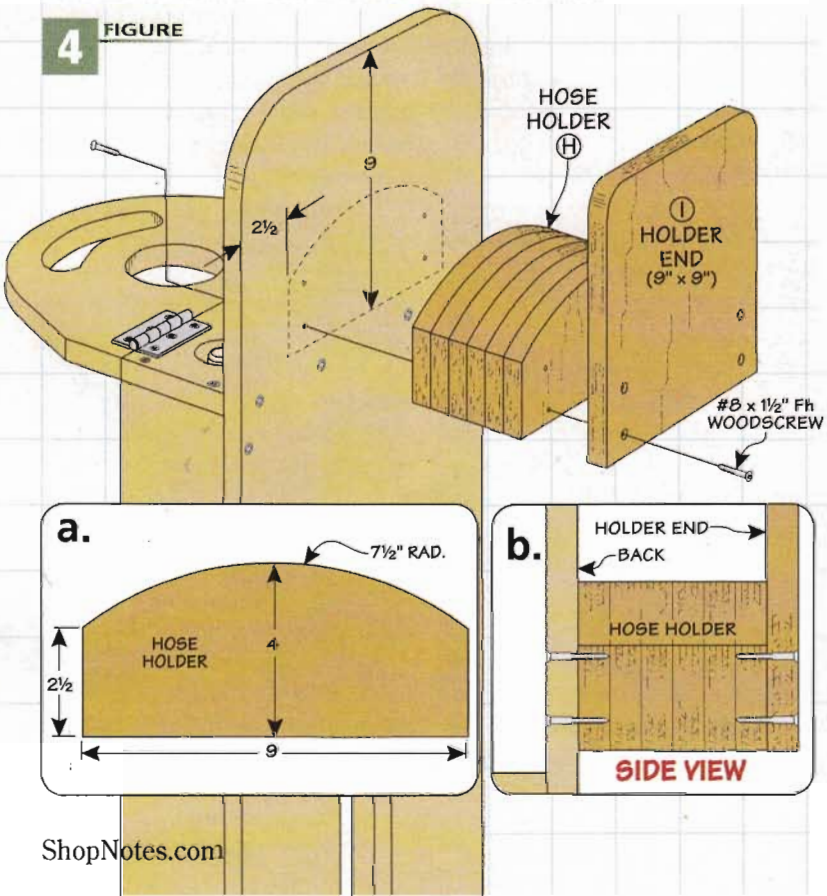
The cyclone fits through a large hole in the cover to keep it stable in use. When you need to empty the bucket, simply remove the top hose and flip the lid clear. The cover also has a curved slot that serves as a handle.

Vacuum Hose Holder. The final component to make for the cart is the hose holder that mounts on the back side of the column, as illustrated in Figure 4. The holder consists of six layers of plywood. Here again, I shaped one layer and used it as a template to create the other layers one at a time.

The vacuum hose is held in place by an end piece. The end piece is attached to the hose holder with screws (Figure 4a). The hose rack is screwed to the column through the back, as shown in Figure 4b.

With the cart complete, you can set the vacuum and cyclone in place and thread the connecting hose through the column. Now you're ready to hook it up to your power tools and start collecting dust and chips.



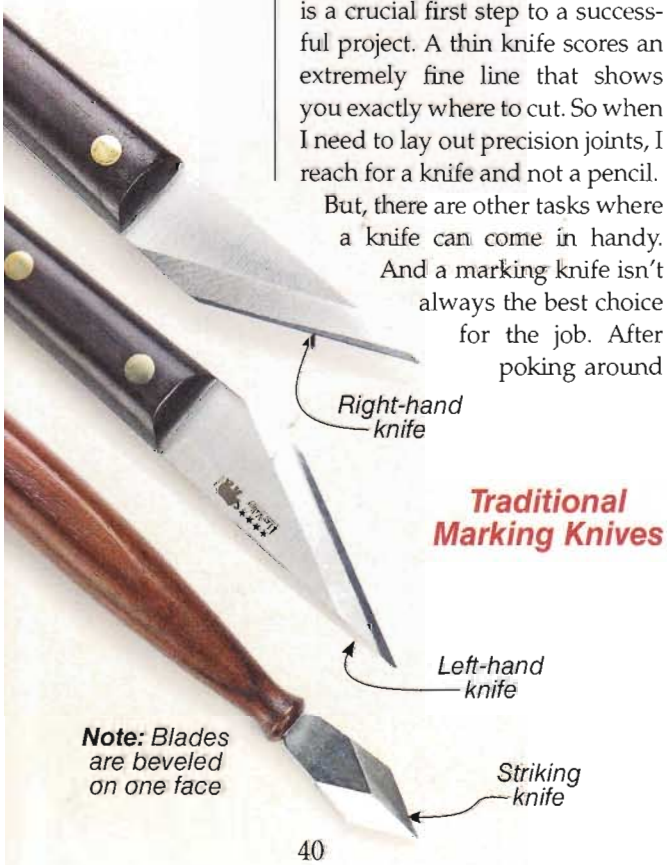


all about Shop Knives

A good knife or two is a versatile addition to any toolbox. Here are our favorite shop knives.

When you think of a knife in a woodworking shop, the first thing that comes to mind is a traditional marking knife. And the reason is simple. Accurate layout is a crucial first step to a successful project. A thin knife scores an extremely fine line that shows you exactly where to cut. So when I need to lay out precision joints, I reach for a knife and not a pencil.

But, there are other tasks where a knife can come in handy. And a marking knife isn't always the best choice for the job. After poking around the toolboxes of a few woodworkers here, I came across several styles of knives. And I learned about the uses and advantages of each one.



Traditional Marking Knives

TRADITIONAL STYLE

The first type of knife I want to talk about is the traditional-style marking knife. These tools are designed primarily for layout.

The feature that makes a marking knife different from most other knives is how the blade is beveled. An ordinary knife blade is beveled on both faces and it has to be held just right to create an accurate mark when using a straightedge.

The blade on a marking knife, on the other hand, is only beveled on one face. The back face is perfectly flat. In use, the flat face is placed against a straightedge or square, as shown in the main photo above. This way, it's easy to mark the line exactly where you want it.

Marking knives have a few other features. Just like a chisel or plane iron, marking knife blades are meant to be resharpened to keep them working their best.

Right & Left. Marking knives come in two main styles, as shown in the left margin photo. In the most common style, the blade angles in one direction. That means there's a left and right-hand version. For most tasks, you can get by with just the knife that matches your dominant hand. But having a matching pair gives you more versatility.

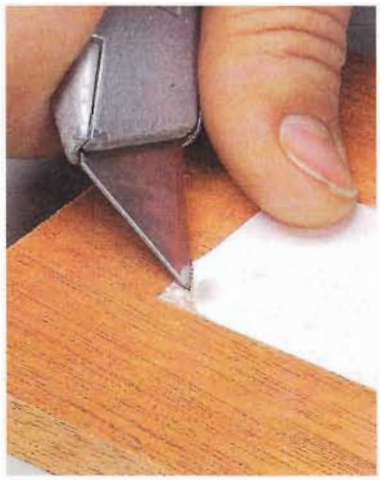
Striking Knife. The other kind of marking knife — a striking knife — is shown in the lower left margin photo. As you can see, the blade is angled in both directions like the tip of a spear. This tool combines a right and left-hand knife into one tool. So making the opposite layout mark is as simple as flipping the tool around.

UTILITY KNIVES

Marking knives are best for laying out precision joinery. But there are a lot of other jobs around the shop where a knife can really come in handy. That's why many woodworkers usually have a utility knife (or two) close at hand.

Small Utility Knife

► **Pen Sized.** *Small enough to fit in an apron pocket, it's easy to keep this knife close at hand.*



◄ **Thin Blade.** *The thin blade allows you to perform difficult tasks precisely, like peeling the backing off double-sided tape.*

Utility knives have a few things going for them. The first is the replaceable, razor-type blade. It's strong and sharp so you can cut a range of materials. And it's thin enough for making fine cuts.

The blade is beveled on both faces. So to make accurate layout marks, you'll need to tilt the knife slightly so that one bevel rides tightly against a square.

Around the shop, I came across two versions of the utility knife. You can see them in the photos above.

Small Utility Knife. The first kind of utility knife was a bit of a surprise. It's about the size of a pen and has a plastic handle.

At first glance, it seems more suited to a kitchen junk drawer. But this simple tool can do just about anything a traditional marking knife can. A unique feature is that the long blade is divided into a number of short sections. When one gets dull, you can snap it off to expose a fresh edge, as shown in the upper left photo.

Large Utility Knife. The other type of utility knife is shown in the upper right photo. With a replaceable, reversible razor blade, a utility knife is something just about every shop needs. The best feature is that when a blade gets too dull to do its job, you can flip it around or swap it out in a few seconds.

You aren't limited to the standard razor blade either. If you take a look at the upper right photo, you can see several other blades that are available.

A utility knife isn't the only kind of knife that accepts different styles of blades. You can learn more about another versatile knife in the box below.

Using a knife is a great way to improve the accuracy of your layouts. But a good knife should do more. It can also be a pocket-sized problem solver and is a handy addition to your tool kit.

versatile Craft Knife

I like to think of a craft knife as an all-in-one cutting tool. That's because there are so many types of interchangeable blades available (photo at right).

You can use it with a standard blade as a marking knife or switch to a thicker blade for carving and cleaning out the waste of a hinge mortise. And like a utility knife, the blades can be thrown out when they get dull. Just keep in mind that the blades are beveled on both faces.

The knife handles and blades can be purchased individually or in a set (as shown). You can find them at most craft and hobby stores.

► **Complete Kit.** *This set comes with three handles and a variety of blades to suit a wide range of tasks.*

weekend project

folding Lumber Racks

All it takes is one sheet of plywood to build these strong and sturdy racks that fold for easy storage.

▲ **Compact.** *The hinged leaves of the racks make them easy to fold up and store out of the way.*

ShopNotes GO ONLINE EXTRAS

To download a 3-D model of the lumber racks, go to: ShopNotes.com

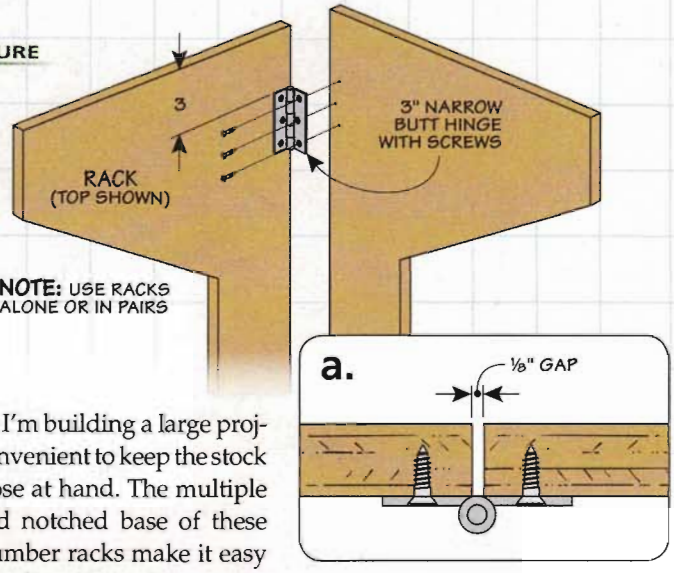
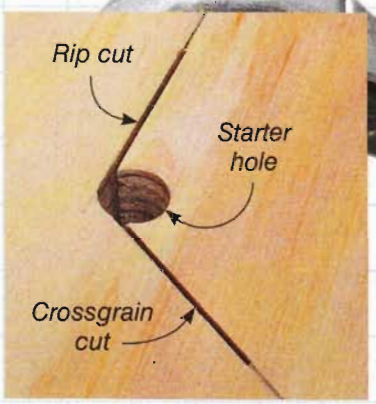


FIGURE 1



▲ **Clean Cuts.** *With the right blade (Bosch T101AO), you'll get clean, chip-free cuts on both the top and bottom faces of the plywood.*

Any time I'm building a large project, it's convenient to keep the stock I need close at hand. The multiple levels and notched base of these folding lumber racks make it easy to sort, stack, and store the material needed for the project. And after I'm finished, the racks fold up and tuck away for storage.

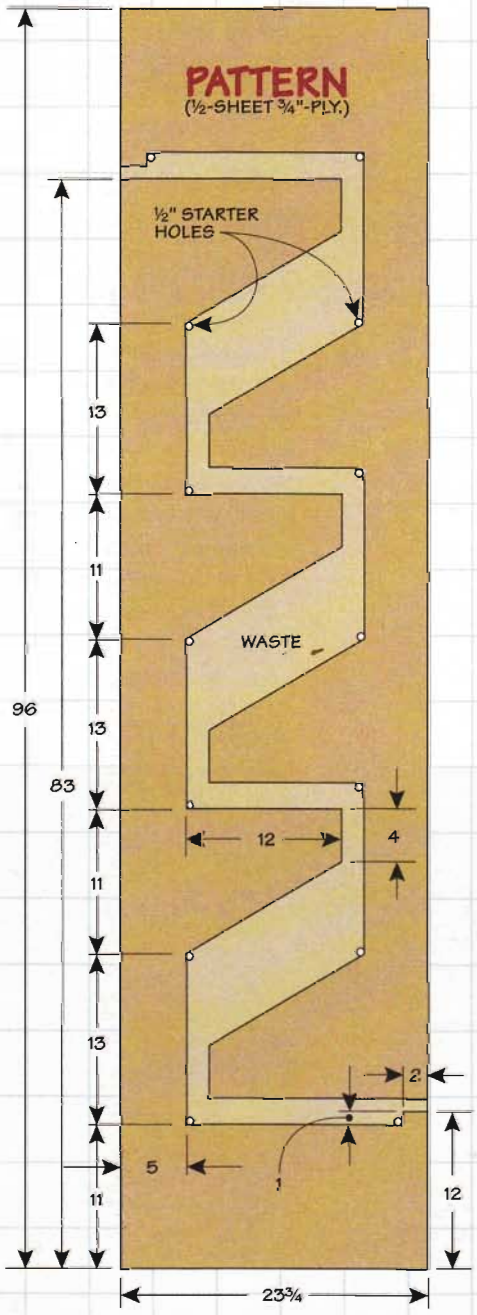
Simple Construction. Each rack is made up of a pair of hinged leaves. The best part is both racks can be made from one sheet of plywood and a handful of hardware.

After ripping the plywood down the center, use the pattern at right to lay out a pair of leaves on each half sheet. Note: To make layout easier, I marked and cut out one leaf to use as a pattern for the other three leaves. Now it's time to get out your drill and jig saw.

Cutting to Shape. I like to drill starter holes on the inside corners first. This makes it easy to "turn the corner," which can be difficult with a jig saw. To get the cleanest cuts, use a quality blade, like the *Bosch* blade shown in the margin photo above. And it helps to turn off the orbital action of your jig saw. After cutting out each leaf, a little sanding is in order to ease the sharp edges. Then you're ready to add the hinges.

Assemble Each Rack. Basic butt hinges from the hardware store connect each pair of leaves. Figures 1 and 2 show you where to locate the top and bottom hinges. The third hinge is centered along the back edge. Finally, simple, nail-on glides keep the racks off the floor and add stability.

Speaking of stability, when you set up the racks for storing lumber and sheet goods, spread the leaves apart until each rack is stable and sits solidly on the floor. Then you can load them up with the material you need for your next project and get right to work.



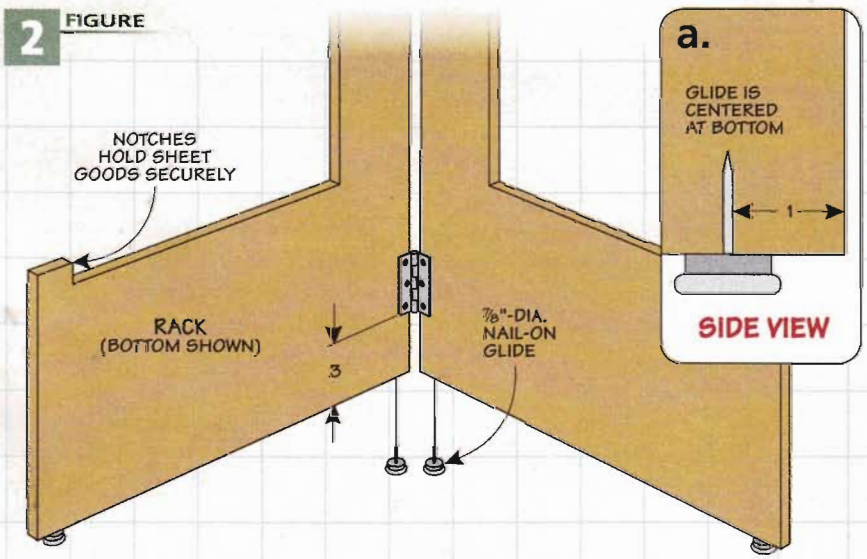
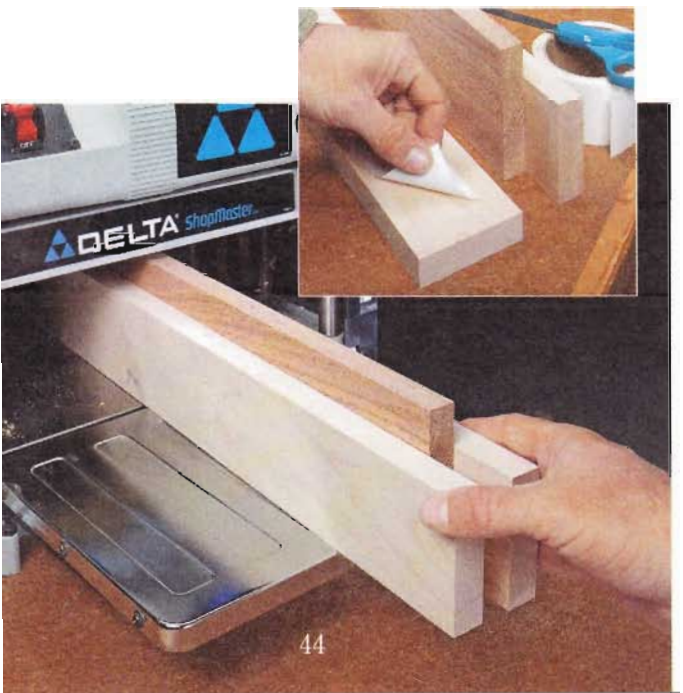


FIGURE 2

5 tips to get more From a Planer

Designed to thickness a workpiece, a planer can do a whole lot more.

If I were to ask you to name one of the most versatile tools in your workshop, it's a pretty good bet that the thickness planer wouldn't be on the list. Most of the time, it gets used for a single operation — making thick stock thinner. And it does this job really well. But through the years I've learned a few tips and tricks to get my planer to do much more than that.



▲ ***Face Joint.*** *By supporting a workpiece with a sled and several shims, it's possible to flatten the face of wide stock that's bowed or warped using a planer.*

FLATTEN WIDE BOARDS

Every once in a while I have a board that has some end-to-end twist, warp, or bow that I can't remove on the jointer because the board is too wide. That's when I turn to my thickness planer.

The trouble is that if one face isn't already surfaced, it may rock back and forth as it passes under the rollers. Or the rollers may force the board flat during the cut. So you end up with a board that's thinner, but still not any flatter. The solution to working with not-so-perfect stock is to use the sled and shims shown above.

The idea is pretty simple. The workpiece rides on the sled and the shims keep it from rocking as it passes through the planer. This way, you'll end up with a flat, smooth face. To prevent the shims from shifting, I like to secure them to the sled and the workpiece with hot melt glue.

◀ ***Edge Jointing.*** *You can square the edge of a workpiece by taping it between two "outriggers."*

For the first pass, find the high point on the board to be planed and set your planer to make a "skip" pass, removing no more than 1/32" (photo above). Continue making shallow passes until the top face is planed flat. Once that's complete, you can remove the sled and then plane the opposite face.

JOINT AN EDGE

A planer also works well at squaring up and straightening the edge of a board. The challenge is balancing a piece on edge. To make it possible, simply attach a couple of narrow boards to the workpiece with double-sided tape, as you can see in the photo and inset at left.

These "outriggers" work like the fence on a jointer. They help keep the edge of the workpiece square to the cutterhead as it passes through the planer.

Finally, to keep any chipout and tearing to a minimum, you'll want to make sure the grain on the board is running "uphill" as you feed it past the cutterhead, like you see in the photo at left.

PLANE THIN STOCK

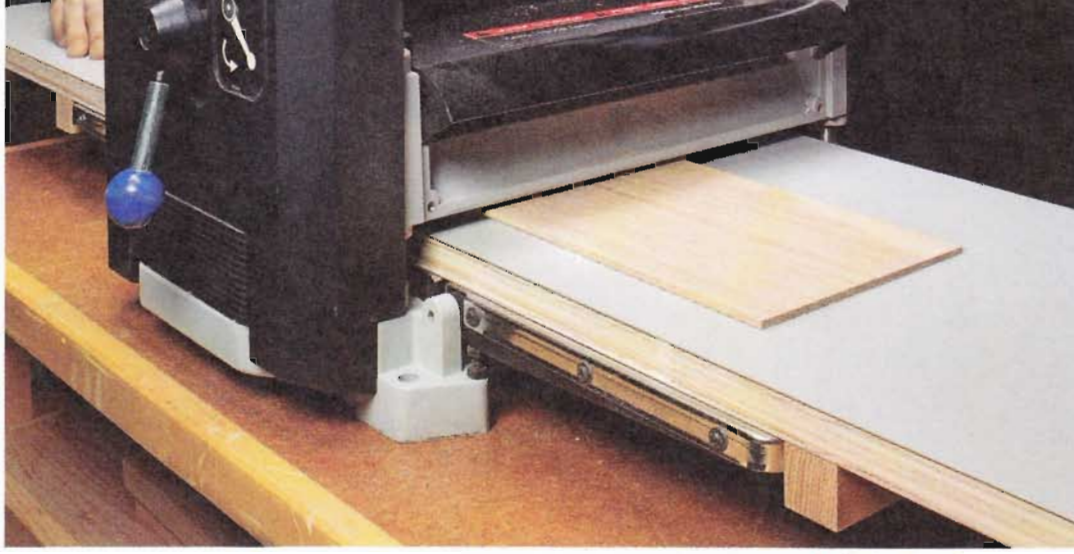
Many thickness planers aren't designed to handle very thin stock ($\frac{3}{16}$" or less). The problem is the cutterhead often can't be lowered past a certain point, and so the rollers and knives won't make contact with thinner pieces.

Fortunately, there's an easy solution to this problem. To safely plane a thin workpiece to the desired thickness, you need to "raise" the bed of the planer with an auxiliary bed, as you can see in the photo at right.

The bed is just a piece of plywood covered with plastic laminate and cut to the width of the planer bed. It's held in place by a pair of cleats attached to the underside of the auxiliary bed. The cleats hook over the outside edges of the infeed and outfeed extension tables to keep the bed from moving.

The auxiliary bed supports the workpiece as it passes through the planer and raises it high enough to contact the rollers and planer knives. Now, planing thin strips is just a matter of feeding them into the planer with the grain, taking several, very shallow cuts until you reach the desired thickness.

As you're working, be sure to plane both sides of the board, flipping it after each pass. This relieves any stress in the stock evenly to minimize any chance of warp once the board is at final thickness.



▲ ***Thin Stock.*** *An auxiliary bed raises the workpiece "up" to the cutterhead, making it possible to plane thin stock.*

MAKE IDENTICAL PIECES

Another handy technique is to plane the edges of a number of pieces to exactly the same width (a set of rails and stiles for example). To do this, simply gang the pieces together and run them all through at the same time (left photo below).

For the best results, cut all the pieces to the same rough width before you plane them. Then, just hold the pieces together and feed them through the planer all at once. You can make the pieces easier to handle by once again using double-sided tape. Just be sure to align the edges that will ride against the bed of the planer.

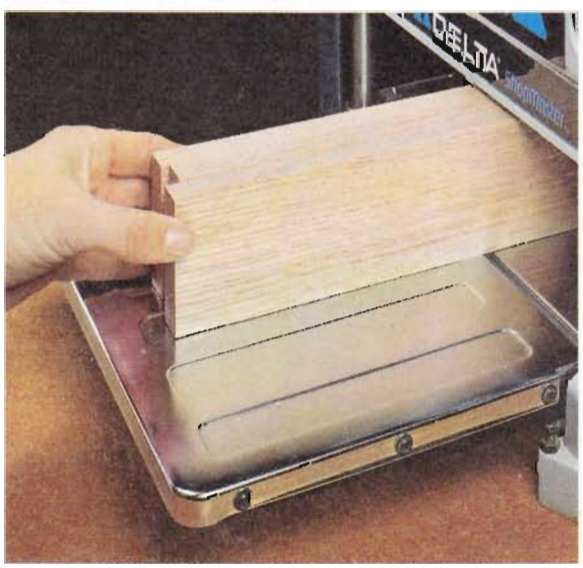
PLANE SHORT PIECES

Most planer manufacturers advise against planing pieces shorter than 12". But there are times when you need to plane a workpiece that's already been cut to a short length.

To solve this problem, you need to make the workpiece act like a longer board. You can do this by attaching a couple of long, narrow scrap pieces to the edges of the short board with double-sided tape (right photo below).

The support pieces span both feed rollers, so the workpiece travels smoothly through the planer. Make them at least the same thickness as the workpiece, but be sure they're flush with the bottom face.

As you can see, a planer isn't just a one-trick pony. With these handy tips, it becomes a very versatile tool.



▲ ***Planing Multiple Pieces.*** *By grouping several narrow boards together, you can plane them all to exactly the same width at the same time.*

▲ ***Thicknessing Short Pieces.*** *Attaching a pair of long, narrow support pieces allows you to safely feed a short workpiece through a planer.*

decorative Splined Miters

Add strength and great looks to a mitered box with a simple technique.

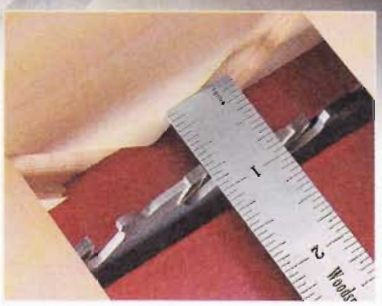
Nothing beats the clean look of mitered corners on a box. And while I like the look, the mitered corners won't stand up to a lot of stress. So if the box is going to be handled much, I like to reinforce the corners by adding thin strips of wood called splines.

Although you can hide these splines in grooves cut in the faces of the miters, I prefer to use exposed splines. It's a great way to add a unique look.

Layout. There are a number of spline styles and combinations you can use. So the first step is to come up with a design to suit your box.

When deciding on the splines, you can make them from the same material or go with a contrasting wood. Other options include, varying the length, spacing, and angle of the splines. (Check out the box on the opposite page.)

▲ ***Depth of Cut.*** *The "window" in the jig makes it easy to set the depth of cut across the corner.*

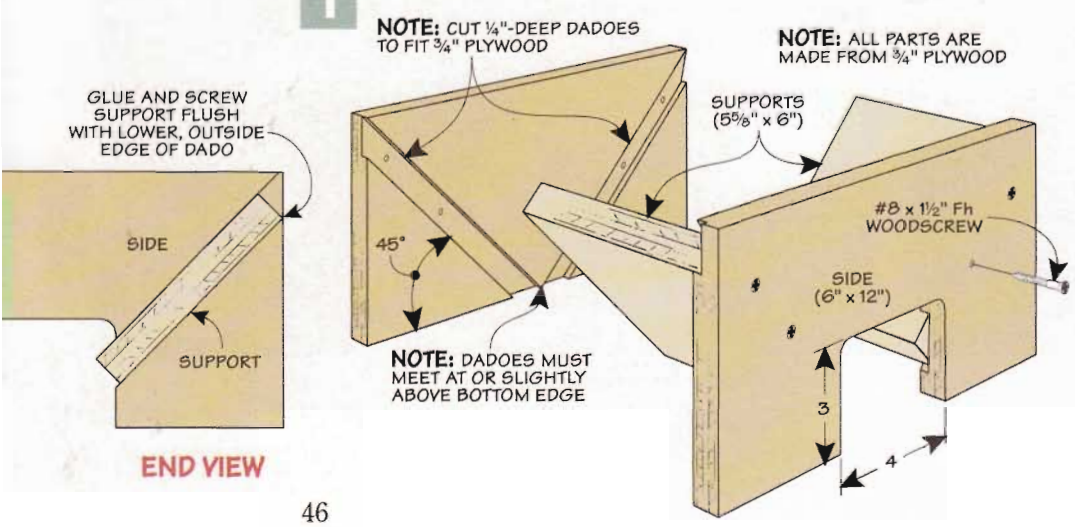


▲ ***Kerf Location.*** *To locate the kerf, just measure from the inside face of the jig to the saw blade.*

Adding the Splines. No matter what style you choose, the overall process is the same. Once the box is assembled and you've decided on a layout, you're ready to add the splines. The process is pretty simple. First, using the table saw, kerfs are cut across the corners of the box. Then, splines are cut to size and glued into the kerfs.

The Jig. The trickiest part of the process is creating the kerfs in the corners of a box. To cut across the joint, the box has to be held at 45° to the saw's table. To do this safely, I built a cradle-style jig that runs along the rip fence (Figure 1).

FIGURE 1



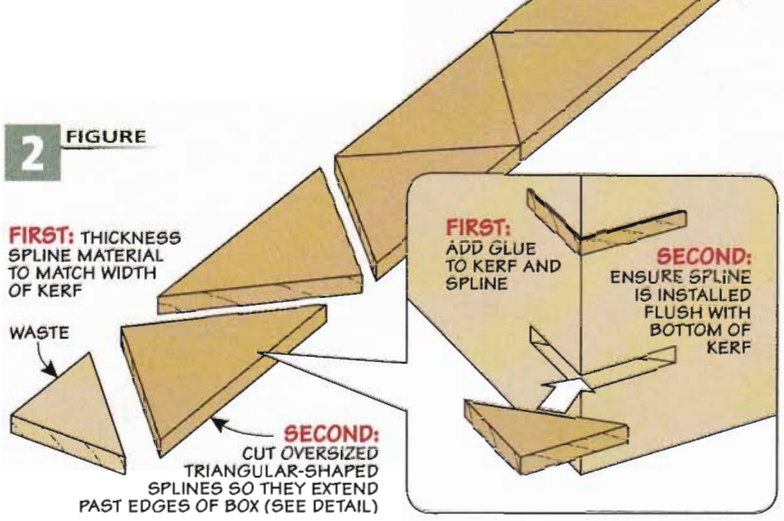
It starts out as two sides cut from ¾" plywood. To hold the box, there are a couple of supports that fit into angled dadoes cut in the sides. Before screwing the sides to the supports, cut a small "window" in one of the sides. This makes it a lot easier to set the height of the blade and to position the rip fence later.

Cutting the Kerfs. With the jig complete, you're ready to cut the kerfs. For this, you want to use a rip blade so the bottom of the kerf is perfectly flat. And in most cases, you want to cut the kerf as deep as possible without cutting through the inside corner of the box where the spline would show.

An easy way to set the depth of cut is to look into the window and raise the blade until it's just below (1/16" to 1/8") the inside corner (left inset photo on the opposite page).

The next step is to position the fence to locate the kerf. After removing the box, just slide a ruler into the window so it rests against the inside face of the cradle. Then adjust the rip fence until the measurement matches the desired location of the kerf (right inset photo on opposite page).

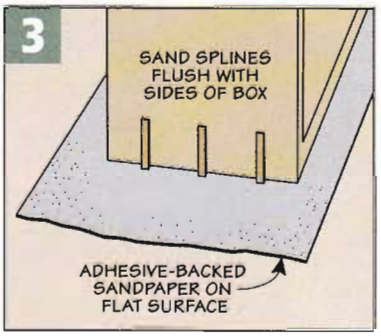
Cutting the kerfs is just a matter of pushing the cradle over the saw blade (main photo). The important thing is to make sure the box stays tight against the inside face of the cradle as you press the cradle against the rip fence. Note: If you experience any chipout, you can slip a piece of hardboard beneath the box to back up the cut. Just be sure to reset your depth of cut.



Making the Splines. With the kerfs complete, the next step is to cut some thin stock for the splines. To do this, I turn to my table saw. The important thing here is the fit.

The splines should slide into the kerfs easily, but you don't want any gaps. Then, I like to use a hand saw to cut the splines into oversized triangles (detail above).

Final Installation. Once you have the splines sized, they're ready to be glued in place (detail above). The splines have a tendency to "rock" when you tap them in place — as you tap one side, the other may pull away from the kerf. You often can't see this easily because of the excess glue. So make sure to press them in place so they seat fully along the bottom of the kerf.



After the glue dries, you can sand the splines flush (Figure 3). Attaching adhesive-backed sandpaper to a flat surface makes quick work of this. And it ensures that the sides of the box stay flat and smooth.

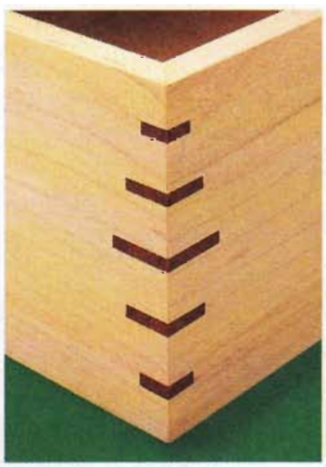
Splines are a great way to reinforce a mitered joint. Plus, you can't beat the decorative look they give a project.

▲ ***Low-Key Look.*** *Installing splines made from the same material as the box provides a subtle detail.*

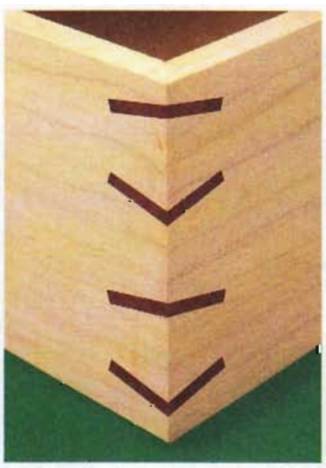
decorative Designs

The nice thing about reinforcing a mitered corner is that you aren't limited to straight kerfs that are all the same size and material. You can see just a few of the many options in the photos at right.

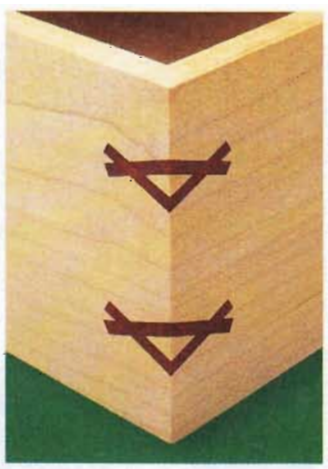
A couple options I use quite often to make the splines stand out is to vary the depth and use a contrasting material (near right). Angling the saw blade or making intersecting cuts are a couple more variations you can use to create a unique look (far right photos).



▲ ***Vary the Size.*** *By changing the depth of cut, you can create a unique look along the edge of a box.*



▲ ***Angled.*** *Tilting the saw blade 10° and flipping the box between passes provides a symmetrical look.*



▲ ***Intersecting.*** *After making one set of kerfs, glue in the splines. Then, repeat the process with opposing cuts.*

clean up with the

Dust-Right System

This integrated system of dust collection tools and accessories makes it a breeze to keep your workshop dust-free.

Collecting dust and chips at the source is an important step in keeping a shop clean. But, for those of us with small shops, collecting sawdust at each and every machine is a real challenge. That's because a full-size dust collector with all the hoses, blast gates, and fittings needed to make them work effectively can take up a lot of valuable floor and wall space.

The folks at *Rockler* recently tackled this problem with their *Dust-Right* line of dust collector attachments, fittings, hoses, and accessories. It all starts with the *Dust-Right Master System*, which includes attachments designed to make cleaning up loose chips in the shop less of a chore.

As a part of the kit, you get a handle and floor extension, plus two nozzles — one for the floor and one for benchtops. Also included are a 4" dust port, a blast gate, and four handy spring clips. All of the *Master System* pieces

Storage Rack. *Hose storage rack keeps flexible hose in place.*

Master System. *Use the attachments to collect dust and debris from floors and benchtops. Then hang everything on the wall when you're finished.*

Handy Accessories. *An expandable hose, storage rack, swivel and clamps allow you to experience the full benefits of the system.*

▲ **Hose Clamp.** *You can tighten this clamp without tools and the design won't crush the wires.*

▲ **Blast Gate & Swivel.** *Simply mount the blast gate to the wall and attach the swivel and hose to allow easy mobility.*

▲ **Sturdy Handle.** *The large handle fits not only the dust collection ports of most tools, but all the attachments as well.*

are pictured in the lower left photo on the previous page. You'll find sources for everything on page 51.

Easy-to-Grip Handle. The handle is truly the heart of the system. One end of it is designed to accept any standard 4" flexible hose, while the opposite end fits the 4" dust collection ports found on larger power tools, as you can see in upper right photo. This handle, in addition to all the attachments, allows you to go from collecting shavings from your planer to cleaning the floor in just seconds.

Floor Nozzle. When it comes to cleaning the floor, you can't beat the floor nozzle. Attached to the extension, its wide mouth makes short work of a pile of sawdust (left photo below). But what I really like about the design is the mouth never sucks tight to the floor, unlike most floor attachments.

Brush Nozzle. If you remove the extension and nozzle and replace it with the brush nozzle, you have the perfect tool for cleaning tools and worksurfaces (far right photo). The stiff bristles make it easy to scrub away packed debris.

Accessories. Finally, the *Master System* includes a blast gate and a 4" dust port. These two accessories make it convenient to hook up to your power tools right away. Plus, the kit includes hangers for the attachments, making it easy to mount it all to your shop wall.

In addition to the *Master System*, I also want to point out a couple of add-on accessories that make the system work even better.

Expandable Hose. *Dust-Right's* sturdy expandable hose, shown in the main photo and inset on the opposite page, uses heavier-gauge wire than most flexible hoses, making it almost crush-proof.

But what I really like is that the 21' hose "accordions" to only 3' when not in use. It's also available in 2' and 4' lengths. Each version expands up to seven times its compressed length, so all you need is one hose for an entire small shop.

Hose Storage Rack. To make storing the hose even easier, you can pick up a simple storage rack that mounts to the wall. A flat, metal base at the bottom of the rack provides a spot for the handle to rest. Placing the handle on the base before you turn off the dust collector pulls the air from the hose, shrinking it to its compressed shape. A pair of magnets on the rack hold the hose in place.

Swivel. To round out the *Dust-Right* accessories, you can add a swivel fitting that allows the hose to turn. This prevents twists and kinks as you move around the shop (center photo above).

Hose Clamps. Although not a part of the *Dust-Right* system, the new bridge hose clamps are a big improvement over conventional clamps (photo and inset above left). A metal clip, designed to span the wire, puts all the clamping pressure on the fitting.

Eliminating dust and chips is a very serious matter. For a small shop, and even some medium-sized shops, the *Dust-Right* system is a perfect place to start.

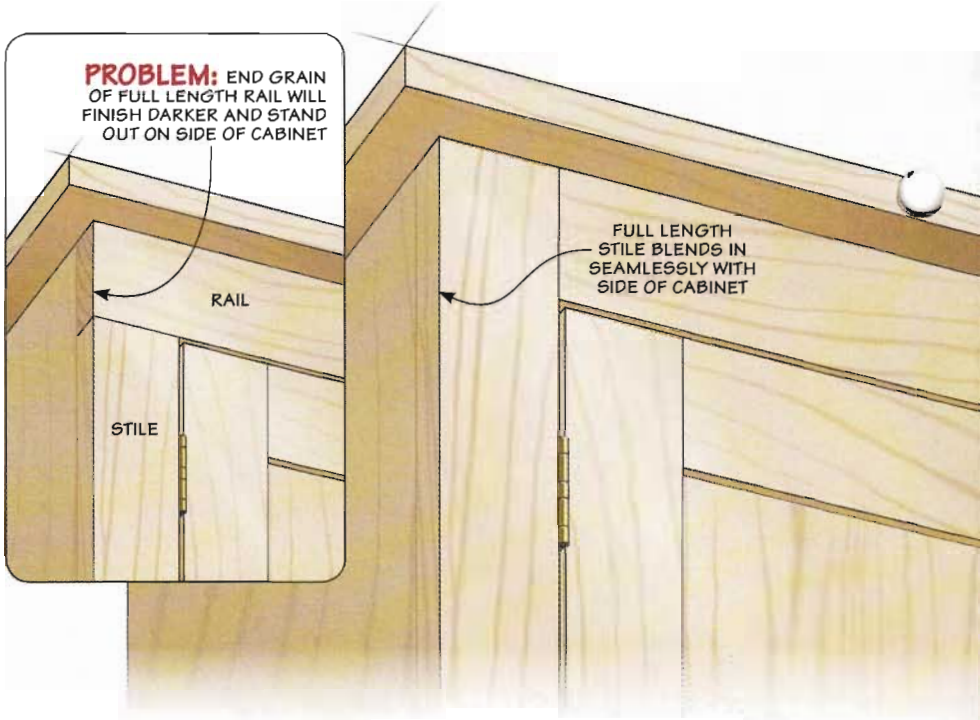
Floor Vac. *Replace your shop vacuum and clean your floor with the extension and floor nozzle.*

▲ **Bench Brush.** *With the powerful airflow of a dust collector and a lightweight bristled brush to dislodge stubborn dirt, your tools will be clean as a whistle.*

Q&A

questions from
Our Readers

configuring Rails & Stiles



I'm a little confused about frame construction. Is there a standard way to configure the rails and stiles? Should the rails go inside or outside the stiles? Either way seems to look okay at times.

Ron Bohland
Moran, Kansas

There's often more than one way to do things in woodworking — like building a frame for a cabinet or door. But in this case, there are a few good reasons for doing things the "old-fashioned" way. And that's to fit the rails between the full length (height) stiles.

It Starts with the Look. In the main drawing above, you'll see the typical, traditional look of a face frame. The rails are fit between the stiles. With the right match of color and grain, the stile will blend in with the side of the cabinet. This way, it appears like a single, solid board.

If the frame is built with the rails running from side to side, you have to fit the stiles in between. So what you're left with is the end grain of the rails showing on the side of the cabinet.

Once you stain and finish the project, there's little chance of the end grain of the rails blending in. It's going to stand out like a sore thumb and draw your eye to it, like you see in the inset detail above.

Doors. A similar situation comes into play with a door. Here, you're going to see the end grain of either the rails or stiles no matter which arrangement you choose.

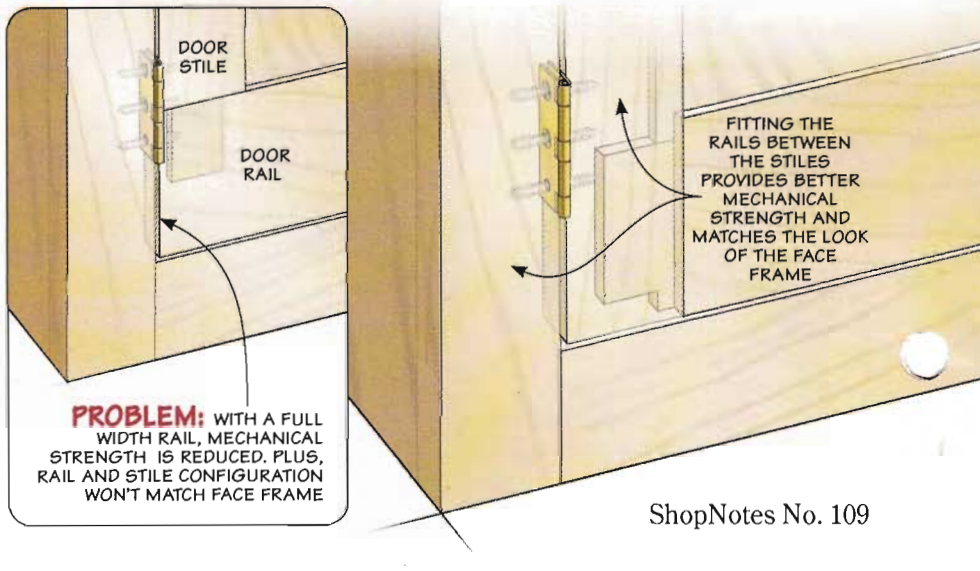
But you're less likely to notice the end grain if it's only visible along the top or bottom edges of the door. And that's going to be the case whether the door is inset into the opening or overlays it. For that reason, I always run the rails between the stiles. Plus, to match the look of the cabinet face frame, it only makes sense to build the door the same way.

But there's another reason to fit the rails between the stiles any time you build a door. And that has to do with basic construction.

For typical rail and stile door assembly, a mortise and tenon joint was, and still is, the go-to method. You can't beat the rock-solid results you get.

As you can see in the drawing below, the mechanical nature of the mortise and tenon joint works to your advantage when the tenon on the end of a rail fits into a mortise in the stile. As the inset shows, building it the other way means gravity is working against the joint. So the only thing holding the joint together is the glue. That was a bigger deal in the past than it is with the glues used today.

When it comes right down to it, you can assemble a frame with the rails and stiles in any configuration you'd like. But for me, I'll stick with the traditional look.



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.

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.

SHELF PIN HOLES *(p.8)*

- **Amana Tool**
  - *¼"-dia. Spiral Downcut Bit* . .46202
  - *¼"-dia. Straight Plunge Bit* . .45208
- **CMT**
  - *5mm Straight Bit*. 811.050.11

COPING SLEDS *(p.10)*

- **Eagle America**
  - *2100 (Dual Post)*. 400-1241
  - *2000 (Single Post)* 400-1249
- **MLCS**
  - *Pro Coping Sled (Single Post)* . . 9546
  - *Pro Deluxe (Dual Post)*. 9548
- **Rockler**
  - *Rail Coping Jig* 28595
- **Woodhaven**
  - *Small Coping Sled* 528

BACK SAW *(p.14)*

The back saw was made from readily available parts from the online suppliers listed below. *Wenzloff & Sons* is offering saw parts separately or as a kit (photo at right).

- **McMaster-Carr**
  - *8" x 24" - .020" Steel*. . . 9075K243
  - *¼"-20 Machine Screws* 91700A542
  - *10-32 Knurled Nuts* . . 92741A140
  - *.064" Brass Strip* 8859K91
  - *Crank Handle* 6129K3
  - *½"-13 Square Nut* 94785A427
  - *¼"-20 x 1" Star Knob* . . 57715K45
  - *5" Extra Slim File*. 4229A25
- **Wenzloff & Sons**
  - *½" Split Nut/Bolt (pr.)*. SN100
  - *7/16" Split Nut/Bolt (pr.)*. . . .SN101
  - *3" x 10" Blade Blank*. SN202
  - *Folded Back (0.063")*. SN303
  - *Folded Back (0.093")*. SN304
  - *Folded Back (0.125")*. SN305
  - *X-Slim File*. SN404
  - *XX-Slim File* SN405
  - *Saw Kit* SN701
- **Tools for Working Wood**
  - *Split Nut Driver* . . . . . .GT-SNSD

WORKSHOP *(p.24)*

- **Lee Valley**
  - *22" Heavy-Duty Slides* . . .02K45.22
  - *22" Standard Slides* 02K62.55
  - *¼"-20 Knobs*. 00M51.01
  - *7" Bench Vise* 10G04.11
- **Rockler**
  - *Heavy-Duty Levelers* 81239
  - *¾"-dia. Nail-On Glides* 24232
  - *7" Woodworker's Vise* 68888
- **Reid Supply**
  - *Toggle Clamps*. TC-213-U

VACUUM UPGRADE *(p.36)*

- **Rockler**
  - *Dust Deputy Kit*. 23773
  - *3" Locking Swivel Casters* . . .38865

MARKING KNIVES *(p.40)*

- **Lee Valley**
  - *Marking Knife (R/H)* 33N07.01
  - *Marking Knife (L/H)* 33N07.02
  - *Striking Knife* 50D01.01

LUMBER RACKS *(p.42)*

- **Rockler**
  - *7/8"-dia. Nail-On Glides* 18649

GREAT GEAR *(p.48)*

- **Rockler**
  - *Dust-Right Master System* . . .35906
  - *4"-dia. Expandable Hose, 3'*. .24719
  - *Hose Storage Rack* 22030
  - *4" Swivel*. 21476
  - *Bridge Hose Clamp*. 26177

MAIL ORDER SOURCES

Woodsmith Store
800-444-7527

Rockler
800-279-4441
rockler.com

Amana Tool
800-472-6226
amanatool.com

CMT
888-268-2487
cmtusa.com

Eagle America
800-872-2511
eagleamerica.com

Lee Valley
800-871-8158
leevalley.com

McMaster-Carr
630-600-3600
mcmaster.com

MLCS
800-533-9298
mlcswoodworking.com

Reid Supply
800-253-0421
reidsupply.com

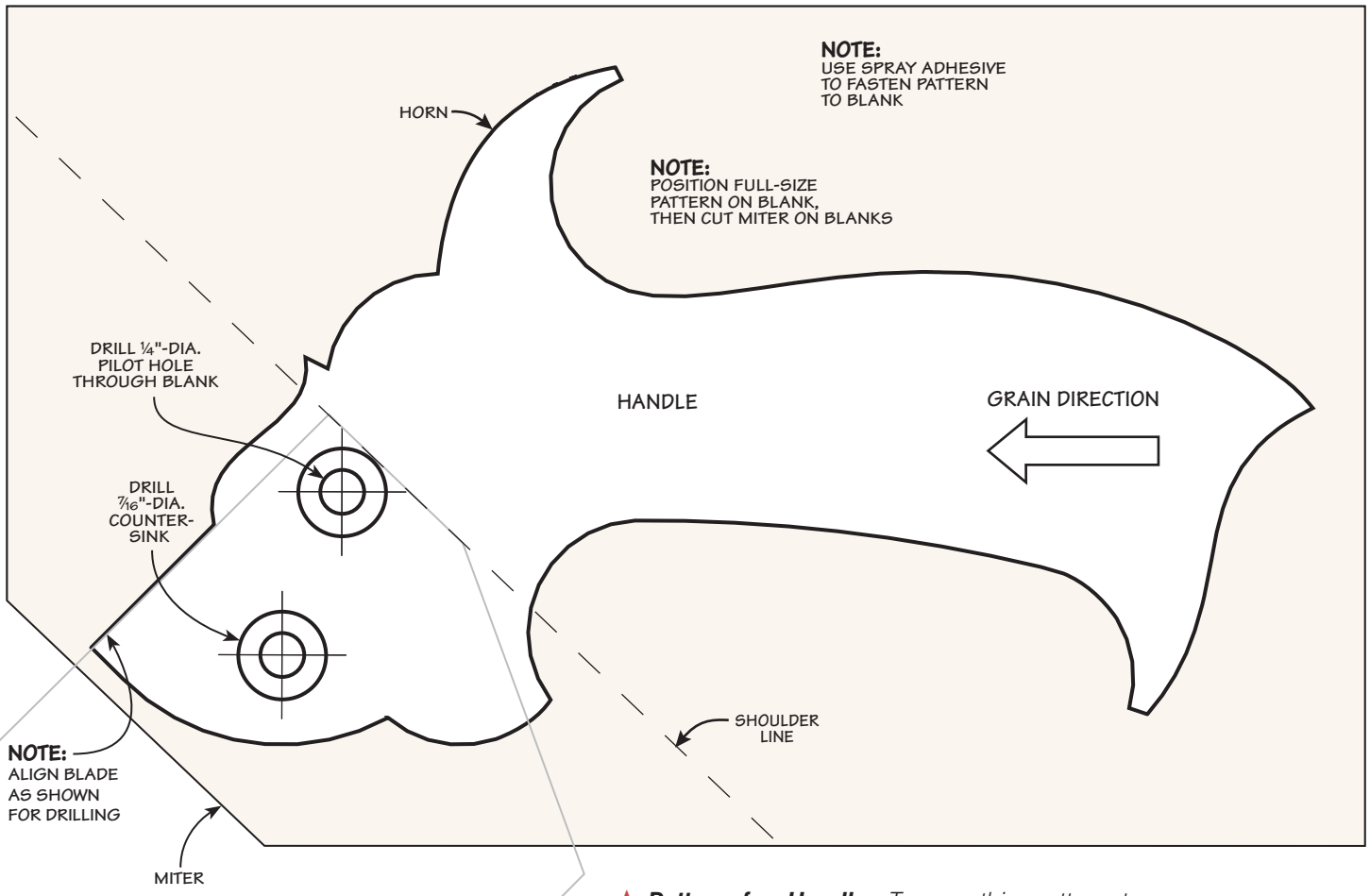
Tools for Working Wood
800-426-4613
toolsforworkingwood.com

Wenzloff & Sons
503-359-5255
wenzloffandsons.com

Woodhaven
800-344-6657
woodhaven.com

ShopNotes

full-size pattern
Back Saw Handle



▲ ***Pattern for Handle.*** *To use this pattern to make your saw handle, make sure your software's "Page Scaling" setting = None (100%).*

ShopNotes

space-saving Workshop

Materials & Hardware

END CABINET

A	Sides (2)	23 x 80 - ¾ Ply.
B	Top/Fixed Shelf (2)	23 x 37 - ¾ Ply.
C	Divider (1)	22¼ x 38 - ¾ Ply.
D	Back (1)	37 x 38 - ¾ Ply.
E	Small Shelf (1)	18⅛ x 22¼ - ¾ Ply.
F	Rails (2)	¾ x 3½ - 37
G	Tray (1)	17⅝ x 22 - ¾ Ply.
H	Tray Front (1)	¾ x 3 - 18¾
I	Tray Cleat (1)	1½ x 1½ - 13
J	Tray Lock (1)	¾ x 1½ - 19½

CENTER CABINET

K	Sides (2)	23 x 80 - ¾ Ply.
L	Top/Fixed Shelf (2)	23 x 48 - ¾ Ply.
M	Divider (1)	22¼ x 30 - ¾ Ply.
N	Back (1)	48 x 30 - ¾ Ply.
O	Adjustable Shelves (3)	14 x 23⅝ - ¾ Ply.
P	Rails (2)	¾ x 3½ - 48

WORKBENCH

Q	Sides (2)	23 x 34½ - ¾ Ply.
R	Top/Bottom (2)	23 x 44½ - ¾ Ply.
S	Fixed Shelf (1)	22¼ x 44½ - ¾ Ply.
T	Divider (1)	22¼ x 20¾ - ¾ Ply.
U	Back (1)	29½ x 44½ - ¾ Ply.
V	Adjustable Shelves (2)	13¼ x 21⅞ - ¾ Ply.
W	Rail (1)	¾ x 3½ - 44½
X	Drawer Fronts/Backs (4)	½ x 3½ - 20⅜
Y	Drawer Sides (4)	½ x 3½ - 22
Z	Drawer Bottoms (2)	20⅜ x 21½ - ¼ Ply.
AA	False Fronts (2)	¾ x 6½ - 22½
BB	Benchtop (1)	1½ x 27 - 48
CC	Vise Spacer (1)	1 1/16 x 4 - 7
DD	Jaw Liners (2)	½ x 2½ - 7

ROUTER TABLE

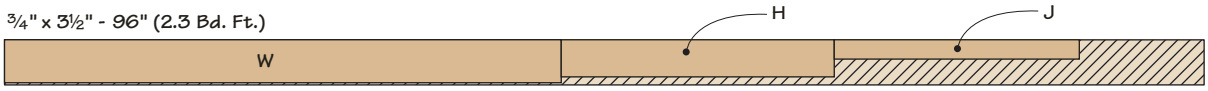
EE	Sides (2)	3½ x 24 - ¾ Ply.
FF	Base (1)	7½ x22½ - ¾ Ply.
GG	Back (1)	22½ x 24 - ¾ Ply.
HH	Top/Long Shelf (2)	2¾ - 22½ - ¾ Ply.
II	Short Shelves (2)	2¾ - 12½ - ¾ Ply.
JJ	Fence Rests (2)	¾ x ¾ - 2¾
KK	Arms (2)	¾ x 2 - 42¼
LL	Tabletop (1)	17⅞ x 25½ - ¾ Ply.
MM	Front Rail (1)	¾ x 2 - 25½
NN	Fillers (2)	4 x 17⅞ - ¾ Ply.
OO	Fence Base (1)	2 x 22 - ¾ Ply.
PP	Fence Face (1)	3 x 22 - ¾ Ply.

- (151) #8 x 1½" Fh Woodscrews
- (20) #8 x 1" Fh Woodscrews
- (2) ¼"-20 x 2½" Hex Bolts
- (6) ¼" Washers
- (2) ¼"-20 Lock Nuts
- (3) 6½" Utility Pulls w/Screws
- (1 pr.) 22" Full-Extension Drawer Slides w/Screws
- (1) 36" T-Track w/Screws
- (2) ¼"-20 x 2" Flange Bolts
- (2) ¼"-20 Knob w/Insert
- (3) Toggle Clamps w/Screws
- (2 pr.) 22" Full-Extension Drawer Slides w/Screws
- (1) 7" Bench Vise
- (6) Heavy-Duty Lifting Levelers w/Screws
- (1) 2" Slide Bolt w/Screws
- (2) ¾"-dia. Nylon Nail-On Glides
- (4) 5/16" x 3" Lag Screws w/Washers
- (20) ¼" Shelf Pins
- (8) #8 x 1¼" Fh Woodscrews

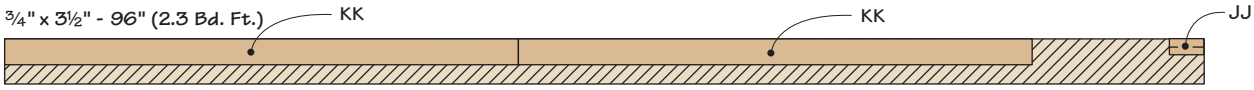
Cutting Diagram - Hardwood

¾" x 3½" - 96" (2 BOARDS @ 2.3 Bd. Ft. EACH)

¾" x 3½" - 96" (2.3 Bd. Ft.)



¾" x 3½" - 96" (2.3 Bd. Ft.)



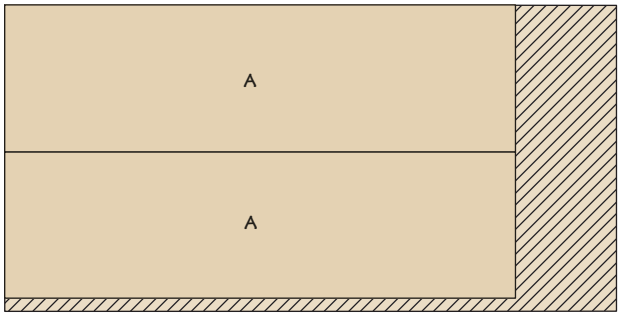
¾" x 6½" - 72" (3.3 Bd. Ft.)

½" x 3½" - 96" (2 BOARDS @ 2.3 Sq. Ft. EACH)

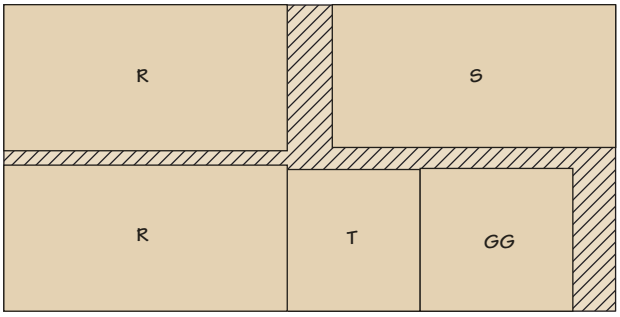
1½" x 6½" - 60" (5 BOARDS @ 5.4 Bd. Ft. EACH)

Cutting Diagram - Plywood

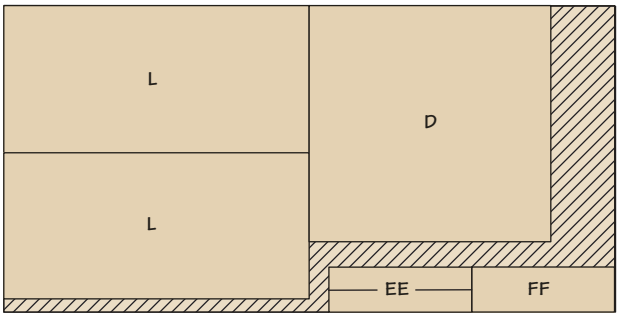
48" x 96" - ¾" PLYWOOD



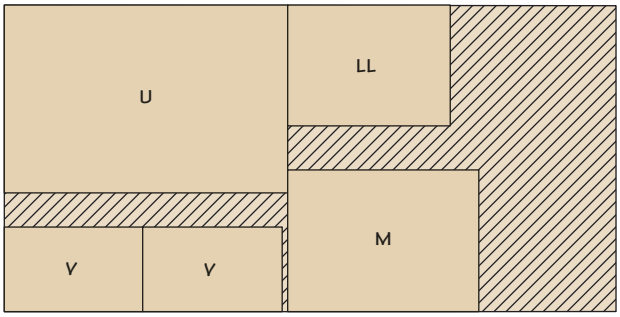
48" x 96" - ¾" PLYWOOD



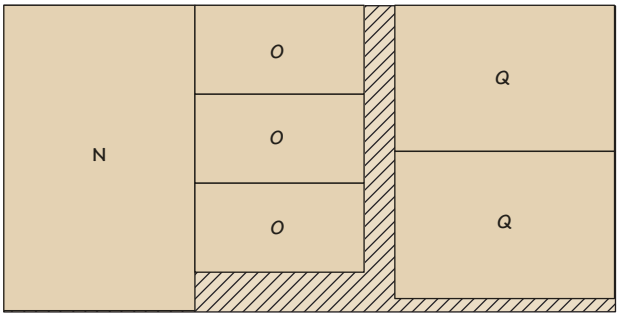
48" x 96" - ¾" PLYWOOD



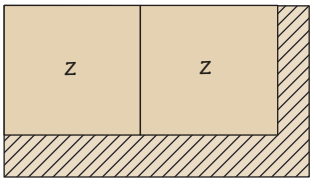
48" x 96" - ¾" PLYWOOD



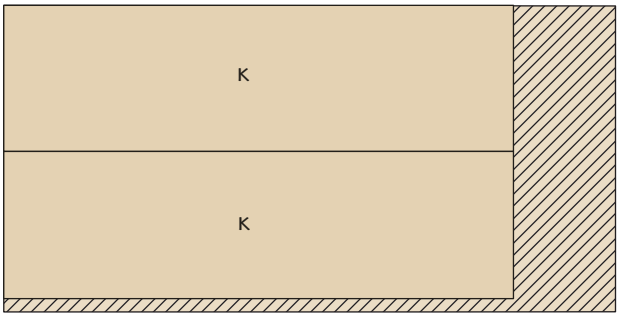
48" x 96" - ¾" PLYWOOD



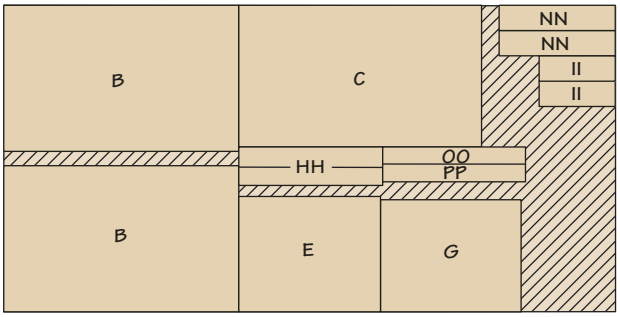
24" x 48" - ¼" PLYWOOD



48" x 96" - ¾" PLYWOOD



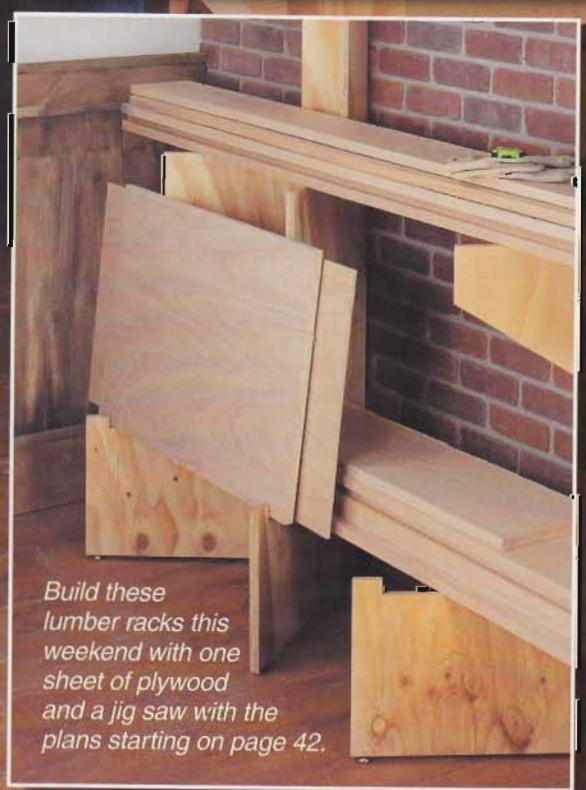
48" x 96" - ¾" PLYWOOD



Scenes from the Shop

A shop vacuum is a great tool for keeping your shop clean — until the filter clogs. But with an add-on cyclone separator and this handy cart, you can turn your vacuum into an efficient, small shop dust collector. Detailed plans start on page 36.

This heirloom saw is ideal for cutting joinery. Best of all, you can make it yourself by following the step-by-step instructions on page 14.



Build these lumber racks this weekend with one sheet of plywood and a jig saw with the plans starting on page 42.