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Vol. 19 Issue 113

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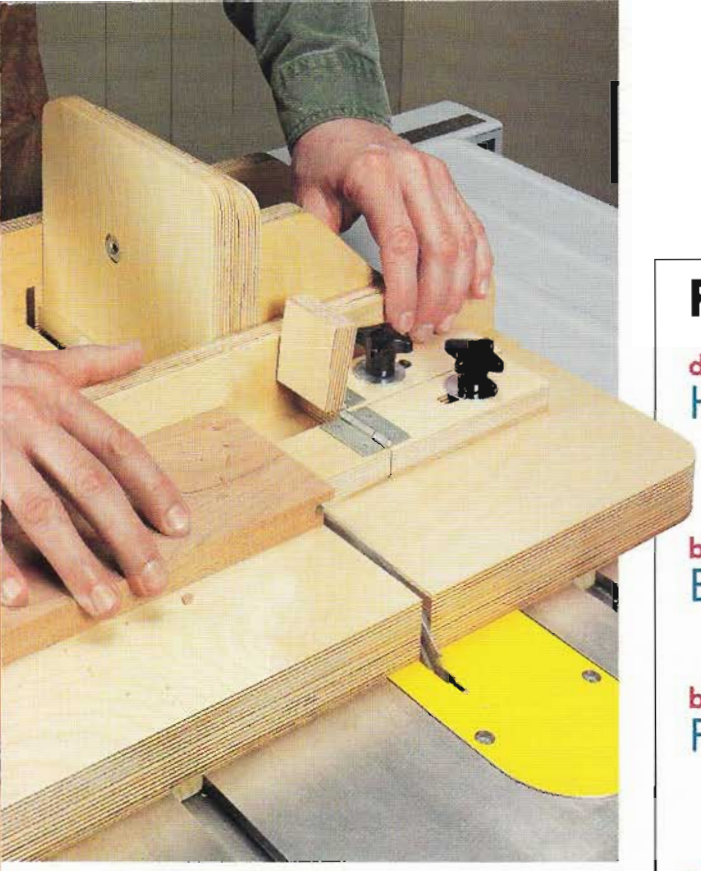
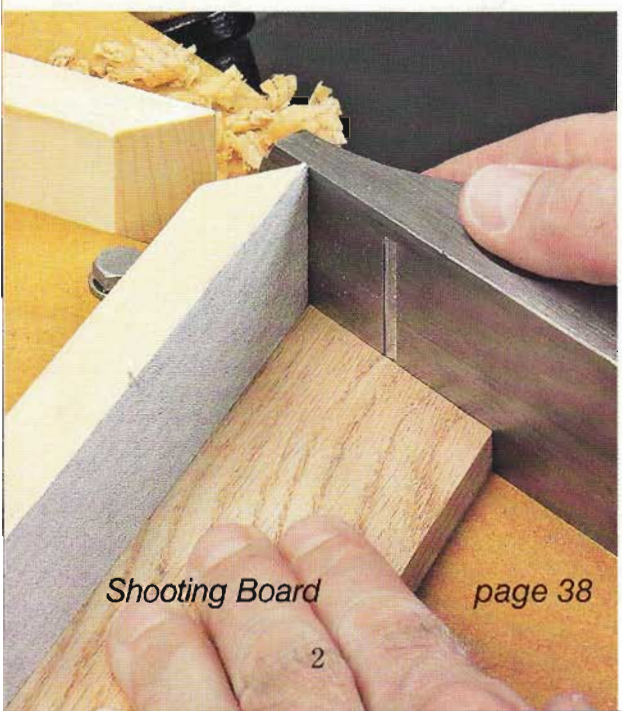


Locking Rabbets page 44

Band Saw Circle Jig page 24

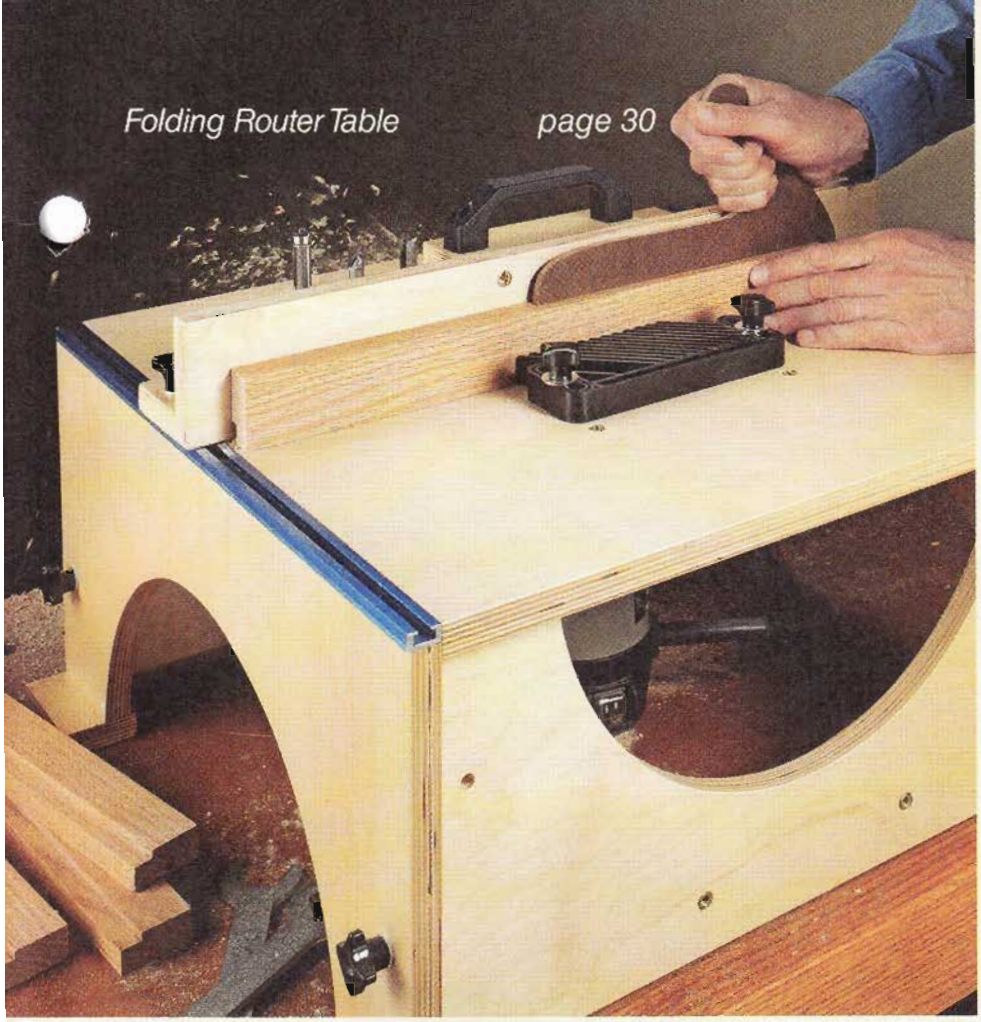


Shooting Board page 38

Contents

Features

Departments



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Cutoffs

One of the main reasons I like the change from summer to fall is that I get to switch from outside activities like mowing the yard and pruning bushes to indoor activities. And for me, that's getting back into the workshop.

"Back to the Shop Special" makes a great title for this issue. It's chock full of practical solutions for getting more out of your shop and the tools in it. On page 8, you'll find quick and easy solutions for storing router bits. And if your collection of hand tools has taken over your workbench, the heirloom tool chest on page 14 is a sure-fire way to get everything organized.

Finally, we have some plans for a few great jigs and fixtures, too. Whether it's the folding router table (page 30), shooting board (page 38), or locking rabbet jig (page 44), you'll find any one (or all) of them a great way to get more from your tools.

Sadly, along with the seasons, there's another change I want to mention. And that's the passing of Joel Hess. Joel was an associate editor with *ShopNotes*, but that doesn't begin to cover his contributions to this magazine and *August Home Publishing*. Among his other tasks, Joel handled the editorial efforts for the *Woodsmith Store*, and he coordinated and presented many of the painting and woodworking seminars held there. But most important of all, Joel was a truly nice guy and dedicated friend to all who knew him. He will be missed.

Terry

This issue of *ShopNotes* is dedicated to the memory of Joel Hess (1955 - 2010)

from our Readers

Tips for Your Shop

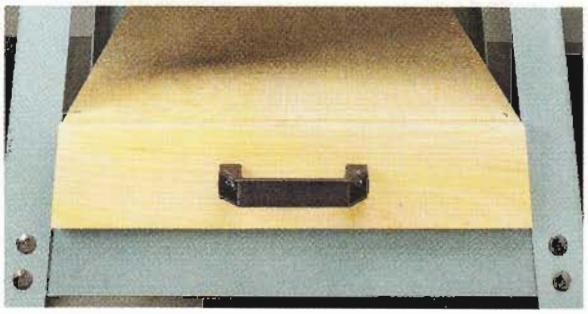
Tool Stand Drawers

My small shop has me constantly looking for additional storage space wherever I can find it. One of those places is in the open area under some of my tool stands. These wide-open spaces are just begging to be utilized for much-needed storage.

You can see in the photos above how I added a drawer in the stand of my table saw. The drawings below show you how I built and installed it. The configuration of your stand may be different, but this will give you an idea of the key steps.

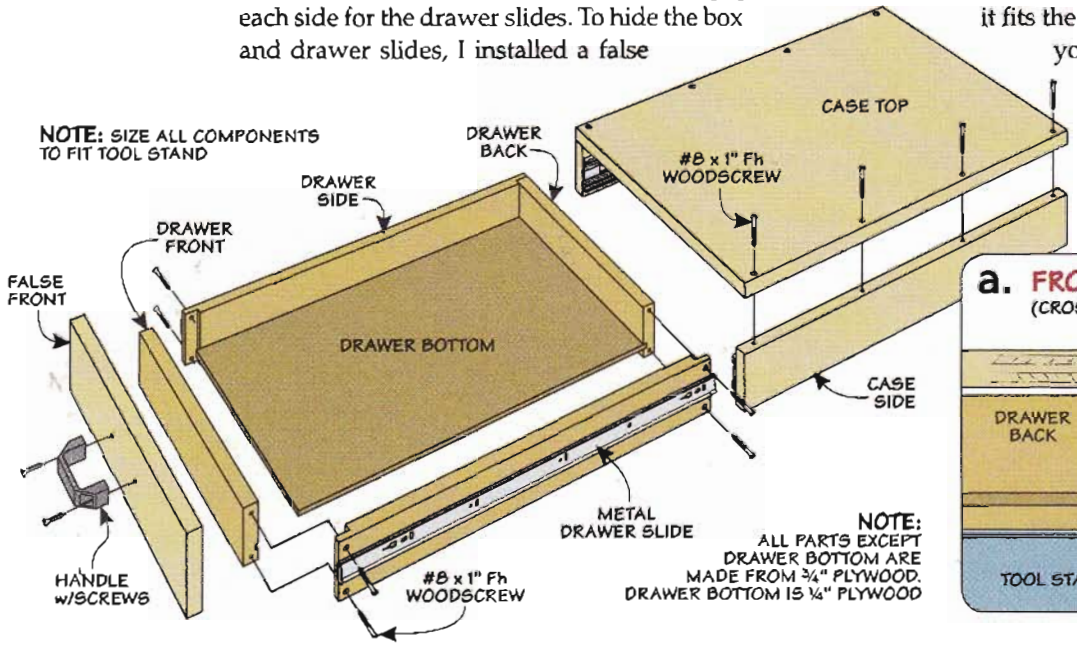
To hold my drawer, I built a simple three-sided support box and fastened it to the tool stand rails. The top of the box serves as a handy shelf for additional storage. A pair of full-extension drawer slides make it easy to access the contents of the drawer.

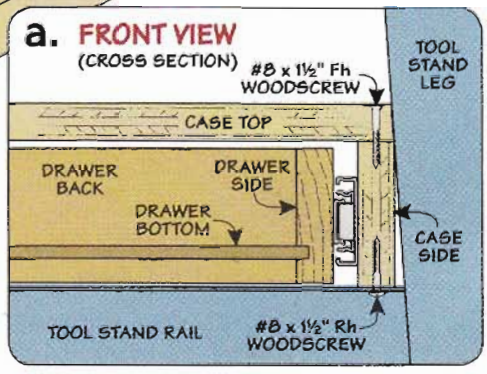
The drawer is sized to fit the box, allowing space on each side for the drawer slides. To hide the box and drawer slides, I installed a false drawer front. You can see in the photos how the ends of the drawer front are tapered to match the angle of the legs of the tools stand. The last things to do are fasten the false front with a couple of screws and add a handle, as shown in the lower photo above.



If you want to add multiple drawers, you can build a taller box to house the drawers. Just make sure it fits the opening in the tool stand. Then, you can cut each false drawer front to fit, as before.

Art Outlaw
Evansville, Indiana





Wire Shelving Tool Storage

After installing some wire shelving in my house, I had a few pieces left over. Not wanting to throw them out, I put them to use in my shop. I came up with all sorts of configurations and mounting options for storing a wide variety of tools and supplies. You can see what I mean by looking at the photos.

The key to working with the shelving is a bolt cutter (right photo). This tool makes it a cinch to cut the shelving to length. Not only that, but you can cut off some parts of the shelving to bend the wires into hooks (photos below).

As you can see below, mounting the wire shelving flat against the wall turns it into a rack for clamps, screwdrivers, and other tools. The possibilities are endless. And best of all, it's a great way to use leftover shelving.

Philip Belanger
Orlando, Florida

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

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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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Mobile Base Pedal Upgrade

THE WINNER!

After a lot of use, the pedals on many mobile bases don't work as well as they should. The metal-to-metal contact causes a lot of friction and wear and the pedal simply isn't effective for lifting the base. I found a way to upgrade the pedals with some simple hardware.

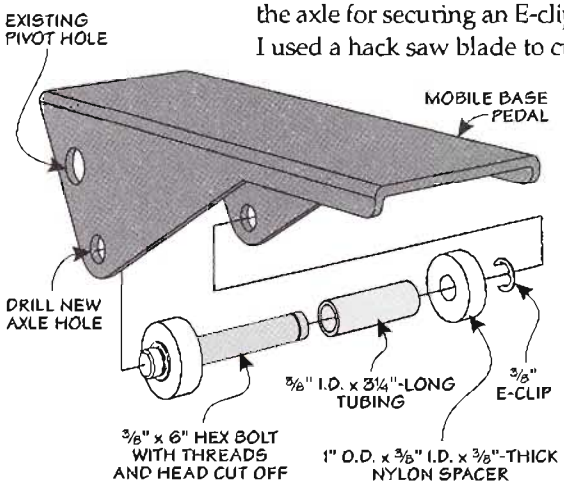
To start overhauling the pedal, a trip to the hardware store is in order. The drawing below shows you the common items you'll need to purchase including nylon wheels (sometimes called spacers or standoffs), tubing, E-clips, and a ⅜"-dia. bolt or steel rod.

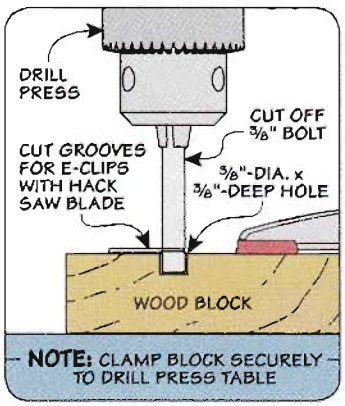
The first step is to remove the pedal from the mobile base to make the modification. Then, drill a new, ⅜"-dia. hole on each side. These holes locate the "axle" you create from the bolt. The goal here is to allow the nylon "wheels" to project just below the bottom edge of the pedal (photo below). To make the axle, cut the head and threads off the bolt so that the length is ¼" longer than the width of the pedal.

At the drill press, I cut a groove ⅜" from each end of the axle for securing an E-clip (detail drawing below). I used a hack saw blade to cut the groove.

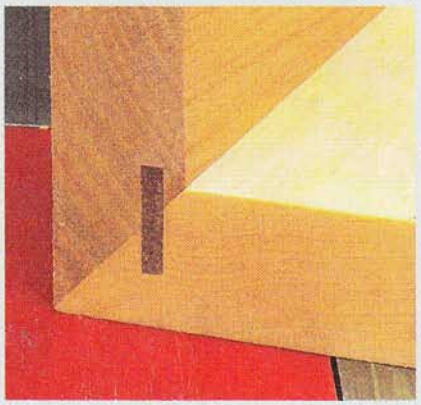
As you slide the axle into the hole, install an E-clip, wheel, tubing, and second wheel. Then, you can install the last E-clip. Needle-nose pliers make this task easier. After reinstalling the pedal, you won't believe how easy it is to raise and lower the base.

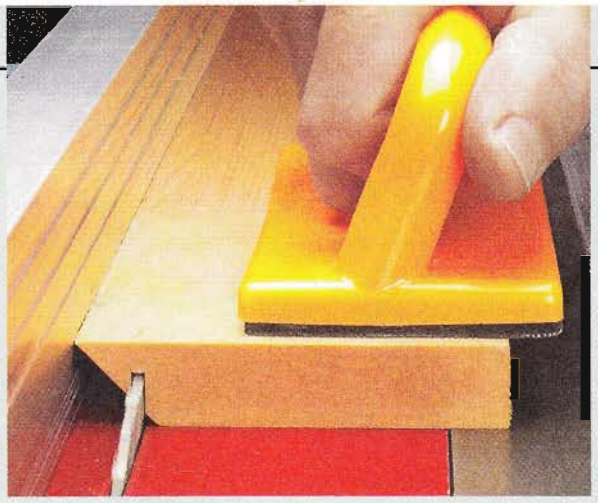
Bill Huber
Haslet, Texas

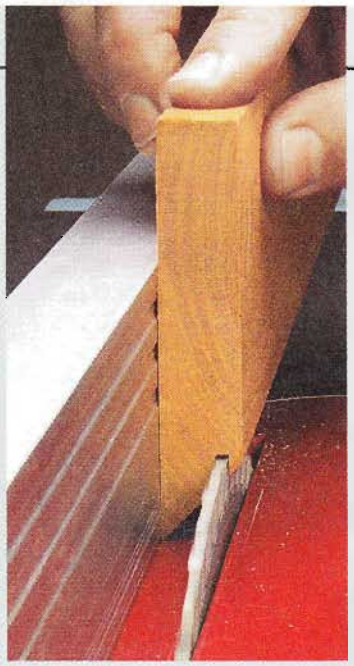




Quick Tips







▲ **Will Braun** of Lacombe, Alberta uses the method you see above for cutting slots for splines to reinforce a mitered joint. The beauty of it is it only requires one fence setting at the table saw. You may need to adjust the height of the blade to make a kerf deep enough for the spline on one of the workpieces. When the joint is assembled, you only need to clamp across the box in line with the spline for a strong joint.

Electric Cord Reel

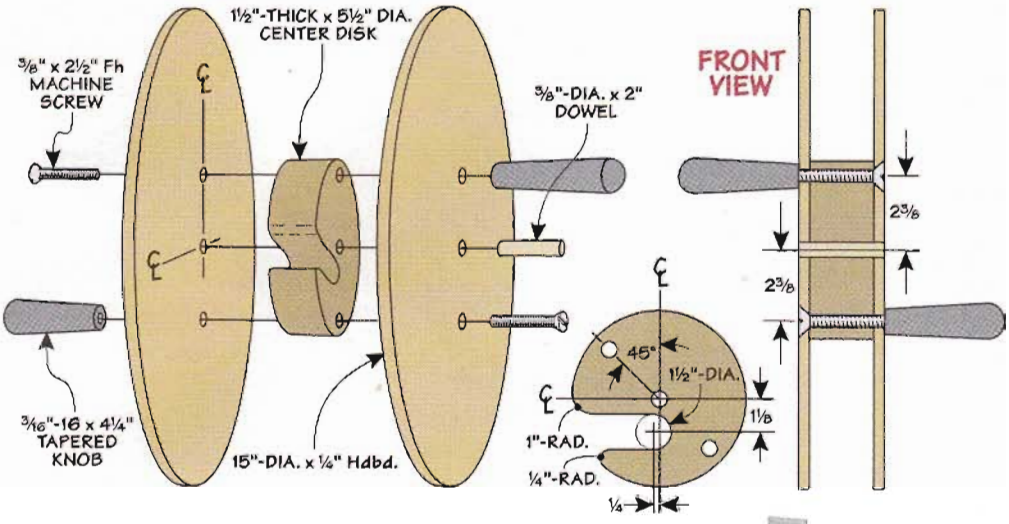
I learned very early that keeping extension cords neatly stored not only avoids a tangled mess, but can extend the life of the cord. For storage in my shop, I've been using simple cord reels like the one you see on the right. One of my reels and cord still works great and has lasted over thirty years.

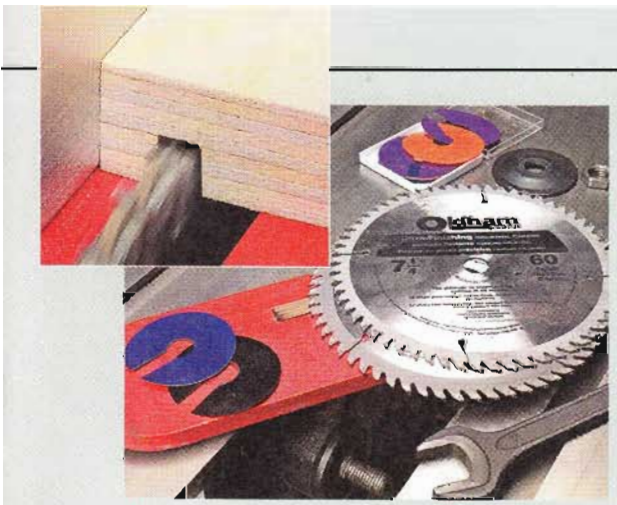
The concept is pretty simple. The reel starts with a solid-wood hub. I made mine from "two-by" stock. You can easily cut it to shape on the band saw. I also create a cavity in the hub to house the male end of the cord (drawing at right). You'll want to take the time to round over any edges that could damage or put strain on the cord.

Once the hub is complete, you can turn your attention to the pair of round caps that hold the cord on the hub. Mine are made from ¼" hardboard and are sized to hold a 14-gauge cord up to 100' long. Cut them to shape and sand off the sharp edges. Then, you can center the caps on the hub using a dowel to help with alignment. All it takes is a pair of long machine screws into the tapered knobs to fasten everything together. Just make sure to avoid the open cavity in the cord when drilling the holes for the screws.

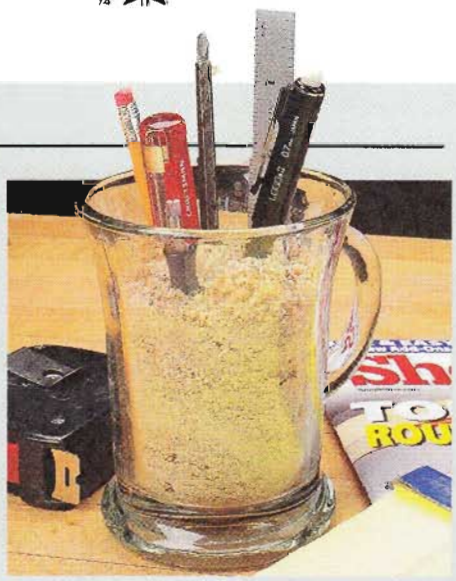
There's one last thing I should mention. To allow for the "cranking" action used to wind up the cord, offset the knobs 180°, as you can see in the photo and drawings below. Now just wind up your cord and go.

Tony Gallo
Brampton, Ontario





▲ *To create dadoes sized to fit ¼" plywood,* ***Philip Lashmit*** *of North Liberty, Iowa uses a pair of inexpensive circular saw blades nested together with shims. The result is a perfectly sized kerf for the plywood.*



▲ ***Cayce Balara's*** *8-year old daughter,* ***Aine****, in Jacksonville, Florida surprised her dad with a simple solution for storing pens, pencils, and other tools. A cup full of sawdust does the trick.*

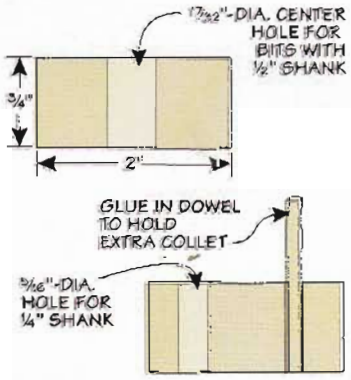
5 router bit Storage Solutions

Getting the most out of your router means having a wide assortment of bits to work with. But as your router bit collection grows, finding a simple way to store and access them can be a real problem. Fortunately, this problem isn't all that difficult to solve.

A good router bit storage system should do three things. First, it should make it easy to locate and to pick out a particular bit. Second, the system should keep the bits separated so the cutting edges don't knock together and become chipped. Finally, the design should be simple and easy to build. Well, the storage options you see here satisfy all those requirements. Your collection of router bits will be well-protected, not to mention, close at hand.

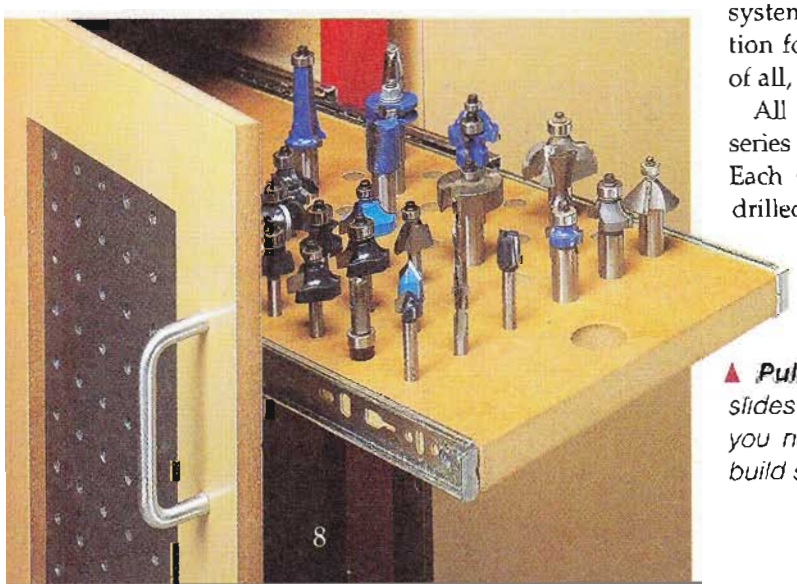
Modular Bit Organizer. If you expect your router bit collection to keep expanding (I know mine always is), a modular storage system might be the best solution for you (photo above). Best of all, it's simple to make.

All there is to this system is a series of 2"-square MDF "tiles." Each tile has one to four holes drilled in it to hold the bits. A single, centered hole is best for large-diameter bits. For smaller bits, you can drill several holes in one tile. The arrangement of the hole (or holes) in each tile is essentially customized for each bit or group of bits. I even mounted a pair of dowels in one tile to hold collets.

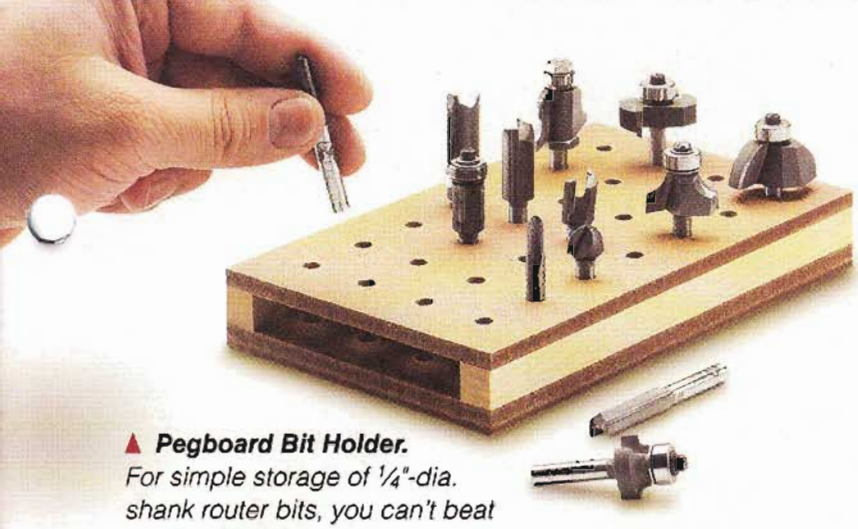


The drawings above give you the "construction" details. Slightly oversized holes allow the bits to slip in and out with ease.

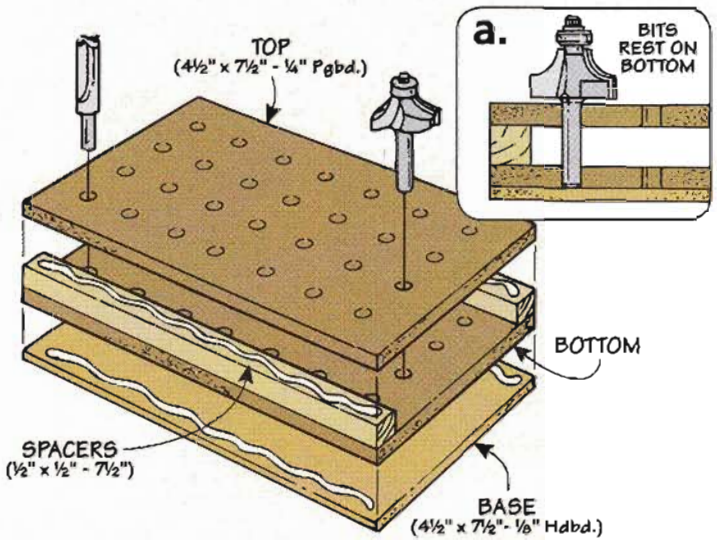
The individual tiles can be stored in a drawer to keep the edges of your bits safely separated. Plus, it's a snap to rearrange or expand the system to accommodate new bits as your collection grows.



▲ ***Pull-Out Tray.*** *A pair of drawer slides and a scrap of MDF are all you need to make this easy-to-build storage tray.*



▲ ***Pegboard Bit Holder.*** *For simple storage of ¼"-dia. shank router bits, you can't beat a little bit of pegboard.*



Pull-Out Tray. Many router bit storage solutions involve building drawers. It occurred to me one day that I could just make a tray from a piece of MDF and avoid building the drawer altogether.

All you need to do is mount drawer slides to the edges of the tray and install it in a cabinet. Here again, slightly oversized, stopped holes hold the drill bits for easy access and organization. And a finger hole near the edge makes it easy to slide the tray out.

Router Bit Racks. Another great way to create storage without a lot of work is the bit holder you see above. It's nothing more than a couple of layers of ¼" pegboard separated by a pair of spacers. Just be sure to keep the holes aligned as you glue everything together. Finally, a piece of ⅛" hardboard keeps the bits from falling through.

The bit holder above worked great for the ¼"-dia. shank router bits I started out with. While working in the kitchen, I came up with a much improved version — a rack made out of a piece of ordinary plastic cutting board. The end result is the rack you see below. What I really like about this storage rack is that the plastic is naturally slippery, so the bits can easily slide in and out.

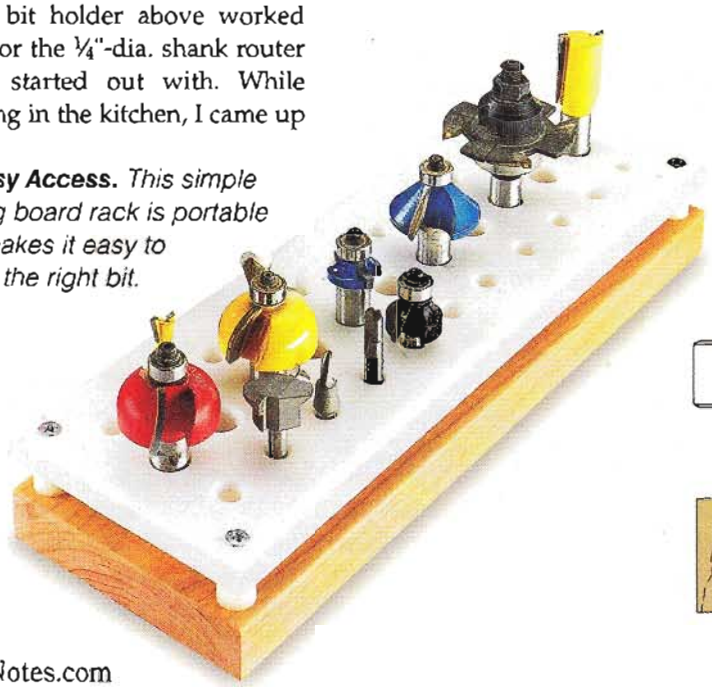
To put my idea into practice, I bought a new cutting board at a grocery store and cut it to size. Then, I drilled a series of holes to fit both ¼"-dia. and ½"-dia. shank bits. Chamfering the top edges of the holes makes inserting the bits a little bit easier.

I mounted the cutting board on a hardwood base. Nylon spacers in between allow the bits to fit deeper and more securely into the rack (detail drawing below).

The best thing about these racks is they're small enough to be portable. You can take them to the router table, the workbench, or just tuck them out of the way in a drawer.

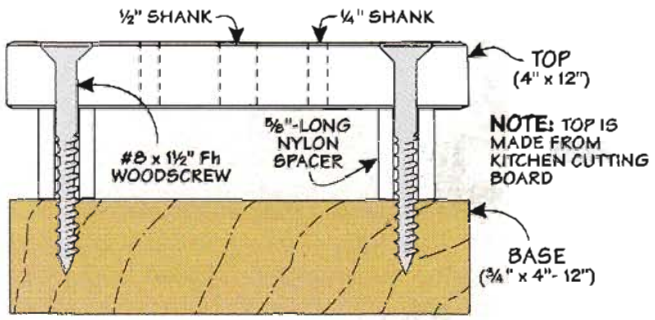
Simple Shelf. Finally, check out the photo below for a really simple way to create a router bit storage shelf (bits with ½"-dia shanks are held in place with a friction fit). It's easy to make and you can mount it anywhere.

Building any of these storage systems will keep your router bits ready and waiting. This way, you can spend more time building projects instead of looking for the right router bit.



► ***Easy Access.*** *This simple cutting board rack is portable and makes it easy to select the right bit.*

▼ ***Storage Grid.*** *You can turn a small section of a light diffuser panel and a pair of metal brackets into a simple, wall-mounted storage shelf.*



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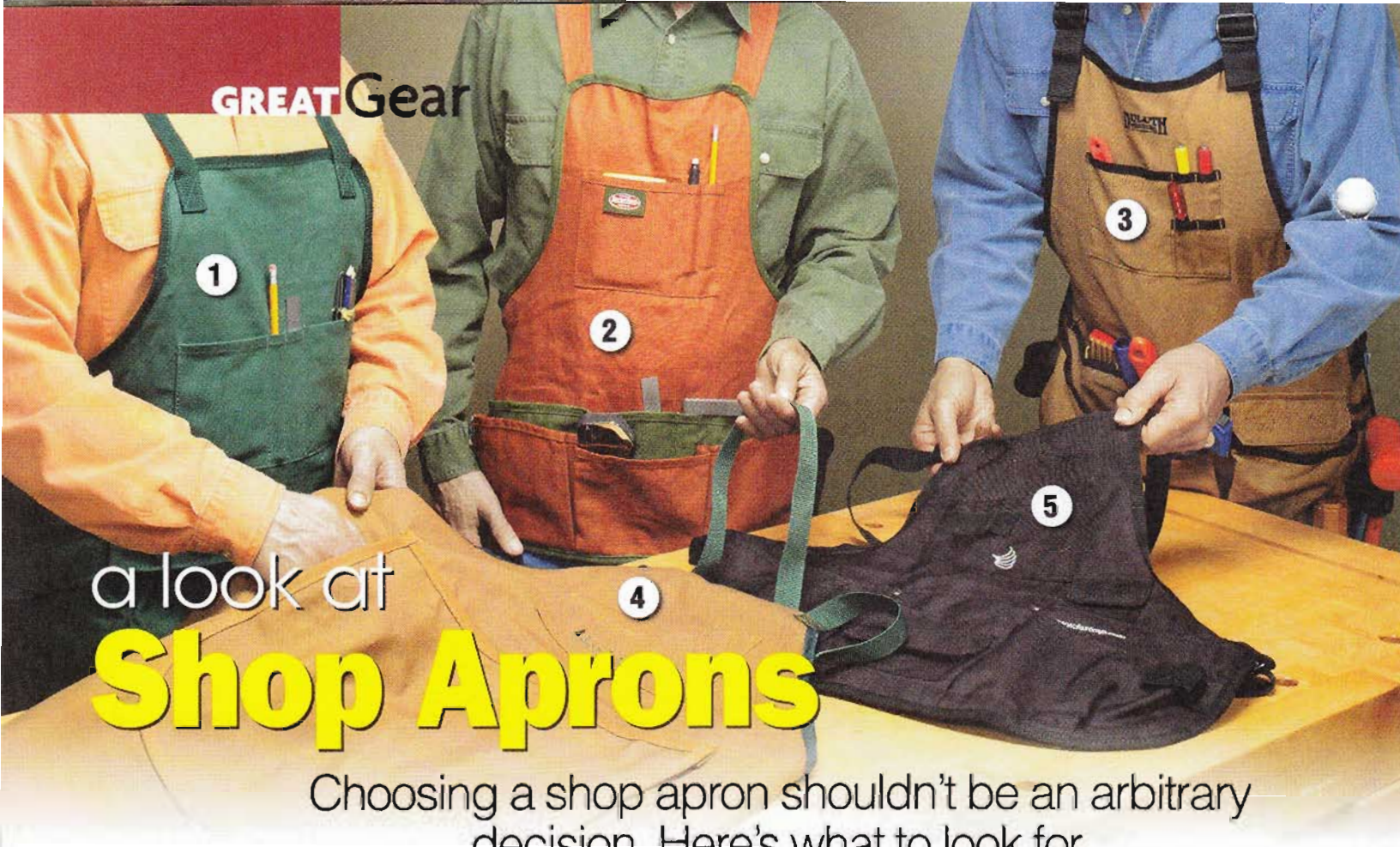


a look at Shop Aprons

Choosing a shop apron shouldn't be an arbitrary decision. Here's what to look for.

Around our shop, it's apparent everyone has a favorite shop apron. And for good reason, an apron protects your clothes and allows you to keep often-used tools handy. Since I'd been thinking about replacing my shop apron, I talked about what some of the other guys in the shop liked about theirs. Then, I set out to find aprons that might fill the bill.

▲ **Strapped for Comfort.** *Look for aprons with straps that bear on the shoulders instead of the neck. The criss-cross or Y-pattern straps are best.*

A Wide Variety. When you take the time to go looking for a good shop apron, it's easy to get overwhelmed by all of the choices. I whittled my selection down to the five aprons you see in the main photo. Each of these has features that are worth a closer look.

In the photo above, you see the *ShopMaster Apron* (1) by *The Morgan Company*, the *Bucket Boss Bib Apron* (2), and the *Fire Hose Shop Apron* (3) by *Duluth Trading Company*. On the bench are the *Lee Valley Mk.II Canvas Apron* (4) and the *Ballistic Apron* by *FastCap* (5). You can find sources on page 51.

Comfort. When shopping for an apron, the first priority on my list is comfort. Since an apron is worn for hours at a time, it needs to be as comfortable as wearing a shirt. Otherwise, you won't use it. The comfort of an apron usually boils down to the configuration of the straps. The least expensive aprons have a simple strap that loops around your neck. It doesn't take long for this to get somewhat uncomfortable even when wearing the apron for a short time.

Over the Shoulders. All of the aprons you see here have a strap configuration that rests on your shoulders, as you see in the photo at left. The *ShopMaster* and the *Mk.II* have a criss-cross configuration, like the one shown on the far left. The *Ballistic* apron also has a criss-cross strap in the back but the straps are excessively long and difficult to adjust.

The other two have a vertical strap that connects the shoulder straps to the horizontal waist strap. (The *Fire Hose* apron is shown in the middle and *Bucket Boss* on the right.) Plus, the *Bucket Boss* and *Fire Hose* aprons have extra-wide straps for added comfort.

Pockets. During our discussion in the shop, I found out that we're all pretty opinionated about what we keep in our apron pockets. So, the quantity of pockets and how they're configured is important.

Many or Few. If you tend to carry a lot of tools, fasteners, and

other supplies, you'll want to consider the *Bucket Boss*, *Fire Hose*, or *Ballistic* aprons. There are plenty of pockets to fill up with tools and supplies. I counted eighteen pockets on the *Fire Hose* apron, sixteen on the *Bucket Boss*, and eleven on the *Ballistic* apron.

The *Fire Hose* apron also has the most versatile pockets. The larger ones have a mesh bottom to allow sawdust to drop through (right photo above). And the flaps on a few of the other pockets keep out dust or can be tucked in for easy access, as shown in the left photo above. Hook and loop fasteners are strategically placed to keep flaps closed or out of the way and to keep tools from falling out.

If getting sawdust in your apron pockets is a big problem for you, you'll want to take a look at the *ShopMaster* apron. All of the lower pockets are covered by a narrow flap. To reach inside the pocket, the flap is easy to lift out of the way with a finger or two, as you can see in the right photo below.

The *Ballistic* apron has elastic loops sewn into the larger pockets. These provide secure storage for screwdrivers and similar tools.

Lee Valley's Mk.II breaks away from the pack with its two, extra-large pockets. The pockets are accessed from the side to help keep out sawdust (lower right photo). And they're deep enough to hold plenty of tools.

▲ **Pocket Design.** *Hook and loop fasteners on the flap mean you can cover the pocket to keep it dust-free or tuck the flap inside for easy access.*

▲ **Mesh Bottoms.** *This pocket design prevents sawdust from accumulating in the bottom.*

Apron Length. There's one other important consideration when choosing an apron. And that's the length. This can range from the short *Ballistic* apron to the long *Mk.II* apron. You can see the differences in the lower right photo. The *ShopMaster* falls in between and also features a split leg (left photo below). This makes walking and navigating stairs easier since the apron flexes with you as you move your leg.

The length is obviously a personal choice. It depends on what feels comfortable to you and how much of your clothing you want to protect from sawdust. Some aprons, like the *Ballistic* apron, are available in longer lengths.

Material & Care. When it comes to durability and comfort, a good shop apron should feel like an old pair of jeans. All the aprons shown here (except the *Ballistic* apron) are made of cotton canvas material. This means that when the apron gets dirty, you can throw it in with the laundry. And the more you wash it, the softer it becomes. Though the *Ballistic* apron is made out of nylon, it can just as easily be thrown in the wash.

My Choices. Now that I've had a chance to talk to the guys and try out each of these aprons, I really like the *Bucket Boss* and *Fire Hose* aprons. Both are long enough to cover the pockets of my pants to keep them clear of sawdust. Their wide shoulder straps are easy to adjust for a great fit. The wider straps put a lot less strain on my neck. And the simple strap configuration makes them easy to put on and take off. Finally, the variety of pockets means that my favorite tools are always within reach.

▲ **Split Leg.** *The split-leg feature of the ShopMaster apron is an added feature for comfort.*

◀ **Length.** *With shorter lengths, you trade greater protection for more freedom of movement.*

all about Engineered Veneer

Factory-made veneer is inexpensive, comes in wide, consistent sheets, and best of all, it's easy to use.

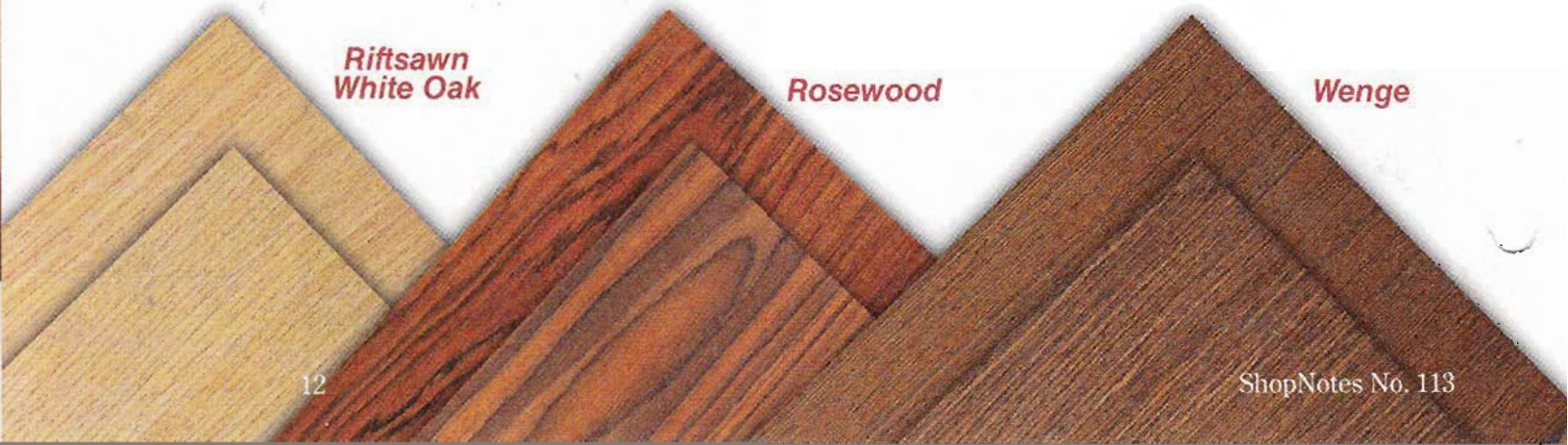
The design of the tool chest on page 14 centers around a plywood box covered with veneer. The problem with most of the veneers I like to use is that they aren't wide enough. This means spending time taping strips together to get a piece that's wide enough to use. And even though veneer is lower in cost than its solid-wood counterpart, some veneers can still be expensive.

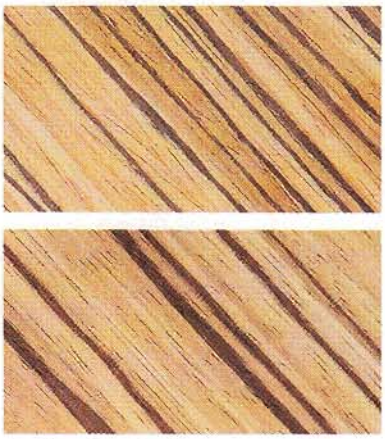
Man-Made Veneer. To reduce the cost and minimize the hassle, I turned to a "new" type of veneer. This man-made, engineered veneer is often called reconstituted, composite, or simply "green" veneer. It's available in long, wide pieces (photo above). And honestly, in the photos below, it's hard to tell a real veneer from its engineered counterpart. I'll let you know later which is which.

Now, engineered veneer isn't really all that new. It's been around for over 30 years. But its biggest use has generally been for office furniture and architectural applications. These man-made veneers are manufactured so the look is virtually identical from one sheet to the next. This provides the consistency needed for an entire project or line of furniture.

I know, "man-made" and "consistency" might sound a little too much like plastic laminate. But these engineered veneers are made from real wood, so a project that uses it has the look and warmth of wood. The procedure used to make engineered veneer is actually quite an interesting process.

Making Engineered Veneer. One of the main reasons for creating veneer is to get more out of a single log. Cutting a log into veneer





▲ **Can You Tell?** *In these close-up views, it's hard to tell engineered zebrawood veneer (top) from its real counterpart (bottom).*

creates more useable material than cutting it into lumber. However, even turning some exotic species into veneer still doesn't provide enough material to match the demand for it.

Engineered veneer solves the problem by starting with logs made from abundant, sustainable species that are often plantation-grown. The logs most often come from Africa and Europe. These species are typically light in color with a nondescript figure. This allows the manufacturer to use them to produce veneers in distinctive colors and patterns.

After selecting the logs, the next step in the process is to slice them. This process uses a rotary method to create a continuous sheet of veneer, which is then cut into wide strips called leaves. After drying, the higher-quality leaves are pulled out and separated into light and dark groups.

Dyeing. Here's where the process gets interesting. Because the leaves are rather plain at this point, each one goes through a dyeing process. Using specific formulas, the manufacturer dyes each leaf for eventual use in a veneer of a specific type or "species."

The dyeing takes place in a vat under high pressure to ensure the dye penetrates each leaf completely. Finally, the leaves are unloaded and dried.

Creating the "Log." The most critical part of the process takes place next. And that's to create a "log" from the dyed leaves. This is where the engineering comes in. Each type of veneer has a specific formula to insure each log is uniform and repeatable.

To do this, the dyed leaves are stacked in a specific order with a layer of dyed glue between each leaf. Besides binding the leaves together, the glue also creates the contrast necessary to provide grain definition later in the process. These steps help ensure color consistency from sheet to sheet.

Once the stack has been built according to the specifications, it goes into a press that uses a shaped mold. The mold can be a simple curve or wave, or something more complex, like a contour. Using these shaped molds results in repeatable "grain" patterns from one sheet of veneer to another.

There are a variety of mold shapes available to create a wide range of patterns. With the leaves stacked between matching top and bottom molds, the assembly is placed under high pressure to form a "square log."

The Final Veneer. This "log" is then sliced into new leaves. The slicing (basically the angle of the cut) is also part of the overall process of creating the specific grain structure in each sheet of engineered veneer.

The leaves that result are typically 26" wide and 99" long (main photo). But 135"-long leaves are available. These can then be backed (margin photo) or even spliced together to make wider sheets.

Cost. Depending on the "species" of the veneer, the cost starts around $2 per square foot and can run up to more than $10 per square foot. Although this may sound expensive, it's less costly than a solid-wood alternative.

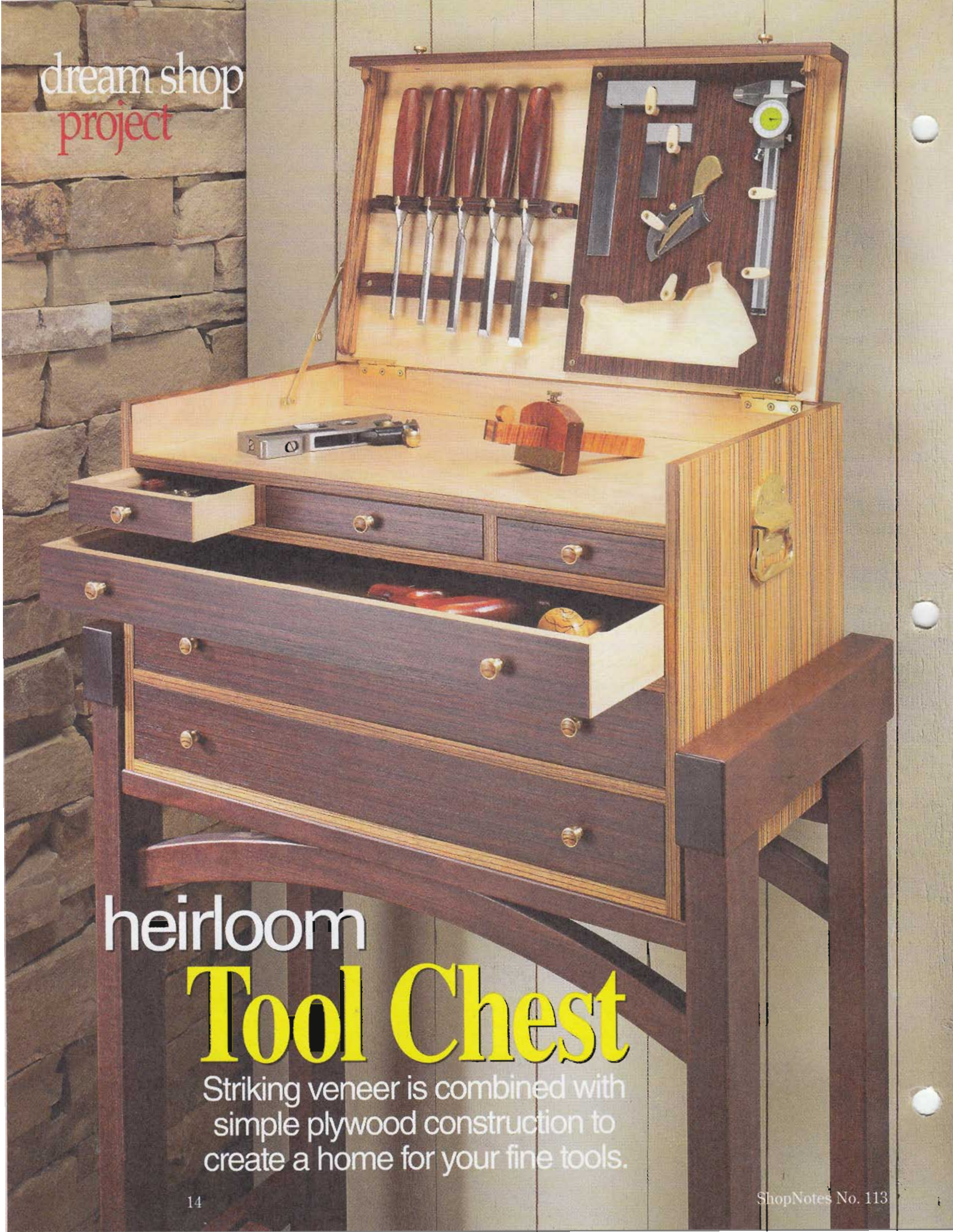
Using Engineered Veneer. I found that working with engineered veneer wasn't all that different from a "real" veneer (refer to page 42 for more on creating veneered panels). Although the manufacturers don't recommend using a dark stain, I didn't have any issues using one on the drawer fronts on the tool chest.

I do find the straight grain, or quartersawn figure, which is the "look" of most of the engineered veneers, quite realistic. And even the engineered bird's-eye below doesn't look bad. But some engineered veneers, like burls, don't look quite real enough for my taste.

I think you'll find engineered veneer a good option to consider for your next project. The low cost and ease of use can't be beat. And if you're still wondering, the engineered veneers are resting on top of their real veneer counterparts in the photos below. All in all, they're pretty good matches.

▲ **Options.** *An engineered veneer without a backing (bottom) is less expensive but can be more challenging to work with than a paperbacked option (top).*

dream shop
project

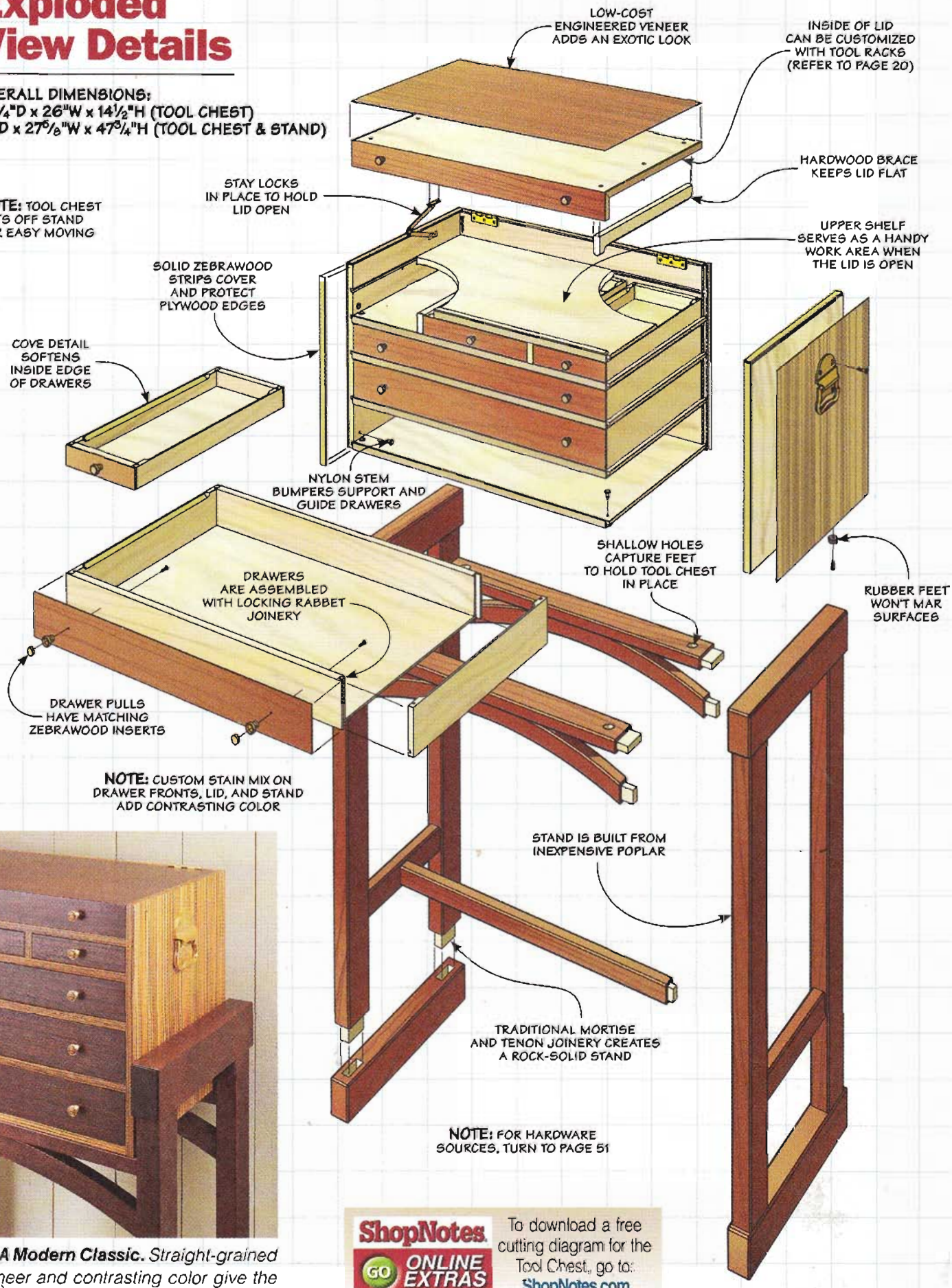


heirloom Tool Chest

Striking veneer is combined with simple plywood construction to create a home for your fine tools.

Exploded View Details

OVERALL DIMENSIONS:
14¾"D x 26"W x 14½"H (TOOL CHEST)
15"D x 27⅝"W x 47¾"H (TOOL CHEST & STAND)



▲ ***A Modern Classic.*** *Straight-grained veneer and contrasting color give the tool chest a timeless appeal.*

ShopNotes GO ONLINE EXTRAS

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

easy-to-build Case

The veneer on the tool chest gives it a great look. But it starts with an easy-to-build case with a lot of storage inside. (You'll add the veneer later.) The case holds six drawers. Flipping up the lid reveals a handy tool rack and small shelf for keeping frequently used tools close at hand but off your workbench.

Simple Materials & Joinery. To minimize the weight, and maximize space inside, the case of the tool chest is made from ½" plywood. And it's assembled with straightforward joinery.

Creating the case begins with cutting the sides and back of the case to the sizes shown in Figure 1. Along with the shelves, they create openings for the drawers and the upper shelf. To do this, you need to cut a series of dadoes across the sides and back. The dadoes can be cut at the table saw with a dado blade. Figure 1 shows the locations for each of the five dadoes. And you can find the size of the dadoes in Figure 1b.

While I was at the table saw, I cut the joinery that connects the sides and back to each other. I cut a rabbet along the back edge of each side. Then, I cut a mating rabbet on each end of the back panel. You can see how this works in Figure 1c. This joint adds a lot of glue surface and helps register the parts during assembly.

Shelves. You'll want to hold off on assembly for now. That's because you need to make the shelves, first. These panels are all the same size, but some have a few added details I'll mention in a bit.

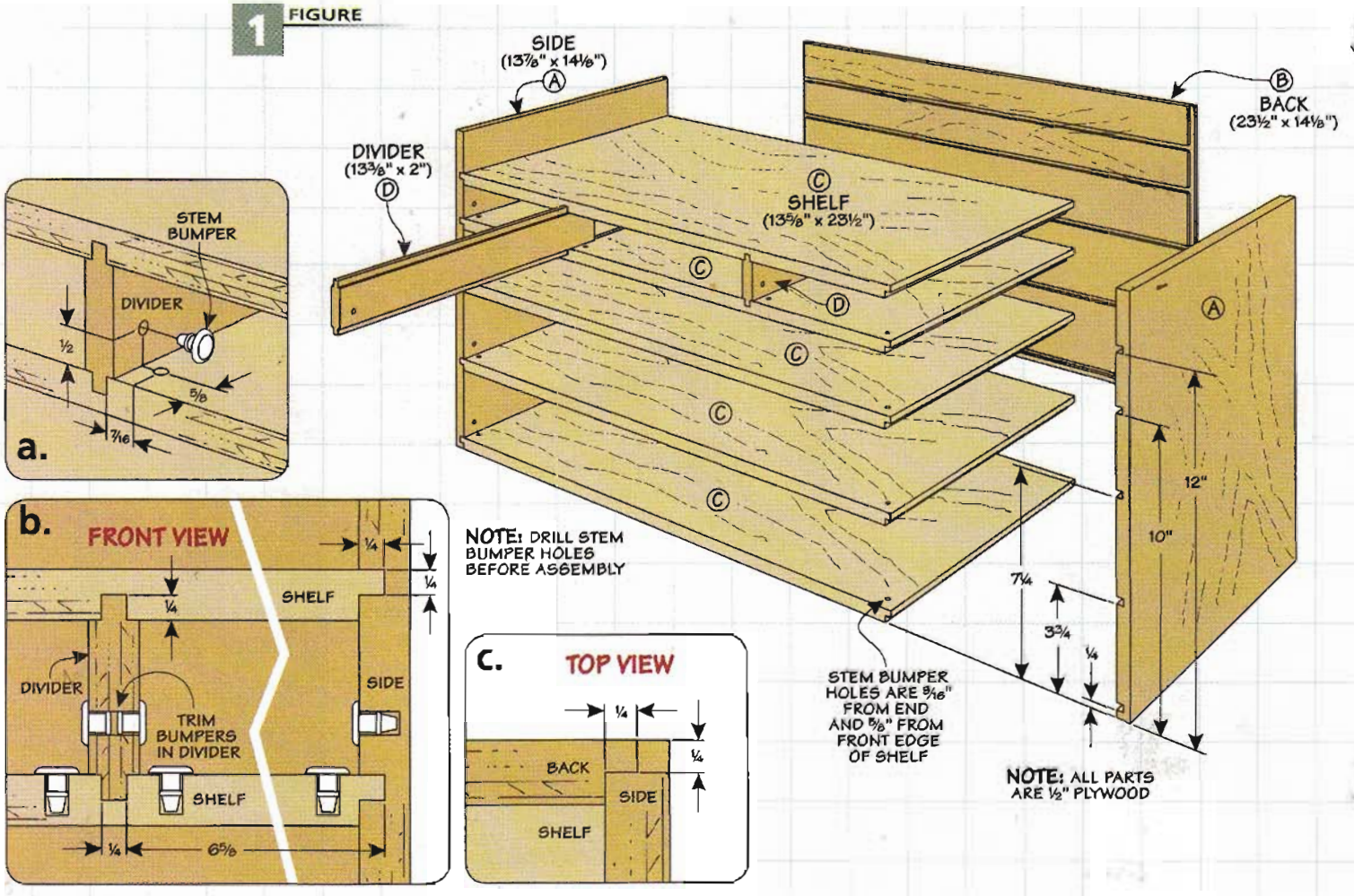
After cutting the panels to size, I cut a rabbet on each end and the back edge to fit the dadoes in the sides and back pieces, as you can see in Figure 1b.

That's all the joinery you need to cut on the lower three panels. The upper two shelves have additional dadoes cut from front to back to accommodate short, vertical dividers. These create smaller openings for the upper three drawers of the tool chest. The dimensions for the dadoes are in Figures 1a and 1b.

Short Dividers. Before assembling the case, I cut the dividers to size and cut a tongue on the upper and lower edges to fit the dadoes in the upper shelves.

The final detail to complete is to drill holes for stem bumper glides that center and support the drawers, as shown in Figures 1, 1a, and 1b. There's one thing I want to mention about installing the bumpers. I trimmed the bumpers in the vertical dividers so they wouldn't interfere with each other, as illustrated in Figure 1b.

FIGURE 1



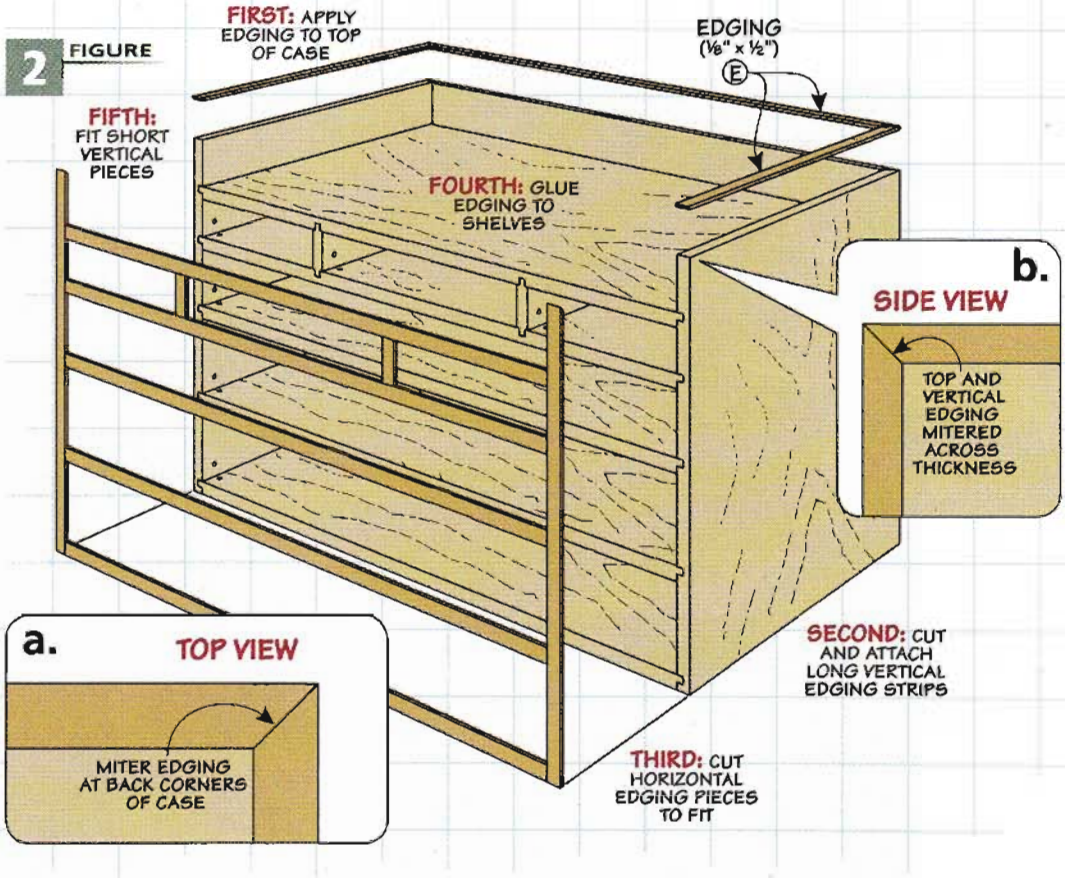
Case Assembly. The case can be assembled at this point. There are a lot of parts that have to go together at once, so it's a good idea to use slow-setting glue and do a dry run to get your clamps ready.

When you're ready, set the back of the case on the workbench and set one of the sides in place. Then, sandwich the dividers between the upper shelves and fit them into the case side and back. After adding the remaining shelves, glue and clamp the other side in place.

Hardwood Edging. That completes the main part of the case. The next steps get the case ready for the veneer. I started by adding some hardwood strips to the exposed edges of the case. (Note: The edging is applied to the front and top edges only.)

For the most part, applying edging to the case is simply a matter of cutting thin strips to size and gluing them in place, as shown in Figure 2. But there are a couple areas I'd like to highlight.

The edging that wraps around the top edge of the case is mitered at the back corners for a seamless look, as you can see in Figure 2a.



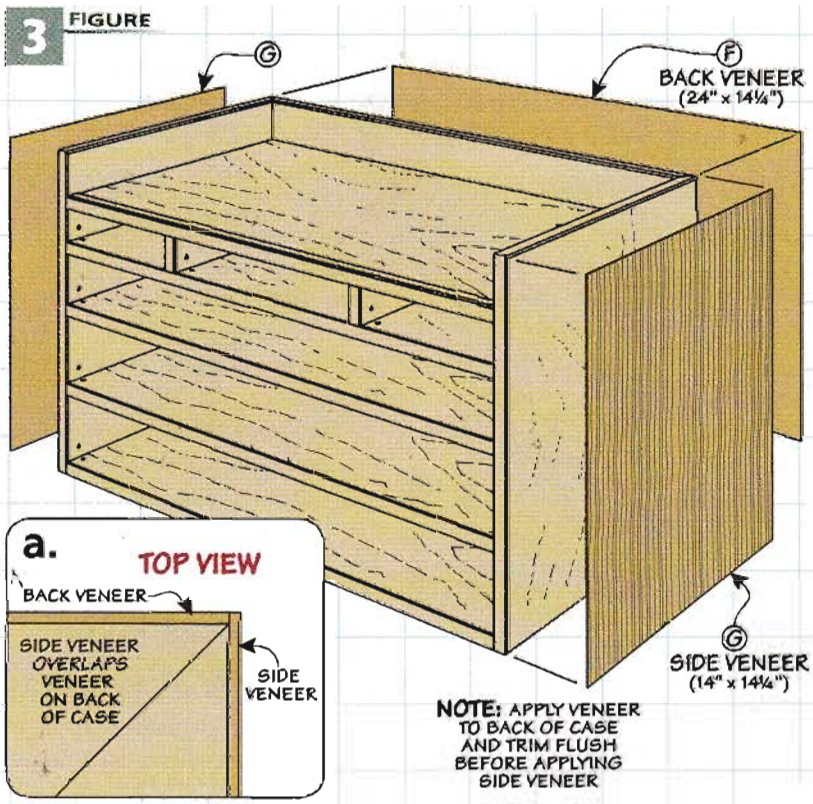
Then, at the front of the case, the edging is mitered across the width to meet the edging on the front of the case, as shown in Figure 2a. I like to cut the edging strips just barely wider than the thickness of the plywood. The strips are cut to length and can be held in place with masking tape while the glue dries. Once the glue dries, a few swipes with a sanding block are all it takes to bring the edging perfectly flush with the case.

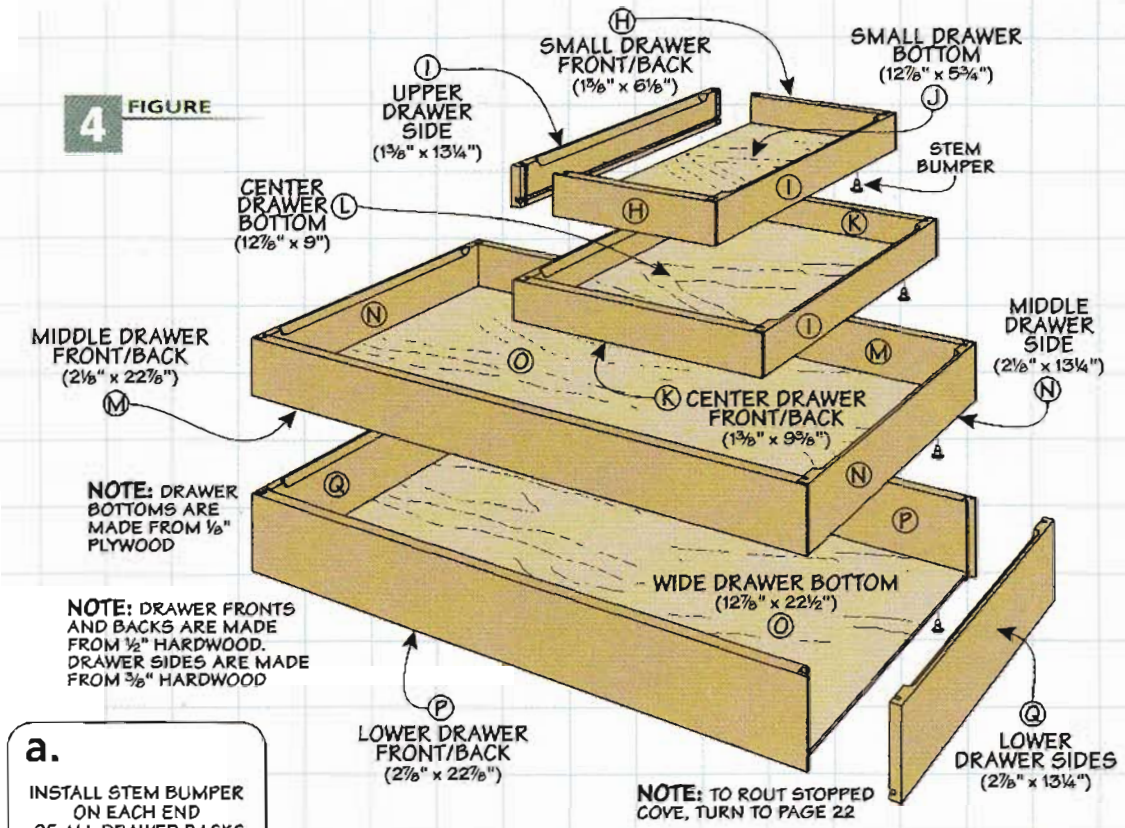
I glue on corresponding strips of edging in stages. For example, the two long vertical strips go on and are sanded flush before adding the horizontal pieces.

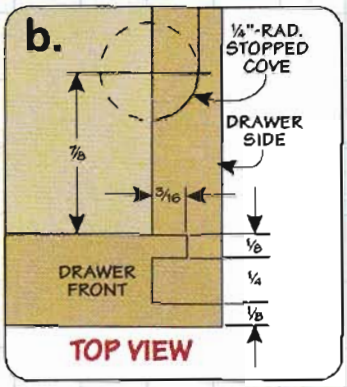
Easy-to-Apply Veneer. At this point, you can apply the veneer, as shown in Figure 3. I used engineered veneer that looks like zebrawood. You can read more about this unique type of veneer in the article on page 12.

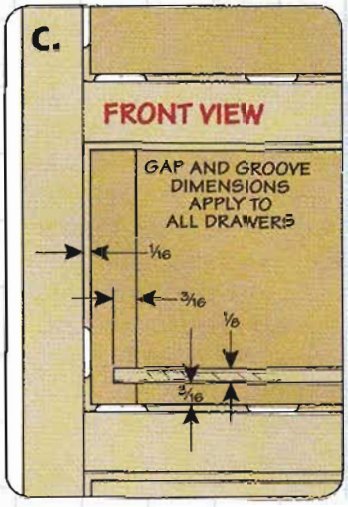
I cut oversized pieces of veneer and attached them with spray contact adhesive. Apply the back piece of veneer first and trim it flush, then add the sides. This way, the side pieces extend completely from front to back. You can learn more about this process on page 42.

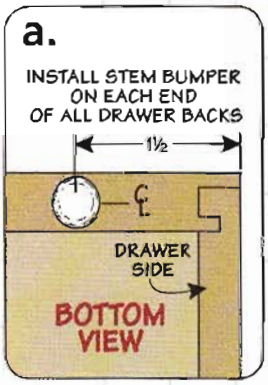
Once the veneer is trimmed flush, I softened the sharp edges with some sandpaper. This prevents the veneer from chipping.











drawers & Lid

Completing the case lets you turn your focus to adding the storage inside it. This consists of building the drawers and adding the flip-up lid. I built the drawers first.

Simple Drawers. The tool chest holds six drawers. However, as you can see in Figure 4, there are only four sizes. Better yet, the joinery on each drawer is identical. So to save some time and extra setups, it's a good idea to cut all the drawer parts to size, first. (Be sure to allow for a 1⁄16" gap on all sides.) Then, you can cut the joinery for all the drawers at once.

Locking Rabbet Joinery. A table saw makes quick work of cutting the locking rabbets that connect the front and back to the sides. I'll explain the three-step process I use. But another option is to use the jig and technique that's shown on page 44.

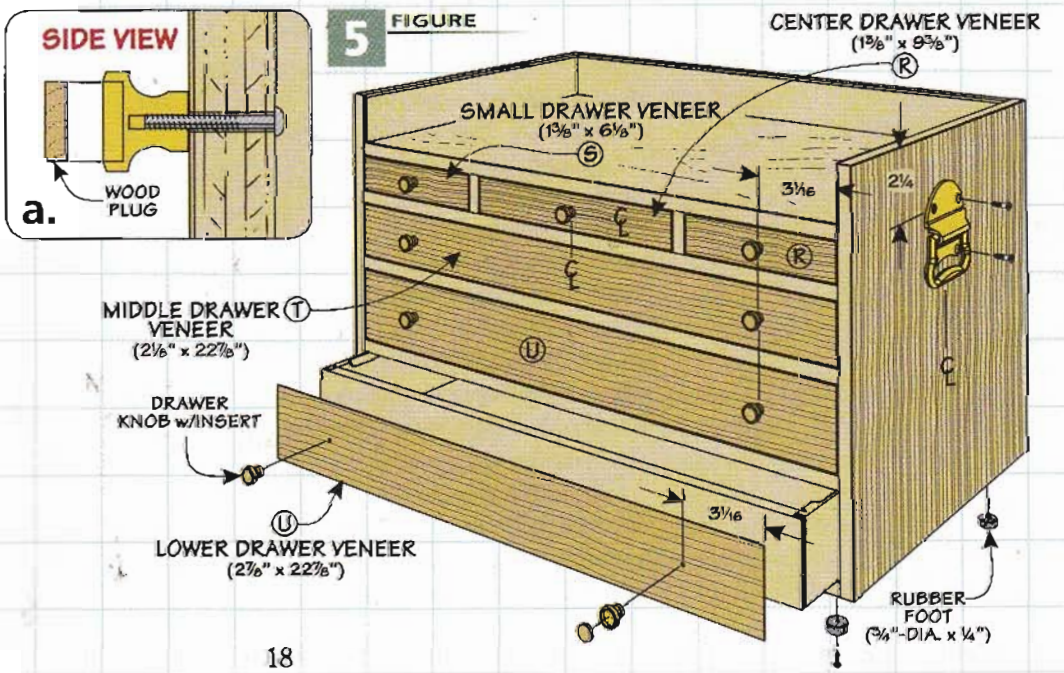
The locking rabbet begins with a groove cut across each end of the front and back pieces, as shown in Figure 4b. The inside tongue is trimmed back slightly to fit a dado cut in the drawer side.

The third step is to cut the dado near each end of the drawer sides. It's sized and located to mate with the groove and short tongue on the front and back pieces.

Stopped Cove. Before assembling the drawers, I took the sides over to the router table to rout a stopped cove detail along the inside top edge. This detail softens the inside edge of the drawer. You can see how I did this in Shop Short Cuts on page 22.

Add Veneer, Too. Once the cove is routed, you can cut a groove in each piece to hold the bottom, as illustrated in Figure 4c. Just like the case, the drawer fronts have veneer added.

The stem bumpers and knobs are the last things to add to the drawers. A pair of stem bumpers is added to each drawer back to keep the drawer level, as you can see in Figure 4a.



The knobs I used for the drawers are a little unique. The center of each knob has a recess that holds a wood plug that matches the veneer and hardwood used on the project. I created the plugs at the drill press using a plug cutter. A little epoxy holds the plugs in place. Finally, I chucked the knobs in the drill press and sanded the plugs smooth.

Flip-Up Lid. The lid at the top of the tool chest does more than enclose the case. It's L-shaped to fit between the case sides and flush with the top, as shown in Figure 6a. The lid has veneer applied to the top and front face.

The lid starts with two pieces — a top and a front. There are two things to take into consideration as you size these pieces. First, you need to allow for a gap between the lid and case. And you need to factor in the thickness of the edging that will be applied on each side.

The lid top and front are joined with a tongue and groove. A groove at the front edge of the top accepts a tongue cut in the front, as shown in Figure 6a.

Cover the Edges. Following the joinery, I applied hardwood edging to the bottom edge of the front and the sides of the lid assembly. For cleaner joint lines, I mitered the edging pieces, as you can see in Figures 7 and 7a.

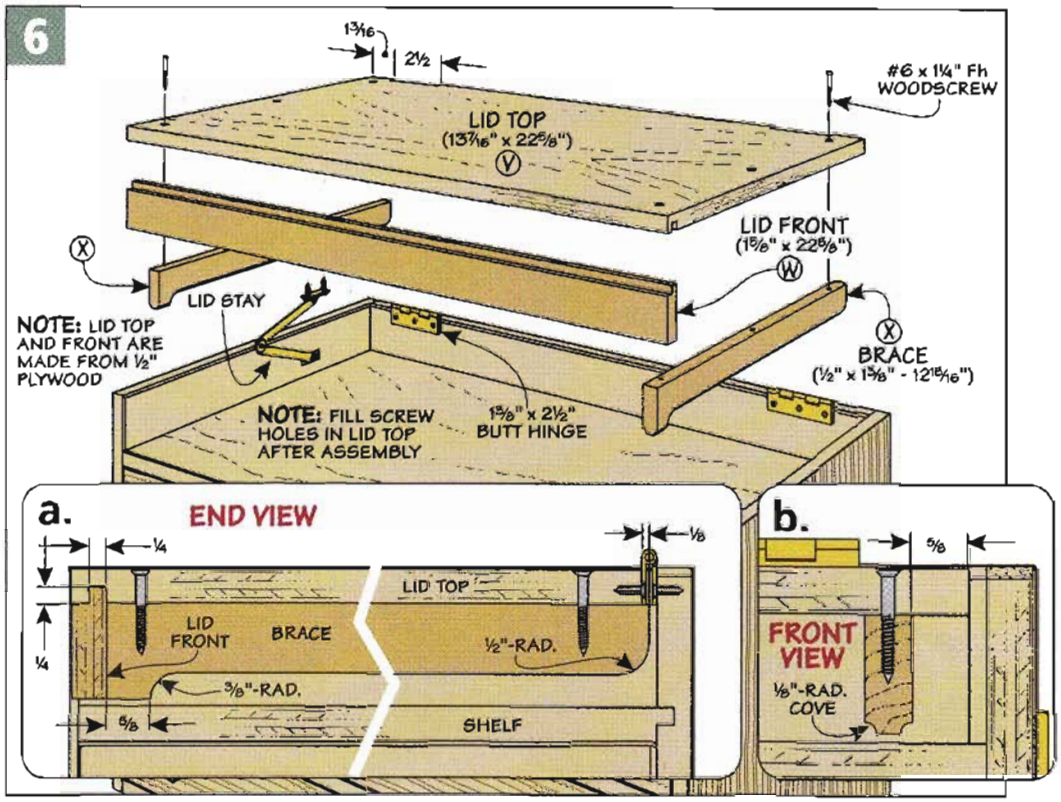
Hardwood Braces. Before adding the veneer, I made a pair of braces to stiffen the lid and keep it from cupping. The braces are made from the same zebrawood as the edging. After sawing and smoothing the profile, I routed a cove along the lower edges (Figure 6b).

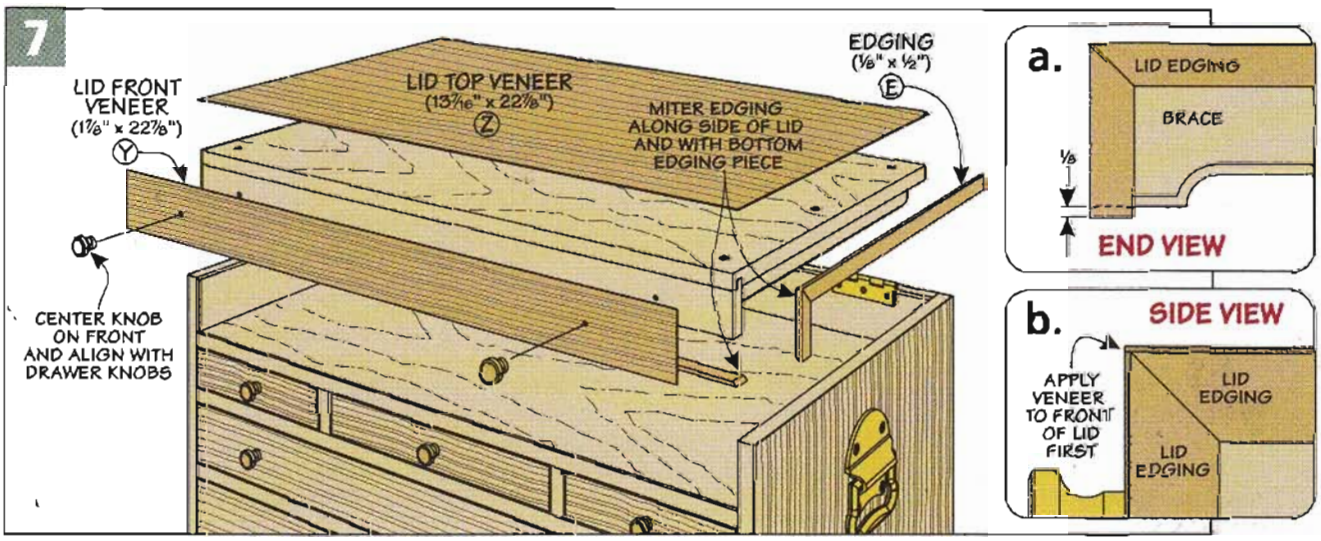
The braces are secured to the lid with glue and screws. The screws are driven through the lid top and into the cleat. To keep the screw holes from telegraphing through the veneer, I filled the holes and sanded them flush. Now you can apply veneer to the top and front face of the lid pieces.

A pair of hinges and a lid stay allow the lid to open smoothly and keep it in the open position. The hinges rest in mortises cut in the back of the lid (Figures 6 and 6a).

The lid stay needs to be attached in just the right position to allow the lid to open and lock in place. You can see how I did this in Shop Short Cuts on page 23.

Finally, I stained the drawer fronts and lid. I used a custom mixture consisting of equal amounts of *Java* and *Georgian Cherry* gel stains from *General Finishes*.



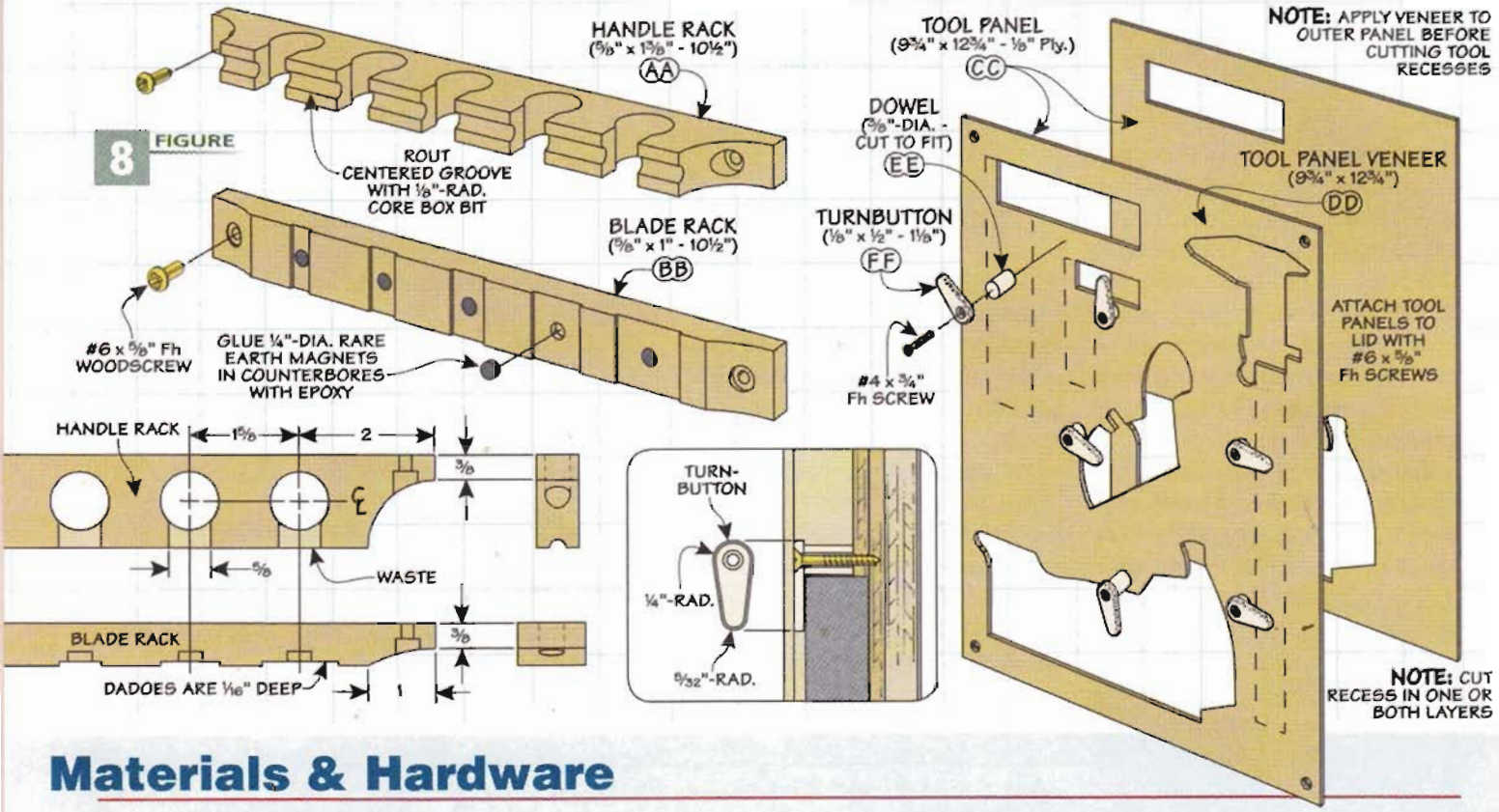


custom Tool Racks

With the lid open, the upper part of the tool chest makes a handy shelf for holding tools. This also exposes the underside of the lid, which creates a perfect place for adding a couple tool racks for storing (and displaying) some of my favorite hand tools.

Chisel Rack. The chisel rack is made up of two parts. The upper rail is drilled and notched to hold the ferrules of my chisel set. The lower rail is simply notched to accept the blades. Magnets glued into counterbores in the lower rail keep the chisels firmly in place.

Storage Panel. The other rack features custom pockets to hold other hand tools. It consists of two pieces of ⅛" plywood and a layer of veneer. Depending on the size of the tool, you may need to cut the recess into one or both layers of plywood, as shown in Figure 8. The tools are held in place with thin, maple turnbuttons.



Materials & Hardware

A	Sides (2)	13⅞ x 14⅛ - ½ Ply.	R	Small Drawer Veneers (2)	1⅜ x 6⅛	II	Middle Rails (2)	1 x 2 - 11¼
B	Back (1)	23½ x 14⅛ - ½ Ply.	S	Center Drawer Veneer (1)	1⅜ x 9⅜	JJ	Upper Stretchers (2)	1 x 2¼ - 26⅜
C	Shelves (5)	13⅝ x 23½ - ½ Ply.	T	Middle Drawer Veneer (1)	2⅛ - 22⅞	KK	Arched Stretchers (2)	1 x 4 - 26⅜
D	Dividers (2)	9⅛ x 2 - ½ Ply.	U	Lower Drawer Veneers (2)	2⅞ - 22⅞	LL	Lower Stretcher (1)	1 x 1½ - 25⅞
E	Edging (1)	⅛ x ½ - 235 (rgh.)	V	Lid Top (1)	13 7/16 x 22⅝ - ½ Ply.			
F	Back Veneer (1)	24 x 14¼	W	Lid Front (1)	1⅝ x 22⅝ - ½ Ply.			
G	Side Veneers (2)	14 x 14¼	X	Braces (2)	½ x 1⅜ - 12 15/16			
H	Small Dwr. Frt./Bk. (4)	½ x 1⅜ - 6⅛	Y	Lid Front Veneer (1)	1⅞ x 22⅞			
I	Upper Dwr. Sides (6)	⅜ x 1⅜ - 13¼	Z	Lip Top Veneer (1)	13 7/16 x 22⅛			
J	Small Dwr. Bot. (2)	12⅞ x 5¾ - ⅛ Ply.	AA	Handle Rack (1)	⅝ x 1⅜ - 10½			
K	Center Dwr. Frt./Bk. (2)	½ x 1⅜ - 9⅛	BB	Blade Rack (1)	⅝ x 1 - 10½			
L	Center Dwr. Bot. (1)	12⅞ x 9 - ⅛ Ply.	CC	Tool Panels (2)	9¾ x 12¾ - ⅛ Ply.			
M	Middle Dwr. Frt./Bk. (2)	½ x 2⅛ - 22⅞	DD	Tool Panel Veneer (1)	9¾ x 12¾			
N	Middle Dwr. Sides (2)	⅜ x 2⅛ - 13¼	EE	Dowels (6)	⅜"-Dia. - Cut to Fit			
O	Wide Dwr. Bottoms (3)	12⅞ x 22 ½ - ⅛ Ply.	FF	Turnbuttons (6)	⅛ x ½ - 1⅛			
P	Lower Drawer Frt./Bk. (4)	½ x 2⅞ - 22⅞	GG	Rails (4)	1¾ x 3 - 15			
Q	Lower Drawer Sides (4)	⅜ x 2⅞ - 13¼	HH	Legs (4)	1½ x 2½ - 36			

- (36) Nylon Stem Bumper Glides
- (11) ⅝"-Dia. Insert Knobs w/Screws
- (2) Chest Handles w/Screws
- (1 pr.) 2½" x 1⅜" Butt Hinges w/Screws
- (1) Left Hand Lid Stay
- (5) ¼"-dia. Rare Earth Magnets
- (6) #6 x 1¼" Fh Woodscrews
- (4) ¾" x ¼" Rubber Feet w/Screws
- (6) #4 x ¾" Brass Fh Woodscrews
- (8) #6 x ⅝" Brass Fh Woodscrews
- (2) #8 x 2" Fh Woodscrews

strong & sturdy
Stand

Once the tool chest is complete, you need a place to put it. Rather than take up valuable bench space, I made a complementary stand. The stand is made from poplar and stained the same color as the drawer fronts and lid.

You can see in Figure 9 that the stand is made up of two identical end assemblies that are joined with a series of stretchers.

End Assemblies. To build the base, begin by cutting the legs and upper and lower rails to size. Mortises in the rails accept matching tenons in the legs (Figure 9b). I also cut mortises on the inside edges of the legs to accept a middle rail. Finally, there are two mortises cut in the inside faces of the legs to hold the long stretchers.

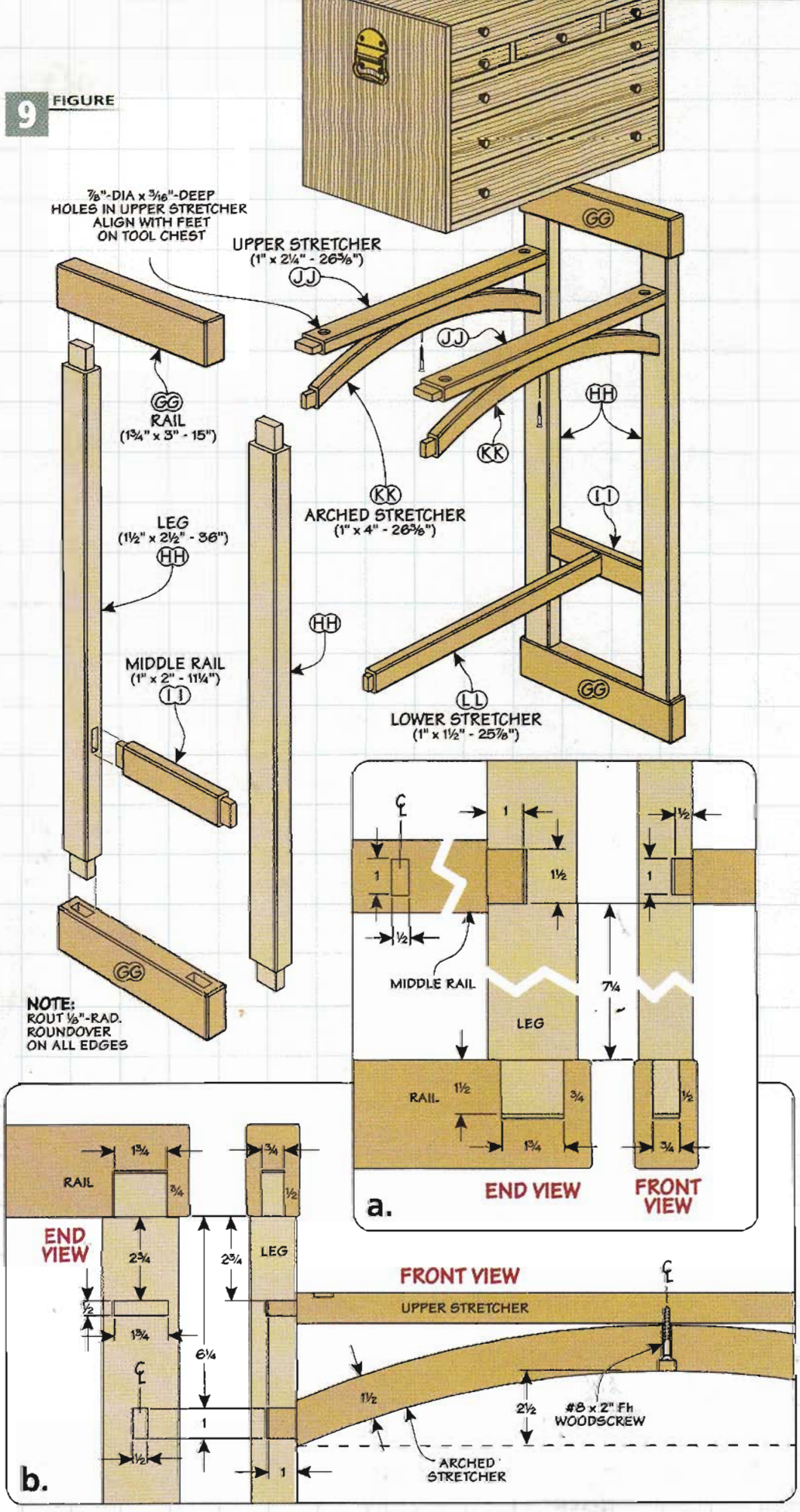
The next pieces to make are the short middle rails. They have a tenon on each end to fit mortises in the legs. And there's a centered mortise on the inside face of each rail to accept the lower stretcher.

Now, you can do some assembly. Just be sure to install the middle rail before fitting the legs into the upper and lower rails.

Connecting Stretchers. With the ends assembled, you can use the tool chest to determine the length of the upper stretchers (plus tenons). Allow a little extra space (⅜") so the fit of the chest isn't too snug.

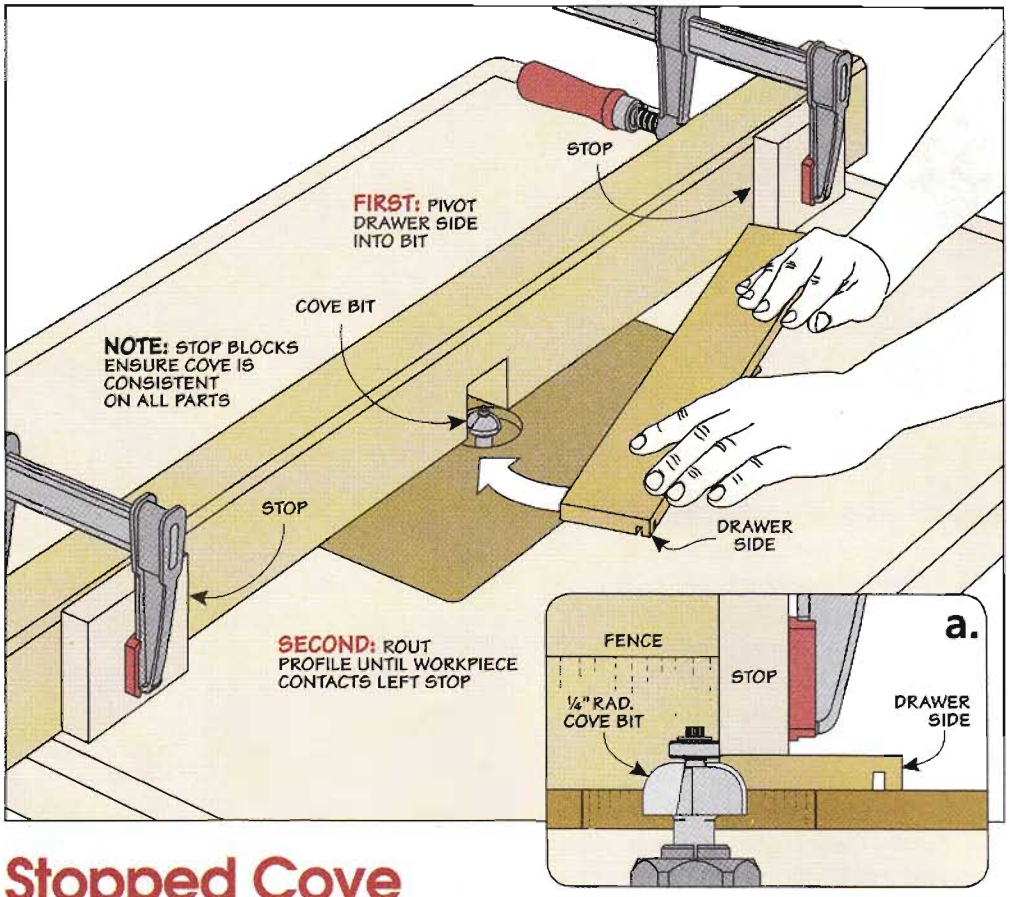
To make the arched stretchers, start with a 4"-wide blank. After cutting a tenon on each end, cut the curved profile on the top and bottom of the rail (Figure 9b). The final piece to make is the lower stretcher. Cut it to size and create the tenons on each end (Figure 9a).

To hold the tool chest in place, I added rubber feet to the bottom and drilled matching shallow holes in the upper rails of the stand. Now you have a handy place to store your tools close by but not on your workbench.



TIPS FROM
Our Shop

Shop Short Cuts



Stopped Cove

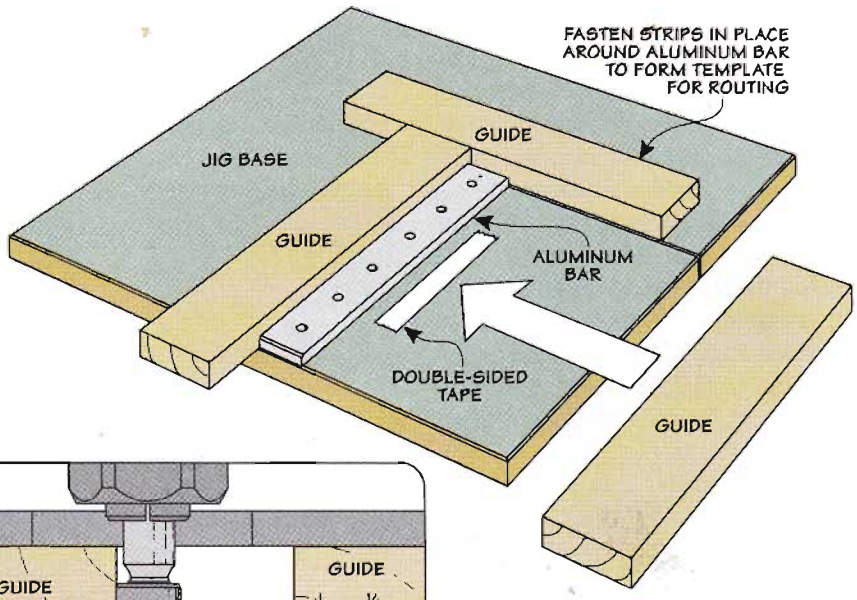
The drawers in the tool chest on page 14 have a stopped cove routed on the inside edge, as shown in the left margin photo. To speed up the process of cutting this profile in all 12 drawer sides, I turned to the router table and a set of stop blocks.

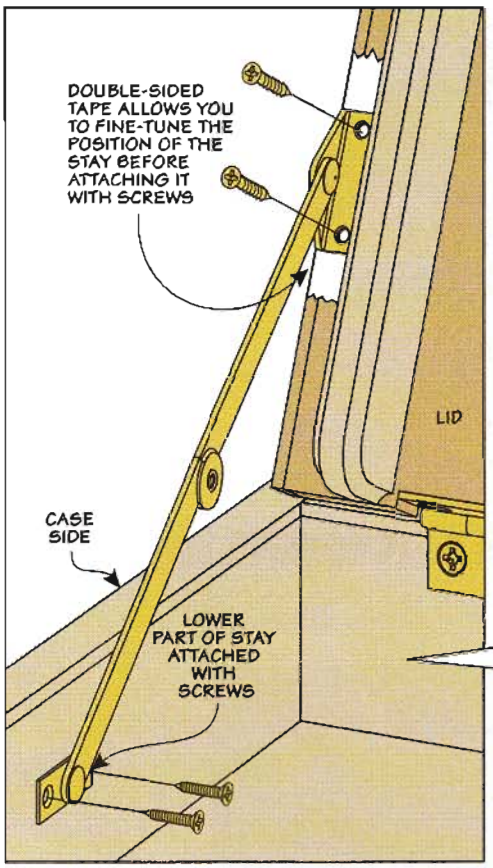
I marked the end points of the cove on one drawer side. Then, I used that piece as a gauge to set the position of the stop blocks. Simply align the bit with each layout mark on the workpiece and clamp a stop block to the fence at the opposite end. To rout the profile, brace the drawer side against the right stop block (drawing above). Then, pivot the piece into the bit and slide it along the fence until it contacts the other block.

Fitted Groove

The adjustment bar on the band saw circle jig (page 24) rides in a stopped groove. To cut the groove, I used my router and simple guides. As you can see in the drawings at right, I assembled the guides around the aluminum bar, guaranteeing a perfect fit. All you need to do is set the bar in position on the base, then fasten hardwood guides around it using double-sided tape.

I used a dado cleanout bit to rout out the groove. The bearing on the bit follows the guides. All that's left to do is square up the corners with a chisel.

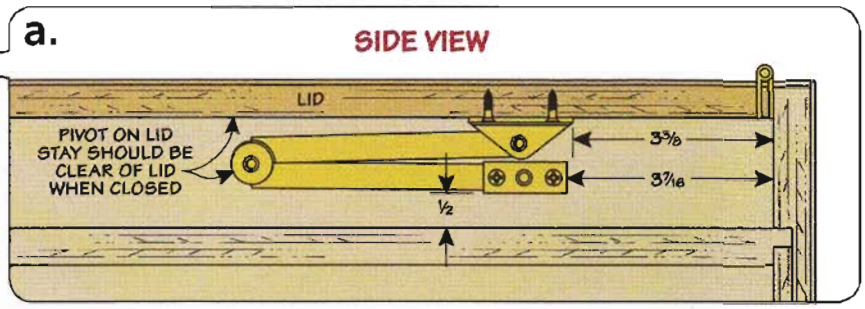




Installing a Lid Stay

I used a lid stay on the tool chest on page 14 to hold the lid in the open position. There's just one trick: You need to install the stay in the right position to keep the lid open without it slamming closed, but the stay must fold so the lid can close completely. To avoid peppering the tool chest with holes in a trial-and-error process, I used double-sided tape to fine-tune the position.

You can start by attaching the lower end of the stay using the dimensions shown in detail 'a' below. With the lid open, extend the stay arm and lock it. Then, secure the upper bracket to the lid with double-sided tape, as shown in the drawing at left. Try closing the lid. If it doesn't close tightly, reposition the bracket and try the lid again before fastening the stay with screws.

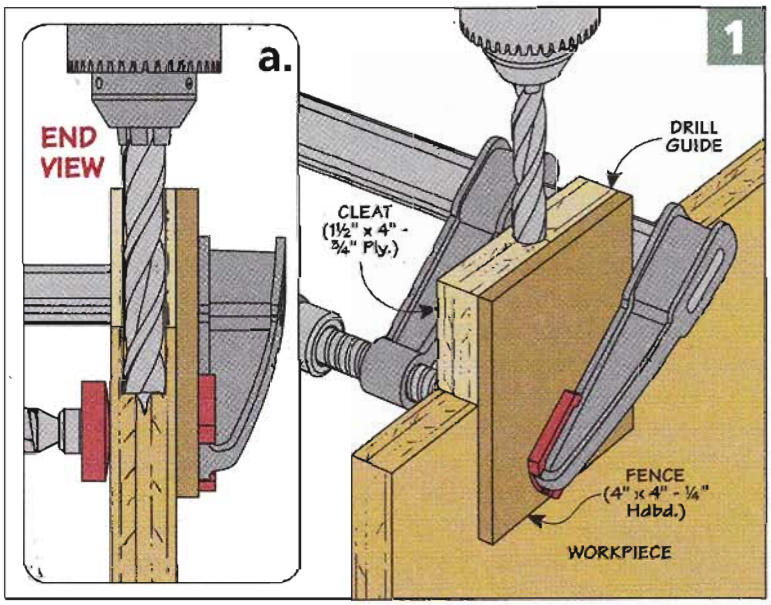


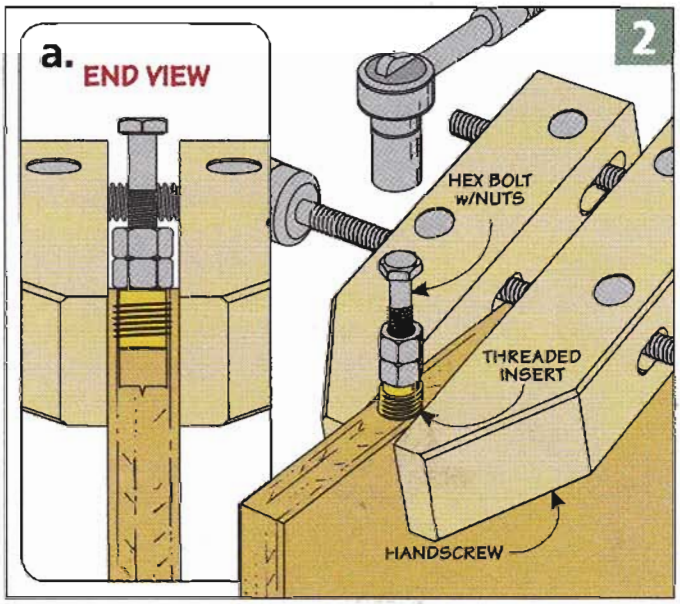
Installing Inserts into a Plywood Edge

The folding router table on page 30 relies on quite a few threaded inserts and knobs. Installing inserts that go into the edge of plywood presents a challenge. First, there's the problem of drilling a straight hole for the insert. Then, there's a chance that the edges of the plywood will "blow out" as you try to install the insert. There are a couple of easy solutions to get around these problems.

The first step is to use a drill guide to drill a straight hole. You can see what I mean in Figure 1 below. It's a plywood cleat with a through hole glued to a hardboard fence. Simply clamp this to the edge of the plywood and then drill the hole for the threaded insert.

After the hole is drilled, use a clamp or handscrew to support the plywood edges as you drive the insert home. Figure 2 shows how to do this. To install the insert, I use a bolt and nuts, as shown. A socket wrench makes it an easy task.





Cut perfect circles and arcs with this simple, easy-to-use accessory.

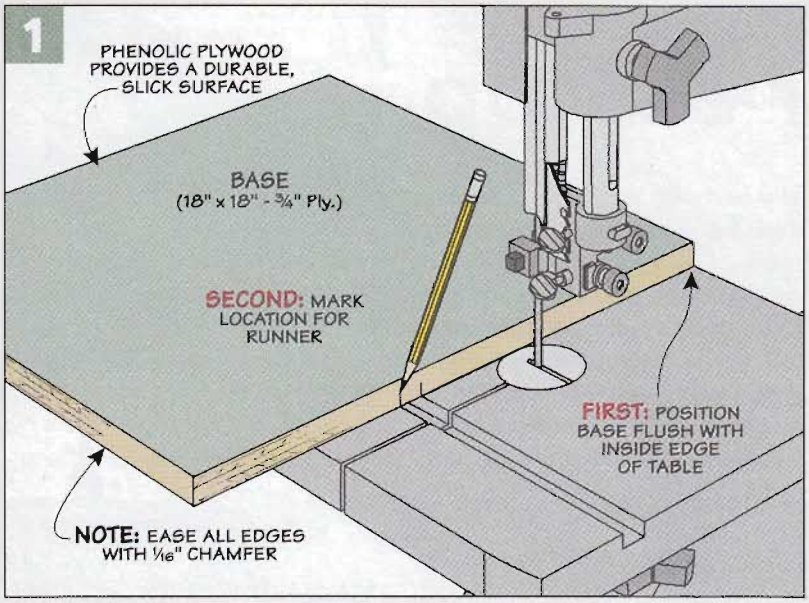
band saw Circle-Cutting Jig

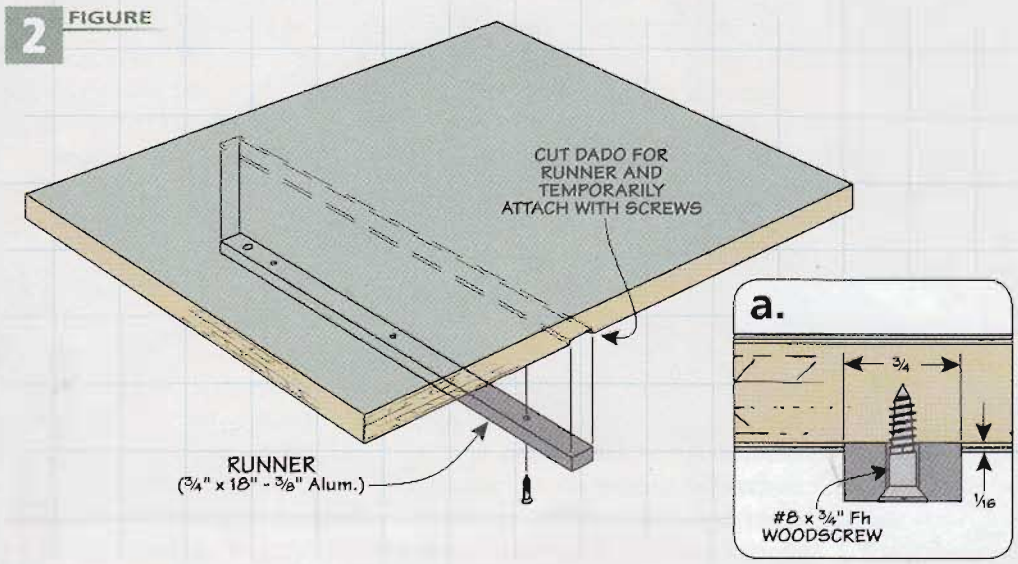
The band saw is without a doubt one of the most versatile tools in the shop. One of the tasks it excels at is cutting curves. And with the jig you see above, you can cut perfect circles quickly and reliably.

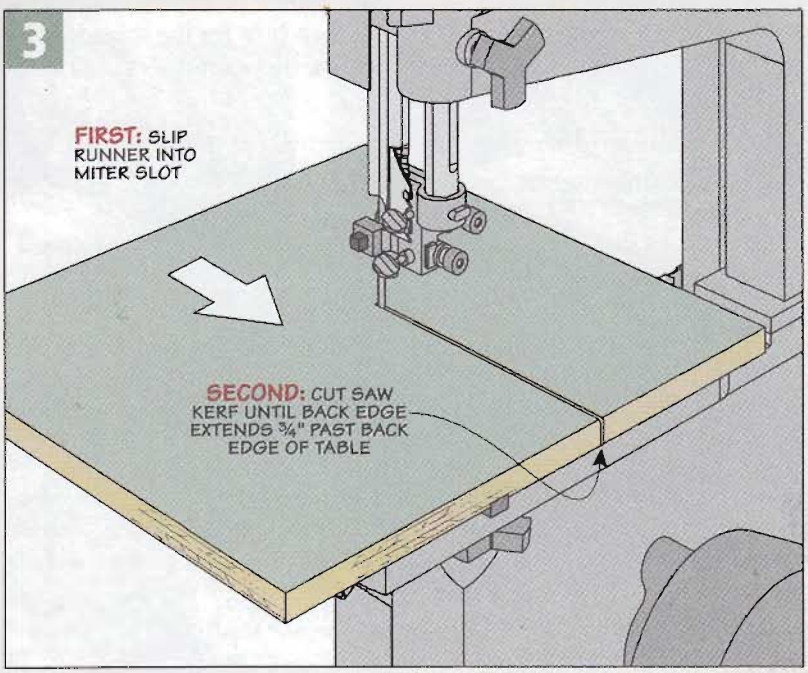
The jig's base is made from phenolic plywood. Its durable, slick surface is perfect for supporting the workpiece as you rotate it through the cut. An adjustable pivot pin a heavy-duty aluminum bar allows you to cut circles up to 38" in diameter. Finally, a unique stop system lets you align the pivot pin with the front edge of the blade. This way, the jig automatically stops at the correct point for you to begin rotating the workpiece for the cut.

Sizing the Base. To get started, you'll want to measure the width and depth of your band saw table. I sized the jig base 4" larger in both directions to provide solid support for the workpiece (Figure 1).

Locate the Runner. An aluminum runner rides in the miter slot to align the jig for the initial cut into the workpiece. (I'll talk more about that later.) To locate the runner, place the base on the saw table with the left side of the base flush with the edge of the saw table. After marking the location of the miter slot, cut a shallow dado sized to fit the runner (Figure 2). You can temporarily install the runner to complete the next step.

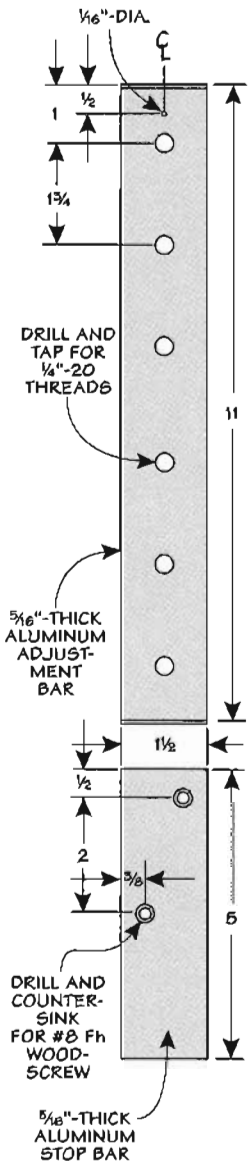






Making a Saw Kerf. The next task is to create a kerf in the base. This kerf locates the end of the stopped groove used to house the adjustment bar. It's a simple matter to turn on the saw, set the runner in the miter slot, and push the base forward. When the back edge of the base extends ¾" past the back edge of the table, stop the cut, as shown in Figure 3. You can now turn your attention to making the adjustment bar.

attaching the
Bar & Stop



The next task is to add an adjustment bar that locks in the cutting radius. The last step will be to add an adjustable stop. This stop correctly positions the pivot pin relative to the blade. It also prevents the jig and workpiece from lifting off the table once you start the cut.

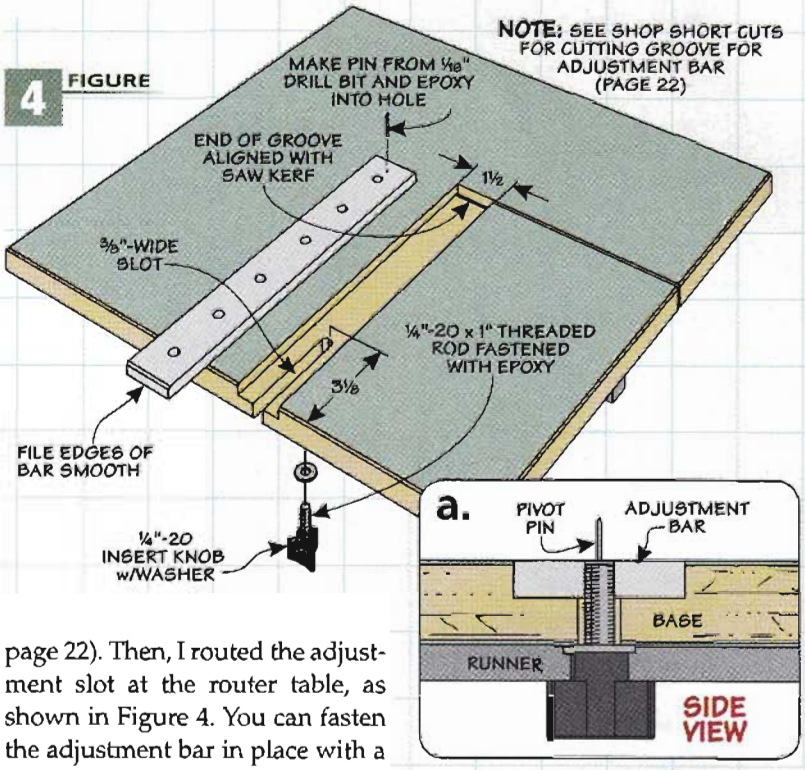
Adjustment Bar. The first thing to do is cut the 5/16"-thick aluminum bar to length. I took the time to file off the sharp edges before drilling and tapping all the holes (margin drawing). The tapped holes allow for a wide range of adjustment for the cutting radius.

Figure 4 and the margin drawing show all of the hole locations in the adjustment bar. The pivot pin is made from a 1/16"-dia. drill bit ground to a point. It's glued with epoxy into the aluminum bar. The remaining holes are drilled and tapped for a 1/4"-20 thread.

Groove & Slot. You can set the bar aside for now and get to work on the stopped groove for the bar. And there's a slot located at the end of the groove for the adjustment knob that sets the radius. I removed the runner to make these two tasks easier.

Routing the stopped groove is easy (refer to Shop Short Cuts on page 22). Then, I routed the adjustment slot at the router table, as shown in Figure 4. You can fasten the adjustment bar in place with a studded knob and washer. Now would also be a good time to reinstall the runner on the bottom.

FIGURE 4



Stop Assembly. When using the jig, it's important that the pin is directly aligned with the front edge of the blade's teeth (see opposite page). This prevents the blade from binding and results in a smoother cut. To accomplish this goal, I made the stop assembly shown in Figure 5.

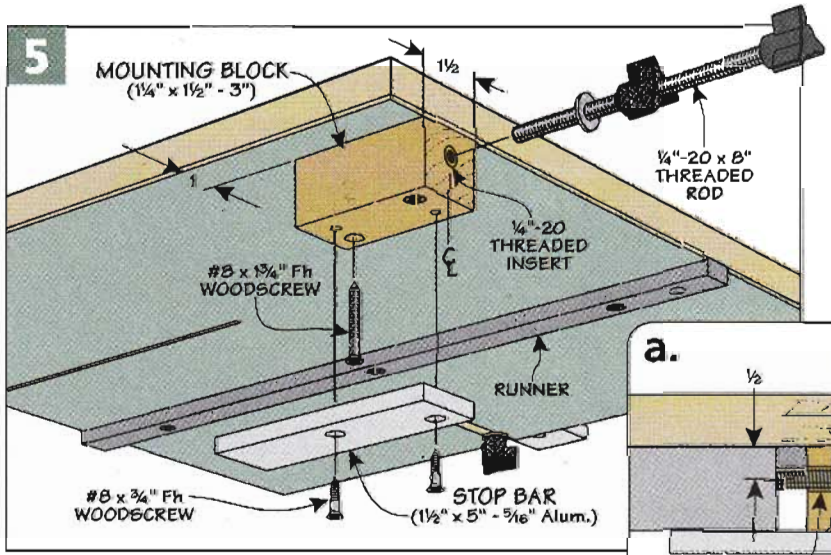
The assembly starts with the mounting block. Its thickness matches the thickness of the band saw table (Figure 5a). Drill the through hole for the threaded rod and the two screw holes used when attaching it to the base. You can go ahead and install the threaded insert while you're at it.

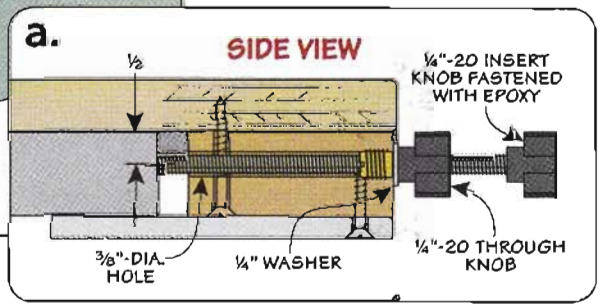
After fastening the block to the underside of the base, all you need to do is install the hardware. This starts with a short length of aluminum bar. It's longer than the mounting block and creates a "hook" to keep the jig in place. You can see how it's installed in Figures 5 and 5a.

Next comes the knob assembly. Begin by cutting the threaded rod to length and using epoxy to fasten a knob at one end. After the epoxy sets up, you can spin on a locking knob before threading the rod into the insert in the mounting block.

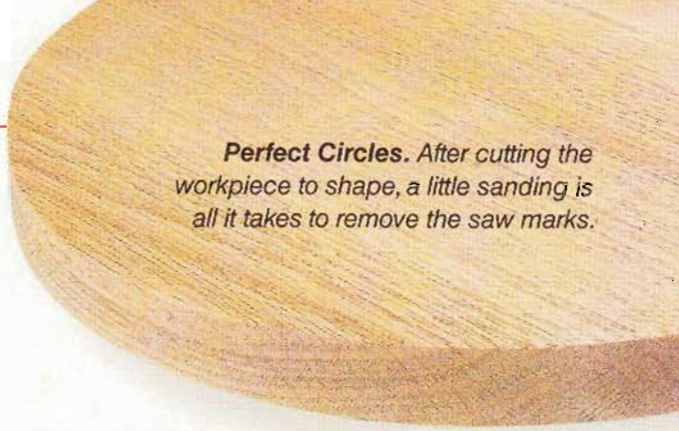
Final Adjustment. The last thing to do is install the jig on your saw and make some adjustments following the process detailed on the next page. Once everything is set up, you'll soon discover how easy it is to cut perfect arcs and circles in no time at all.

5





Using the Circle-Cutting Jig



Perfect Circles. *After cutting the workpiece to shape, a little sanding is all it takes to remove the saw marks.*

Setting up the jig and using it is pretty simple. The photos step you through the process.

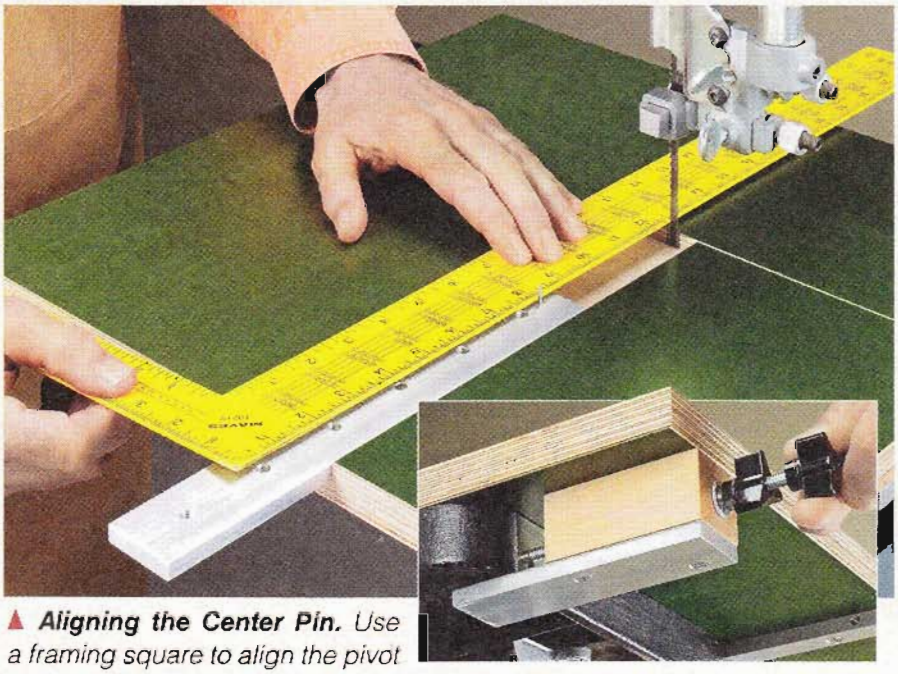
Initial Setup. The most important part of using the jig is making sure the pivot pin is aligned with the front edge of the blade. This is a matter of adjusting the stop to contact the edge of the table and locking it using the locking knob.

Set the Radius. The next step is to set the radius for the desired cut. Here, you're measuring from the center of the pin to the outside edge of the blade's teeth.

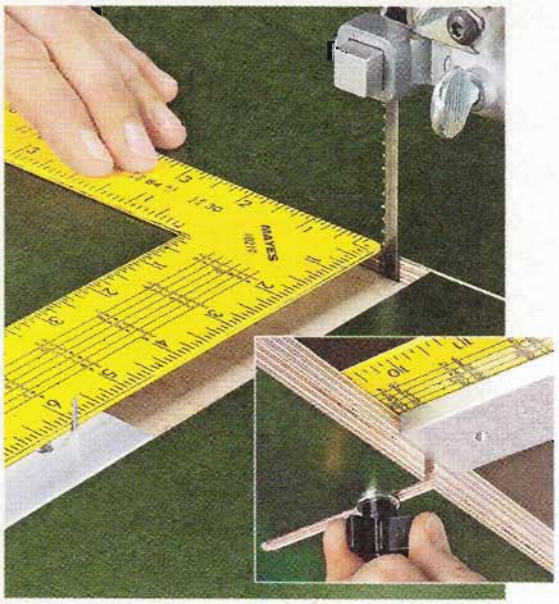
Cutting. You're almost ready to start cutting, but first you need to drill a centered pivot hole in the workpiece. This involves drilling a stopped hole on the bottom face.

With the saw off, slip the workpiece over the pivot pin. Now you can turn on the saw and get ready to make the cut.

While holding the workpiece steady, slide the jig forward, making a straight cut, until the jig stops against the table. Then, you can begin rotating the workpiece into the blade to cut a perfect circle.

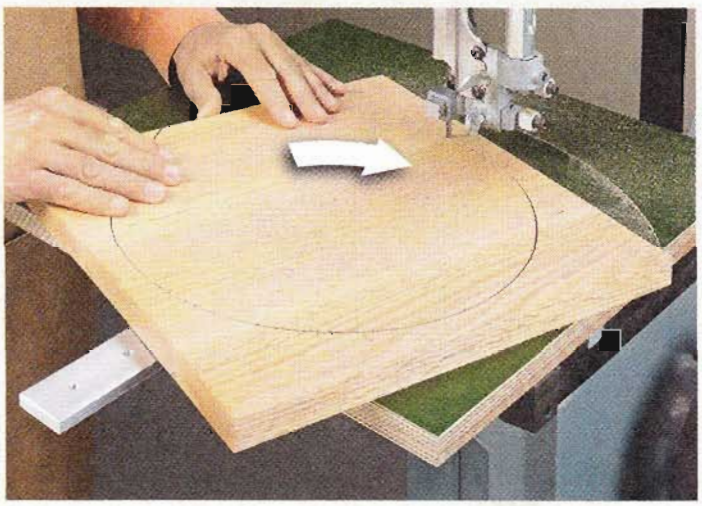


▲ ***Aligning the Center Pin.*** *Use a framing square to align the pivot pin with the front edge of the blade. After adjusting the stop underneath so that the threaded rod contacts the table, lock it in place (inset).*



▲ ***Setting the Radius.*** *To set the radius, loosen or remove the adjustment knob and slide the bar so the pivot pin is located at the desired radius and tighten the knob.*

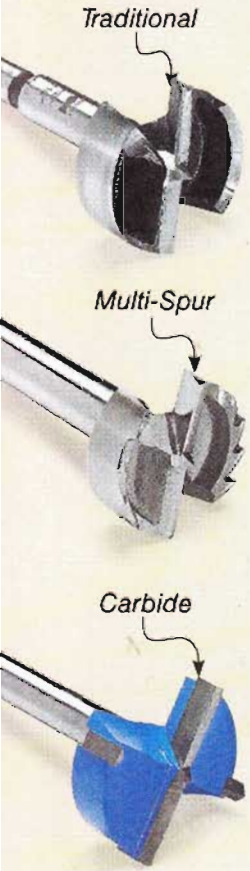
▲ ***Straight Cut First.*** *After drilling a pivot hole (inset), place the workpiece on the jig. As you make the cut, hold the workpiece straight until the jig stops.*



▲ ***Perfect Circles.*** *Once the stop contacts the band saw table, you can start rotating the workpiece into the blade in a clockwise direction. The key to a smooth edge is to maintain a consistent feed rate throughout the cut.*

get better results with a Forstner Bit

Learn how to drill clean, accurate holes with these essential woodworking drill bits.



When it comes to drilling holes, I often reach for a Forstner bit. This type of bit is designed to drill a precise hole with a flat bottom. It's perfect for creating counterbores, recesses, and mortises.

As simple as drilling a hole sounds, there's more to using a Forstner bit than meets the eye. It takes an understanding of the different kinds of bits as well as some shop-tested tips and techniques for getting the best results.

Pick a Bit. For starters, not all Forstner bits are the same. They come in several styles, as you can see in the left margin. The traditional style has a continuous rim with two cutting edges that shave away the waste (upper example).

Another common version has a saw-tooth rim, as shown in the center photo. This reduces heat buildup, which is especially helpful in larger-diameter bits.

The third type of Forstner bit doesn't have a cutting rim (lower bit). Instead, there are two carbide spurs mounted along the edge to score the cut, while flat cutters hog out the waste. This type of bit is designed for drilling in abrasive particleboard and MDF.

You'll find that Forstner bits range in price from cheap bargain sets that cost only a few dollars to premium bits that cost at least twice as much per bit. As tempting as the inexpensive bits are, I've found it pays to be choosy.

First off, look for bits made from high-speed steel. They're designed to withstand the speed and heat created during heavy drilling. As a result, the bit will stay sharp longer.

No matter what kind of bit you have, there are some techniques that will help you take advantage of the bit's design and give you crisp, accurate holes.

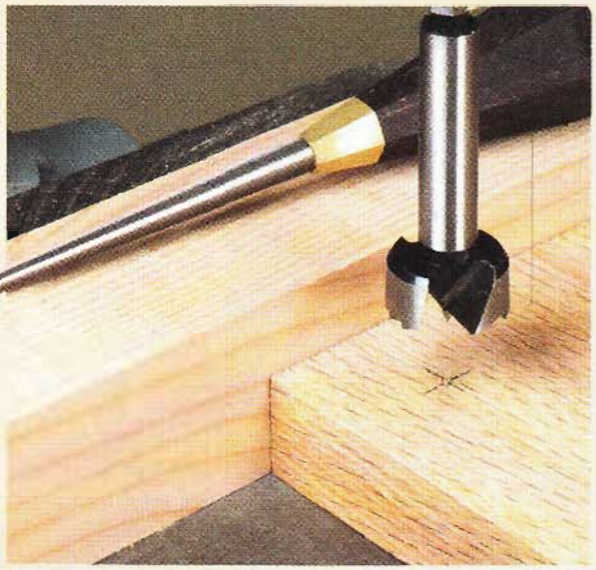
The Right Speed. First, a Forstner bit works best in a drill press. And one of the most important things is running the bit at the right speed. Even with high-speed steel bits, too much heat and friction will shorten the life of the bit.

You need to consider the size of the bit, and the hardness of the wood you're working with. The chart below provides a good speed range for most Forstner bits. In general, the harder the material and the larger the bit, the slower the speed you should use.

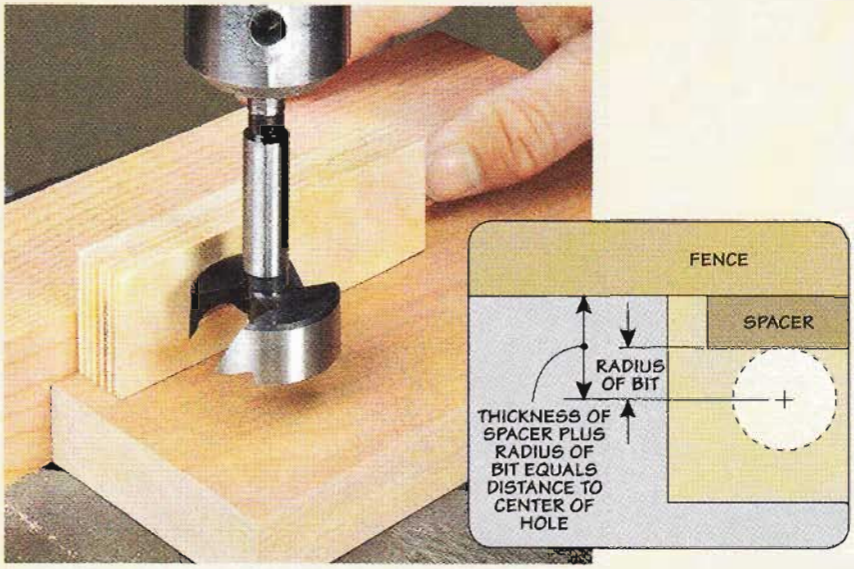
Under Control. Just as important as the speed is the feed rate.

Recommended Speeds Forstner-Style Bits

Bit Diameter	RPM Range
1/4" – 5/8"	1800-2400
11/16" – 1"	1400-1800
1 1/16" – 1 7/16"	900-1200
1 1/2" – 3"	450-600



▲ ***Start with a Dimple.*** *Mark the center of the hole with an awl. With the drill press off, lower the bit until the bit catches in the dimple, then set the fence.*



▲ ***Use a Spacer.*** *To accurately locate the bit from the edge of a workpiece, cut a spacer to position the bit off the rim and set the fence.*

The idea is to apply just enough pressure to let the bit do the work. It's also a good idea to keep the workpiece from shifting by using a fence, stop block, or additional support blocks.

Locating a Bit. One challenge in using a Forstner bit is positioning it accurately. The large rim often gets in the way of seeing the layout mark. To solve this problem, there are two tricks I use.

The first is to mark the centerpoint of the hole with an awl, as in the upper left photo. This way, you can gradually lower the bit and slide the workpiece around until the centerpoint "finds" the dimple. Then, you can set your fence.

The other method is to use a spacer as a set-up gauge, as shown in the upper right photo. The spacer fits between the rim of the bit and fence. When determining the thickness of the spacer, remember to use the radius of the bit, and not its diameter.

Through Holes. A Forstner bit is ideal for drilling a flat-bottom hole. But I often use one to drill through holes, as well. The problem is in some materials, the bit may grab and tear out the back side.

To eliminate tearout, back up the workpiece with a backer board, as in the lower photo at right. Then, set the depth stop on the drill press so the rim just touches the backer. This prevents the bit from bursting through as the last of the material is drilled out.

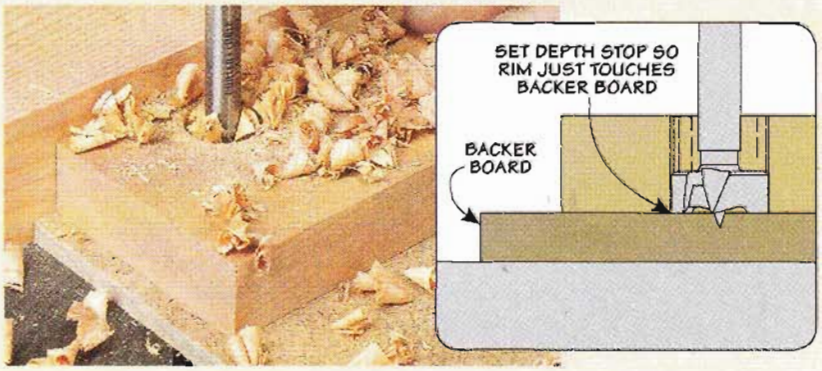
Deep Holes. If there's a downside to using a Forstner bit, it's that it doesn't have continuous flutes to pull chips out of deep holes. So, to keep the bit cool and cutting smoothly, retract it periodically as you drill to pull out the waste.

Overlapping Holes. One final use for a Forstner bit is to make recesses and mortises. Since a Forstner bit cuts along the rim, you can drill overlapping holes. But a partially supported bit can sometimes wander and spoil the hole.

For the best results, leave a space between each hole as you drill (upper photo below). Then, come back and drill out the remaining waste, as shown in the main photo on the previous page.

Forstner bits are simple woodworking tools. And when you combine them with these tips, they can improve the quality of your woodworking.

► ***Skip Holes.*** *To create a mortise, leave a space between holes to support the center of the bit.*



► ***Backer Board.*** *A fresh backer board supports the workpiece to prevent tearout when drilling through holes.*

folding Router Table

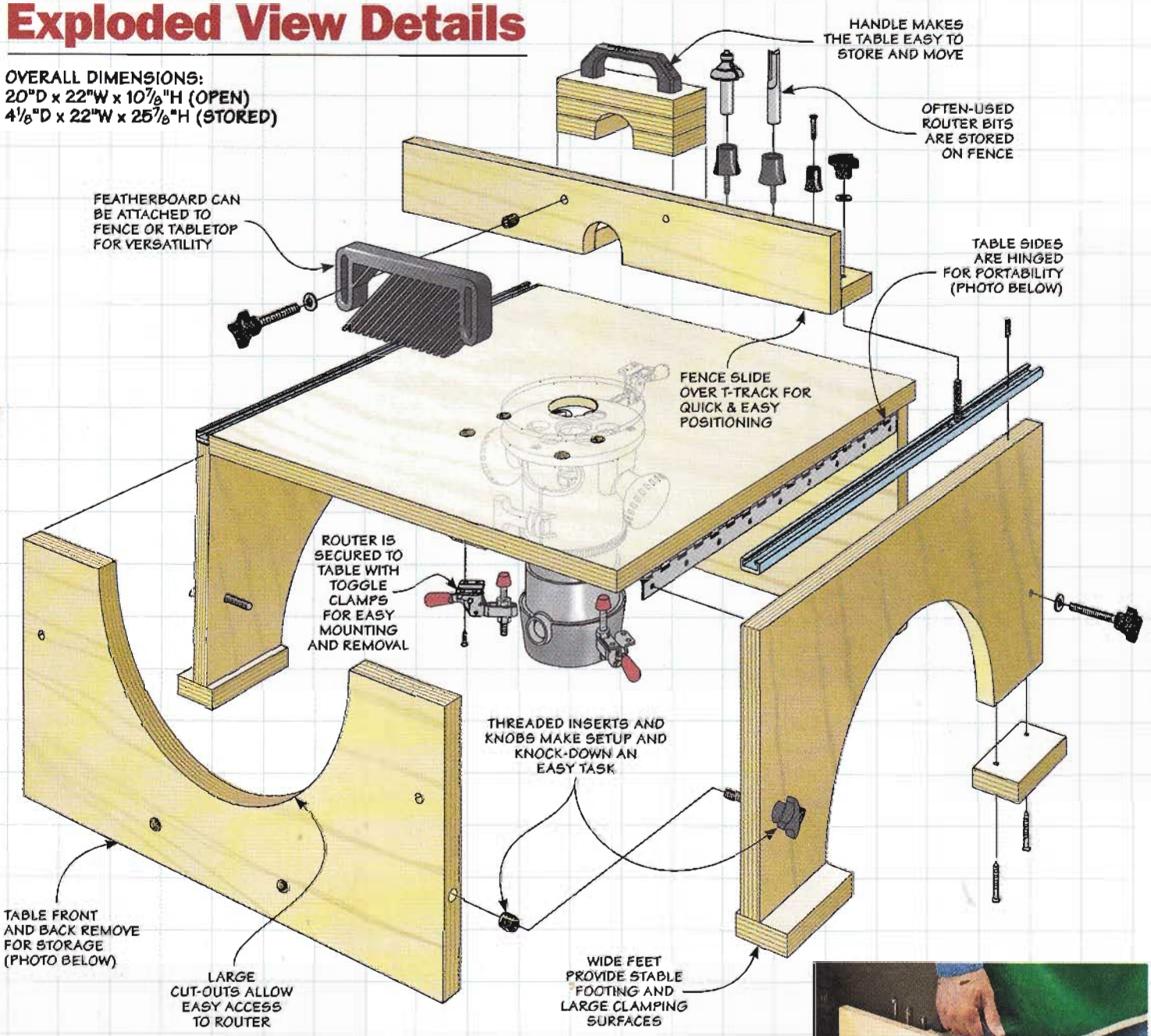
A briefcase-sized package transforms into a full-featured benchtop tool in minutes.

A full-sized, permanent router table setup might be a great solution — if you have the space. But if you only use a router table occasionally, or you need a mobile solution, take a look at the photo above. This benchtop tool features all the accuracy and stability you'd expect from a full-size router table. And when it's time to store the table or take it to a job site, just remove the router, fold up the table, and it's ready to go.

This quick transformation is possible due to a unique design and readily available hardware. The sides of the table are hinged to fold like a book. The front and back are then fastened in place with threaded knobs. Finally, the fence detaches from the top to become the handle for transporting and storing the table. Simply reverse the process to create a solid, accurate router table ready for work.

Exploded View Details

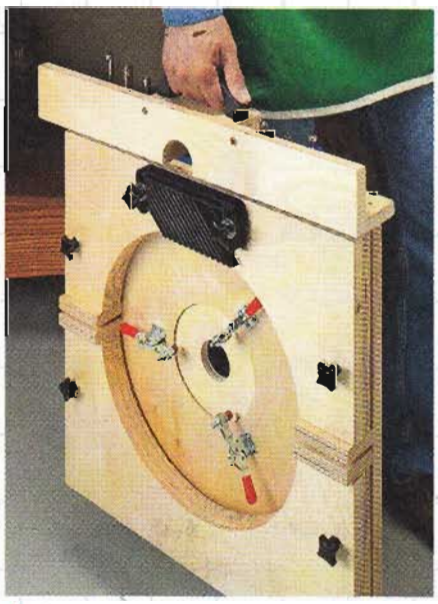
OVERALL DIMENSIONS:
20"D x 22"W x 10⅞"H (OPEN)
4⅛"D x 22"W x 25⅞"H (STORED)



Materials & Hardware

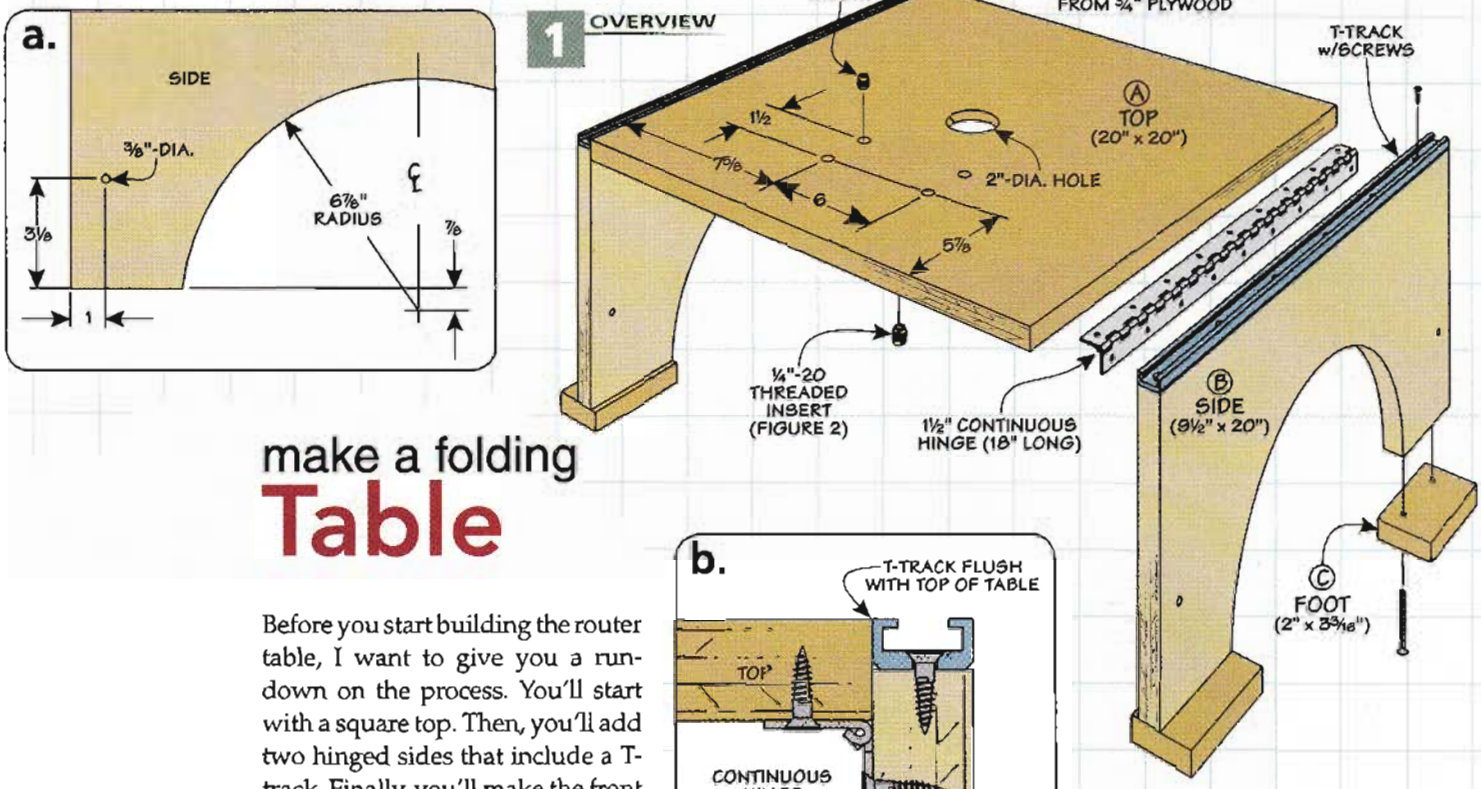
A	Top (1)	20 x 20 - ¾ Ply.
B	Sides (2)	20 x 9½ - ¾ Ply.
C	Feet (4)	2 x 3 3/16 - ¾ Ply.
D	Front/Back (2)	9⅛ x 20 - ¾ Ply.
E	Fence Base (1)	2¼ x 22 - ¾ Ply.
F	Fence Face (1)	3 x 22 - ¾ Ply.
G	Handle Block (1)	2¼ x 6 - 2¼ Ply.

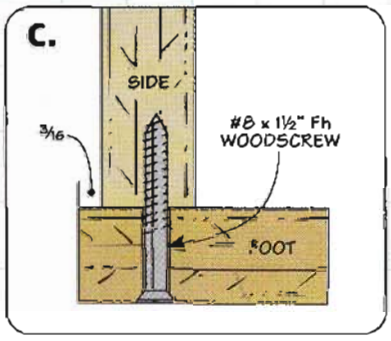
- (2) T-Track, 24" long
- (2) ¼"-20 x 1" Flange Bolts
- (1) ¼"-20 x 24" Threaded Rod
- (8) ¼"-20 Insert Knobs
- (14) ¼"-20 Threaded Inserts
- (1) 5" Handle
- (2) #8 x 2" Rh Woodscrews
- (8) ¼" Washers
- (3) Toggle Clamps (Model 213-U)
- (6) Router Bit Holders
- (6) #6 x ½" Fh Woodscrews
- (10) #6 x ¾" Fh Woodscrews
- (8) #8 x 1½" Fh Woodscrews
- (2) 1½" x 18" Continuous Hinges



▲ **Portable Convenience.** *Fold up the router table in just a few minutes for easy storage and mobility.*

make a folding Table





Before you start building the router table, I want to give you a run-down on the process. You'll start with a square top. Then, you'll add two hinged sides that include a T-track. Finally, you'll make the front and back pieces that lock the sides in position for a solid assembly.

Start with the Top. The top starts out as a square blank. I drew diagonal lines from corner to corner to mark the center. This locates the hole for the router bit and the recess on the bottom side for the router. Then, I drilled the through hole for the router bit first.

Rout a Recess. To make it easy to install and remove the router, I chose to use three toggle clamps (more about these later). But the clamps alone won't prevent the router from vibrating and moving out of position when in use.

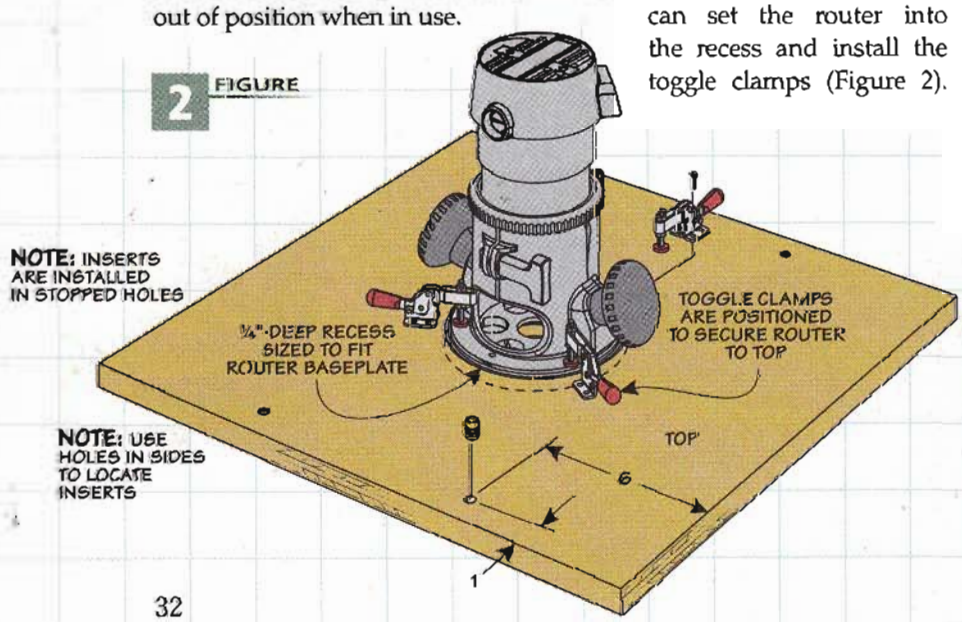
To avoid this problem, I routed a recess for the router's baseplate on the bottom side of the tabletop (Figure 2). A snug fit is important so the router doesn't move during use. The box at the bottom of the next page shows how I accomplished this task using a template.

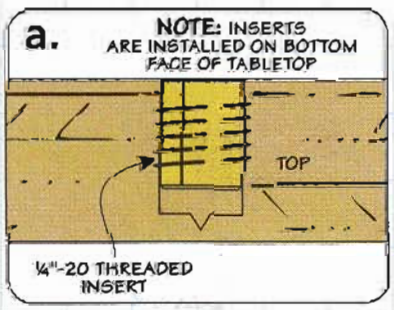
Inserts. In Figure 1, you can see a set of four threaded inserts on the tabletop. These are used to fasten a featherboard to the top.

After installing the inserts, you can set the router into the recess and install the toggle clamps (Figure 2). Mine were spaced equally around the edge of the recess.

Adding the Sides. You can see in Figure 1 how the sides are put together. After cutting out the shape, step over to the drill press and drill the pair of holes for the studded knobs used to assemble the table (Figure 1a).

There are a few things you need to add to complete the sides.



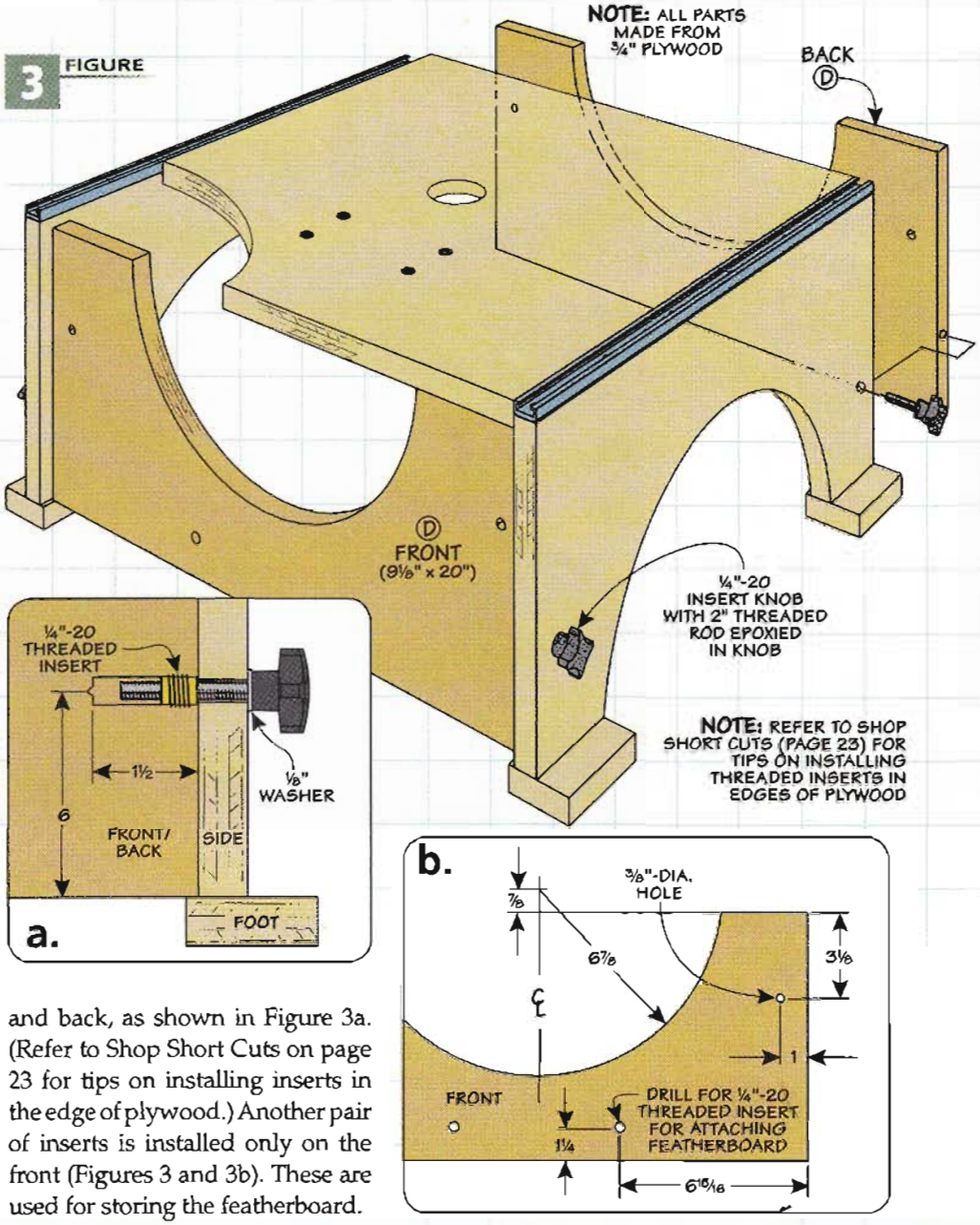


A pair of wide feet add stability to the table during use and provide a clamping area to secure the table to the worksurface. T-track along the top edge secures the router fence. With these additions complete, use a continuous hinge to attach the sides to the top. The only thing to watch for here is that the T-track is flush with the tabletop (Figure 1b). I found it works best to place the top upside down on the bench to attach the hinges.

Front & Back. The front and the back complete the basic table assembly. They're slightly shorter than the sides so that they clear the feet when the table is assembled for use. Otherwise, the construction is the same as the sides.

Now you can set about drilling all the holes for the knobs and threaded inserts used for assembling and storing the table. To locate the inserts on the underside of the top (Figure 2), I folded the sides down and used a drill bit to mark the centers.

Threaded inserts on the edges of the front and back are used to hold the sides in the open position. To ensure that the inserts align with the holes in the sides, I extended the sides and clamped the front and back in position. This makes it easier to locate and drill the extra-deep hole in the ends of the front and back, as shown in Figure 3a. (Refer to Shop Short Cuts on page 23 for tips on installing inserts in the edge of plywood.) Another pair of inserts is installed only on the front (Figures 3 and 3b). These are used for storing the featherboard.

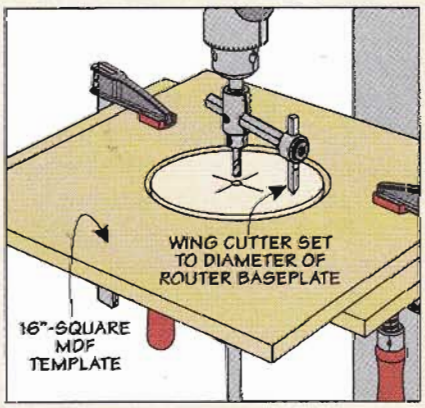


Routing a Baseplate Recess

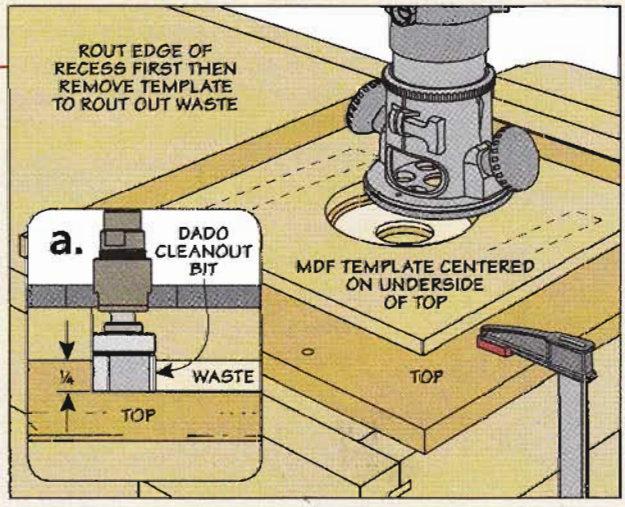
To get smooth cuts when routing, it's important the router doesn't move. To create a snug-fitting recess for the router baseplate, I used a two-step process.

First, I used a wing cutter on the drill press to cut a hole centered on a square blank of MDF (left drawing). The hole is sized to fit the baseplate of the router.

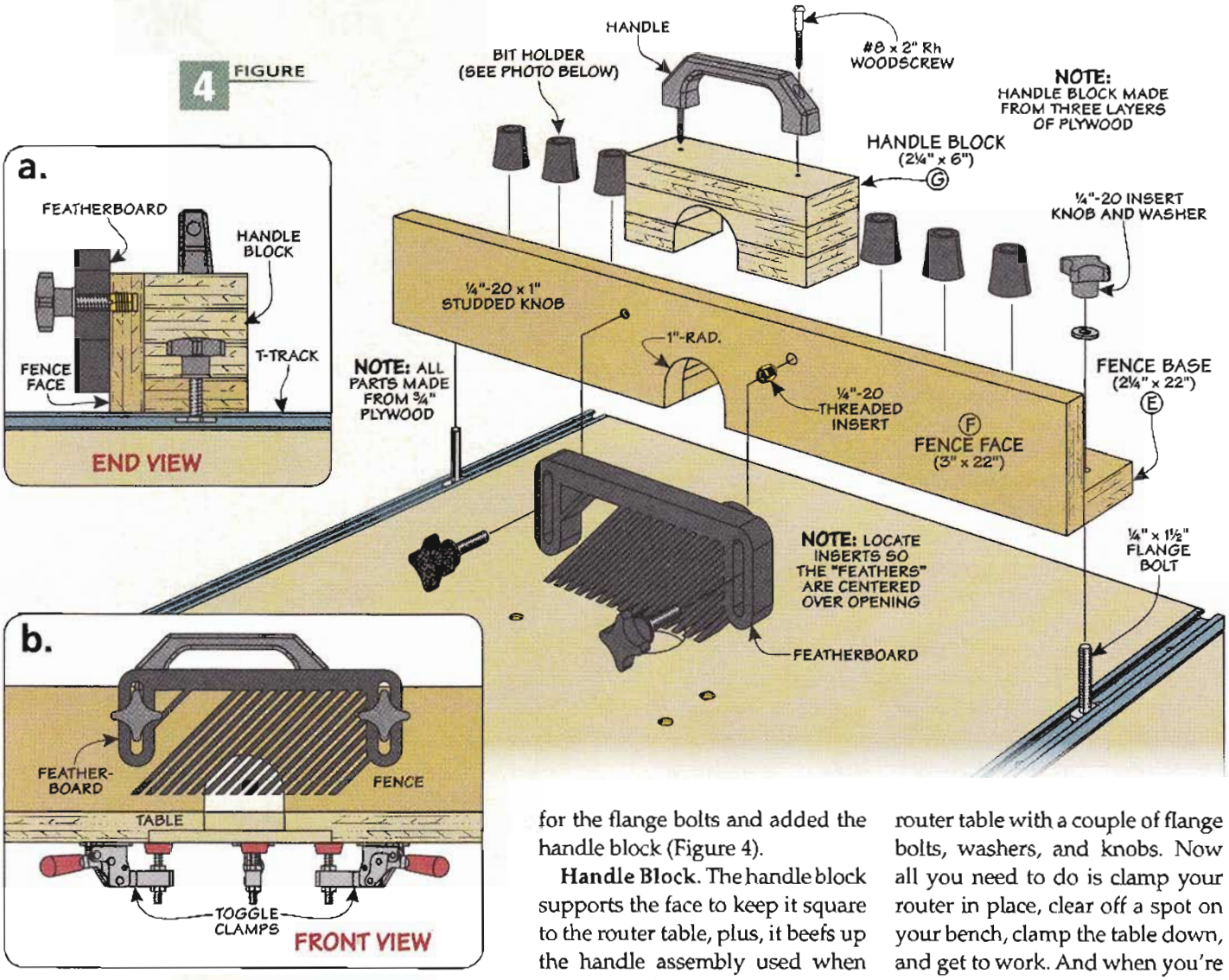
Use the template (fastened with double-sided tape) to rout the edge of the recess using a dado cleanout bit. Then, remove the template and clean out the waste.



▲ ***Make an MDF Template.*** *Cut a centered hole sized to fit the baseplate on your router.*



▲ ***Rout a Recess.*** *After routing the edge of the recess, remove the template. Finally, adjust the bit for a ¼"-deep cut and then rout out the waste.*



adding a router Fence

No router table is complete without a sturdy fence. But the fence for the folding router table serves multiple purposes. Yes, it meets all of the requirements for a typical fence — it's adjustable, straight, and square. But is also serves as a stout handle for the table when it's folded up for transport and storage. And the bit holders (right photo) keep your most-used bits secure and handy.

L-Shaped Assembly. To make the fence, I started by cutting the base and face to size. I installed a couple of threaded inserts in the face for attaching a featherboard. Before assembling the two components, I drilled holes in the base for the flange bolts and added the handle block (Figure 4).

Handle Block. The handle block supports the face to keep it square to the router table, plus, it beefs up the handle assembly used when toting the table around.

The handle block consists of three layers of plywood. After gluing the block to the fence base, I ran the assembly across the jointer to make sure the front was smooth and square. With this done, I glued the fence face in place.

To provide clearance for the router bit when using the table, I cut out a semicircular notch in the fence. Start by drilling a hole through the face, base, and handle block. Then complete the notch at the band saw. Finally, you can sand it smooth with a sanding drum.

Final Details. The last details are adding the handle and the bit holders. The handle is simply fastened onto the handle block with a couple of screws. All it takes is a single screw to secure the bit holders to the base of the fence.

Ready to Rout. The next thing to do is attach the fence to the router table with a couple of flange bolts, washers, and knobs. Now all you need to do is clamp your router in place, clear off a spot on your bench, clamp the table down, and get to work. And when you're done routing for the day, check out the next page to learn how to pack up the table for storage.

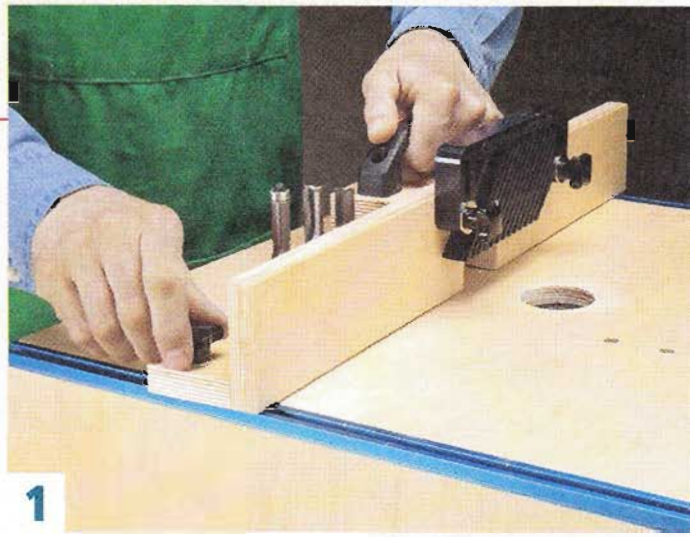
▲ ***Bit Storage.*** *These handy holders from Lee Valley store router bits securely.*

Knocking Down the Table

When you're finished with your routing jobs, you can transform this table into a briefcase-size package for storage or transport. The photos here step you through the process. The fence becomes the handle and the parts are fastened in place with studded knobs.

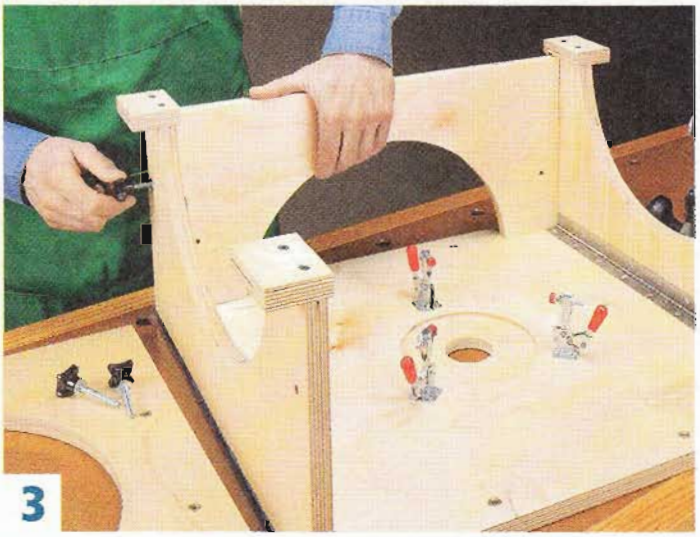
You'll start the knock-down process by removing the fence and setting it aside for now, as you can see in Step 1. Now, flip the table over and remove the router (Step 2). The next thing to do involves removing the front and back, as shown in Step 3. All you need to do here is remove the pair of knobs that holds each one in place.

Set the front and back aside while you fold in the sides of the table. Then, you can use the studded knobs to reattach the front and back to the assembly (Step 4). You can see how they're attached in Step 5. This photo also shows how you can relocate the fence and fasten it to one of the T-tracks to make the assembly easy to carry.

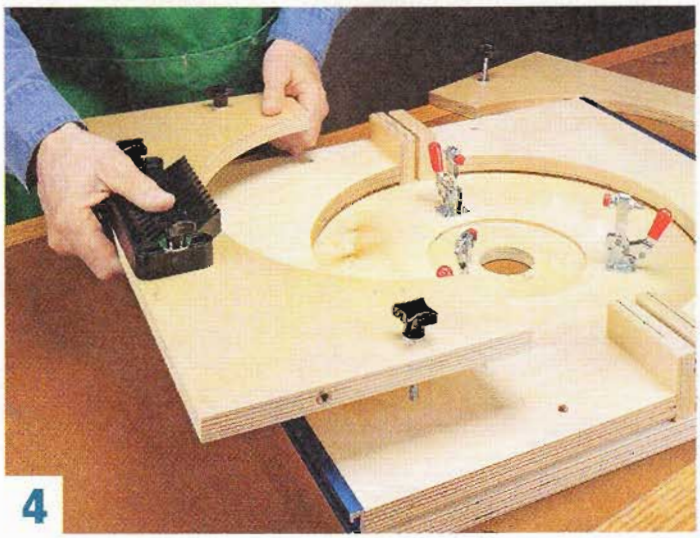


Remove the Fence. *Remove the pair of knobs that holds the fence in place. Set the fence aside while you complete the knock-down process.*

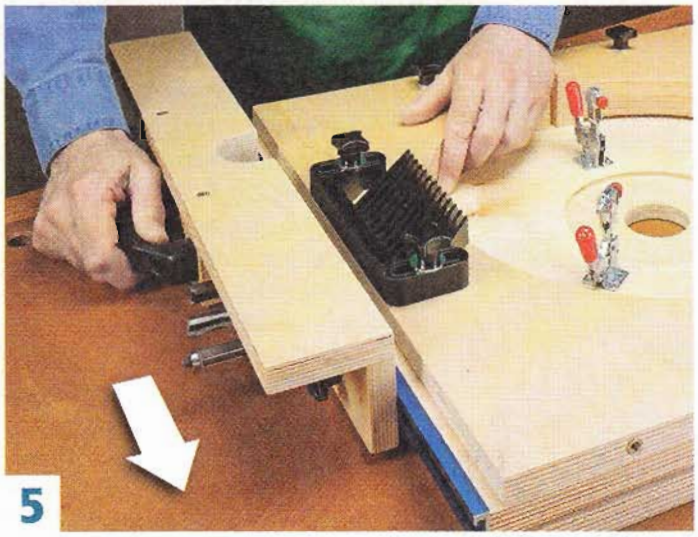
Remove the Router. *Now you can turn the table upside down for easier access to the router. Flip up the handles on all of the toggle clamps to remove the router.*



Remove the Front & Back. *A pair of studded knobs holds the front and back of the table in place. Remove the knobs and set both pieces to the side, for now. .*



Fold & Reattach. *The next step involves folding the sides flat against the underside of the table. Then, you can reattach the front and back pieces through the holes in the sides*



Install the Fence. *The featherboard is stored with a pair of knobs. Finally, you can slip the fence onto one of the T-tracks and lock it down. Now your "briefcase" is ready to travel.*

Your finishing tasks will go smoothly with these basic shop supplies and a few simple techniques.

quick & easy Finishing Tips

▼ ***Clean.*** *These items will keep your work area neat when spraying finishes.*

After the glue has dried on your project and the dust is cleaned up from all the sanding, it's time to apply a finish. But before you get out the rags and brushes, there's a little more work to be done to help ensure a perfect finish.

Clean Up. The first order of business is to clean up your work area. It pays to spend a little time vacuuming to remove as much sawdust as possible. Then you can set about prepping the work area.

Protection. The next thing to do is protect your workbench from drips and spills. For this task, I like to use newspapers. Another great alternative is inexpensive kraft paper. You can mount a roll at the end of your bench so it's always at hand. Just pull out a fresh strip for each finishing session to keep the area clean.

Now that you have your work area cleaned up and ready to go, it's time to round up the supplies you'll need for applying the finish. And for me, this depends on the type of finish I'm using.

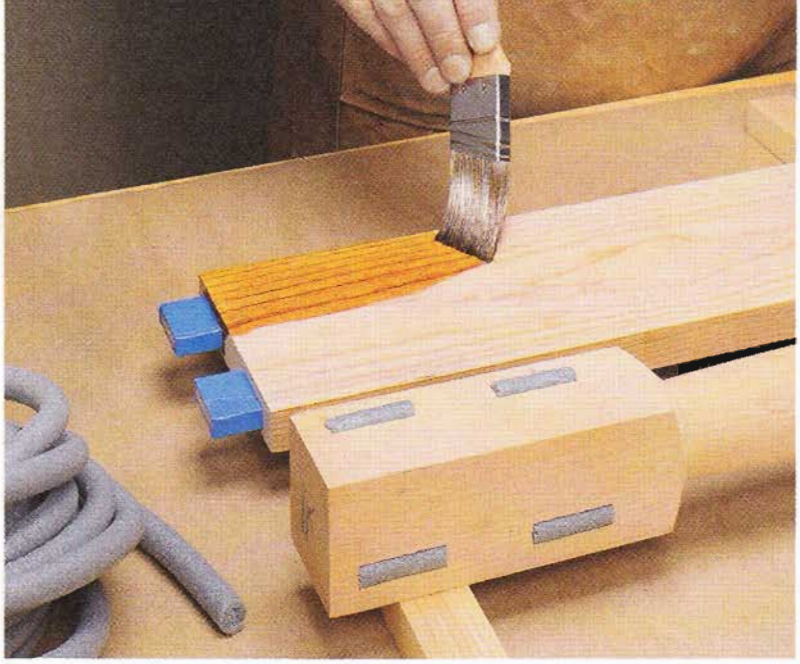
Spray Finishes. You don't need fancy spray guns and an expensive spray booth to get a great finish. You can get good results using an aerosol can. For this, there are a few supplies I like to have handy. The first is a pistol-grip handle that attaches to the spray can. This allows me to use the spray can more like a spray gun. It's much more comfortable and makes it a lot easier to control the application of the finish for an even film.

Controlling overspray is the biggest problem with using a spray finish. For small projects, a cardboard box works great as a small "spray booth." You can see what I mean in the main photo.

Brush-On & Wipe-On. When you're using a finish that can be applied by wiping or brushing, there are some other basic supplies you'll want to keep within reach.

Gloves. To protect my hands from chemicals and keep them clean, I like to wear gloves. I find that blue nitrile gloves hold up the best. They're a little more expensive than vinyl or latex gloves, but they don't tear as easily. And they won't disintegrate when exposed to most of the solvents you use for thinning and cleanup of finishes.

Stirring. After opening up a can of finish, I grab a wood stir stick, like a craft stick or tongue depressor to mix the finish completely. They're inexpensive and disposable. You can cut the end flat for scraping solids off the bottom of a can to provide a thorough mix.



▲ ***Prefinishing.*** *Use masking tape and foam backer rod to mask glue areas (like mortises and tenons) when prefinishing parts. Then, use a quality brush to apply the ultimate finish.*

Masking. When it comes to applying finish, I like to prefinish as many project parts as possible. Applying finish to smaller pieces makes the process more manageable. And it's easier to prefinish areas that will be tough to get at once the project is assembled.

But you don't want to get the finish on glue surfaces like mortises and tenons. To protect these areas, I use blue painter's tape and foam backer rod (photos above). The tape effectively masks off an area, yet you can remove it easily. And the backer rod can be cut to fit mortises and grooves.

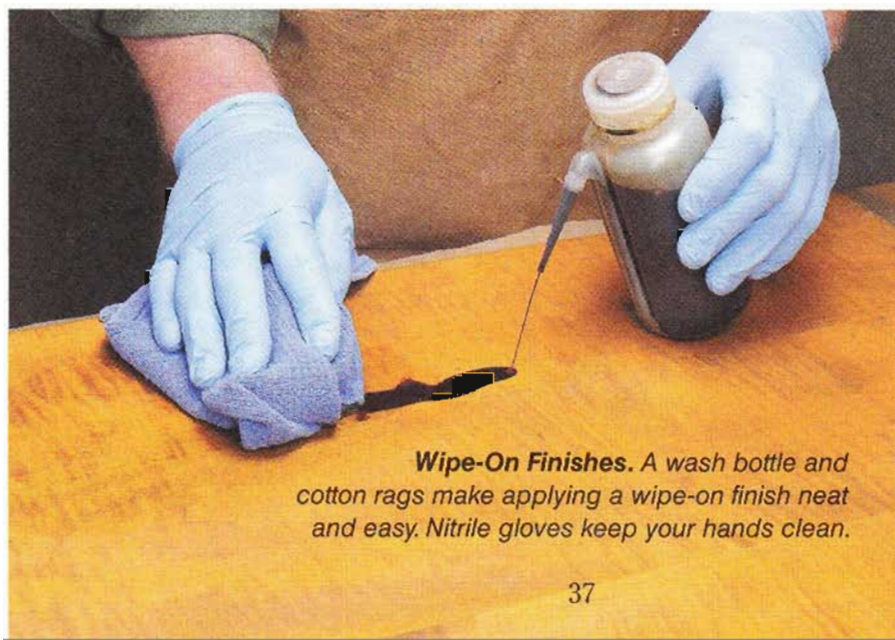
Rags. I always keep a stock of rags in the shop. But for finishing, I limit my supply to clean, lint-free cotton rags. You can purchase cotton rags (photos below) or use old T-shirts. Rags are great for wiping on a finish or cleaning up drips and spills. Note: Remember to spread out and hang up oil-soaked rags to dry to avoid a fire.

Brushes & Jars. When applying finishes with a brush, it's best to pour the finish into a separate container. This way, you won't run the risk of contaminating the finish with dirt and dust. For these containers, I like to use small, wide-mouth jars or disposable plastic containers. Just make sure they're wide enough for the brush.

And speaking of brushes, I've found it pays to invest in quality brushes. You'll be able to apply a smoother finish than you can with most disposable brushes. With proper care, a quality brush will last for years. Just remember to use a synthetic brush for water-based finishes and a natural-bristle brush for solvent-based finishes.

Simple Dispensing. My last piece of advice is a handy tip for using wipe-on finishes. I purchased a wash bottle like you see in the photos below. (A condiment dispenser, like a ketchup bottle, works great, too.) Just pour a small amount of finish into the bottle, then it's easy to squeeze out a controlled amount without making a mess as you apply it.

As you can see, it doesn't take much time, effort, or investment to have the right supplies. And with a few simple tips and techniques, your finishing tasks are sure to go more smoothly.



Wipe-On Finishes. *A wash bottle and cotton rags make applying a wipe-on finish neat and easy. Nitrile gloves keep your hands clean.*

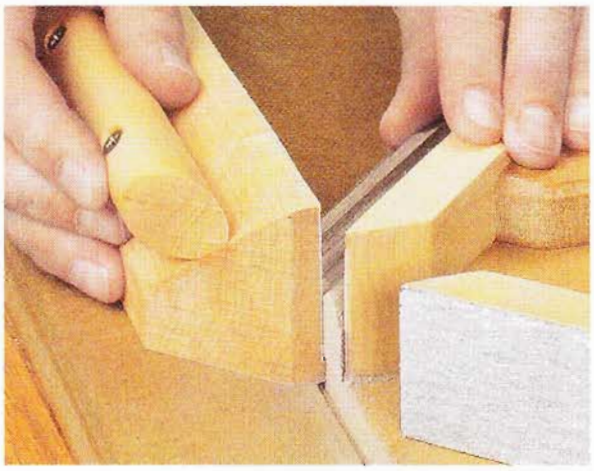
weekend project

This must-have jig allows you to take whisker-thin shavings off the end of a workpiece to fine-tune the fit of a joint.

shop-made Shooting Board

One of our designers, Chris, was in the shop working on a prototype for a project a while back. I noticed he was fine-tuning the fit of a part using a shooting board that looked a bit familiar. It was from an issue we published about eight years ago. He decided it would be a good addition to his set of "tools," but Chris made a few changes to improve its capabilities and make it work even better. You can see the result in the photo above. I really liked the new design and was sure it would make a great project to share.

The reason a shooting board is a must-have for the shop is it allows you to take a paper-thin shaving off the end of a workpiece with a hand plane — something that's just about impossible to do with a tool like a table saw or miter saw. And the optional sanding "plane" (photo at right) lets you fit a joint or simply sand a surface smooth.



▲ **Sanding Block.** *Another option for tweaking the fit of a workpiece is this shop-made sanding block. It slides along the base just like a hand plane.*

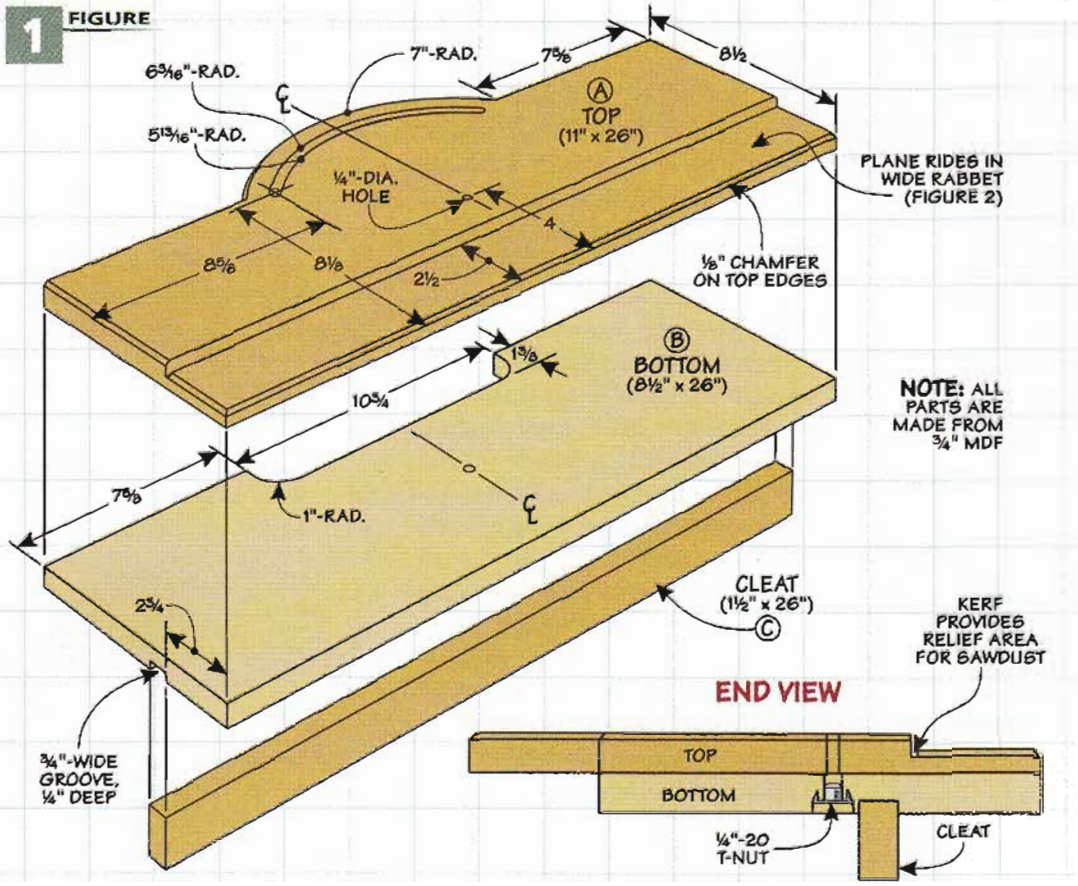
Overview. The shooting board is a base made from two layers of ¾" MDF with a cleat for clamping the jig in a bench vise (Figure 1). The base serves an important purpose. A rabbet along the edge of the base guides the hand plane (or sanding block) in a straight path as you trim the workpiece.

Later, a pair of fences are attached to an adjustable stop so you can quickly and easily set the fences to 45° or 90°, or lock in any angle in between. And the fences adjust to back up the workpiece and prevent tearout.

Start with the Top. Since most of the detailed work is on the top layer of the base, that's where I started. The first step is to cut the top to overall size and then do a little layout work.

The key to the layout is locating the hole for the pivot pin. It's used to mark the curve along the edge of the top as well as the location of the curved slot used to lock the pivoting stop block in place.

Once you have the layout work completed, you can cut the curved slot. To make quick work of this, I drilled out the ends of the slot and then used a jig saw to remove the waste. I used my jig saw to complete the shaping along the edge of the top, as well.



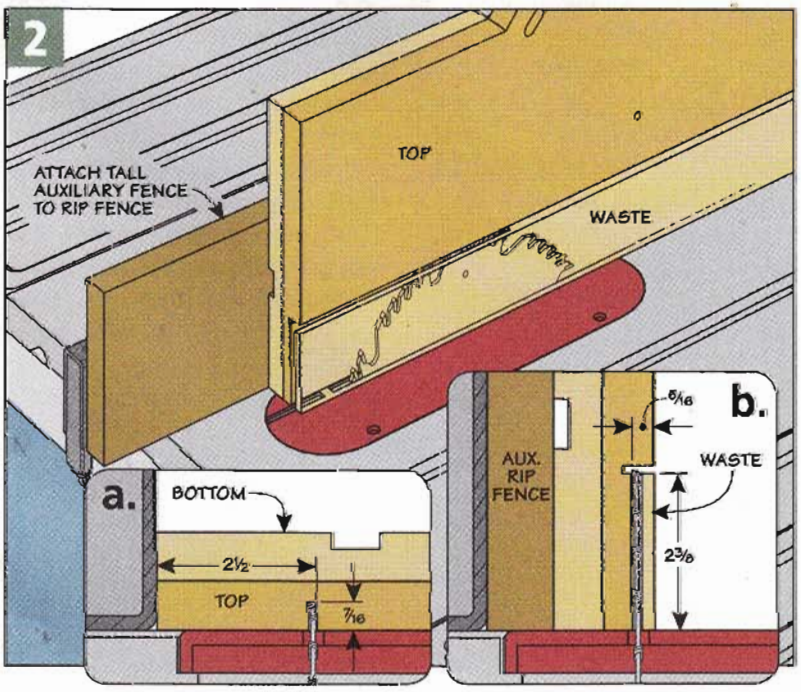
Add the Bottom. To build up the base, I added a bottom layer. As shown in Figure 1, the bottom is sized to match the overall length of the top and its width matches the width at the ends of the top.

Before gluing it to the top, you'll need to create a notch along one edge for the fence locking system that's added later. And to accept the ¾" MDF cleat, you'll need to cut a groove in the bottom face. The cleat allows you to secure the shooting board in a bench vise. You can cut the cleat to size now, but don't glue it in place yet.

Completing the Base. After gluing the top and bottom together, there are a few things left to do. The first is to drill the hole for the pivot pin through the glued up base. Then, on the bottom side, enlarge the hole and add a counterbore to accept a T-nut.

The last step is to create a wide rabbet in the top to guide the plane in a straight path as you trim a workpiece. As you can see in Figure 2, cutting the rabbet is a two-step process. First, to provide a dust relief, cut a kerf in the base (Figure 2a). To complete the rabbet, reposition the rip fence to cut away the waste, as in Figure 2b. Adding a tall auxiliary fence provides solid support as you make the cut.

All that's left to do on the base is add the cleat. It's simply glued into the groove you cut earlier.



adjustable fence

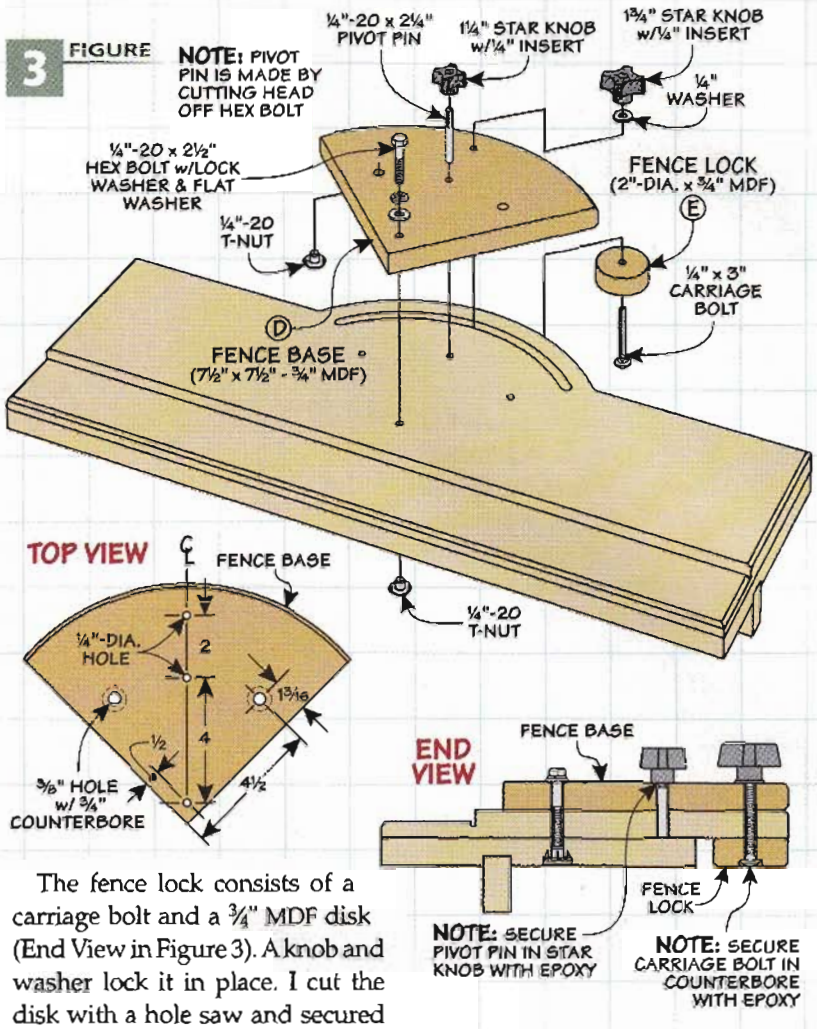
System

The rabbet cut in the base of the shooting board guides the hand plane. But in order to make an accurate cut, you need a fence to securely hold the workpiece in place. The fence system on this shooting board is also designed to pivot so it can be set up to trim miters of almost any angle.

To provide adjustability, the system starts out as a fence base made from ¾" MDF (Figure 3). As you cut the blank to size, it's important that the base have a true, 90° corner.

The next step is to lay out a series of holes in the base (Top View in Figure 3). With the layout complete, drill the three ¼"-dia. holes for the pivot pin, locking pin, and locking knob. Then, to lock the fences in place, you'll need to drill a couple of counterbored holes for a pair of T-nuts (Figure 3). Finally, rout a small chamfer on the top and bottom of the curved edge of the base.

Locking System. Most of the time, a shooting board is used for trimming workpieces at 45° and 90°. To secure the fence system for other angles, you'll need to add a lock for the fence base. This is detailed in Figure 3.



The fence lock consists of a carriage bolt and a ¾" MDF disk (End View in Figure 3). A knob and washer lock it in place. I cut the disk with a hole saw and secured the bolt into a counterbore on the bottom of the disk with epoxy.

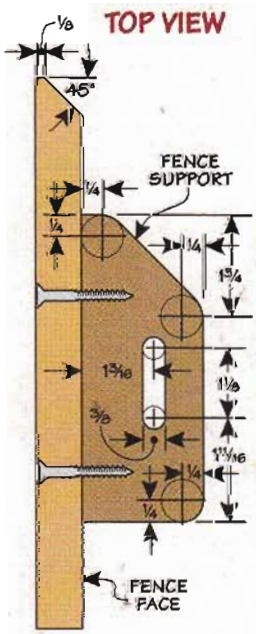
SLIDING FENCES

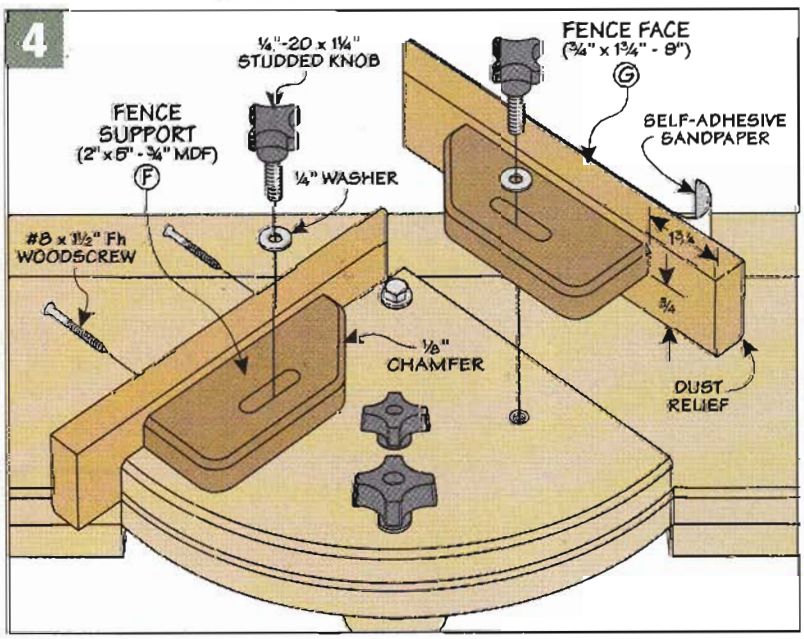
In order to back up the workpiece when "shooting" a miter, there's a pair of sliding fences attached to the base. You can see these illustrated in Figure 4. The two sliding fences are mirror images and are made up of a fence support and a fence face. To lock the fences in place, you'll need to cut a slot in each support for a studded knob (margin drawing at left).

Once the slots are complete, you can chamfer the top edges of each support. The front edge is left square for adding the fence faces.

Adding the Fence Faces. The next step is to add the fence faces to the supports. The fence faces are just strips of ¾"-thick hardwood, mitered on one end (left margin drawing). I sanded a slight chamfer on the bottom, front edge to create a relief area for sawdust.

The fence faces are attached to the fence supports with screws. This way, you can replace them if they ever get chewed up. Finally, the sliding fences are mounted to the fence base with knobs and washers.





Locking Pin. There's one last step to complete the locking system for the fence. And that's to drill a few holes in the base of the shooting board for a locking pin, as in Figure 3. These holes make it easy to quickly set the stop for the 45° and 90° positions.

The photos at right show you how to use a combination square and the holes in the fence base to accurately drill into the main base of the shooting board. Just be sure to lock the fence base in place as you drill each hole and don't drill into your benchtop.

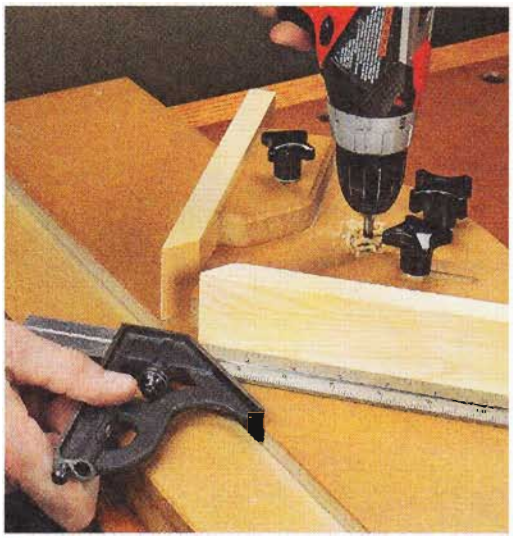
I made the locking pin by cutting the head off of a hex bolt and gluing it into a knob with epoxy. Finally, adding self-adhesive sandpaper to each of the fence faces provides a more secure grip during use.

Sanding Option. The shooting board is designed for use with a hand plane. But you can also fine-tune the fit or simply sand the end grain of a workpiece smooth using a sanding block (Figure 5).

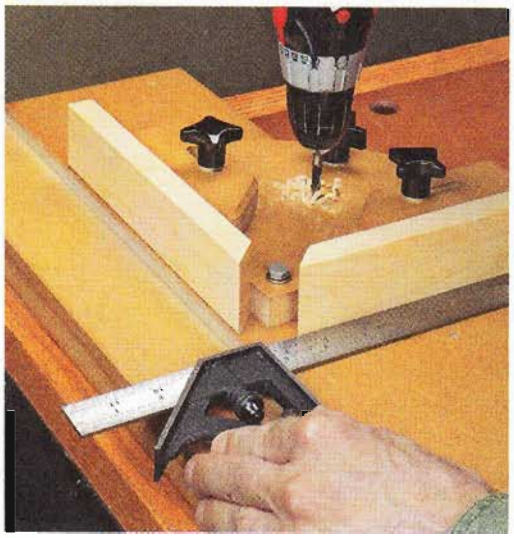
The sanding block is just a thick block of hardwood with a narrow rabbet cut along one face. This forms a reference edge that rides against the shooting board to ensure accurate sanding.

After beveling the top edge of the block, I sanded a small flat on a dowel and screwed it to the beveled face. Finally, I mitered the ends of the block (and handle) to provide a more comfortable grip.

The shooting board makes quick work of taking a thin shaving off the end of a workpiece (photos at left). It's a sure way to fine-tune any workpiece for a perfect fit. If you'd like more information on using a shooting board, check out our website, ShopNotes.com.



▲ ***Setup for 45°.*** *After positioning the fence, drill a hole in the base using the hole in the fence base as a guide.*

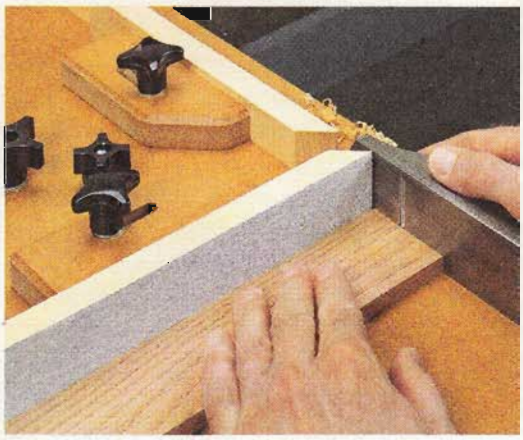


▲ ***Square It Up.*** *Repeat the process for drilling the two holes in the fence base for the pair of 90° settings.*

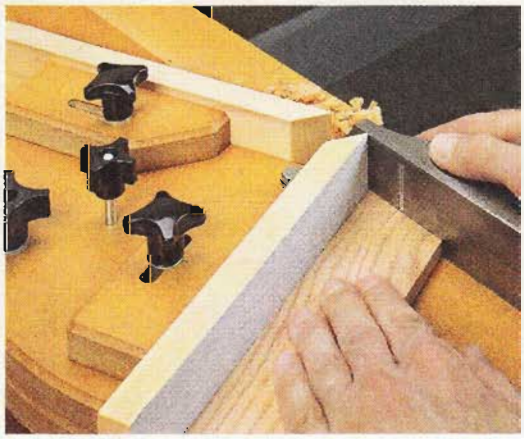
ShopNotes GO ONLINE EXTRAS

For an article on setting up and using a shooting board, go to: ShopNotes.com

Using the Shooting Board

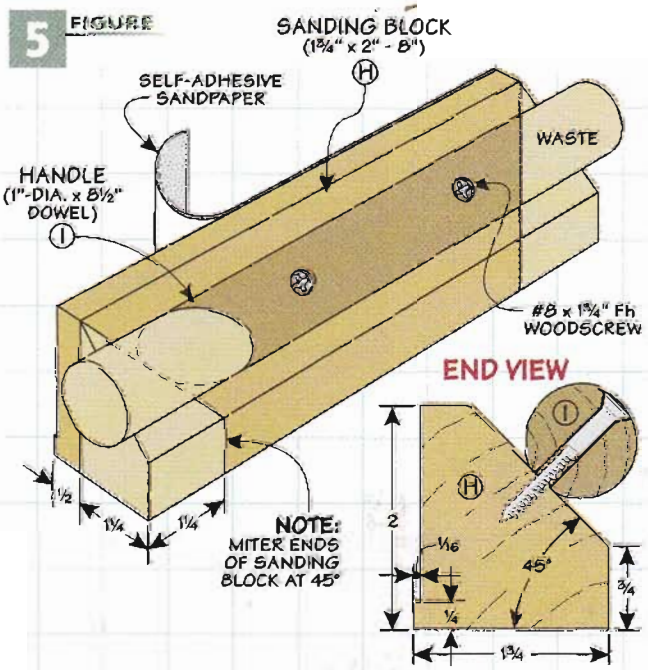


► ***Square an End.*** *With the fence set perpendicular to the edge of the shooting board, you can shave a hair off the end of a workpiece.*



► ***Other Angles.*** *By disengaging the locking pin, you can adjust the fence for any angle. Simply lock it in place at the desired angle, adjust the fence, and you're ready to plane.*

FIGURE 5



easy Veneered Panels

You can create custom plywood panels in a short time with this simple technique.

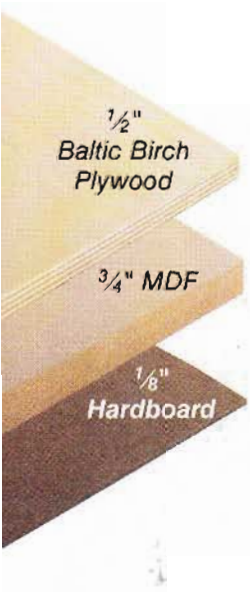
Exotic veneer is a sure-fire way to take the look of a project up a notch. It can be used as an accent or for creating the entire piece — something that would be difficult or too expensive to do with solid wood. However, the traditional process of veneering can be intimidating for many woodworkers.

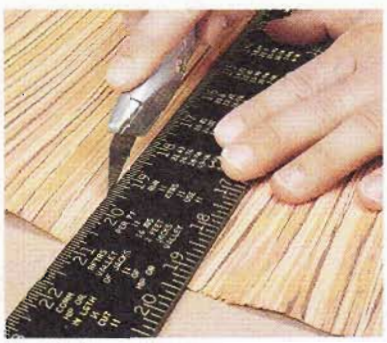
To minimize the hassle, I use a simple, modern technique that's quick, easy to master, and provides stand-out results. There are three keys to this technique: The first is selecting the right type of veneer, the second is choosing a good substrate, and the third is using the correct adhesive.

Easy Veneer. In the past, working with veneer meant raw wood veneer, which comes in narrow pieces and is often wavy and brittle. One solution is to use paper-backed veneer. And recently, I've used engineered veneer. (You can learn more about this type of veneer in the article on page 12.) These veneers have several advantages over raw wood veneer. Both paper-backed and engineered veneer are flatter, come in larger sheets, and are often less expensive.

No Clamps Needed. However, the main reason I like using "modern" veneer is that I can apply it with spray contact adhesive (refer to sources on page 51). This fast-drying glue really speeds up the process and eliminates the need for clamps. And since there's no moisture in the glue, warping in the finished panel isn't a problem.

Smooth Substrates. The final component is the material the veneer is applied to — the substrate. The main goal in applying veneer is to end up with a flat panel. So you want to select a substrate that's as flat as possible (left margin photo). For case panels, I like to use Baltic birch plywood or MDF. And when making thin door panels, ⅛" (or ¼") hardboard is a good choice.





▲ ***Utility Knife.*** *For straight, smooth edges, cut the veneer with several light strokes.*

▲ ***Veneer Saw.*** *The teeth on a veneer saw are designed to cut cleanly and prevent tearing.*

Spray it On. *Use an overlapping pattern to apply the glue to both the veneer and substrate.*

▲ **Trim it Flush.** *At the router table, use a flush-trimming spiral bit to cut away the waste.*

▲ **Router Bit.** *A spiral downcut bit cleanly trims the edging flush with the substrate.*

When to Apply. Before you can use the materials to make panels, you have a decision to make. And that's when to apply the veneer — before or after assembly.

For example, I applied veneer to the tool chest on page 14 after assembly. There were a few reasons for this decision. Applied after assembly, the veneer covers the case joinery. And the tool chest is small enough that I wasn't wrestling with large veneer pieces. Finally, adding veneer towards the end of the construction process means I didn't have to worry as much about damaging it.

However, if your project uses larger panels or the veneer will be visible on the inside as well, it's best to apply the veneer before assembly. But, no matter when you add the veneer, the process is pretty much the same.

You should also consider how and when to cover the exposed edges of the substrate. The photos at right show three good options.

Flat Veneer. The veneer I used came in a large roll. So before cutting and applying the veneer, it's a good idea to lay it out and let it "relax" overnight. Some slight curling is okay because the glue will keep it tight to the substrate.

While the veneer is resting, cut the substrate panels to their finished size. The panels can then serve as a guide to size the veneer.

Sizing Veneer. When cutting the veneer piece to size, I like to make it slightly oversized (1" wider and longer). This makes it easier to align on the substrate. You can trim the veneer flush to the substrate later.

To cut the veneer, you can use either a veneer saw or a utility knife (lower photos on the opposite page). Use a straightedge to guide the tool and a light touch to get it started. Paper-backed veneer is pretty forgiving to cut. But unbacked, engineered veneer can splinter easily, especially on cross-grain cuts.

Applying the Veneer. The task at this point is to bring the veneer and substrate together. As I mentioned earlier, I use spray contact adhesive for this.

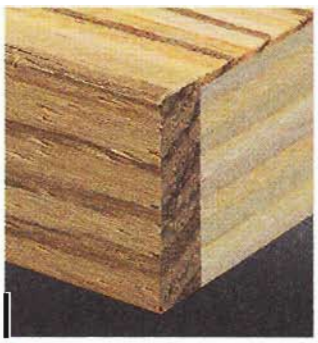
Spray an even coat on both pieces, making sure to cover the edges well (upper left photo). The glue needs a couple minutes to dry. Then, center the veneer over the panel and press it flat with your hand (upper photos on the previous page). To ensure a good bond, I use a rounded block of wood to press the veneer down.

Trim it Flush. Now, you need to trim the veneer flush. Here again, you have some options. For thick panels, a good method is to use a router and a flush trim bit. If you're doing this after the project is assembled, a hand-held trim router is the best tool for the job. Otherwise, I prefer to do the job at the router table with a spiral bit (right photo above).

On thin door panels, the bearing won't make contact on the substrate. So instead, carefully trim the veneer flush with the veneer saw or utility knife.

Once the panels are complete, you're ready to move on to the next part of your project. All in all, this veneer technique adds a great look without adding many steps or time to your project.

▲ **Edging First.** *Hardwood edging is applied before the veneer to create a seamless panel.*



▲ **After the Veneer.** *Apply edging after the veneer to prevent the veneer from catching and chipping.*

▲ **Veneer Edging.** *You can cut narrow strips from the same veneer to get perfectly matched edging.*

versatile Locking Rabbet Jig

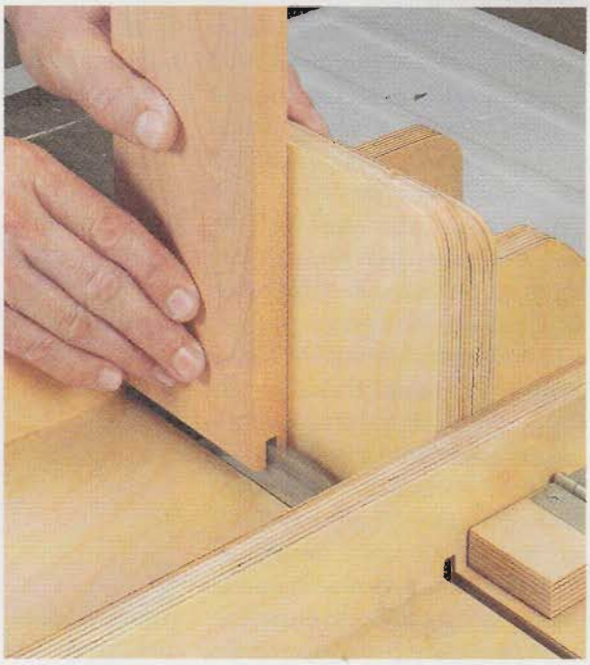
Take a weekend to build this jig and you'll be rewarded with easy-to-cut drawer joints.

▲ **Perfect Fit.** *Locking rabbet joints are common in drawer construction.*

I use locking rabbet joints quite often when building drawers. (You can see samples on page 47.) But setting up to cut a tight-fitting joint can be a tedious, frustrating process. The location and size of the dadoes and tongues have to be perfect (margin photo).

This jig eliminates the guesswork and allows you to cut a snug joint in a snap. As a matter of fact, when I showed our shop craftsman, Steve, how the jig works, he said, "I have to have that jig!"

Using a pair of flip-up stops and a tall, adjustable fence, the jig lets you make all the cuts with one setup (main photo). A few test cuts are all you need before you're ready to cut all the workpieces in "production mode." Just a few easy steps and you're done. To get the specifics on using the jig to cut four variations of the joints, turn to page 47.



▲ **Groove Cuts.** *The adjustable tall fence allows you to cut the groove in the ends of the drawer front easily and accurately.*

start with a Sled

You're going to start by building a sled that carries the workpiece past the blade. Then, you'll add the tall fence and stops that help you position the cuts accurately.

Base & Fences. The first thing to start on is the base. But there's one thing I need to point out. My jig was designed for a right-tilt saw. This keeps the edge of the kerf on the arbor side of the blade to minimize tearout. (To get plans for building the jig for a left-tilt saw, go to ShopNotes.com.)

The sled consists of a shaped plywood base along with a front and rear fence. It's guided by a pair of runners that slide in the miter gauge slots. Figure 1 shows you how these components are assembled. The key to the whole process is to make sure the fences are square to the saw blade. To make this task easier, I took the time to make sure the front edge of the jig was square to the blade first. This edge can then serve as a reference when locating the fences.

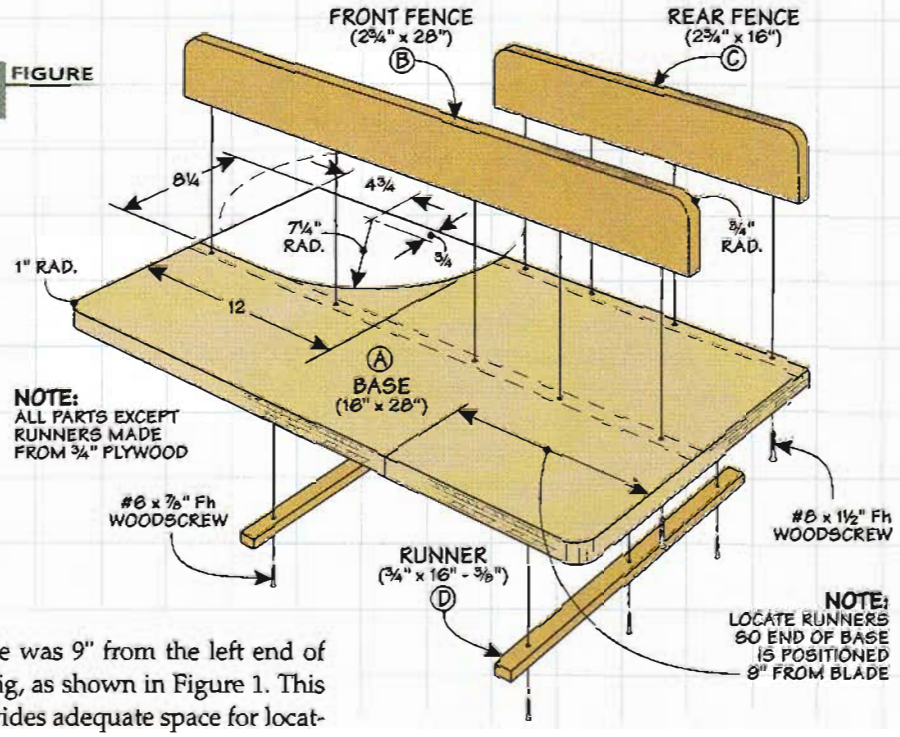
And there's one other thing — I positioned the left runner so the blade was 9" from the left end of the jig, as shown in Figure 1. This provides adequate space for locating and installing the pair of stops and the tall fence later.

Once the fences and runners are screwed in place (without glue), place the sled on your saw and make a cut to separate the base into two pieces. Then, you can remove the smaller piece to cut the wide notch you see in Figure 2. This notch provides clearance for the tall fence assembly you'll build on the next page.

Riser Platform. Part of what makes this jig so handy is you don't need to change the blade height between workpieces to cut the mating parts of the joinery. Instead, a riser platform raises the workpiece when cutting the shallow dado in the drawer sides. Figure 3 shows how the riser fits tight against the front fence.

Threaded Inserts. The last thing to do is drill holes for three threaded inserts. Two inserts in the riser allow for adjusting the stops. The third insert is located between the fences and lets you adjust the horizontal position of the tall fence for cutting grooves.

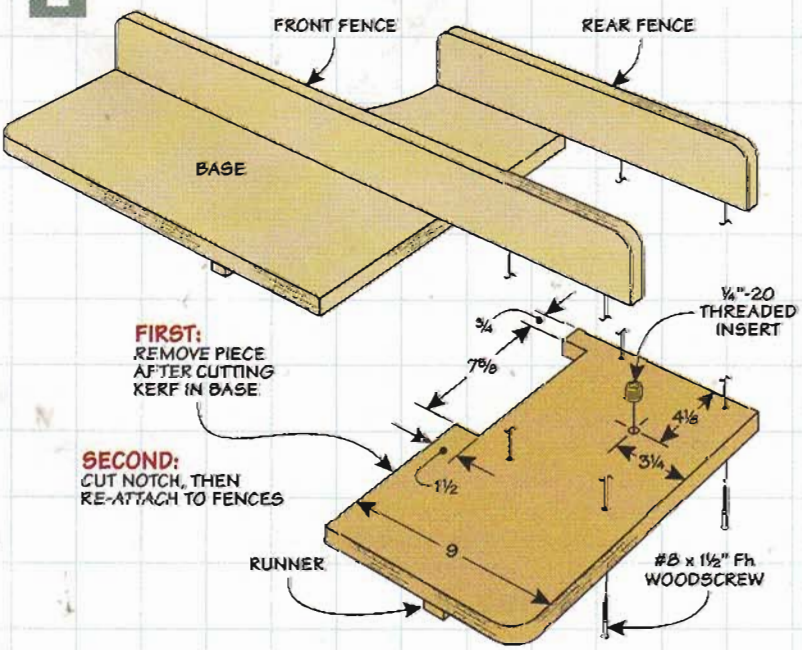
1 FIGURE



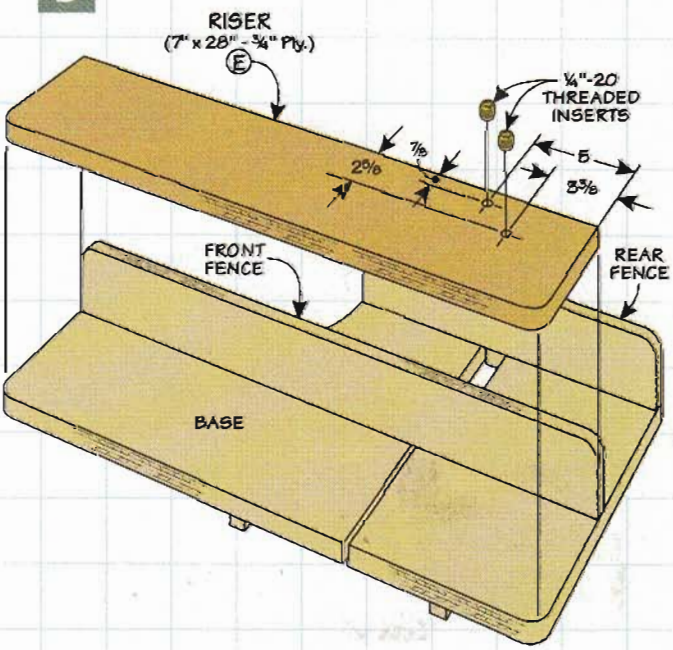
ShopNotes GO ONLINE EXTRAS

For plans to build this jig for a left-tilt saw, go to: ShopNotes.com

2 FIGURE



3 FIGURE

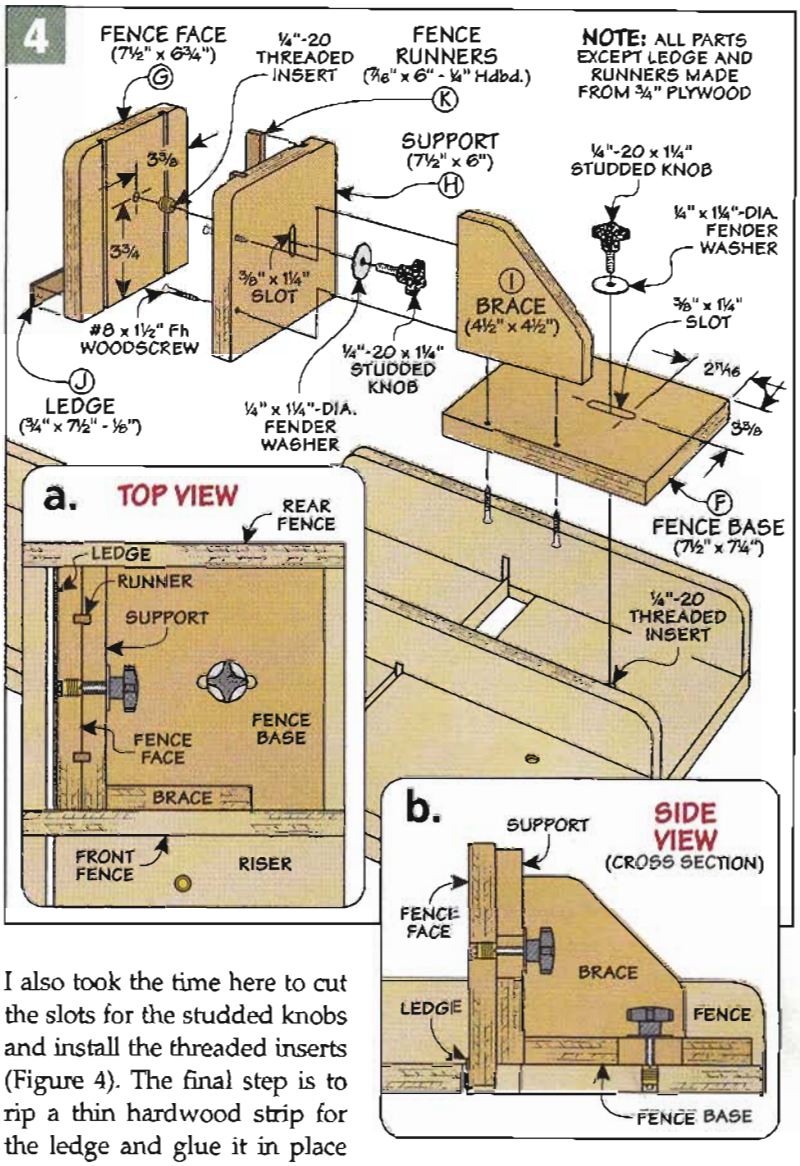


adding the Fence & Stops

The next thing to work on is the tall fence at the rear of the jig. This fence holds the drawer front and back vertically to cut a groove in the ends. You can see how it goes together in Figure 4. It starts with a fixed support and base connected by a brace. An adjustable face with a narrow ledge rides on two hardboard runners to control the depth of the groove cut in the ends of the drawer fronts.

Long Blank. I started building the fence assembly from a long blank sized to fit between the fences on the jig base. From this blank, you can cut the fence base to length and set it aside.

Grooves. In the remainder of the blank, cut two parallel grooves for the hardboard runners. With that done, you can cut the support and face to length, round the corners, and glue the two runners into the support.



I also took the time here to cut the slots for the studded knobs and install the threaded inserts (Figure 4). The final step is to rip a thin hardwood strip for the ledge and glue it in place before assembling the fence.

When assembling the fence, be sure to locate the brace on the side that will be next to the long front fence. This provides more clearance for the adjustment knobs. You may also need to do a little sanding on the hardboard runners and grooves to allow the fence face to slide smoothly.

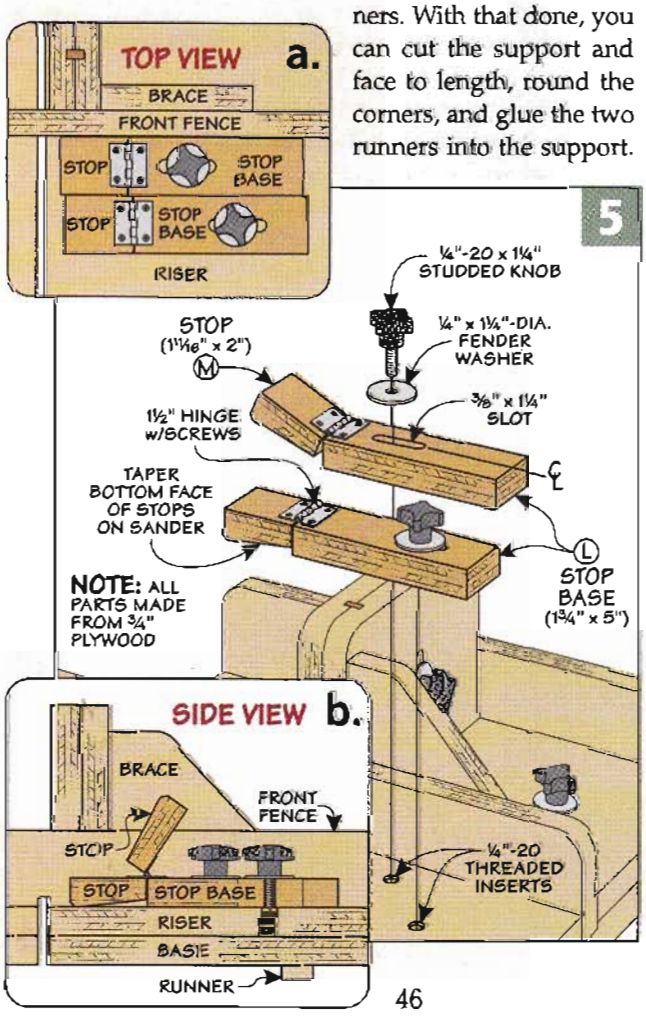
Hinged Stops. After fastening the fence assembly to the base, you can start to work on the two simple, hinged stops. The stops are critical for getting a tight joint. As I mentioned earlier, one stop controls the location of the dado in the drawer sides. The second stop determines the length of the tongue that fits the dado.

The stops are identical except for the locations of the slots used to position them. You can see what I mean in Figure 5. I started by ripping a long blank, and then cut the four pieces (two bases and two stops) to length. To prevent the stops from binding, I sanded them a little narrower than the bases.

While you're at the sander, you can add a slight taper to the two stops, as shown in Figure 5b. This ensures the leading edge of the stop seats firmly on the base.

Before adding the hinges, cut the slot in each base. To install the hinge, simply align the center of the hinge barrel with the joint and install the screws (Figure 5a).

Now you're ready to give the jig a test run. But you'll want to take a look at the next few pages to learn how to set up the jig to cut a variety of joints effortlessly.



easy & accurate Drawer Joinery

Making a variety of strong, gap-free locking rabbet joints has never been easier — or faster.

A while back our designer, Chris Fitch, and I started talking about a jig to cut standard locking rabbet joints (the top one shown in the photo). It's a joint we've used on a lot of projects over the years. Chris built a prototype and it worked great. But then I wondered if it could cut other variations of the joint — tongue and dado, thin-stock locking rabbet (for small drawers), and lipped locking rabbet (for hiding drawer guides). Chris nodded, scratched his head, and wandered away. A few weeks later he came back with the jig you see on page 44.

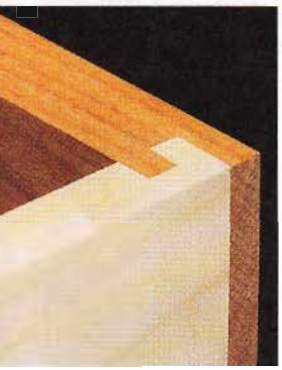
With this jig, the process of cutting any of the joints shown here is pretty similar and straightforward. And once it's set up, you can cut joinery with ease.

In brief, you start by cutting a dado in the drawer sides using one of the hinged stops to locate the dado. Then, you start to work on the drawer front and back. First, you stand the workpiece on end against the tall, adjustable fence. After cutting a groove on the end of the workpiece, you end up with two tongues. Finally, you use the second stop to cut one of the tongues to length to fit into the dado you cut in the drawer sides.

On the following pages, I'll step you through the process of cutting each of the four joints shown here. But there are a couple of things to remember when using the jig. The most important thing is to mark the workpieces so that the inside face of each drawer part is always against the jig. This ensures that the tongue will fit into the dado. It's also important that the workpieces are cut square and the jig is square to the blade.

For the joints shown here, you'll use either a ⅛" combination blade or a ¼" dado blade. You can also use blades designed to cut box joints.

Now, just turn the page to get started on cutting perfect joints.



Standard Locking Rabbet Joint

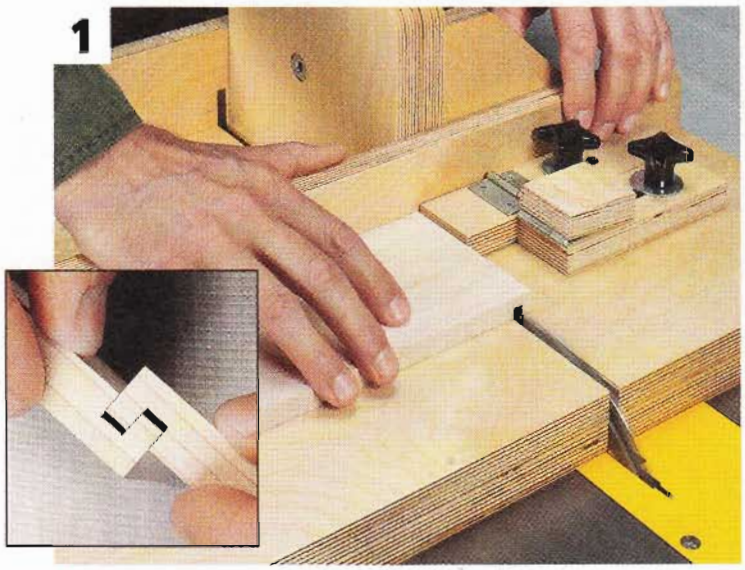
The locking rabbet joint you see in the margin uses ½" stock for the drawer sides and ¾" stock for the drawer fronts and backs. Using a ¼" dado blade, this makes the width of the tongue and dado portion of the joint each ¼" wide.

To get set up, you'll want to have a few extra drawer parts on hand for test cuts. The first step in the process is setting the blade height. I like to aim for half the thickness of the drawer side.

With the blade height set, adjust the rear stop (closest to you) to cut a dado near the end of a couple of test pieces (Step 1). Test the fit and adjust the stop until you get a good fit between the pieces, as you can see in the inset photo in Step 1. Now go ahead and cut the dadoes in all of the drawer sides.

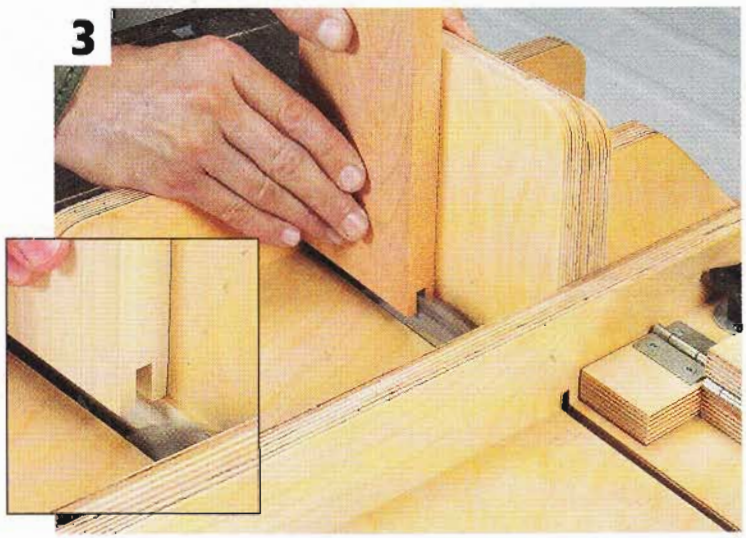
Using one of the drawer sides as a set-up gauge, you can set the side-to-side position of the tall fence, as shown in Step 2. Make some test cuts in ¾"-thick stock with the inside face against the fence and the end of the workpiece resting on the narrow ledge. Adjust the height of the fence so the depth of the groove in the end of the workpiece matches the thickness of the drawer sides, like you see in Step 3. (I like to make the groove just a hair deeper so I can sand the fronts flush after the drawer is assembled.)

The last step is to use the front stop to set the length of the inside tongue (Step 4). Again, make some test cuts and check the fit. The goal is a snug-fitting joint with no gaps. Once you're set up, you can cut all the drawer fronts.

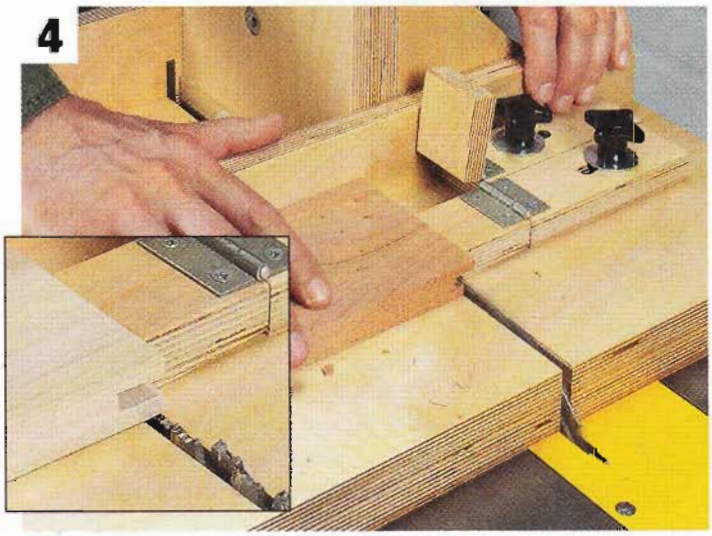


▲ **Drawer Sides.** *Set the location of the rear stop to cut a dado near the end of each drawer side. When two pieces fit together (inset), you're ready to cut all the dadoes.*

▲ **Setting the Tall Fence.** *Use a drawer side to position the tall fence. To do this, slip the dado over the blade and slide the fence up against the end of the workpiece.*



▲ **Groove Depth.** *Use a test piece to adjust the fence height. This determines the depth of the groove in the drawer fronts. The depth should be equal to the thickness of the side.*



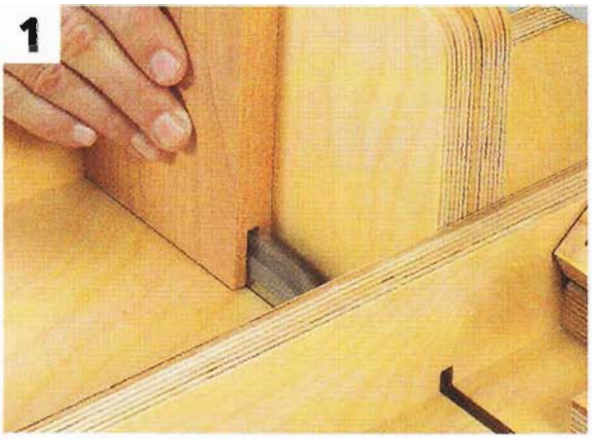
▲ **Cutting the Tongue.** *Flip the rear stop up out of the way and adjust the front stop to cut the inside tongue to length (inset). The end result is a gap-free joint (margin photo).*

Lipped Locking Rabbet Joint

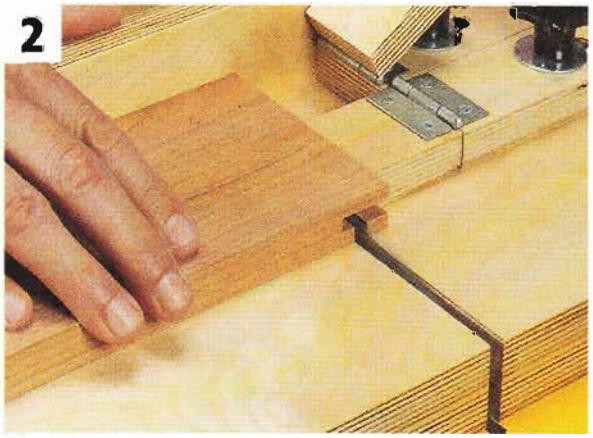
If your project design calls for drawer slides, you might consider the lipped locking rabbet joint shown in the margin. The lip hides the drawer slides.

The setup for this joint is almost the same as the joint shown on the previous page. The difference is in the depth of the groove on the ends of the drawer fronts. This will give you a 7/16" lip which results in a 1/16" side gap when the drawer is installed with standard slides. To cut the groove, the ledge of the tall fence will be aligned with the top of the base (Step 1). Since this cut is deeper, you'll want to take it easy. Don't force the workpiece through the cut. And be sure to keep the end of the workpiece tight against the jig so the depth of the groove is consistent all the way through.

The last step is to set the stop to cut off the inside tongue, as you did before (Step 2). Here again, you'll want to make a few test cuts until you get a perfect fit.



▲ **Deep Groove.** *With the inside face against the fence and the edge against the rear fence, cut a deep groove to form two long tongues.*



▲ ***Shortened Tongue.*** *Adjust the front stop to cut the inside tongue to length. You're left with an extra-long tongue that will hide drawer slides.*

Tongue & Dado Joint

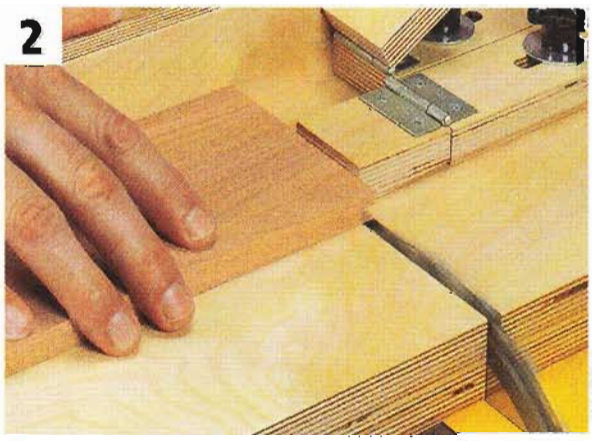
The tongue and dado joint you see at right is a simple, strong joint for building drawers. It's great for utility drawers or instances in which a false drawer front is installed to hide the joinery.

For this joint, I use ½"-thick stock all around. Like the other joints I've talked about so far, the dadoes in the drawer sides are cut first using the same process.

The drawer fronts and backs are different in that you'll be cutting a shallow, ¼"-deep rabbet instead of a groove. This creates one tongue instead of two. You'll adjust the tall fence for this cut, as shown in Step 1. After making this cut, you may have a thin sliver of material that needs to be cleaned up. You can see what this looks like in the photo in Step 1.

To remove this extra material, set the front stop like you see in Step 2. What you're left with is a crisp, square tongue to fit into the dado in the drawer sides.

▲ **Creating a Tongue.** *With the inside of the workpiece against the tall fence and the end secure on the ledge, make a cut to form a tongue.*



▲ **Clean Up the Joint.** *To remove any leftover material and get a crisp, clean joint, set the stop and make a quick pass over the blade.*

Thin-Stock Locking Rabbet Joint

At first glance, the joint on the left looks like the standard locking rabbet joint shown on page 48. But if you look closely, the tongues on the drawer front are only ⅛" thick. And the stock is thinner, too. The front is ½" thick while the sides are only ⅜" thick. This is the joint used for the drawers on the tool box starting on page 14.

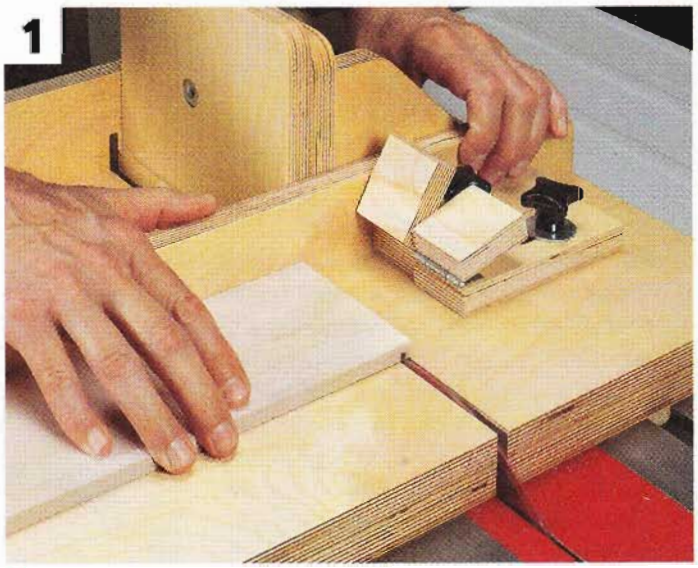
To set up for cutting this joint, I switch to an ⅛"-kerf combination blade. You'll cut an ⅛"-wide dado in the sides, leaving ¼" of material at the end (margin photo).

The trick is accurately locating the dado from the end of the workpiece. To do this, I first cut a dado near the end of a test piece, as shown in Step 1. Then, I cut the groove in the end of the drawer front using another test piece, as you can see in Step 2. This cut requires two passes, rotating the workpiece between cuts. The result is a centered groove and two long tongues. Now, you can adjust the fence until the inside tongue fits snugly into the dado, like you see in the right inset photo (Step 2).

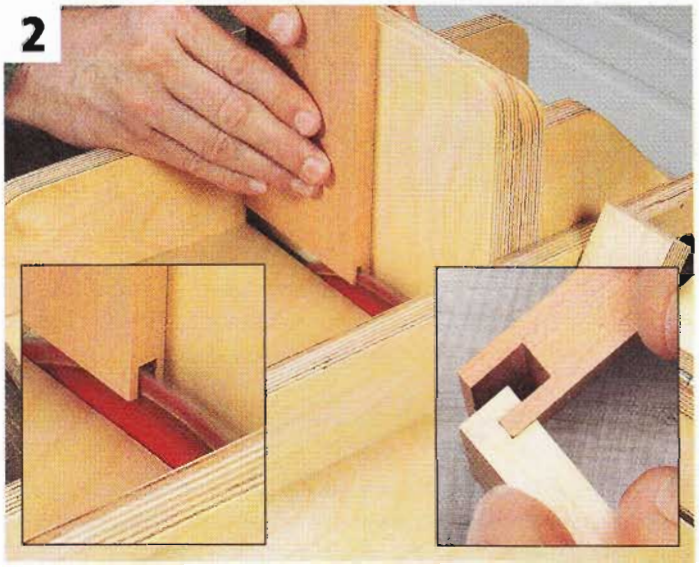
Now adjust the rear stop to fine-tune the location of the dado in the side pieces. Continue to make test cuts until the joint fits as in the inset photo in Step 3.

The last step involves setting the front stop to cut the inside tongue of the drawer front to length.

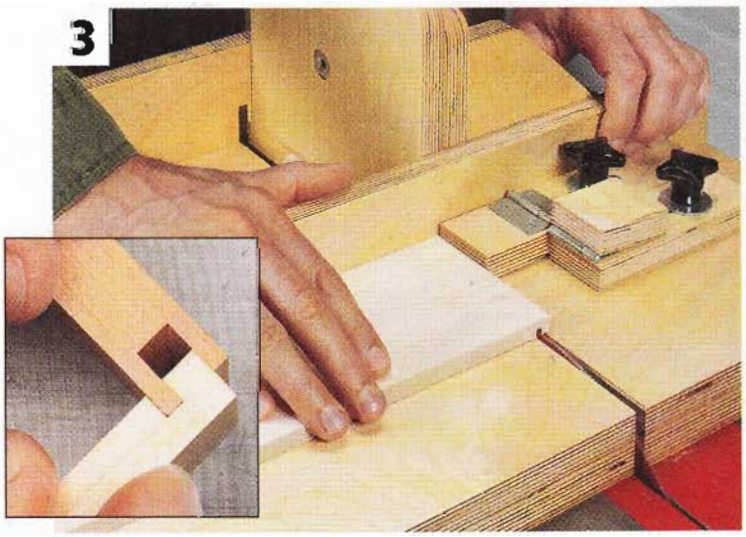
It's always a good idea to complete all these set-up steps on test pieces to make sure the joint fits snugly and without gaps. After all, this is a high-profile joint, and you want it to show off your woodworking skills.



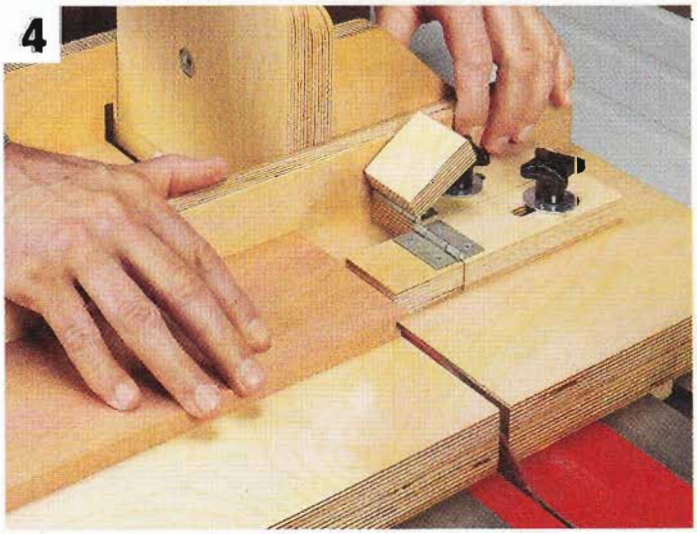
▲ **Test Cut.** *Finding the exact location for the dado in the drawer sides is a trial and error process. Cutting a dado near the end of a test piece starts the process.*



▲ **Groove.** *Next, make two passes (rotating the workpiece in between) to create a centered groove. Make adjustments until the inside tongue fits the dado in the test piece.*



▲ **Fine-Tune.** *Using the drawer front as a guide, adjust the rear stop until the joint fits as shown in the inset photo. The goal is no gaps at the sides of the tongues.*



▲ **Cutting the Tongue.** *The last step in the process is to cut the inside tongue to length. For this, you'll use the front stop, making adjustments until the joint fits together perfectly.*

Sources

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

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

GREAT GEAR (p.10)

- **Highland Woodworking**
  Standard Ballistic Apron . . . 167231
  Kilt Ballistic Apron 167233
- **The Morgan Company**
  The Shopmaster Apron 12551
  Builder's Apron 12553
- **Lee Valley**
  Mk.II Canvas Apron 67K10.06
- **Duluth Trading**
  Fire Hose Shop Apron 85021
- **Rockler**
  Bucket Boss Bib Apron 98964
  Cross-Back Shop Apron 53748

ENGINEERED VENEER (p.12)

Both *Certainly Wood* and *Oakwood Veneer Company* offer engineered, veneer in single sheet quantities. *Certainly Wood* identifies their engineered veneer as reconstituted or green. *Oakwood* will have "Italian" listed as part of its description.

TOOL CHEST & STAND (p.14)

- **Rockler**
  Stem Bumper Glides 28373
- **Lee Valley**
  2½" x 1⅜" Butt Hinge . . . 00D02.03
  ⅝" Insert Knob 05E01.05
  Brass Chest Handle 06W02.01
  Brown Rubber Feet 00S51.03
  Left-Hand Lid Stay 00T07.11

BAND SAW CIRCLE JIG (p.24)

- **McMaster-Carr**
  5/16" x 1½" Alum. Bar . . . 8975K18
- **Reid Supply**
  ¼"-20 Insert Knob DK-1204
  ¼"-20 Through Knob DK-1210
- **Woodsmith Store**
  Kreg Jig/Fixture Bar 273736
- **Woodcraft**
  Phenolic Plywood 131170

FOLD-UP ROUTER TABLE (p.30)

- **Reid Supply**
  ¼"-20 Insert Knob RST-93
  Handle DUH-50
  Toggle Clamps TC-213-U
- **Lee Valley**
  ¼" Bit Holders 16J03.61
  ½" Bit Holders 16J03.62
- **Rockler**
  Featherboard 53685

FINISHING SUPPLIES (p.36)

- **Lab Safety Supply**
  Wash Bottles . . . . . Varies
  Tongue Depressors 37523

SHOOTING BOARD (p.38)

- **Reid Supply**
  ¼"-20 x 1¼" Stud. Knob . . RST-101
  ¼"-20 T-Nuts WN-120
  ⅓"-20 Thr. Knob (1¾") DK-54
  ¼"-20 Thr. Knobs (1¼") . . . DK-81

VENEERED PANELS (p.42)

The spray contact adhesive referenced in the article is *3M's Hi-Strength 90*. It's available at home centers and hardware stores.

- **Rockler**
  Veneer Saw 43901

LOCKING RABBET JIG (p.44)

- **Reid Supply**
  ¼"-20 x 1¼" Stud. Knob . . RST-101

MAIL ORDER SOURCES

Woodsmith Store
800-444-7527

Rockler
800-279-4441
rockler.com

Certainly Wood
716-655-0206
certainlywood.com

Duluth Trading Co.
800-505-8888
duluthtrading.com

Highland Woodworking
800-241-6748
highlandwoodworking.com

Lab Safety Supply
800-356-0783
lss.com

Lee Valley
800-871-8158
leevalley.com

The Morgan Company
530-417-6534
aprons.net

McMaster-Carr
630-600-3600
mcmaster.com

Oakwood Veneer Co.
800-426-6018
oakwoodveneer.com

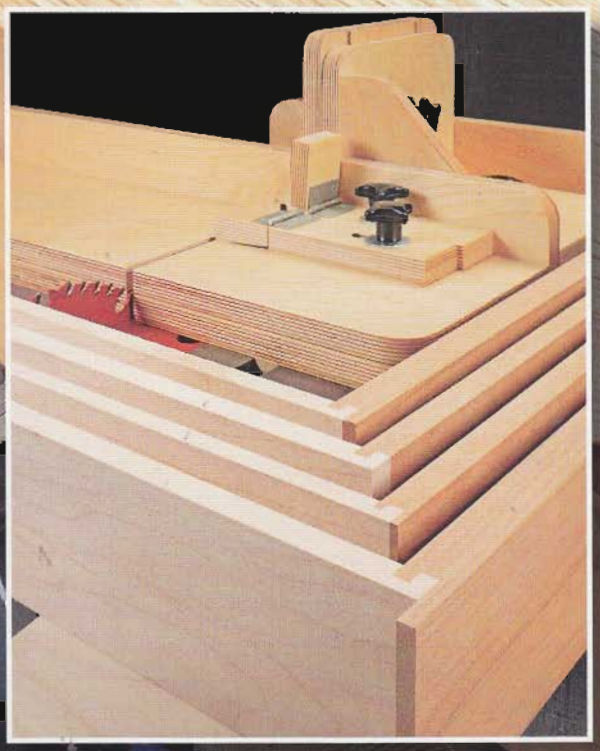
Reid Supply
800-253-0421
reidsupply.com

Woodcraft
800-225-1153
woodcraft.com

Scenes from the Shop

Unlike the narrow sheets of standard veneer, engineered veneer comes in wide, consistent sheets. Plus, it's inexpensive and easy to use. *To learn more, turn to page 12.*

Cutting different types of locking rabbet joints couldn't be easier with this exclusive table saw jig. You'll find everything you need to know beginning on page 44.



A shop-apron is a must-have accessory. To see the best aprons available and what to look for, check out the article starting on page 10.