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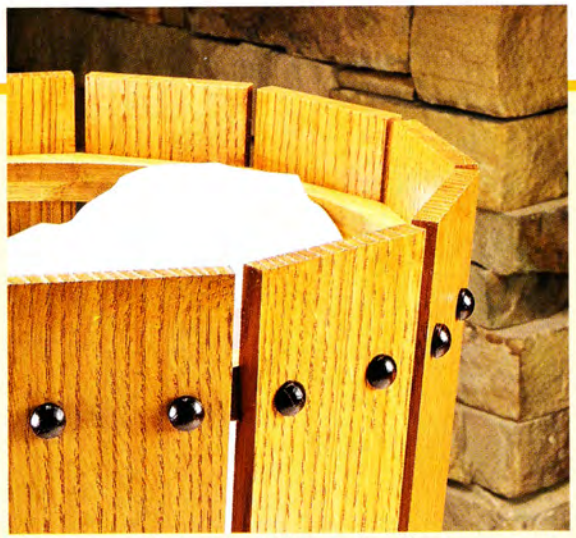
Table of Contents



Craftsman-Style Wastebasket page 18

Sawbuck Desk page 22

projects

Baker's Rack page 34

editor's note

Sawdust

I can't decide what I like more, the fact that we were able to squeeze an extra project into this issue, or that most of the work for completing the project takes place at the band saw.

For such a small project, the sculpted vases shown below have an elegant look. And it doesn't take much in time or materials to make. So it's the perfect way to use those special pieces of material you've been saving.

Plus, it's a great opportunity to dust off your band saw, give it a quick tuneup, and then knock a few out just in time for the holidays. You'll find everything you need to start your own sculpted vase on page 29.

The other weekend project, a Craftsman-style wastepaper basket (page 18), is a classic way to keep things tidy. And the angled, tapered slats and segmented ring construction will give your woodworking skills a test. Finally, I love the designs on our two larger projects, the sawbuck desk (page 22) and the baker's rack (page 34). But the thought that delicious desserts might start showing up once it's complete puts the baker's rack at the top of my to-do list.

Bryan

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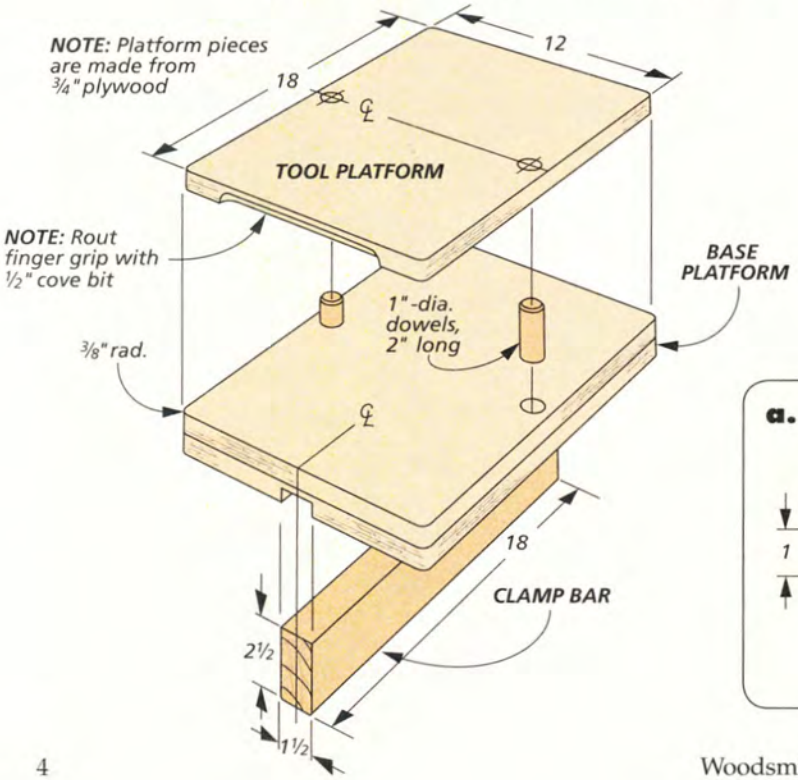
Tips & Techniques

Interchangeable Workstations

Workbench space is at a premium in my shop. To make the most of the space I do have, I wanted an easy way to use smaller bench-mounted tools (my grinder and machinist's vise) in the same location. What I came up with is this interchangeable work platform that clamps into the face vise on my bench.



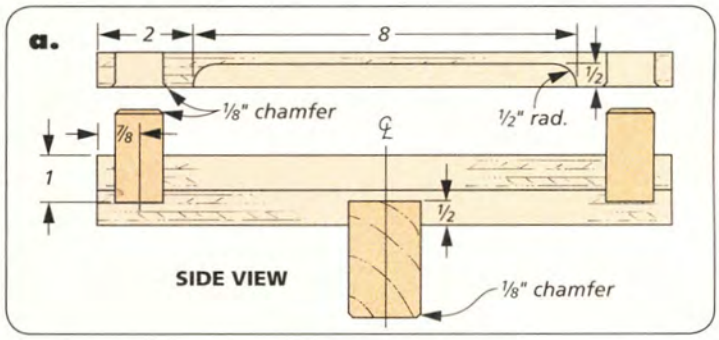
WORKSTATION PLATFORM. The platform portion of the workstation consists of two pieces of plywood laminated together. A wide dado is cut on the bottom face of the platform to accept the clamp bar.

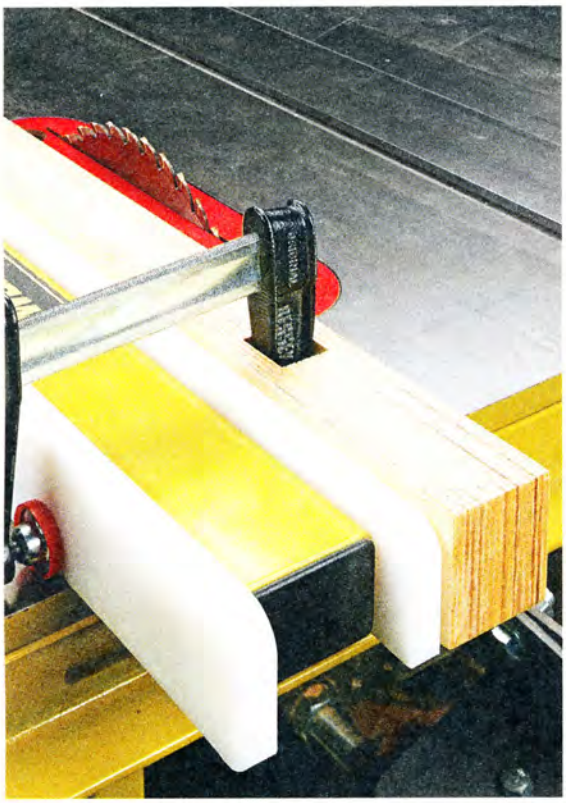
The two holes drilled in the platform surface hold a pair of hardwood dowels. These are simply glued in place. I chamfered the exposed end of each dowel.

TOOL PLATFORMS. The tool platforms are each a single piece of plywood cut to match the base. Drill a pair of holes to set over the dowels and chamfer the underside of each hole to make it easier to set the tool platforms in place.

I also routed a finger grip along the underside edge of each tool platform. Then it's just a matter of attaching the bench-mounted tools to the platforms.

Lewis Hammond
Warrensburg, Missouri





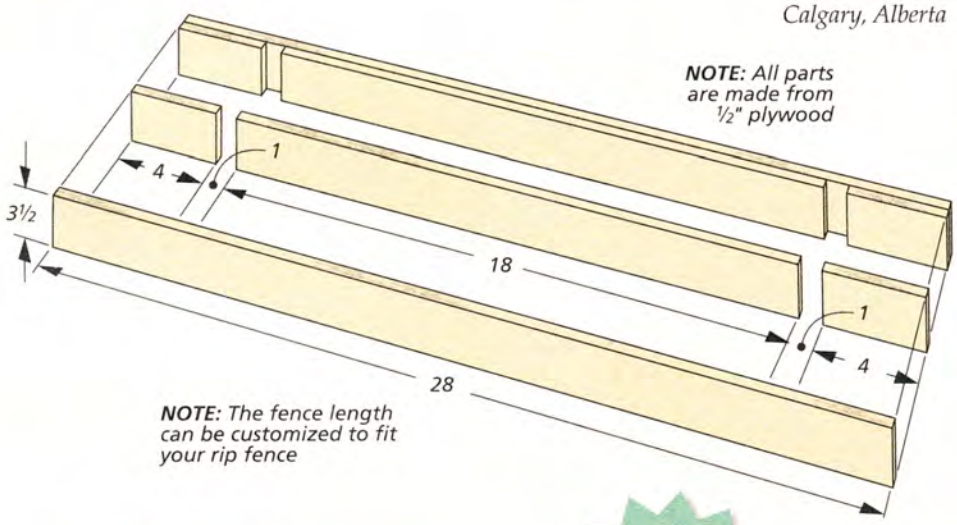
Shop-Made Fence

Wood auxiliary rip fences come in handy on the table saw. But it's tough to secure them without the clamps getting in the way of the cut. I solved that problem with the simple fence you see here.

FENCE DETAILS. The fence consists of four layers. The two outer layers are cut to the length of your rip fence. The two middle layers are each made up of three parts, with gaps wide enough to accommodate the clamp heads.

I left all of the pieces a little wide and then ripped the whole assembly to final width after it was glued together. The design could also be modified for resawing on the band saw by making one outer layer taller.

Charles Mak
Calgary, Alberta



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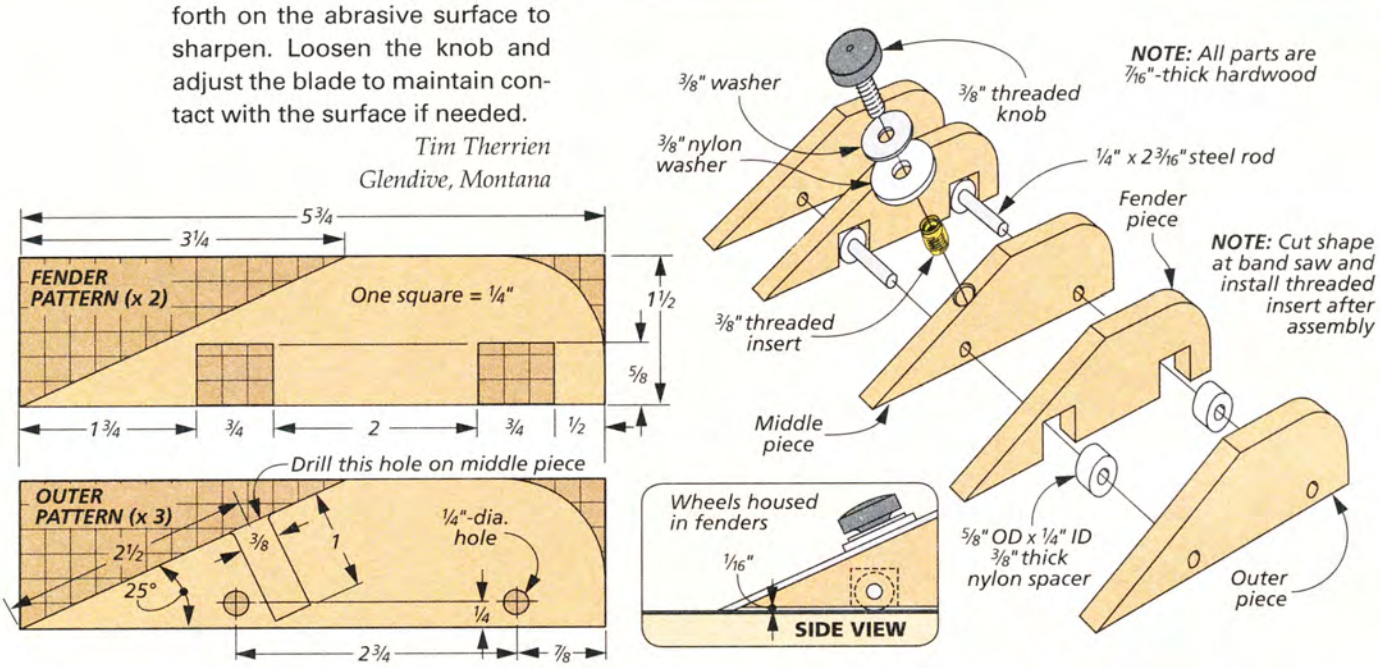
Blade Sharpening Jig

Some plane blades are too wide to sharpen with my honing guide. Instead, I use this shop-made guide. It's made from a glued-up wood block cut at an angle to match the bevel of the plane blade. Two inner pieces are notched to house nylon wheels, while a knob and washers on top hold the plane blade in place.

USING THE GUIDE. With the guide sitting on a flat surface, place the plane blade on top, bevel side down, and tighten the threaded knob. Roll the guide back and forth on the abrasive surface to sharpen. Loosen the knob and adjust the blade to maintain contact with the surface if needed.

Tim Therrien
Glendive, Montana



Save the Sawdust

I like to mix my own wood filler using glue and sawdust. To ensure I always have sawdust on hand from the right species of wood, I store sawdust in labeled, resealable bags.

Using scrap wood, I drill a series of larger holes with a Forstner bit, (stop short of drilling all the way through, though). Then, using a sandpaper grit of 120 or coarser, I sand the piece until the holes are filled. If you use an electric sander to capture the sawdust, be sure to clean the dust bag before starting.

To make the wood filler, I find that a good ratio to start with is to use three parts yellow wood glue to one part sawdust.

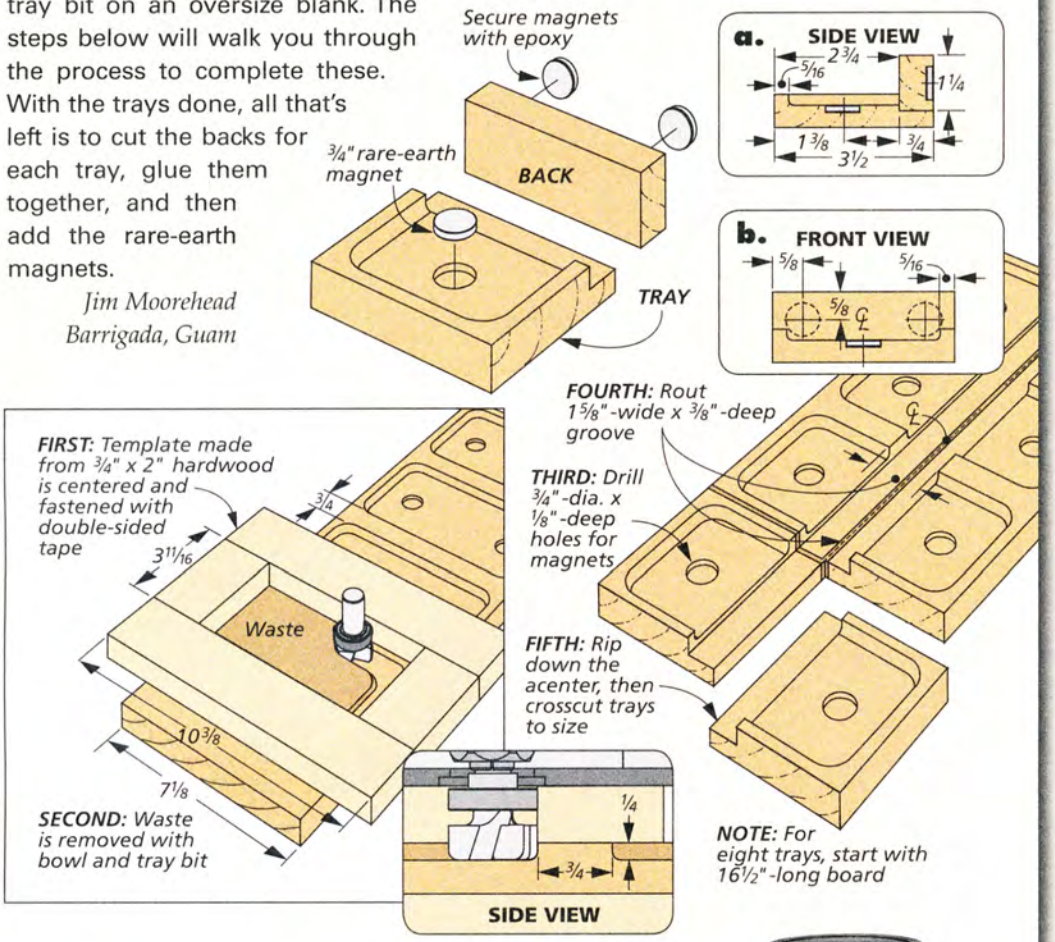
Craig Long
Auburn, Indiana

Small Parts Trays

It's nice to have a place to hold small parts and accessories at different tools around my shop. I came up with the idea below to make small trays that attach to my woodworking machines using magnets.

To make the job easier, I designed an easy way to make eight tray bottoms at one time. I used a simple template to rout the tray recess with a bearing-guided bowl and tray bit on an oversize blank. The steps below will walk you through the process to complete these. With the trays done, all that's left is to cut the backs for each tray, glue them together, and then add the rare-earth magnets.

Jim Moorehead
Barrigada, Guam



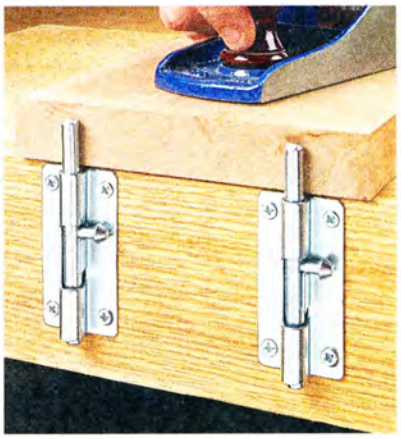
Quick Tips

AUTOMATIC NAIL SET

Instead of putting larger holes in trim work using a nail set, *David Fraser* of Modjeska Canyon, California sets the nail heads with an automatic center punch.

BARREL BOLT BENCH STOPS

Serge Duclos from Delson, Quebec attaches barrel bolts to the sides of his workbench to serve as additional bench stops.



WIN THIS PORTER-CABLE COMBO ROUTER

Simply send us your favorite shop tips. If your tip or technique is selected as the featured reader's tip, you'll win a *Porter-Cable* combo router kit just like the one shown here. To submit your tip or technique, just go online to Woodsmith.com and click on the link, "SUBMIT A TIP." You can submit your tip and upload your photos for consideration.

The Winner!

Congratulations to Tim Therrien, the winner of this Porter-Cable router. To find out how you can win this router kit, check out the information on the left.

choosing & using Cabinet Levelers

If you're dealing with an uneven floor, then choosing the right levelers will help take the guesswork out of your next cabinet installation.

Uneven floors are a pretty common occurrence in older homes (not to mention in some newer construction). And if you've ever installed base cabinets in a kitchen, utility room, or garage, then you know that a truly level floor just doesn't seem to exist. The good news is that for just about any application, there is a leveler available that will help make the job easier.

▼ A variety of levelers are available for many cabinet applications.

FEATURES. Over the past decade, cabinet levelers have come a long way in terms of design, concealability, and load-bearing capacity. Some levelers are designed to fit inside the thinnest of cabinet sides, while others can be mounted directly to the bottom of the cabinet.

Another nice feature is that when installed, most of these levelers all but disappear from view. And you don't need to be concerned with their durability. Made from steel or rugged plastic, the levelers featured here have a load-bearing capacity ranging from 330 to 400 pounds.

CONSIDERATIONS. Deciding on which leveler to use for your cabinet installation will depend on a few different factors. The first is how severe the slope in the floor is where your cabinet will be placed. Most levelers, like the two side-mount levelers pictured on the left, provide anywhere from ½" to 1" of vertical travel. The second thing to consider is whether the levelers need to be mounted in the cabinet sides or on the cabinet bottom.

Finally, you'll want to consider how much access you'll need to adjust the levelers. Once you've answered these questions, take a look at the following options to see which one will meet your needs (refer to Sources on page 51).

SIDE MOUNT

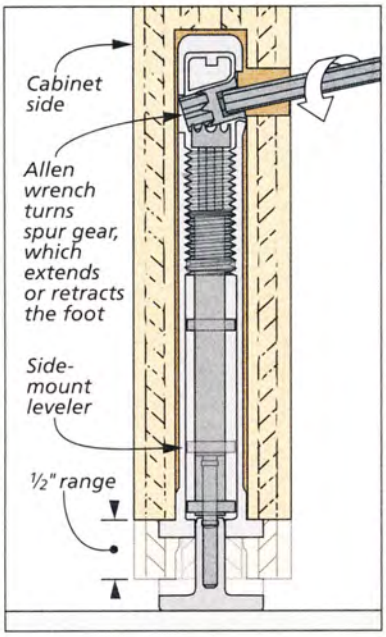
Side-mounted, concealable levelers are not a new product by any means. But the two shown here have upgraded features that make them great choices. The beauty of these types of levelers is they're barely visible when installed.

CONCEALED LEVELER. The leveler in the main photo above has the advantage of adjustability from inside the cabinet, a tremendous

benefit if it will be installed in two or more adjoining cabinets where accessibility from underneath may be limited. These slim-profile levelers are press-fit into 12mm holes drilled in material at least ¾" thick. An internal, gear-driven mechanism (shown in the illustration at right) provides up to ½" of vertical adjustment. And conveniently, these levelers are available with the adjustment access holes located at varying heights to accommodate different bottom shelf locations. This allows you to customize the fit to your application.

If a drill press is not available to bore the 12mm hole, extra care should be taken, particularly in thinner material. There are guide templates available for purchase, or you can build a simple jig like the one I used in the photo at the upper right. This will ensure that you drill a perfectly straight hole.

ULTRA GLIDE LEVELER. Another option when it comes to side-mounted levelers is the *Ultra Glide* model shown in the bottom right photo. These are designed for use in composite or hardwood cabinet panels, as well as solid-wood furniture legs. This style of leveler can't be adjusted from inside the cabinet, however.



▲ Use a shop-made guide to drill a straight pilot hole for side-mount levelers.

While similar to a standard T-nut leveler, the *Ultra Glide* uses a special nut with left-hand knife threads that lock the nut to the mounting surface. This helps to keep the nut from dropping out of the cabinet side when lifted. In addition, it incorporates a steel pilot sleeve which provides lateral support if you slide the cabinet along the floor.

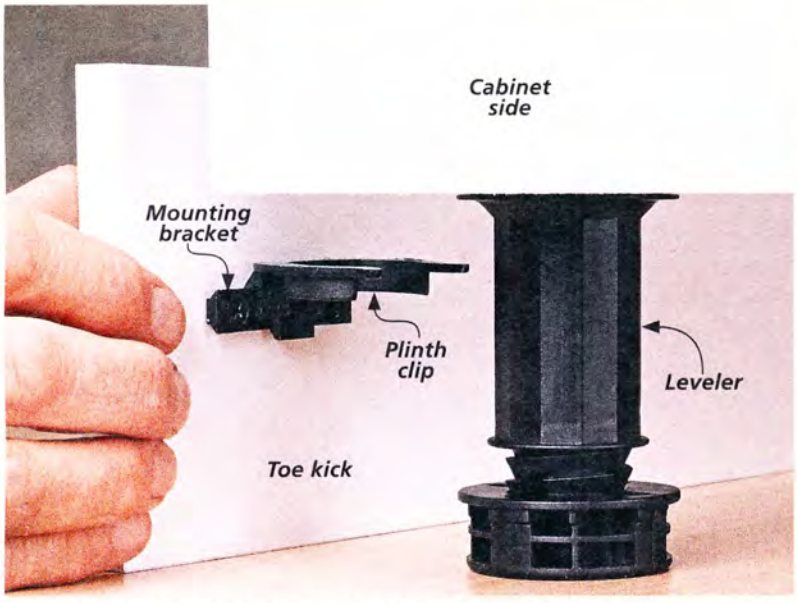
BOTTOM MOUNT

While they're mostly used in kitchen base cabinet installations, the adjustable leveler legs shown in the photo below can also find a home in laundry rooms, utility rooms, and garages. Constructed of durable plastic, these beefy, bottom-mounted levelers can be adjusted using a Phillips screwdriver inserted in one of the base holes for leverage.

OPTIONS. This type is adjustable from 3¾" all the way up to 8" with an optional leg extension. That's more than enough to level any utility room or garage cabinet. Plus, the additional height provides the added benefit of protecting your cabinet and its contents from water damage. And with a 400-pound load rating per leg, you'll feel comfortable loading those cabinets to the brim.

Another nice feature about these leveler legs is the option to mount a toe kick to your cabinet using the supplied bracket and plinth clip. The brackets can be either surface or kerf-mounted and simply snap onto the body of the leveler to give your cabinet a nice, clean look. The surface-mount option is shown in the photo at left. If used in a kitchen cabinet installation, these easy-to-remove toe kicks provide convenient access to all of the wiring and plumbing hidden behind.

Dealing with a sloping floor doesn't have to be a struggle if you have the right hardware for the job. Whatever your next cabinet installation project may be, keep these levelers in mind. W



▲ Installing the plinth clips on the toe kick couldn't be any easier. Screw the brackets in place and slide the plinth clips on from the side. This also gives you a small amount of horizontal adjustment.

▲ The *Ultra Glide* leveler provides stability in thin panels.

a fresh look at

Forstner Bits

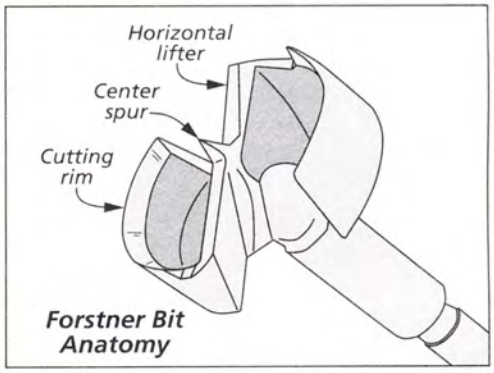
No woodworking tool arsenal is complete without a good set of Forstner bits. Here's why you need them.

▲ Despite the subtle differences, each style of bit works about the same to cut clean, flat holes.

Most bits will drill holes in wood. But when it comes to the vast majority of the holes I drill for woodworking, there's one bit I turn to time and time again. And it's a tool with a design that has remained largely unchanged for well over a century — the Forstner bit.

A BETTER BIT. If you do even a moderate amount of woodworking, you are no doubt familiar with the basic idea of a Forstner bit and its overall design. It's known for its center spur and circular cutting head that's attached to a long shaft. But each detail of a Forstner bit is carefully thought out to make it excel at drilling holes in wood. What's more, some of the details of a Forstner bit's design allow it to do things that you simply can't do with other drill bits. I'll get to those in a minute.

DETAILS OF THE DESIGN. One key difference between a Forstner bit and other drill bits is that it's the rim of the bit, rather than the centerpoint, that guides the bit. As you can see in the illustration at right, the rim is notched to form a cutting edge. This is a critical distinction, as it allows a Forstner bit to drill overlapping holes without the tendency to "wander" into the existing hole. It also scores the wood to produce a hole with a very clean edge.



Forstner Bit Anatomy

Inside this rim, you'll find a pair of cutters that extend inward toward the center spur. These are known as the horizontal lifters, and they act almost like plane blades, shaving away waste as you lower the bit into the wood. These are responsible for the ribbon-like wood shavings that a Forstner bit produces. They also make a Forstner

bit the tool of choice for drilling flat-bottomed holes, which comes in very handy for installing hardware like magnets.

The final key feature of a Forstner bit is the center spur. When it's time to start a hole, you can ensure accuracy by lining up the spur with a mark on the workpiece.

BIT TYPES. Variations in these features can be found in three different Forstner bit types (see the margin photo on the opposite page). A traditional Forstner bit is the type I usually turn to for woodworking. These bits are made from high-speed steel for a sharp cutting edge, and they're often sold in sets of common hole diameters you'll need to drill (¼" through 1").

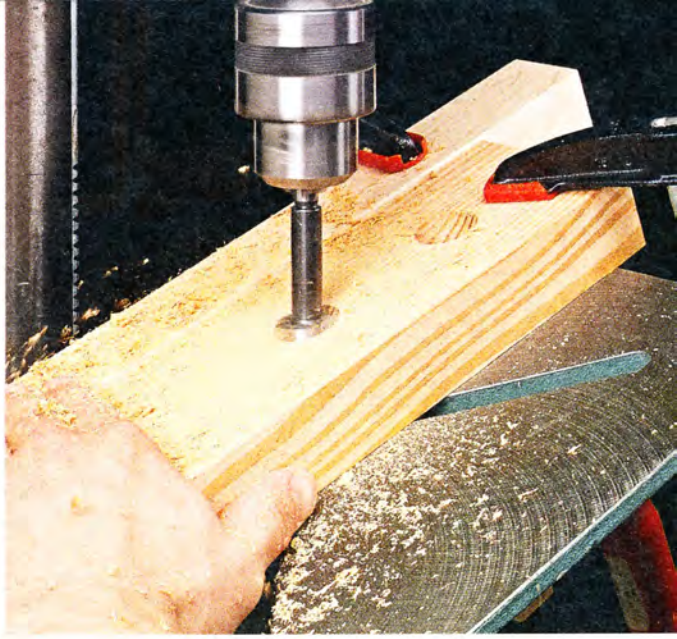
Another variety of Forstner bit is known as a "multi-spur." These are similar to traditional bits but feature sawtooth cutters around the rim. This design is often seen in larger diameter bits, as the sawtooth rim reduces heat buildup.

A carbide Forstner bit is similar in concept but a bit different in design. Instead of a continuous cutting rim, it has two carbide spurs that score the cut. The carbide makes the bits last longer, and they're also great for more abrasive materials like particleboard or MDF. These bits are often used for installing European-style hinges.

NEW USES FOR OLD BITS. Thanks to its design, the three key advantages of a Forstner bit are cleaner holes (because of the cutting rim), flat bottoms (due to the horizontal lifters), and accuracy (courtesy of the center spur). These are the reasons Forstner bits are preferred for tasks like drilling out mortises (main photo, opposite page).

But I've found a few other, slightly unusual jobs that a Forstner bit can also be useful for. Because the bit won't wander off course, for example, you can actually use a Forstner bit to drill half a hole, as seen in the photo below. This comes in handy for tasks like adding finger pulls to a drawer front.

Some projects involve drilling angled holes into the surface of the wood. Stair rails, for example, might require angled holes in order to accept the balusters. A Forstner bit is great for these holes, as well. The cutting rim will bore the hole without the drill bit deflecting to the side, as you can see in the photo above right.



▲ A Forstner bit will stay on course even when you tilt the table to drill angled holes.

GET THE MOST FROM YOUR BITS. Of course, Forstner bits still require the proper technique to get the most from them. They're not the most efficient bits at removing wood chips, so for deep holes, you'll want to drill slowly and back out the bit periodically to pull out the waste. For through holes, it's a good idea to use a backer board to prevent blowout underneath the workpiece.

Finally, it's important to match the drill press speed to the bit you're using to prolong the cutting life of the bits. The chart below will help with that. W

▲ Unlike a twist bit, the rim and lifters of a Forstner bit do the bulk of the cutting. This allows it to make interesting cuts, like drilling a half-hole to create a finger pull on a drawer front.

Watch Your Speed

Recommended Drilling Speeds

Bit Diameter	Maximum RPM
Hardwoods	
¼" – ⅜"	700
½" – 1"	500
1⅛" – 2"	250
Softwoods	
¼" – ⅝"	2400
¾" – 1"	1500
1⅛" – 1¼"	1200
1⅜" – 2"	500

create seamless joints with a Coping Sled

If you build a lot of cabinet doors, then a coping sled for your router table is a wise investment. Here's what to look for in a sled.

As far as woodworking jigs go, few have as specific a job as a coping sled. When making cabinet doors, it holds a rail perpendicular to the router table fence in order to rout a coped profile on the ends. This matches up with an interlocking profile that is cut on the edges of the stiles.

Sleds simplify coping the rails of a cope-and-stick joint for cabinet doors.

DO YOU NEED A COPING SLED? While this may not seem like much, it's an important cut when producing a number of cope-and-stick joints for cabinet doors. But is it critical enough to invest your money or shop time into obtaining one? The answer really depends on the type of woodworking that you do.

It is possible to make a coped cut on the end of a rail without a coping sled. A typical approach is to back up the cut with a wide backer board and run both pieces against the router table fence. But when you're producing a large number of cabinet doors, I would argue that a coping sled is a must-have accessory.

SLED ADVANTAGES. The first advantage that a coping sled offers is precision. If you simply back up the cut with a backer board, there is a lot of opportunity for the rail to move and shift as you're making the cut. Commercial coping sleds, like the one shown above, have hold-downs that keep the piece locked in place as you cut it.

Along similar lines, the coping sled ensures the cut will be square with the end of the rail. The miter bar and the built-in fence make sure of that.

Commercial coping sleds also promote safety by keeping your hands well clear of the spinning bit. Most have handles placed in a comfortable position for operating the sled. That's not the case when simply pushing a rail and a backer board through the bit.

For all commerical coping sleds, you'll need to add some form of auxiliary fence to the existing fence. This fence serves an important role, as it backs up the cut and

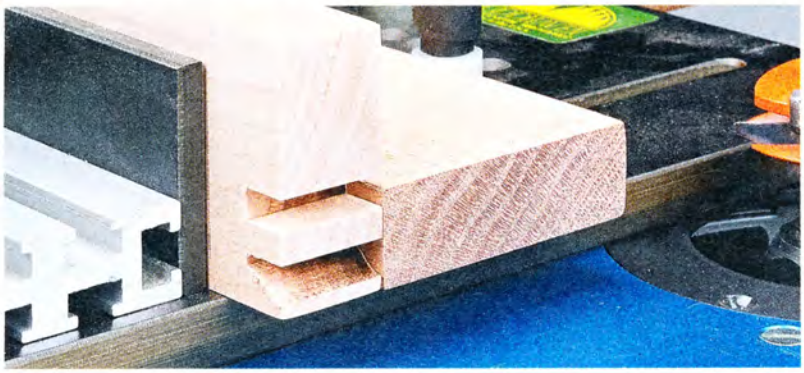
prevents tearout from occurring on the ends of the rail.

But this wood auxiliary fence also has another purpose. Once you get set up and make your first cut, the sled makes repeating the cut very simple. For each subsequent cut, all you have to do is align the end of the rail with the end of the fence (photo below). Lock it in place, and you're ready to cut. The fence is also easy to replace as needed for cutting a different shape of profile.

CHOOSING A COPING SLED. There are a variety of commerical coping sleds available that range in price from $50 to well over $100. I've found plenty in the "$100 or less" category that will serve your needs fine. The *Woodhaven* sled shown in the main photo is one of my favorites, but other inexpensive sleds also do a nice job.

When shopping for a sled, you want to look for one with heavy-duty components. You don't want the sled to flex when you clamp the workpiece in position.

Also, I'd look for a sled that allows you to add your own wood auxiliary fence, rather than replaceable, phenolic fences that you have to purchase separately. You may be using different bits for different projects, so it should be as easy as possible to replace this fence.



Once you get the rail bit set up properly and make the first cut, you can then use the sled's wood auxiliary fence as a guide for positioning the rail for each subsequent cut.

Adjustable posts lock the workpiece in place and prevent it from shifting while making the cut.

You'll notice in the photo above that the *Woodhaven* jig has two posts that lock down in front of the rail. This is a nice addition that prevents the workpiece from rotating as it first contacts the spinning bit. Many other jigs also have this feature.

Finally, the handle is critical for using the sled comfortably. The *Woodhaven* shown here has two knobs that can be moved to different positions on the sled.

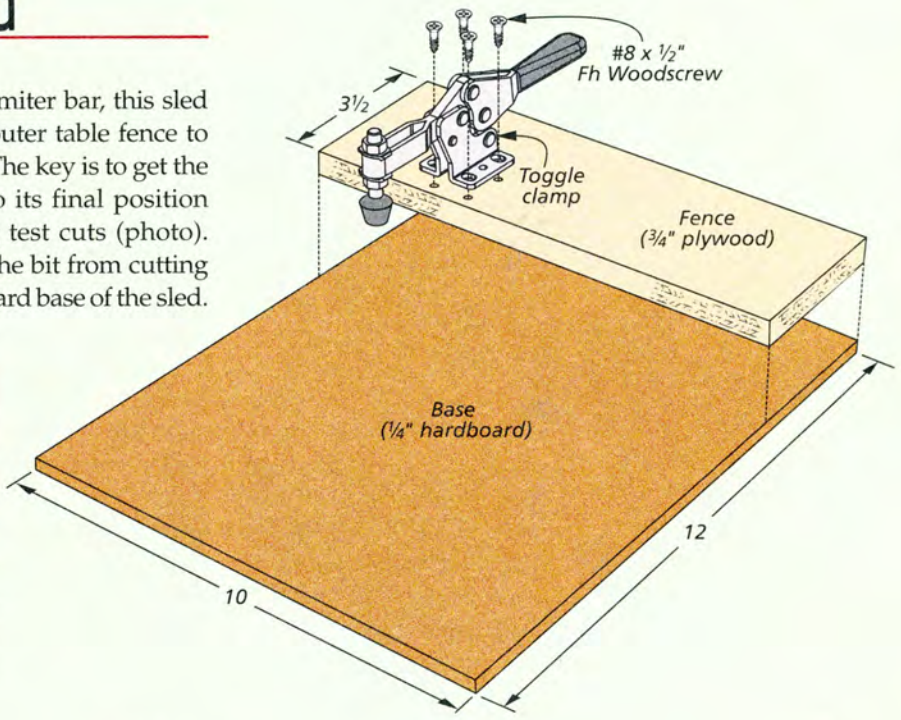
SHOP-BUILT SOLUTION. If your tool budget is tapped out, you can also knock out a shop-made coping sled fairly easily (see the box below). This version provides some of the important features of a commercial coping sled in an inexpensive, easy-to-build package. W

Shop-Made Coping Sled

Making a coping sled in the shop is pretty straightforward. As you can see at right, this version simply has a hardboard base to carry the rail, a plywood fence to back it up, and a toggle clamp that holds the workpiece in position.

Instead of a miter bar, this sled relies on the router table fence to guide the cut. The key is to get the rail bit close to its final position before making test cuts (photo). This prevents the bit from cutting into the hardboard base of the sled.

The base and fence of this shop-made coping sled guide the rail past the bit, while an added toggle clamp holds it in place.



making Loose Tenon Joinery

A mortise and loose tenon joint can provide a strong alternative to the traditional mortise and tenon. Here's how to do it.

Standard mortises and mating loose tenons create rock-solid joints.

Mortise and tenon joinery is a fundamental part of woodworking. But if you're interested in trying an alternative with equal strength and potentially greater accuracy, then you might want to consider mortise and loose tenon joinery for an upcoming project.

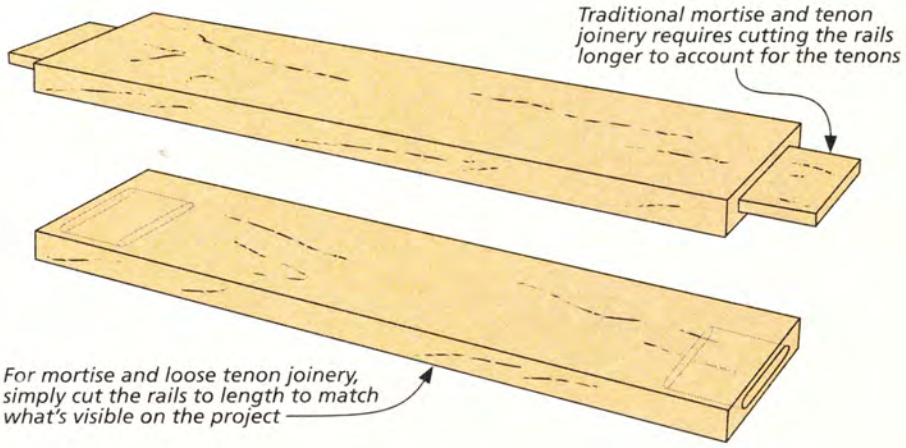
It's easy to see the differences between a traditional mortise and tenon and a mortise and loose tenon joint. Rather than a mortise in one piece and a mating tenon on the other piece, there are mortises in both pieces. The tenon is a separate piece that is machined to fit between them (margin photo at left).

ADVANTAGES OF THE JOINT. These differences give the joint a few unique advantages. For one, the joinery method simplifies laying out the sizes of project parts, since you don't have to account for the extra length that tenons add to some project pieces.

Also, the joint can be more accurate. A traditional mortise and tenon requires separate operations on different tools for cutting both the mortise and the tenon. But with a mortise and loose tenon joint, you'll rout all the mortises using an identical setup. I'll explain more about this in a minute.

Finally, a mortise and loose tenon joint can save you time by taking the chisel work out of the process. Rather than cutting the mortises at the drill press and cleaning them up with a chisel, you'll use a plunge router guided by a shop-made jig. And when you have a project with a large number of mortise and tenon joints, this can certainly work to your advantage by saving you time and eliminating a lot of hand tool work.

PLANNING FOR THE JOINERY. As far as planning a project that uses



mortise and loose tenon joinery goes, it's not much different than laying out parts with traditional mortises and tenons. In fact, as mentioned earlier, it's easier because you don't have to account for the extra length that traditional tenons will add to some of the pieces (see the illustrations at right).

When it comes to sizing the mortises and loose tenons, the same principles apply as to most woodworking projects. You want the width of the mortises to be between a third and a half of the thickness of the parts. For the frame shown in the main photo on the opposite page, I used ¾"-thick stock, so I made my mortises ¼" wide.

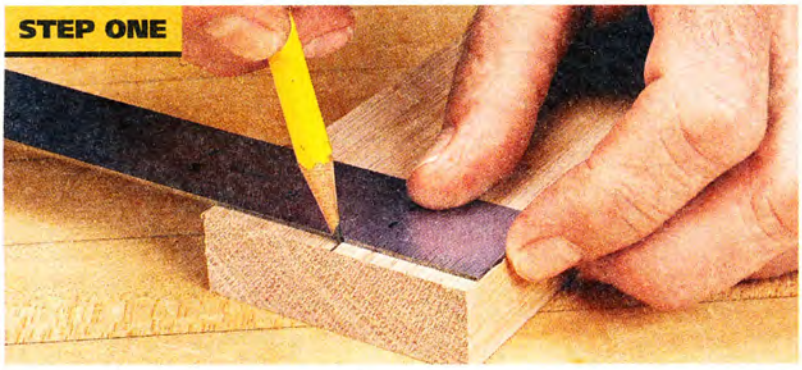
A typical mortise length is around two-thirds the width of the workpieces, so I made mine 1¾" long for 2½"-wide stock. And the mortise depth should be about half the workpiece width. Later on, you'll cut tenons to roughly twice that long to fit in both of the mortises.

LAYING OUT MORTISES. One advantage to loose tenon joinery is the precision you get from creating all the mortises with an identical setup. The first step in achieving that setup is to lay out and mark the parts accurately.

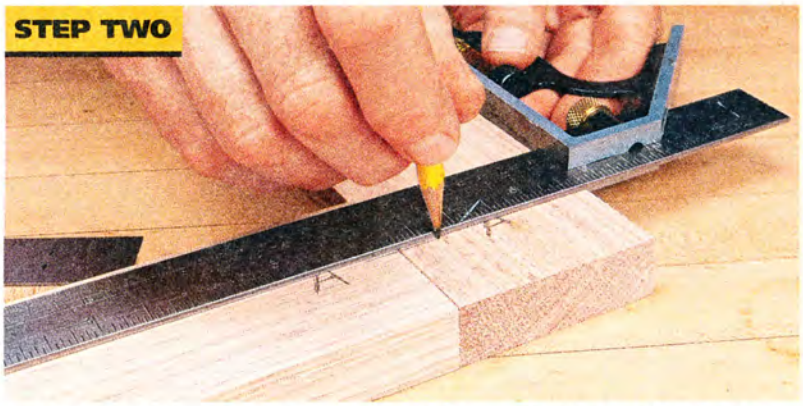
Fortunately, this isn't difficult to do. You can start by finding the centerline on each rail by using a metal rule and then marking it with a pencil, as shown in Step 1 below. Now butt all the pieces together and mark the mating joints with corresponding letters. This will make it easier to match the parts up with each other for assembly.

Before moving on, use a square to align all the parts precisely. Then transfer the rail centerlines across each mating joint and onto the stiles, as you can see in Step 2. Finally, transfer that mark from the face of each workpiece to the end or edge of the piece with a combination square (Step 3).

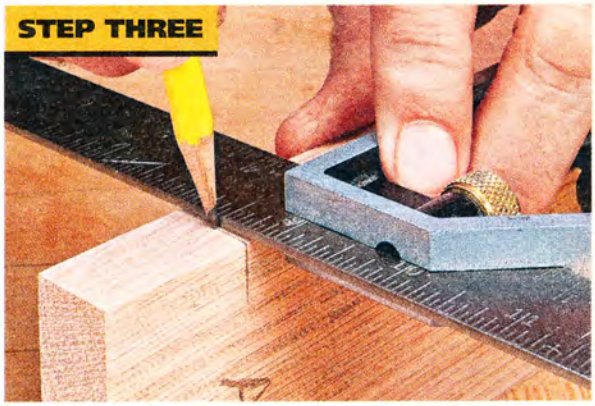
Later on, this centerline will align with a centerline on a plunge router jig to ensure precise, identical mortises on all the mating parts of the project. On the following two pages, I'll show you how to make the jig, use it for routing mortises, and then make the loose tenon pieces.



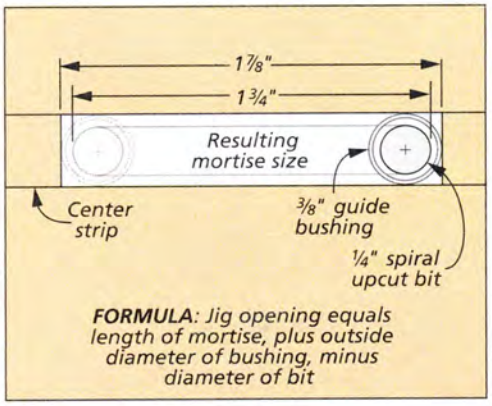
▲ To ensure accurately placed, mating mortises between rails and stiles, the most important step is to find the centerline of the rail width. This is easy to do with a metal rule.

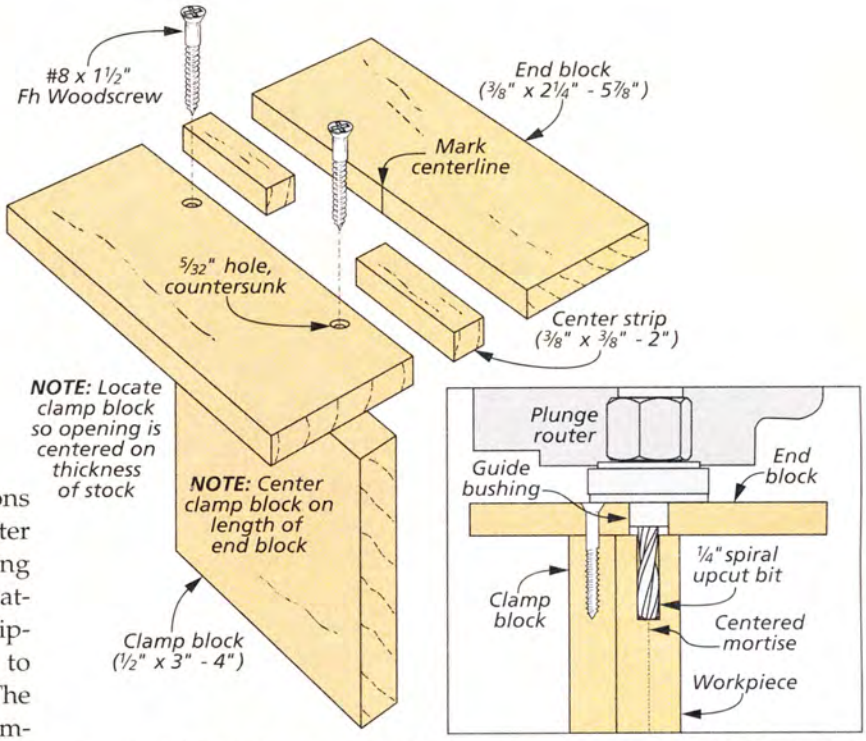


▲ Next, butt the parts together and transfer the centerline from the rails to the stiles. It's also helpful to letter the mating joints, so they'll be easier to match up during assembly.



▲ Finally, transfer the centerline across the ends of the rails and the edges of the stiles. These lines will be used to position the router jig.





Making Mortises

Now that the mortise locations are established, a plunge router makes quick work of creating them. But you need a stable platform to keep the router from tipping, as well as an opening to guide the router bit as it cuts. The T-shaped jig you see here accomplishes both of these goals.

BUILDING THE JIG. The jig is fairly simple to build. It has a platform with an opening in the center for a router bit and a guide bushing, plus a clamp block that's used to secure the jig to each workpiece. The key consideration when making the jig is sizing the opening correctly. You need to account not only for the size of the bit you're using, but also the guide bushing that goes around it. The illustrations above show you how to size the parts to match the bit and bushing you plan to use.

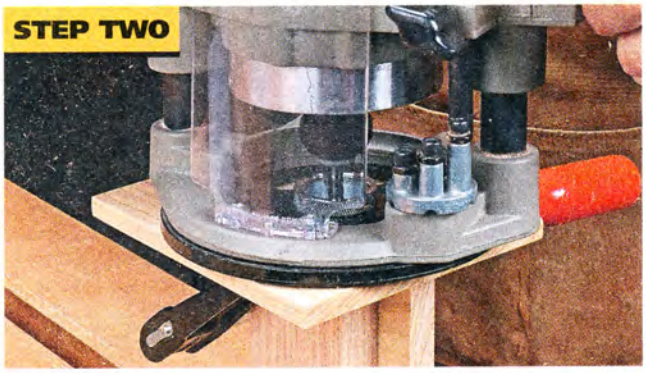
Also, it's important to attach the clamp block to the platform so that the opening is centered on each project part. Finally, mark a centerline in the opening of the jig, so you can easily align the workpiece with the jig before routing the mortise.

ROUTING MORTISES. Once the jig is assembled, routing the mortises is a fairly straightforward task. You'll start by equipping a plunge router with the bit and guide bushing you'll be using. (I recommend a spiral upcut bit, see the box on page 17). After lining up the centerline of the jig with the centerline on the workpiece, clamp the jig in place (Step 1).

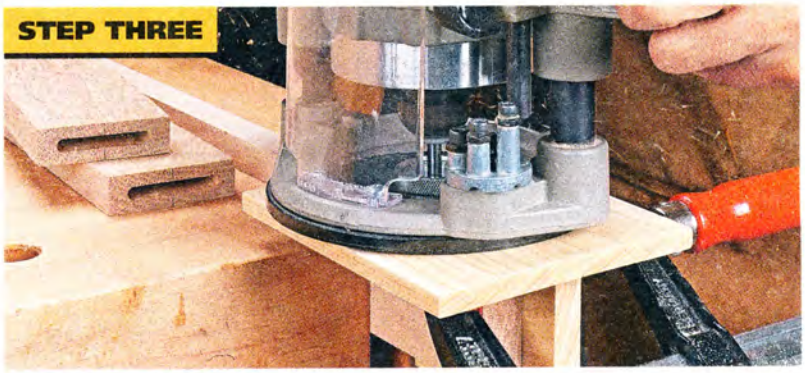
Next, set the router in place on the jig and carefully fit the guide bushing into the opening. Turn on the router, plunge the bit into the wood, and rout back and forth along the opening (Step 2).

You'll want to rout the mortise in a series of progressively deeper passes. Because of this, it's a good idea to use the plunge router's stop rod and turret to establish the depth of each routing pass, particularly the final pass. After completing the first mortise, you can repeat the process on the other project parts (Step 3).

First, align the center mark in the jig opening with the centerline on the end of the rail. Then clamp the jig in place.



With the plunge router equipped with a spiral upcut bit and a guide bushing, rout the mortise by making a series of progressively deeper passes.



You can repeat the process on the mating stiles by routing the mortises on their edges. Align the mark as before, and clamp the jig in place. Then rout the mortise to full depth.

Adding Loose Tenons

Once all the mortises are cut, you can turn your attention to the loose tenons. These are simply hardwood parts sized to fit inside the mortises. Making them just requires a few steps, which I'll walk you through here.

PLANE TO THICKNESS. One of the most critical aspects of the tenon stock is that its thickness matches the width of the mortises. So I started by planing a piece of stock down to fit (¼", in my case).

As you get close to final thickness, it's a good idea to keep a piece with a mortise close by and check the fit as you go. That way, you can get a nice fit between the mortises and the loose tenons.

RIP TO WIDTH. Once you achieve the desired thickness for the tenon stock, the next step is to rip the stock to width to match the length of the mortises. Here, it's a good idea to rip it slightly narrower (about 1/16") than the overall length of the mortise.

There are a couple of reasons for this. First, it gives you some extra space in the joint for glue. Also, it gives you just a little bit of "fudge factor," so you can adjust the joints for perfect alignment when you assemble the final project.

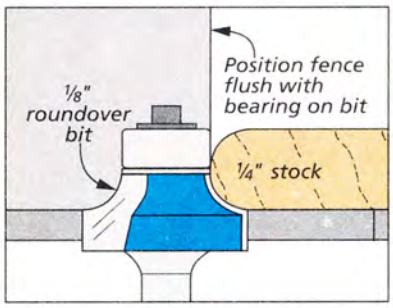
ROUND THE EDGES. Making mortises with a plunge router definitely takes the chisel work out of the equation. But it also creates mortises with rounded ends. Fortunately, when making loose tenons, it's easy to shape the tenon stock to fit these mortises. All you do is round the edges to match the profile of the mortise.

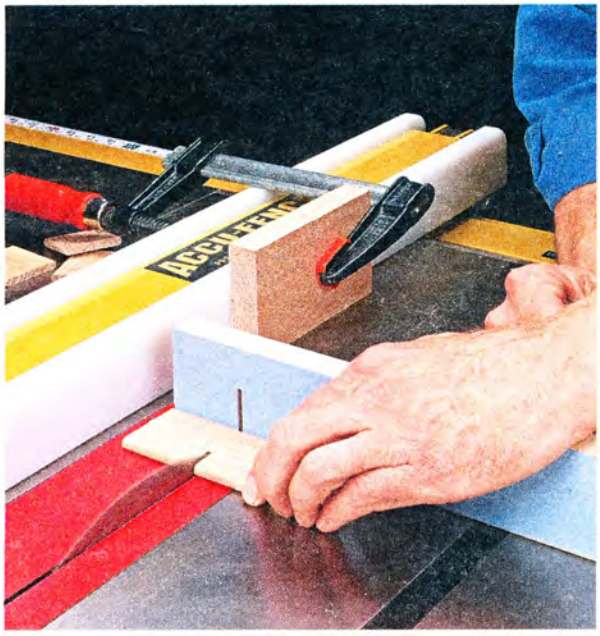
This is accomplished with a roundover bit at the router table. And since you'll only be rounding half of each edge with each pass, you'll need to choose a roundover bit with a radius half the thickness of the tenons. Since my tenons were ¼" thick, that means using a ⅛" roundover bit to round all four edges of the tenon stock (see the photo and illustration, above right). Once again, check the fit of the tenon stock in the mortise and make any needed adjustments.

CUT TO LENGTH. Now all that's left is to crosscut the tenons to length at the table saw. I used the stop block setup you see below to end up with identical-length tenons. Just as before, I made them 1/16" shorter than the combined depth of the two mortises.

Mortise and loose tenon joinery may be a bit different than its standard counterpart, but I've found a lot of uses for it in my woodworking projects, particularly in projects with a lot of mortises. It offers the same time-tested strength and durability of a traditional mortise and tenon, but it eliminates some of the fussiness of cutting and fitting the joints.

After you plane and rip the tenon stock, round the edges to match the ends of the mortises.

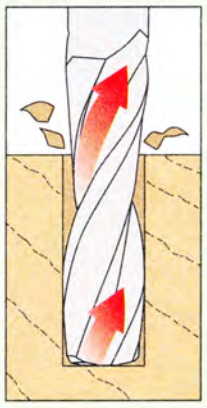




A stop block clamped to the rip fence makes it easy to crosscut each loose tenon part to a consistent length to fit the mortises.

Spiral Upcut Bits

I recommend using a spiral upcut bit for plunge-routing mortises. It offers a few advantages over a standard straight bit. For one, the tip of the bit has cutting edges, which make it easier to plunge the bit into the workpiece. Also, the spiral design shears the wood at an angle, rather than chopping it, for an exceptionally smooth cut. Finally, the flutes on the bit pull chips up and out of the cut, so they won't clog up the mortise as you're routing it.



Weekend Project

craftsman-style Wastepaper Basket

With its open slat design and "rivets," this wastepaper basket looks so great you won't want to hide it under your desk.

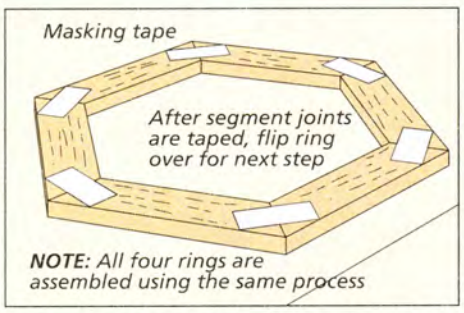
A well-appointed office just isn't complete without a matching wastepaper basket to dispose of the everyday papers and litter that cross your desk. This Arts and Crafts-inspired project certainly serves that purpose well. And since this is sure to be a piece you'll want to have on full display, you may even decide to build more than one.

At first glance, the cylindrical shape of this basket might give even the most seasoned woodworker pause. In reality, the framework is nothing more than two sets of concentric, hexagonal rings. The tapered slats are all the same size. Dadoes on the inside faces hold the rings. But the best part about this tidy little project is that it can easily be completed in a couple of days.

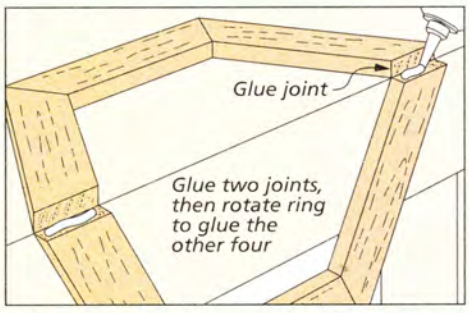
MAKING THE RINGS. The framework of the wastebasket consists of upper and lower ring assemblies. As I mentioned, these ring assemblies each start as two hexagonal frames that are glued together and will eventually create one 12-sided ring.

I started the rings by cutting twelve segments for the two upper rings and twelve segments for the lower rings. Be sure to leave these segments a little long, so the ends can be mitered. Cut the miter on one end of each piece and then, using a stop block attached to your miter gauge, miter the other end of each upper segment. Now reposition the stop

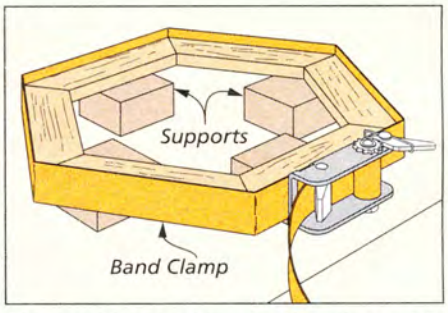
How-To: Glue Up the Rings



Tape Segments. *On a flat surface, tape the segment joints. Be sure to stretch the tape so that it pulls the joints tight.*



Glue Rings. *With the taped joints facing down, slide the assembly halfway over the edge of the bench and glue each joint.*



Clamp Rings. *Elevate the ring with supports and use a band clamp to hold everything together.*

block and cut the lower segments to their final length.

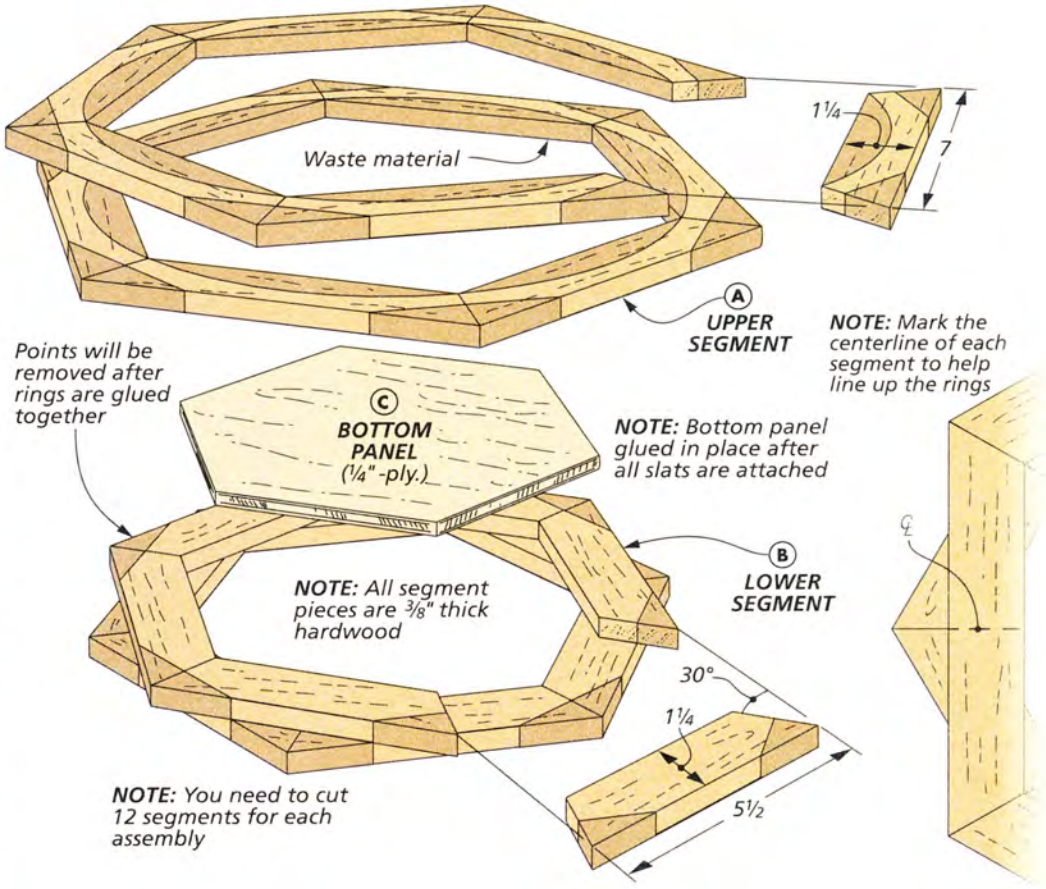
GLUEUP. The box at the bottom of the facing page will walk you through the steps to assemble each of the four rings. Since the two upper and two lower rings will eventually be laminated in pairs, just a little glue at each miter joint is all that is necessary to secure these connections.

LAMINATE. It doesn't matter if you glue up the upper rings or the lower rings first, just be sure to mark the centerlines on each of the ring segments, as shown in the illustration at right. This will make lining them up a breeze. Again, a little glue and some clamps are all that's needed to hold the two rings together. At this point, I labeled the upper and lower assemblies since the next step will only be performed on the upper ring assembly.

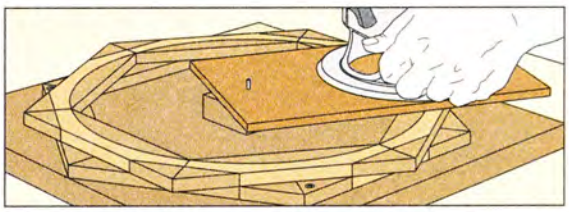
ROUT THE CIRCLE. You can now rout the inside edge of the upper ring assembly. The Shop Tip at right and Shop Notebook on page 33 shows the simple, shop-built trammel that I used for this. Since the bottom ring assembly will hold a bottom panel, it doesn't need this step.

FRAMEWORK & BOTTOM PANEL. The only thing left to complete the framework is to cut off the points of each hexagon ring. The box below shows this process. After the points have been removed at the band saw, use a bearing-guided flush-trim bit in the router to clean up the cuts.

With the upper and lower assemblies completed, use the lower assembly as a guide to mark and cut out the bottom panel from a piece of plywood, as shown in the drawing at the bottom right. It will be easier to assemble the wastebasket with the panel removed, so sand it to fit in the lower assembly recess, but set it aside for now.

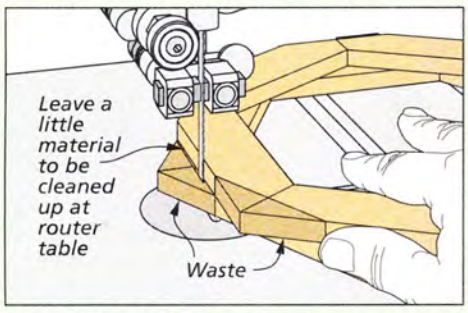


Shop Tip: Trammel

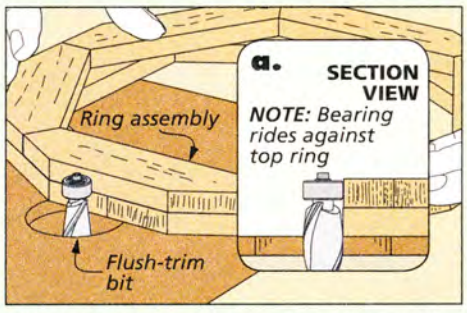


Circle Routing. *The circular opening on the upper ring assembly gives it a nice, clean look. You'll find more information about the trammel on page 33.*

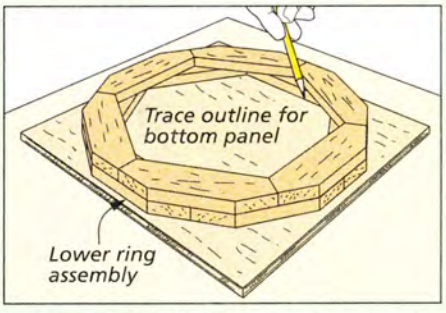
Complete Rings & Bottom Panel



Trim Points. *At the band saw, remove the points on each ring using the opposing ring as a guide. Leave the cuts proud.*

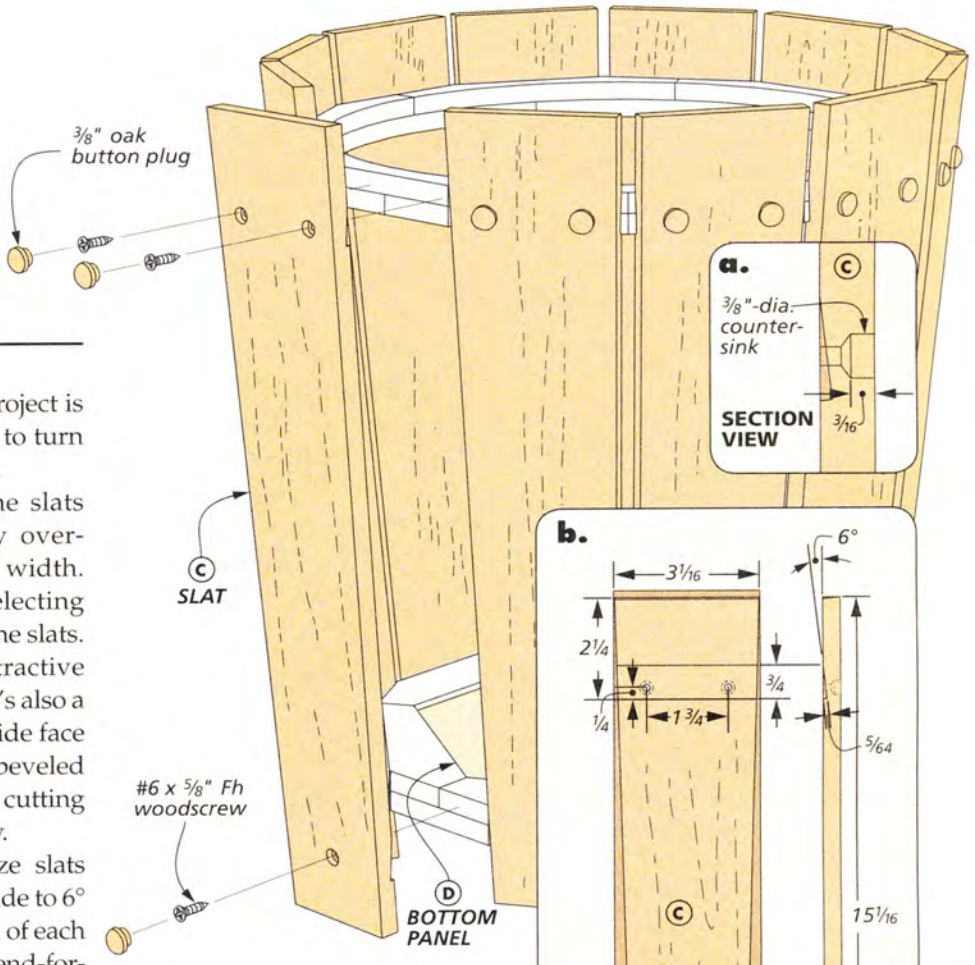


Clean up Cuts. *Using a bearing-guided flush-trim bit, remove the rest of the material at the router table.*



Bottom Panel. *After tracing out the bottom panel, cut it to shape at the band saw and sand to fit.*

completing the SLATS & ASSEMBLY



The hardest part of this project is completed. Now it's time to turn your attention to the slats.

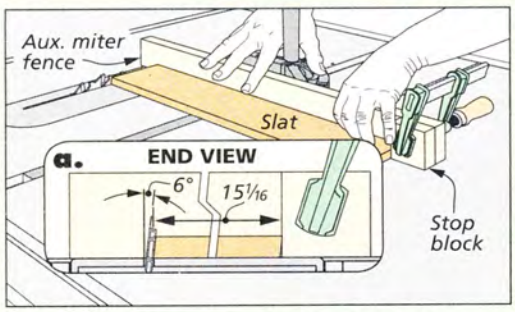
I started by cutting the slats rectangular and slightly oversize, both in length and width. Take some extra time selecting the boards you'll use for the slats. You'll want the most attractive grain pattern facing out. It's also a good idea to mark the inside face of each slat to ensure the beveled ends and dadoes you'll be cutting next are oriented correctly.

BEVELS. With the oversize slats made, tilt the table saw blade to 6° and cut a bevel on one end of each slat. Now flip each board end-for-end. Using a stop block attached to the miter gauge, cut the bevel on the other end of each slat. The left drawing in the box below shows how I set this up.

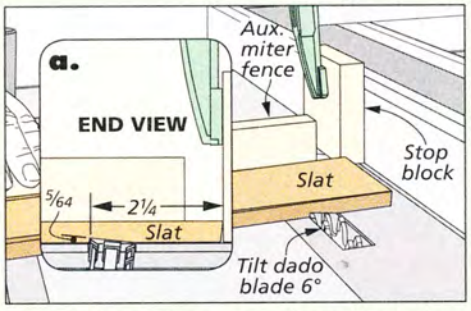
LOWER DADOES. The ring assemblies rest in a pair of angled dadoes on the inside face of each slat. Leaving the saw set at 6°, install a 3/4" blade. Start by cutting the bottom dadoes on the inside face of each slat using a short stop block attached to the rip fence to position the dadoes. Make sure the stop block is tight to the table saw surface so that the beveled end of the slat cannot slip underneath it.

UPPER DADOES. To cut the upper dadoes as safely as possible on the table saw, you'll need to make a small adjustment to your

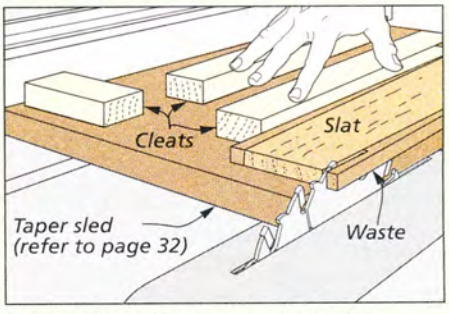
How-To: Making Slats



Bevel Ends. *With one end beveled, set up a stop block attached to your miter gauge and cut all of the slats to final length.*



Beveled Dadoes. *Cut all of the dadoes with a similar setup. Simply adjust the miter gauge and rip fence between cuts.*



Taper Sled. *This taper sled allows you to cut the tapers on both sides of the slats simply and safely.*

setup. Simply move the rip fence to the left side of the blade and move the miter gauge to the slot on the right side of the blade. The middle box at the bottom of the opposite page shows how I then used the stop block and rip fence to cut the upper dado on the inside face of each slat.

TAPERS. All of the slats have a slight taper on the edges. I built the simple taper sled shown in the lower right drawing of the facing page. This sled will allow you to cut the tapers at the table saw. Turn to page 32 for the steps to build and use the taper sled.

HOLES. With the sides of each slat tapered, this project is just about finished. The only thing left to do before assembly is to drill the holes and countersinks for the woodscrews and plugs. Since there are a total of 36 holes to drill, I decided to use stop blocks attached to the auxiliary fence of the drill press as shown in the Shop Tip at right. This speeds up the process and accounts for greater accuracy.

Pay close attention to the location of the holes when laying them out. They aren't centered top to bottom in the dadoes, but slightly below center. This will give the screws better purchase in the upper and lower rings when the slats are attached.

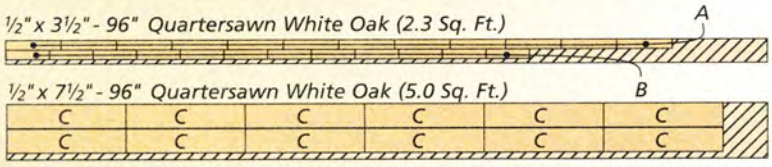
If you have a countersink drill bit, you can drill the shank hole and the countersink for the plugs all at once. With all of the upper holes drilled, you can reset one of the stop blocks and drill the single shank hole and countersink centered at the bottom of each slat.

ASSEMBLY. While there's certainly more than one way to attach the slats, I found the best approach was to break it into small stages as shown in the How-To box starting in the lower left corner of the page. The key is to make sure the slats are centered on the sides and fully seated in their dadoes. With the glue dry on the first four slats, I pre-drilled the pilot holes and installed the screws.

Now it's just a matter of attaching the remaining slats and installing the screws. Since I wanted the wood plugs to have a darker shade than the rest of the project, I decided to stain them before gluing them in place. Finally, you can glue the bottom panel into the recess in the lower ring. Sources, on page 51, provides the details on applying the stain and finish.

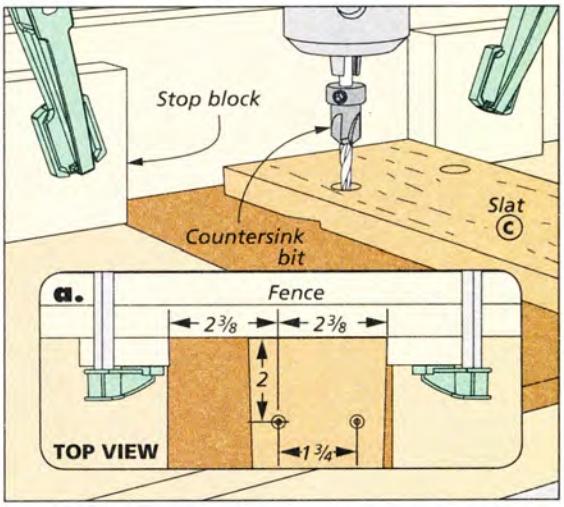
Materials, Supplies & Cutting Diagram

A	Upper Sgmt. (12)	$\frac{3}{8}$ x $1\frac{1}{4}$ - 7	
B	Lower Sgmt. (12)	$\frac{3}{8}$ x $1\frac{1}{4}$ - $5\frac{1}{2}$	
C	Slats (12)	$\frac{3}{8}$ x $3\frac{1}{16}$ - $15\frac{1}{16}$	
D	Bottom Panel (1)	$\frac{1}{4}$ ply. - 7 x 7	
•	(36) #6 x $\frac{5}{8}$" Fh Woodscrews		
•	(36) $\frac{3}{8}$" -dia. Button Plugs		



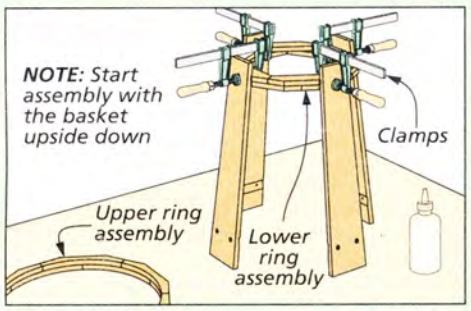
NOTE: *All parts planed to ⅜" thick*
ALSO NEEDED: *One 12" x 12" piece of ¼" White Oak Plywood*

Shop Tip: Drill Slats

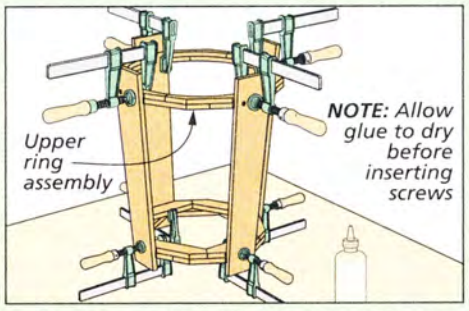


Drill Holes. *With two stop blocks attached to the drill press fence, you can simply drill one hole, slide the slat over, and then drill the other.*

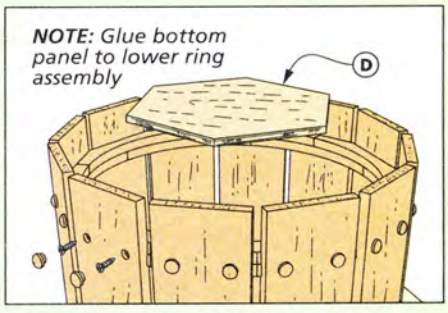
Assembly



Four Slats. *Start by attaching four slats to the lower ring with glue. Make sure each slat is centered on the side.*



Add Upper Ring. *Flip the assembly over and drop the upper ring down so that it sits in the dado. Glue it in place.*



Wood Plugs & Bottom. *Insert the screws and plugs into the slats. Then glue the bottom panel in place.*

stylish Sawbuck Desk

Traditional construction meets modern design in this desk. Its narrow profile and unique blend of wood and paint look great in any room.

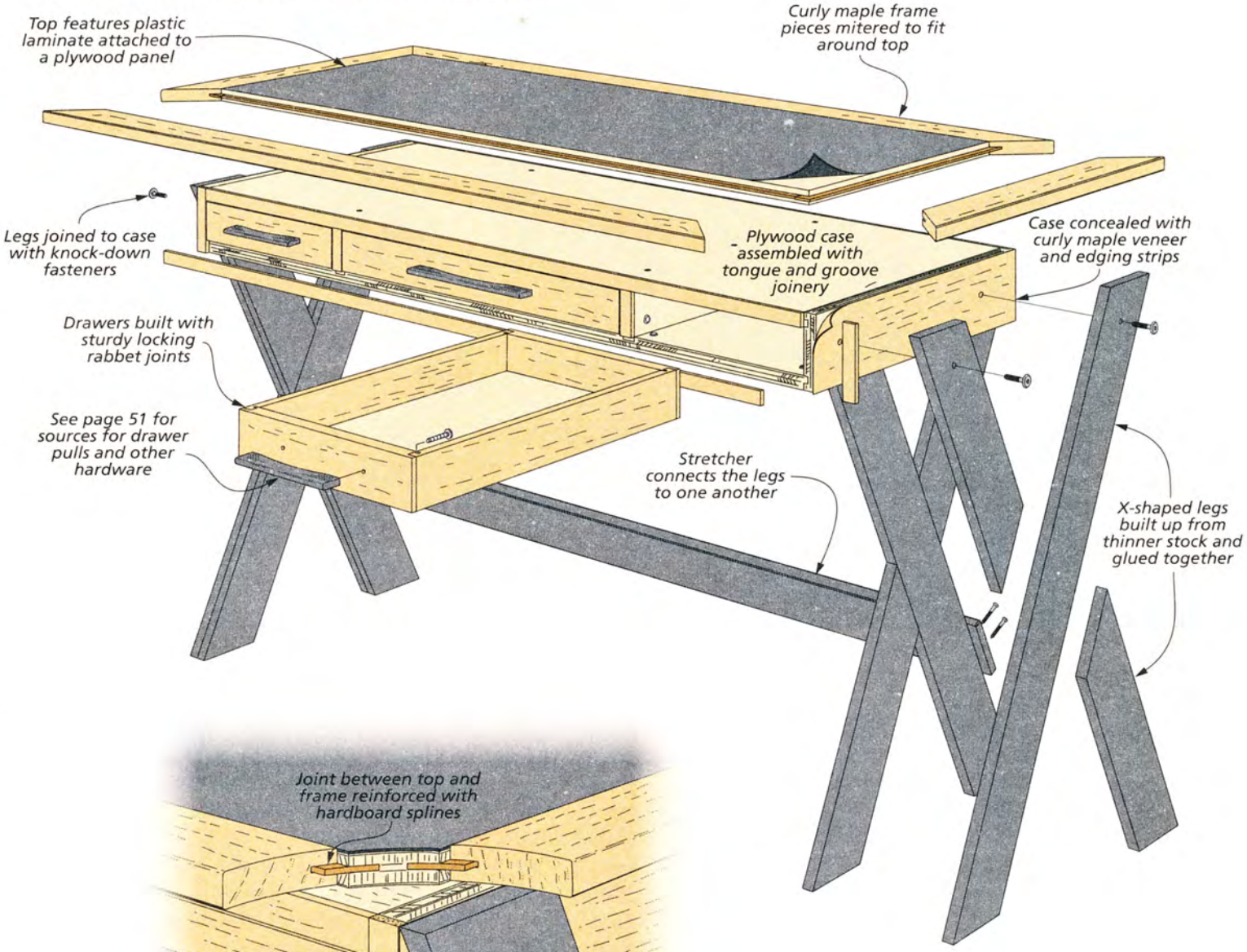
The word "sawbuck" has had a lot of meanings over the years, from a sawhorse to a slang term for a $10 bill. But originally, a sawbuck was a structure with X-shaped legs used for cutting logs with a handsaw. The look of the legs caught on elsewhere in furniture design, and sawbuck tables and benches have been popular for decades.

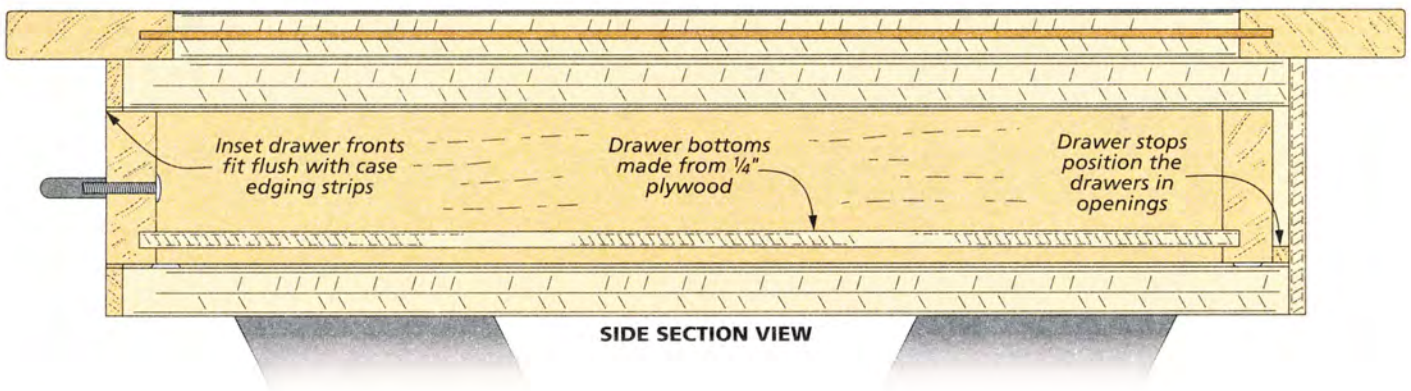
A DIFFERENT KIND OF SAWBUCK. This desk takes the sawbuck concept and gives it a completely new look. While the shape of the legs might be traditional, the rest of the desk has stylish flair. It features great-looking curly maple highlights that really pop against the deep black legs, laminate top, and hardware. Plus, the small size of the desk makes it a great choice for a guest room, kitchen, or family room.

DETAILS OF THE DESIGN. While this desk might be big on style, that doesn't mean it's difficult to build. The legs are built up from smaller pieces, and I used a simple template for cutting and aligning each part as I went along. And under all that great-looking curly maple is a simple plywood case fitted with drawers that are easy to build. All in all, you'll find that this desk offers a big payout in style for not a lot of effort in the shop. And its origins as a "sawbuck" are sure to be a conversation starter.

CONSTRUCTION DETAILS

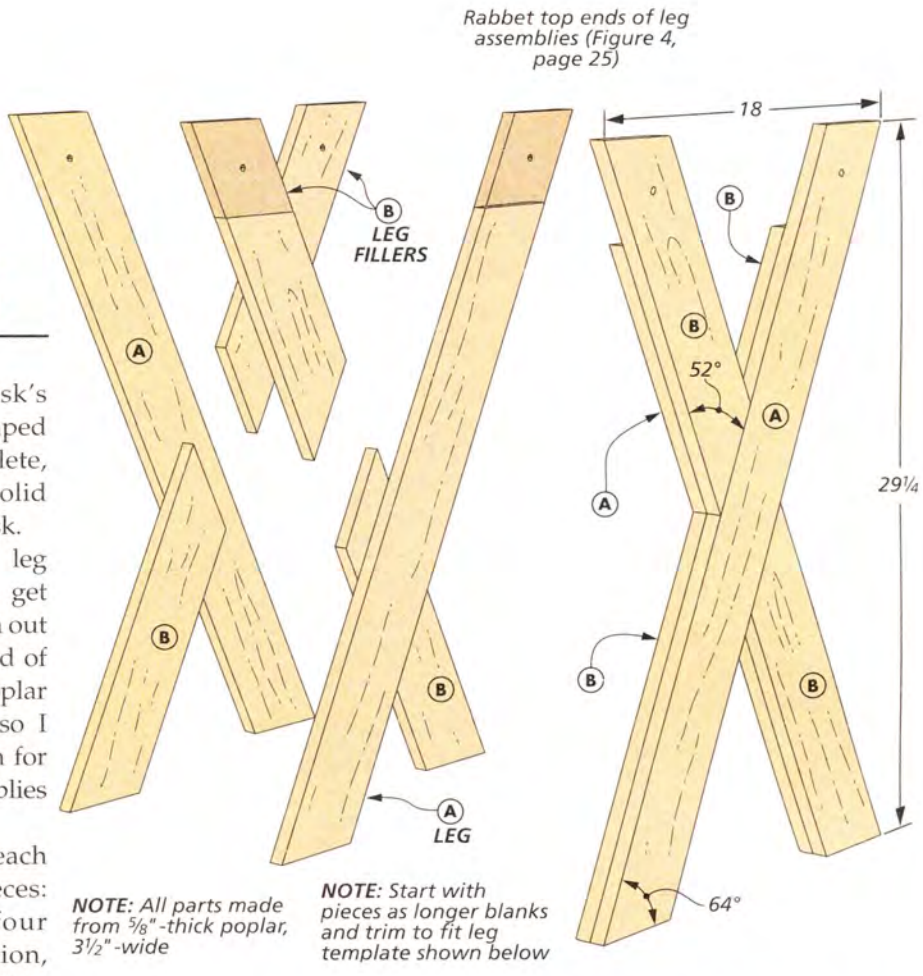
OVERALL DIMENSIONS: 21"D x 49"W x 30"H





SIDE SECTION VIEW

build the leg ASSEMBLIES



The "sawbuck" in this desk's name comes from the X-shaped leg assemblies. Once complete, the thick legs serve as a solid anchor for the case of the desk.

BUILT-UP LEGS. Because the leg assemblies in this project get painted later on, I made them out of inexpensive poplar instead of maple. And 1¼"-thick poplar is often hard to come by, so I devised a different approach for building up the leg assemblies using thinner stock.

The solution is to make each leg assembly out of six pieces: Two longer legs, and four shorter leg fillers (illustration, right). The longer legs criss-cross each other in the middle, and the leg fillers fill in the spaces around the legs. Once they're painted, they have the appearance of a thick, solid leg.

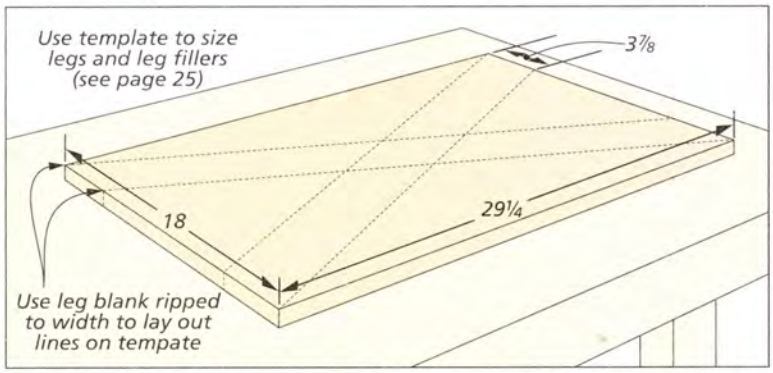
PLYWOOD TEMPLATE. The only tricky part in this process is getting the miters cut just right on the ends of the legs and leg fillers so that they all come together without any gaps. To help with this process, I created the leg template that's shown below. It's just a piece of plywood that's cut to the final length and width of the leg assemblies, and it has the shape of the leg assemblies traced onto it. I used this plywood template to lay out and check the fit of the parts for each leg.

CREATING THE LEG ASSEMBLIES. Using the leg template to make the legs is pretty straightforward. The box on the opposite page helps walk you through the process, but I'll provide some additional insight here.

You'll want to get started by planing your poplar to thickness, and then ripping a number of extra-long pieces to width, as shown above. Then you're ready to miter the pieces to their final sizes for the legs and leg fillers.

This is where the template comes into play. To lay out the miters, I set the longer blank in place on the leg template. Then I laid out the angles to cut on the leg by marking along the ends of the template, as shown in Figure 1. Using these marks, I could then set the miter gauge at the table saw, and trim the leg to final size. Then I checked its fit on the template once again. You may need

Shop Tip: Make a Template



Leg Template. *Keeping track of all the pieces for the leg assemblies can get a bit tricky. Making this simple template from a piece of plywood gives you a guide for cutting and checking the fit of the parts.*

to fine-tune the cut until it fits the template just right.

Once the legs fit, you can repeat the process for the two leg fillers. Here again, use the template to lay out the miters on the pieces, and then check the fit after you cut them (Figure 2).

If you look again at the main drawing on the opposite page, you'll see that each leg assembly is made up of two layers, with the longer leg on the second layer criss-crossing the first. So you can repeat the process to cut and check the fit of the parts for both legs.

Keep in mind that the finished leg assemblies are mirror images of one another, so it's a good idea to label all the parts so you can keep track of them. Take your time, check the fit of the pieces as you go, and everything should come together fine.

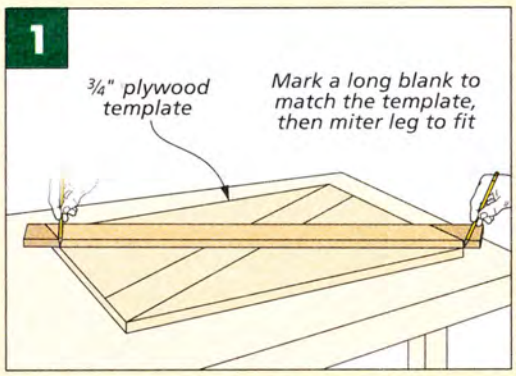
LEG GLUEUP. Assembling the legs requires a lot of glue and clamps. To prevent the pieces from slipping out of alignment, I drove a few small brads into one layer, and then snipped off the heads, as shown in Figure 3.

One small note on this glueup: Make sure to keep the brads out of the upper 4" of each leg assembly. That's because this portion of the leg assembly gets rabbeted away in the next step to fit around the case later on.

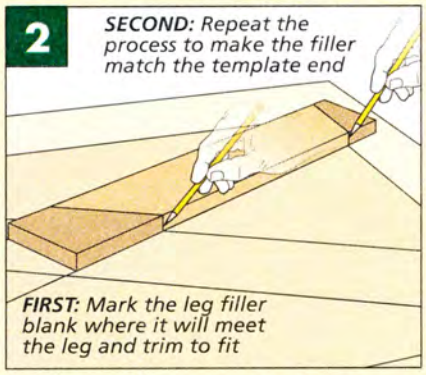
RABBET THE ENDS. Speaking of those rabbets, the easiest way to cut them is with a dado blade at the table saw. To fully support the end of the leg assembly as you make this cut, attach a long auxiliary rip fence, as shown in Figure 4. Then set the fence to establish the shoulders of the rabbets first, and adjust the fence after each pass to remove the waste and complete the rabbets.

DRILL HOLES. Now all that's left is to drill pilot holes in the legs (see Figure 5). Later on, these holes will accept knock-down fasteners that connect the leg assemblies to the case.

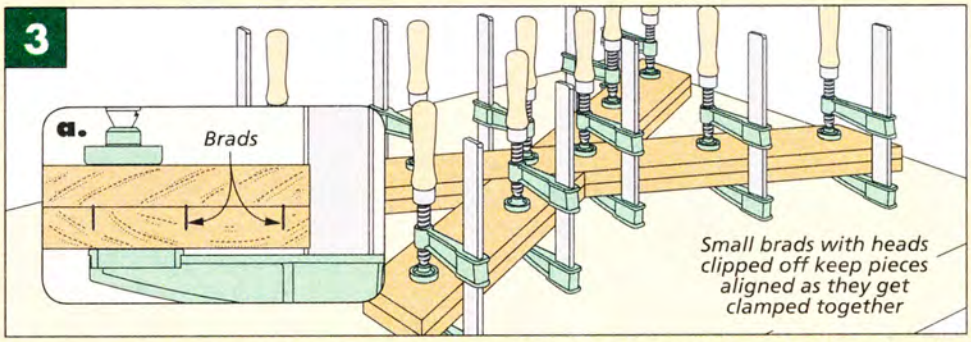
How-To: Make the Leg Assemblies



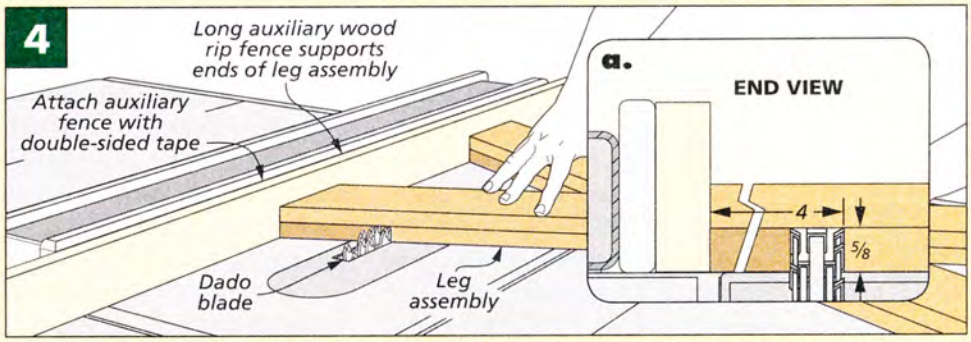
Make the Legs. *Lay a longer blank on the template, and mark the ends for each leg. Then miter each leg to fit the template.*



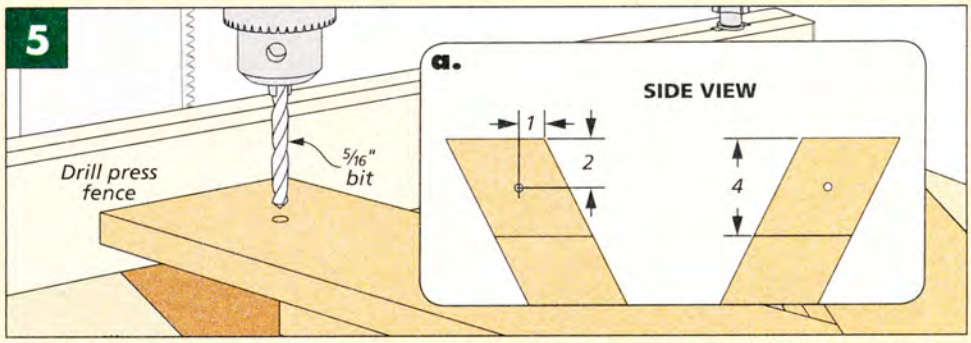
Add Leg Fillers. *After each leg is cut, you can mark and cut the leg fillers to fit around them. Repeat for each leg.*



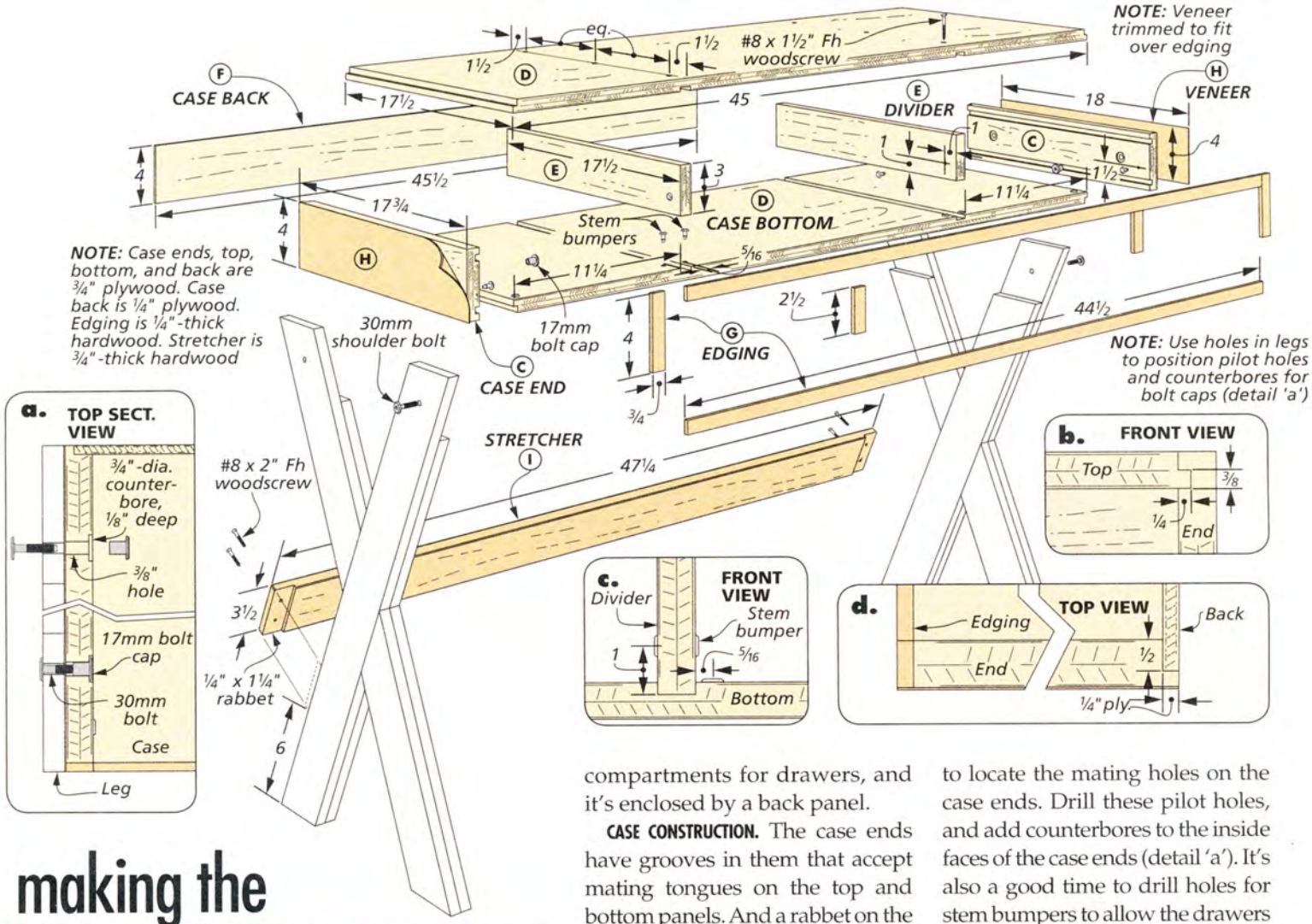
Clamping Up the Legs. *The most difficult part of gluing up the leg assemblies is keeping the faces aligned. To help with this, drive some small brads into the lower parts, clip off the heads, and use them to keep the upper parts aligned as you glue and clamp them on.*



Cutting the Rabbets. *To cut the rabbets in the top ends of the leg assembly, you'll need a long auxiliary rip fence to fully support the assembly throughout the cut. Position the fence to cut the shoulder first (detail 'a') then remove the waste.*



Drill Holes. *All that's left to complete the leg assemblies is to drill holes near the top ends for knock-down fasteners that connect the leg assemblies to the case later on. A fence on the drill press will ensure that the holes are positioned accurately.*



making the CASE & DRAWERS

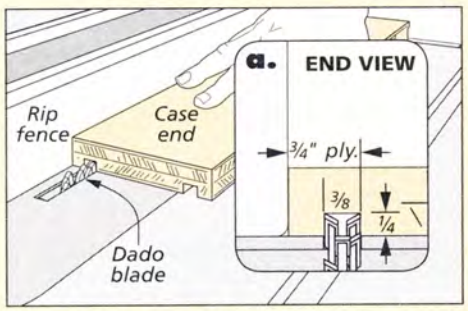
With the legs complete, you can now turn your attention to the case that rests between them. Compared to the legs, it's a much more straightforward assembly: a plywood top and bottom captured between a pair of ends. Two dividers in the case create compartments for drawers, and it's enclosed by a back panel.

CASE CONSTRUCTION. The case ends have grooves in them that accept mating tongues on the top and bottom panels. And a rabbet on the back of the ends receives the case back. So I started with the grooves and rabbets first, as shown in the left and middle drawings below. Next, I cut tongues in the ends of the top and bottom panels to mate with the ends. And then I cut full-width dadoes to accept the divider panels (right drawing below).

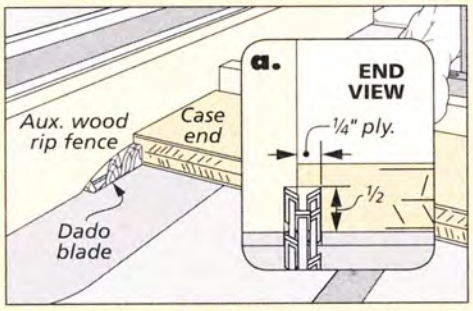
Before assembling the case, you can bring the legs in and use them to locate the mating holes on the case ends. Drill these pilot holes, and add counterbores to the inside faces of the case ends (detail 'a'). It's also a good time to drill holes for stem bumpers to allow the drawers to slide smoothly (detail 'c').

Now you're ready to assemble the case, leaving the back off for now. Next, the solid-wood edging pieces are cut to size then glued and clamped to the front. Finally, veneer gets glued and rolled over the case ends and trimmed and sanded flush. Note that you'll need to drill the veneer where it covers the pilot holes for the bolts.

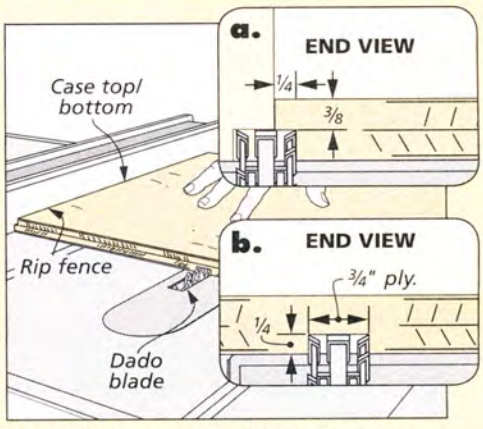
How-To: Case Assembly



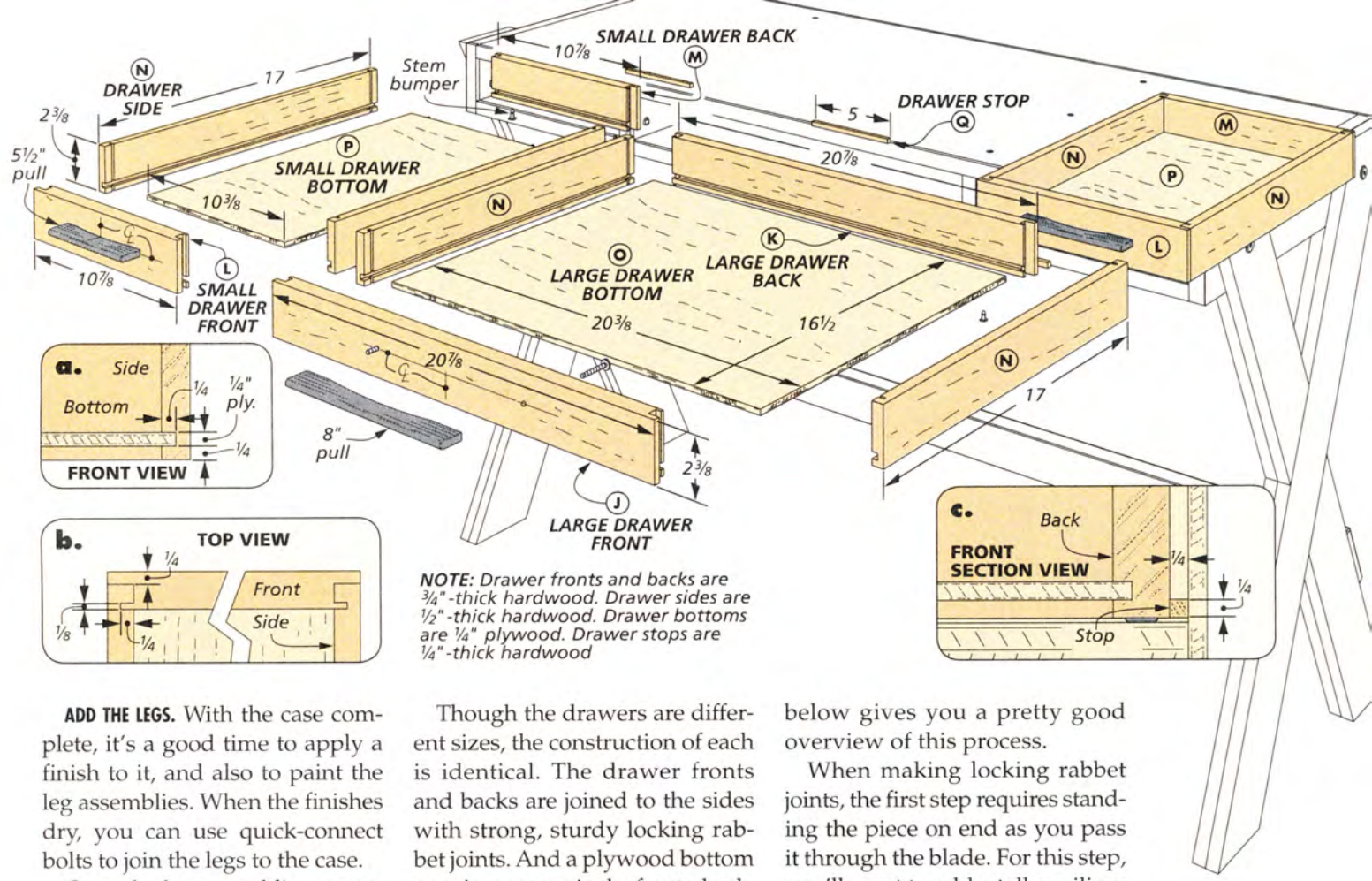
Cut Grooves. *With a dado blade installed in the table saw, pass the ends along the rip fence to cut the grooves.*



Add Rabbets. *To cut a rabbet for the back, bury the blade in an auxiliary rip fence, and use the miter gauge.*



Tops & Bottoms. *All that's left are mating tongues and the full-width dadoes in the top and bottom panels.*



NOTE: Drawer fronts and backs are ¾"-thick hardwood. Drawer sides are ½"-thick hardwood. Drawer bottoms are ¼" plywood. Drawer stops are ¼"-thick hardwood

ADD THE LEGS. With the case complete, it's a good time to apply a finish to it, and also to paint the leg assemblies. When the finishes dry, you can use quick-connect bolts to join the legs to the case.

Once the leg assemblies are on, measure the distance between the legs, and cut a stretcher from poplar to fit between them. Rabbet the ends to fit over the leg assemblies, and paint it black to match the legs. Then mount it with woodscrews.

FIT THE DRAWERS. The openings in the center of the case are filled with three drawers: a larger center drawer and two smaller outer drawers. Each drawer is sized to fit flush with the opening in the case with a small gap around it.

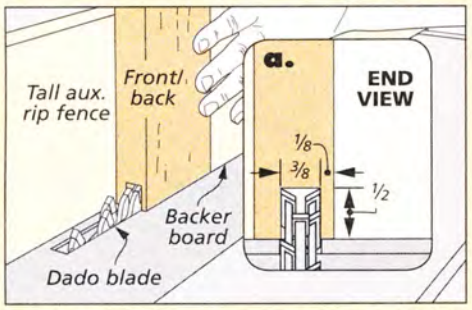
Though the drawers are different sizes, the construction of each is identical. The drawer fronts and backs are joined to the sides with strong, sturdy locking rabbet joints. And a plywood bottom rests in a groove in the fronts, back, and sides. Stops glued behind the drawers position them properly in the case. And stem bumpers pressed into the drawer backs allow them to slide smoothly in their openings (detail 'c').

I cut the drawer fronts out of curly maple to match the case edging, but I made the other parts out of standard maple lumber. Once all the parts were cut to size, I got started on the joinery. The series of drawings below gives you a pretty good overview of this process.

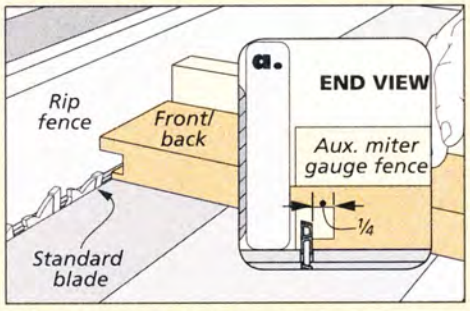
When making locking rabbet joints, the first step requires standing the piece on end as you pass it through the blade. For this step, you'll want to add a tall auxiliary fence to your rip fence and use a backer board to support the workpiece (left drawing below).

The rest of the joinery is fairly straightforward. You trim the tongue as shown in the middle drawing, and cut a mating dado in the sides. Now add a groove to all the parts to accept the bottom. Assemble the drawers, and then you can add the stops, stem bumpers, and drawer pulls as shown in the drawings above.

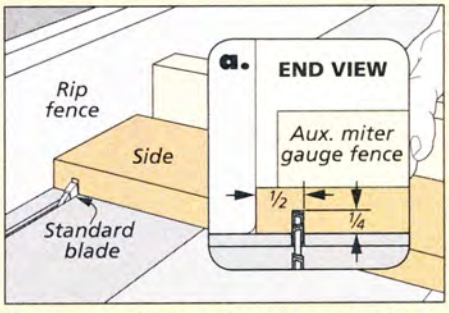
Locking Rabbet Joinery



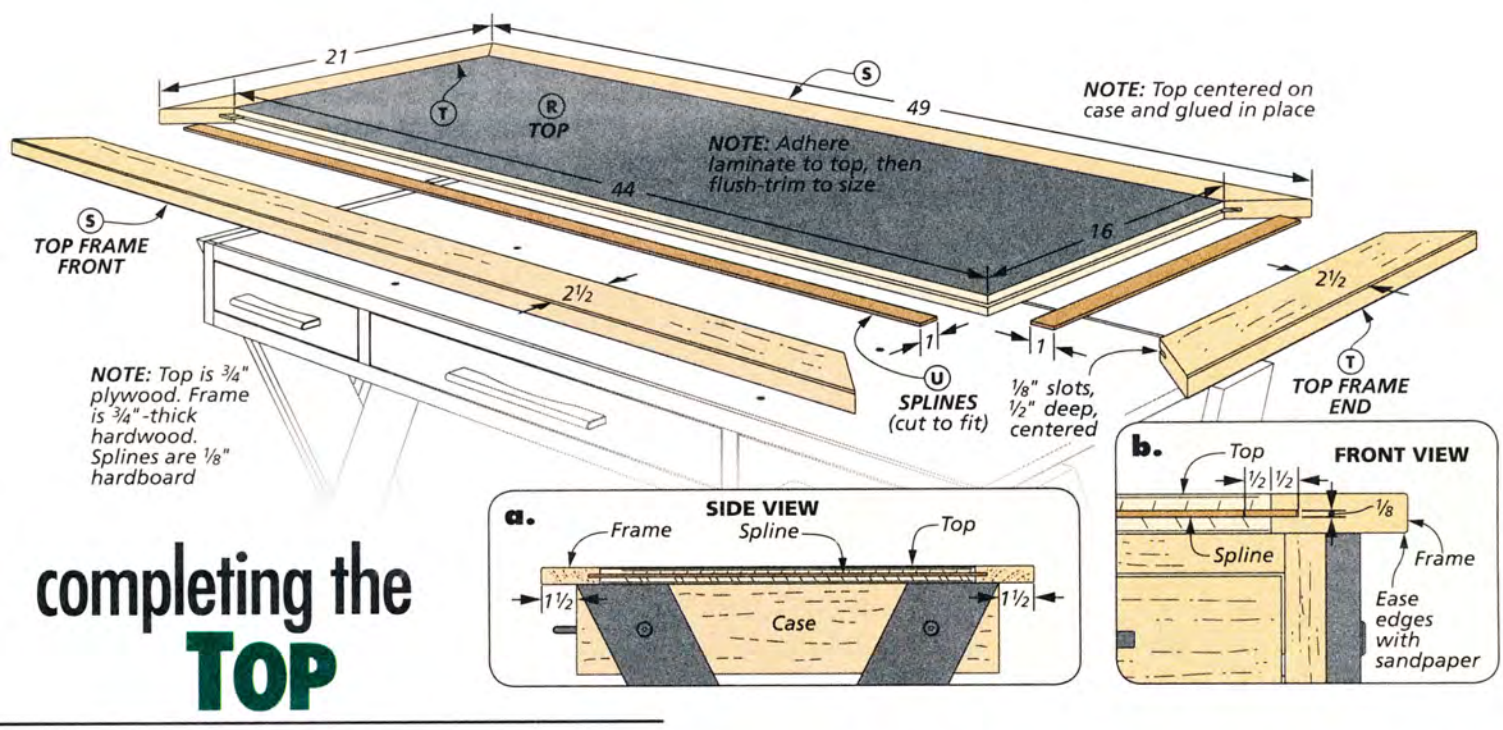
Cut Groove. *Equip the saw with a tall rip fence. Pass the fronts and backs through the blade using a backer for support.*



Trim Tongue. *Using a miter gauge and a standard blade, trim away a portion of the inner tongue on each joint.*



Dado the Sides. *Now use the blade to cut a mating dado in the sides. Then check the fit with the front and back.*



completing the TOP

The top of the desk is a plywood panel that's covered with plastic laminate and surrounded by a solid-wood frame. It simply gets glued and clamped to the top of the case with an equal overhang on the ends and edges.

LAMINATE. After cutting the top to size, you can add the laminate using contact adhesive and a roller. I like to leave the laminate a little oversized, and then flush-trim it to fit the top.

ADDING THE FRAME. The frame that surrounds the top is made from curly maple. To reinforce the joints, I added hardboard splines.

To add the frame, start by planing boards down to match the thickness of the top plus the laminate. Then rip them to width. Next, set up a ⅛" slot cutter on the router table, and rout matching slots around the top and in one edge of all the frame pieces.

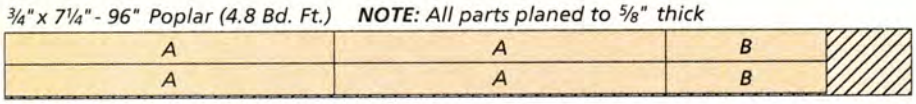
Cut the splines to size, and then miter the frame pieces to fit around the top. Check the fit, and bring in the glue and clamps to complete the assembly. Now glue the top to the case, and your unique sawbuck desk is ready to be put to use in your home.

Materials, Supplies & Cutting Diagram

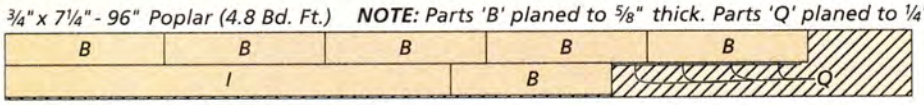
A Legs (4)	⅝ x 3½ - 35 rgh.	**L** Sm. Drawer Fronts (2)	¾ x 2⅜ - 10⅞
B Leg Fillers (8)	⅝ x 3½ - 17 rgh.	**M** Sm. Drawer Backs (2)	¾ x 2⅜ - 10⅞
C Case Ends (2)	¾ ply. - 4 x 17¾	**N** Drawer Sides (6)	½ x 2⅜ - 17
D Case Top/Btm. (2)	¾ ply. - 17½ x 45	**O** Lg. Drwr. Btm. (1)	¼ ply. - 16½ x 20⅜
E Case Dividers (2)	¾ ply. - 3 x 17½	**P** Sm. Drwr. Btms. (2)	¼ ply. - 16½ x 10⅜
F Case Back (1)	¼ ply. - 4 x 45½	**Q** Drawer Stops (4)	¼ x ¼ - 5
G Edging	¼ x ¾ - 110 rgh.	**R** Top Panel (1)	¾ ply. - 16 x 44
H Veneer (2)	5 rgh. x 19 rgh.	**S** Top Frame Front/Back (2)	¾ x 2½ - 49
I Stretcher (1)	¾ x 3½ - 47¼	**T** Top Frame Ends (2)	¾ x 2½ - 21
J Lg. Drawer Front (1)	¾ x 2⅜ - 20⅞	**U** Splines	⅛ hdbd. - 1 x 150 rgh.
K Lg. Drawer Back (1)	¾ x 2⅜ - 20⅞		

- (12) #8 x 1½" Fh Woodscrews
- (18) Stem Bumpers
- (4) 30mm Shoulder Bolts
- (4) 17mm Bolt Caps
- (4) #8 x 2" Fh Woodscrews
- (1) 8" Drawer Pull w/screws
- (2) 5½" Drawer Pulls w/screws
- (1) 30" x 60" Sheet of Plastic Laminate

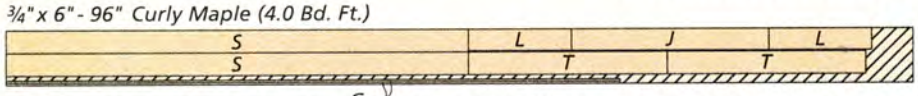
¾"x 7¼"- 96" Poplar (4.8 Bd. Ft.) **NOTE:** *All parts planed to ⅝" thick*



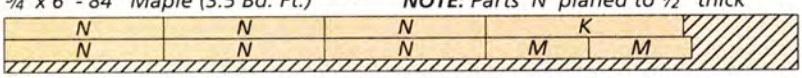
¾"x 7¼"- 96" Poplar (4.8 Bd. Ft.) **NOTE:** *Parts 'B' planed to ⅝" thick. Parts 'Q' planed to ¼" thick*



¾"x 6"- 96" Curly Maple (4.0 Bd. Ft.)



¾"x 6"- 84" Maple (3.5 Bd. Ft.) G **NOTE:** *Parts 'N' planed to ½" thick*



ALSO NEEDED: *One 48"x 96" Sheet of ¾" Maple Plywood*

One 24"x 48" Sheet of ¼" Maple Plywood

One 12"x 48" Sheet of ⅛" Tempered Hardboard

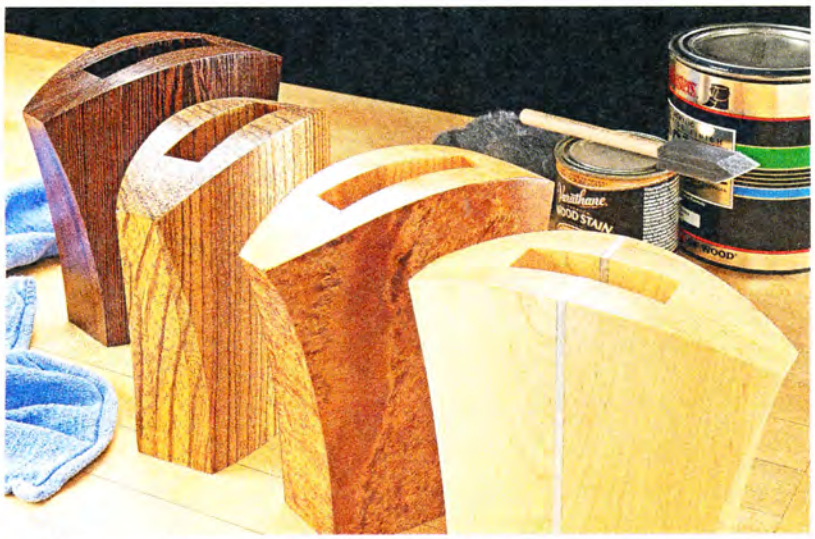
One 24"x 24" Sheet of Curly Maple Veneer

sculpted wood Vase

Have a prized piece of wood you're looking to use? You can make this vase with just a few cuts at the band saw.

Most woodworkers I know have a treasured "stash" of wood. These are the pieces they've squirreled away over the years. They're not quite sure what they're going to do with them, but the wood was just too good-looking to pass up.

With this vase design, I finally found a way to use a few of these special pieces of wood. The project is woodworking at its essence — just a block of wood that's shaped at the band saw to achieve its sculpted appearance. It really lets the look of the wood itself do the talking. Of course, I should probably also note that these vases aren't meant to hold water. They're for dried or artificial flowers only.



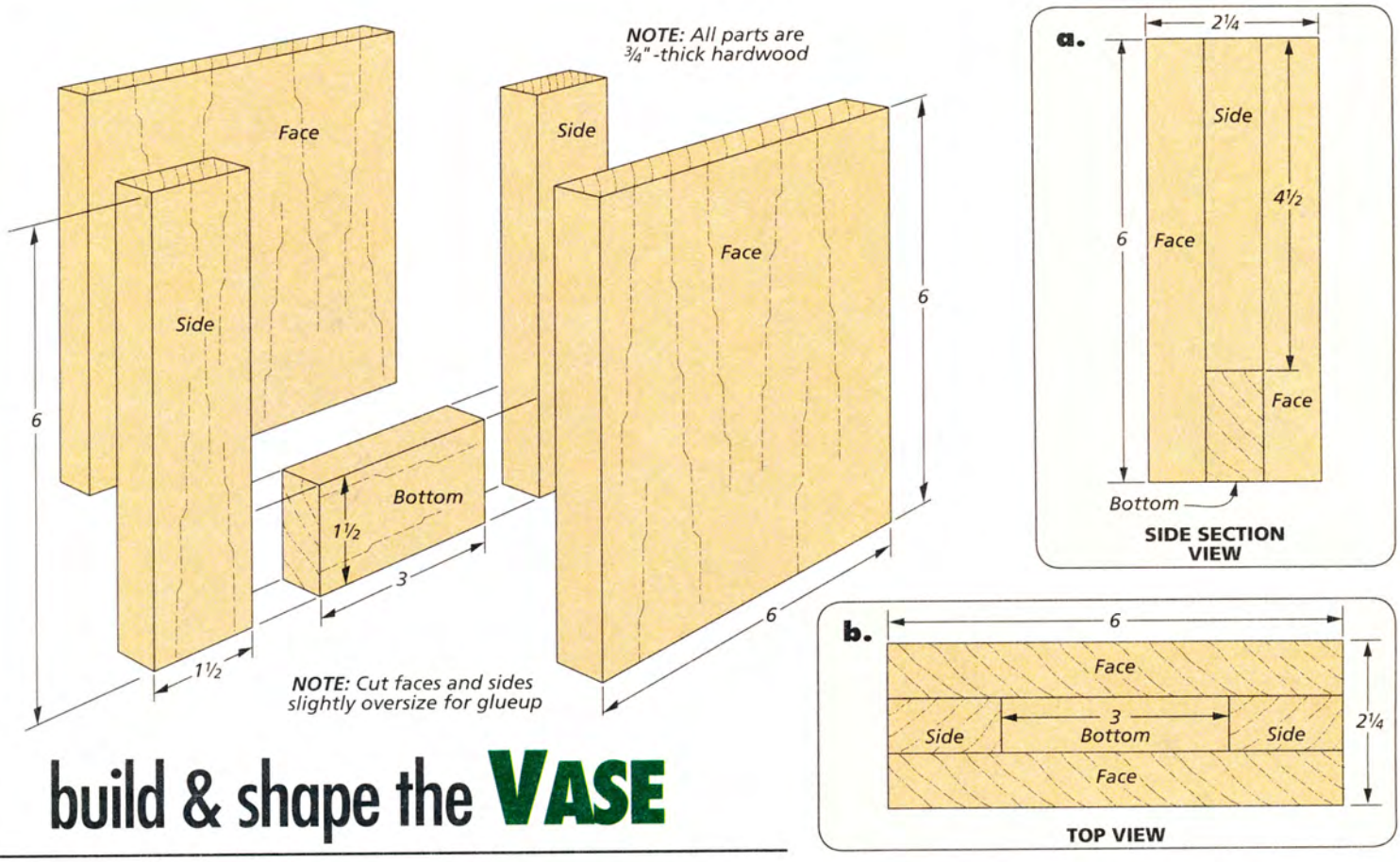
This vase design offers many possibilities. Making it from exotic wood, covering wood with highly figured veneer, or using a combination of metal and wood are just a few of the options.

VASE DETAILS. In reality, each of these "blocks" of wood you see here is actually built up from five separate pieces. Gluing them together creates the rectangular opening at the top of the vase. Then, a series of simple band saw cuts is all that's required to shape the vase into what you see above.

ENDLESS POSSIBILITIES. What I really enjoy about the project is all the different directions you can take it in. You can see just a few of the possibilities in the photo at left. Using an attractive, exotic wood is one option. The vase shown above and on the far left of the photo is made from wenge, and the one next to it is zebrawood.

Another option is to use a less exotic wood for the vase, and then face it with an attractive veneer. The one shown second to the right, for example, features a maple cluster veneer over maple.

Wood and aluminum also make for a unique combination. The far right vase simply has two strips of aluminum sandwiched between the face pieces.



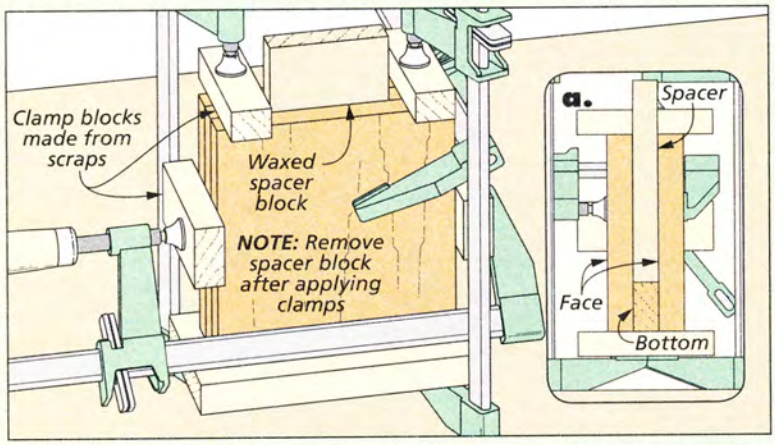
build & shape the VASE

Each vase starts as a blank glued up from fives pieces: two faces, two sides, and a bottom. Making the blank this way automatically creates the opening in the vase.

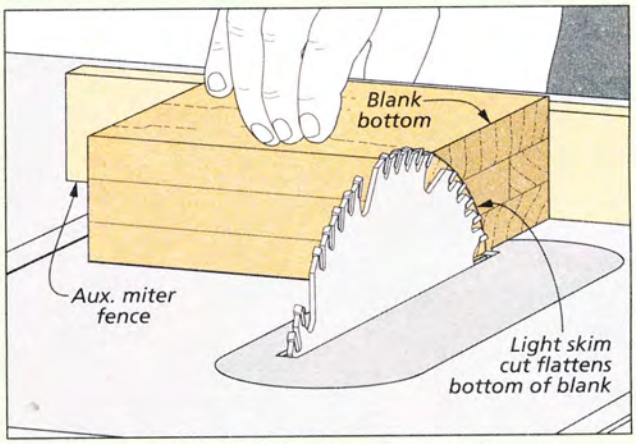
As far as how to make the blank, you have a number of options. One interesting possibility for this project is to start with a thick board or a bowl turning blank, and then resaw it to make the pieces. This gives the appearance of the vase being one solid block. Of course, you can also get a nice look by matching the grain carefully among the pieces you choose.

GLUEUP TIPS. There are a few tips to get a successful glueup, however. First, I'd recommend starting with the face and side pieces sized slightly larger than what's shown above. This will help you compensate for any slipping as you glue and clamp them together. Then, when you're ready for the glueup, you can employ a series of clamping blocks to keep everything square and in alignment (lower left drawing). Probably the most

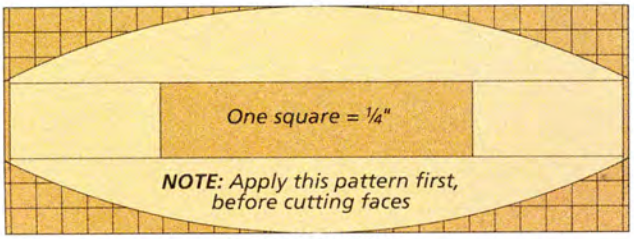
How-To: Five-Piece Glueup



Glue the Blank Together. *Clamp blocks ensure alignment when gluing the five pieces together, while a waxed spacer block preserves the size of the rectangular opening in the top.*



Trim the Bottom Flat. *Before shaping the vase at the band saw, it's critical that the bottom be flat. A quick table saw cut will take care of this.*



VASE TOP VIEW PATTERN

important of these blocks is the spacer that keeps the opening in the top of the vase square. Make sure to wax this block and remove it after it's all clamped up, so that the block doesn't get glued in place.

The one facet of the block that won't get shaped at the band saw is the bottom. You can get it completely flat with a table saw cut, as shown in the lower right drawing on the opposite page.

BAND SAW CUTS. Now you're ready to cut the faces, top, and sides of the blank on the band saw to create the shape. The patterns that are provided above and on our website can simplify this process.

You'll start by cutting the faces of the vase. First, print out and glue or trace the full-size top view pattern on the top of the vase. Then cut along the lines of the pattern, as shown in Figure 1.

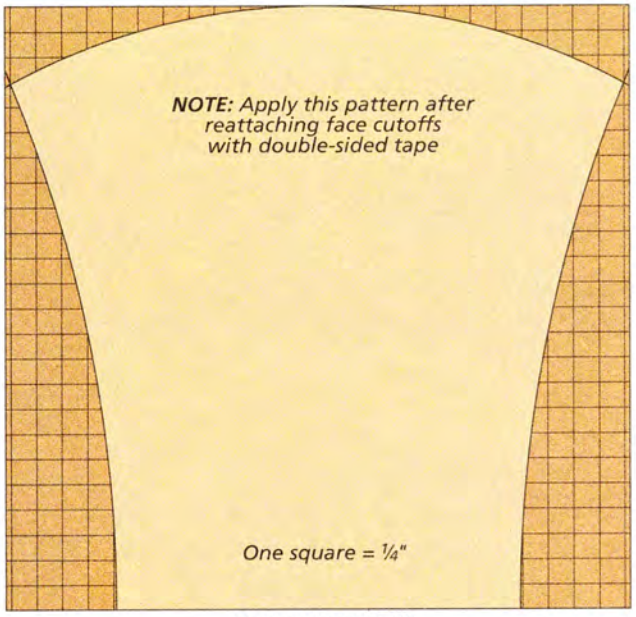
The next steps are cutting the top and sides of the vase. This may seem difficult now that the faces are curved, but the trick is to reattach the four waste pieces using double-sided tape. This allows the blank to rest flat on the band saw table as you make the next sequence of cuts.

Now you can glue or trace the side view pattern on the face of the blank. Then cut along the top and sides, as shown in Figures 2 and 3.

FINISHING THE VASE. A little sanding is all that's left to complete the vase. To get smooth surfaces, I made sanding blocks curved to match the sides and the top (see Figure 4). Once the vase is glass-smooth, apply a finish. You'll probably have enough shop time left during the weekend to make more vases for your friends and family members, too. W

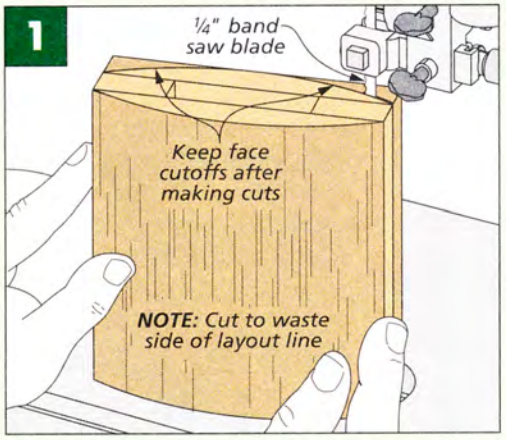
Woodsmith GO ON-LINE EXTRAS

For full-size patterns of the vase top and side views, visit our website at Woodsmith.com

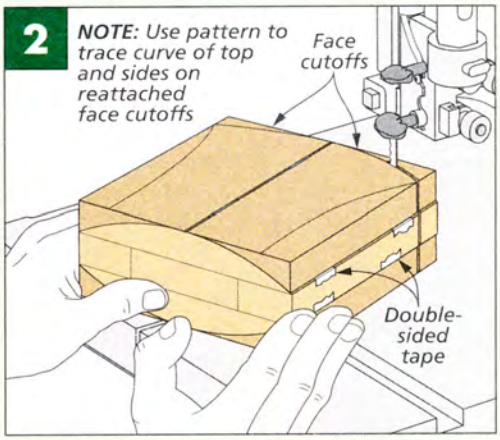


VASE SIDE VIEW PATTERN

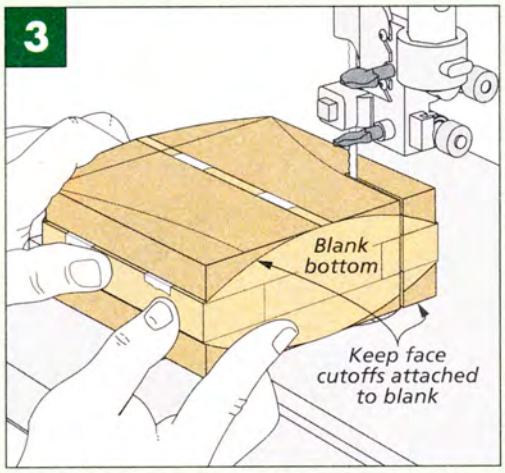
How-To: Shaping



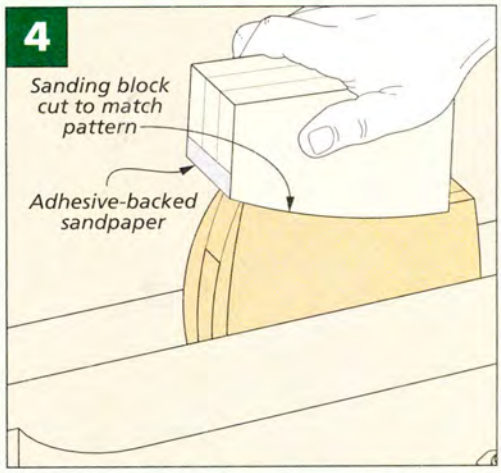
Cut the Faces. *After tracing the shape from the top view pattern, trim the faces at the band saw. Cut slightly outside the lines.*



Trim the Top. *Before making the next band saw cuts, reattach the cutoff pieces. Now trace around the pattern and cut the top.*



Finish on the Sides. *The final band saw cuts are on the sides. Here again, cut slightly outside the pattern's layout lines.*



Sand It Smooth. *You can use the pattern again to make sanding blocks to match the sides and top of the vase.*

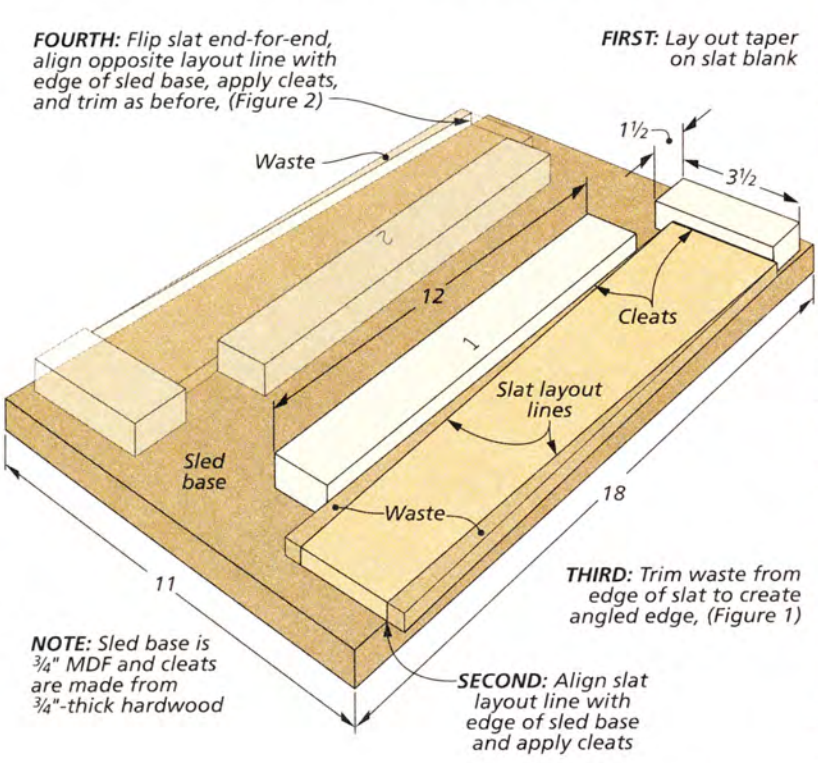
SHOP NOTEBOOK

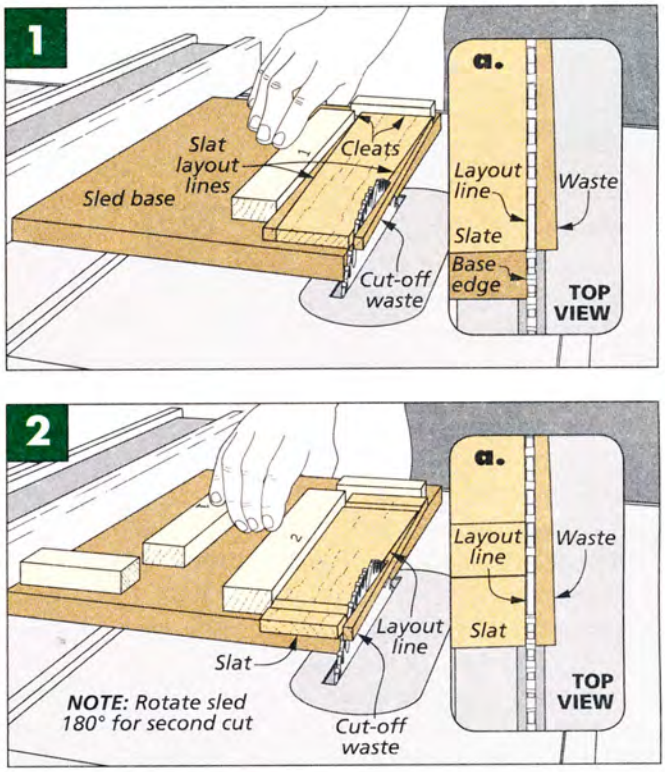
Slat Taper Sled

The slats for the wastebasket on page 18 are tapered on each edge. I built this simple taper sled for the table saw to ensure precise, identical results. The taper sled is two-sided, so you can taper both edges of the slats without having to reposition the cleats or move the rip fence. Simply turn the sled 180° and flip the slat to the other side to make the second taper cut.

BUILDING THE TAPER SLED. There's not a whole lot to making this taper sled. The base is made from a piece of MDF, and the cleats can be made from any leftover scraps that you have available.

You'll start by laying out the taper on one slat and use that as your guide for placing the cleats on the sled as shown in the illustration below. Line up one of the layout lines with the edge of the MDF base and secure the cleats. You can then make the first taper cut at the table saw as shown in Figure 1. Now it's just a matter of flipping the slat end-for-end and lining up the second layout line on the other side of the sled. Secure the cleats and make the second taper cut as shown in Figure 2. It's a good idea to number each side of the sled for reference.

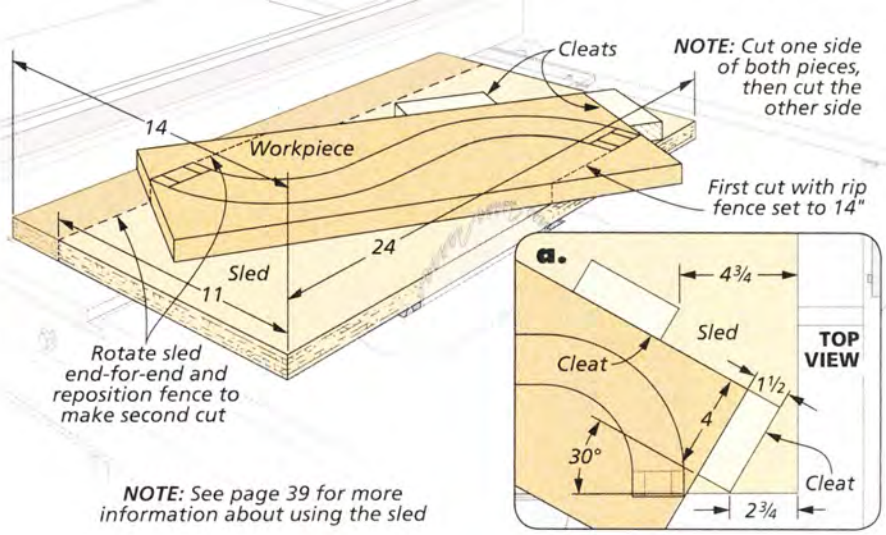




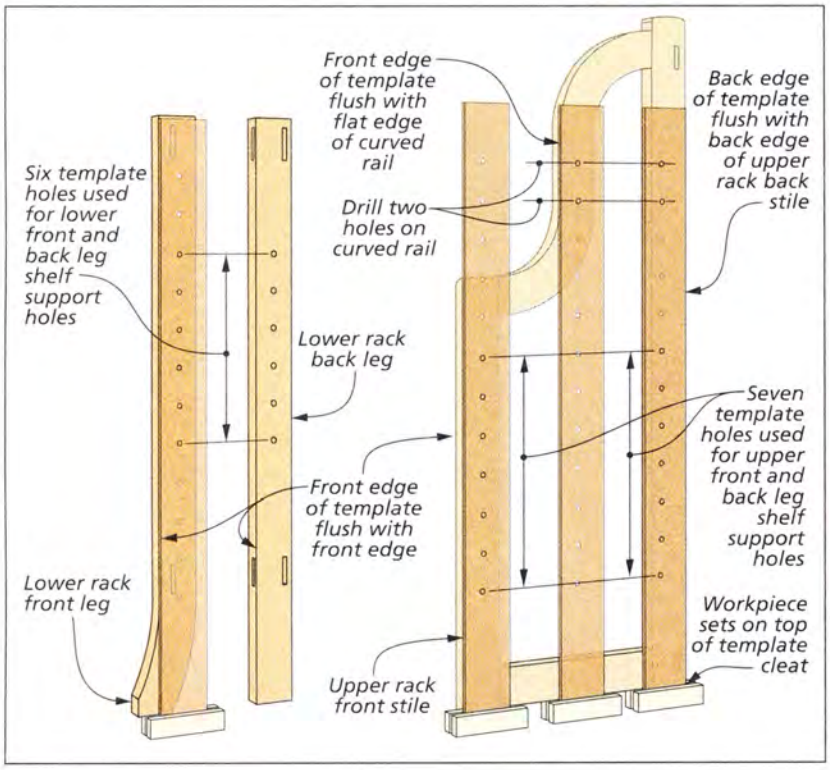
Tenoning Sled

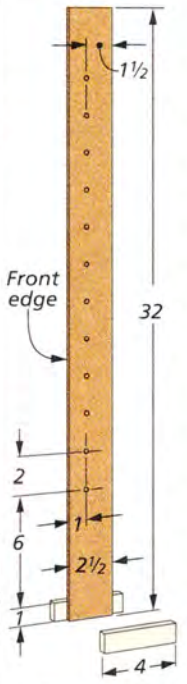
The curved, S-shaped rails on the baker's rack on page 34 presented a challenge. I needed a way to cut tenons at an angle, so I could preserve the corner-to-corner grain orientation of the rails. That meant I had to start by establishing a straight edge at the proper angle.

Taking inspiration from a taper sled, I made the sled shown at right. It holds the rail blank at the correct angle for cutting the edges at the table saw. The cleats are the key. They define the angle for the edge of the workpiece. By cutting the first edge and then flipping the entire sled end-for-end, I was able to cut both edges.



NOTE: See page 39 for more information about using the sled





SHELF SUPPORT HOLE TEMPLATE

Shelf Support Holes

Drilling the matching shelf support holes in the baker's rack was kind of tricky. The curved rails on the upper unit made it tough to measure the positions accurately.

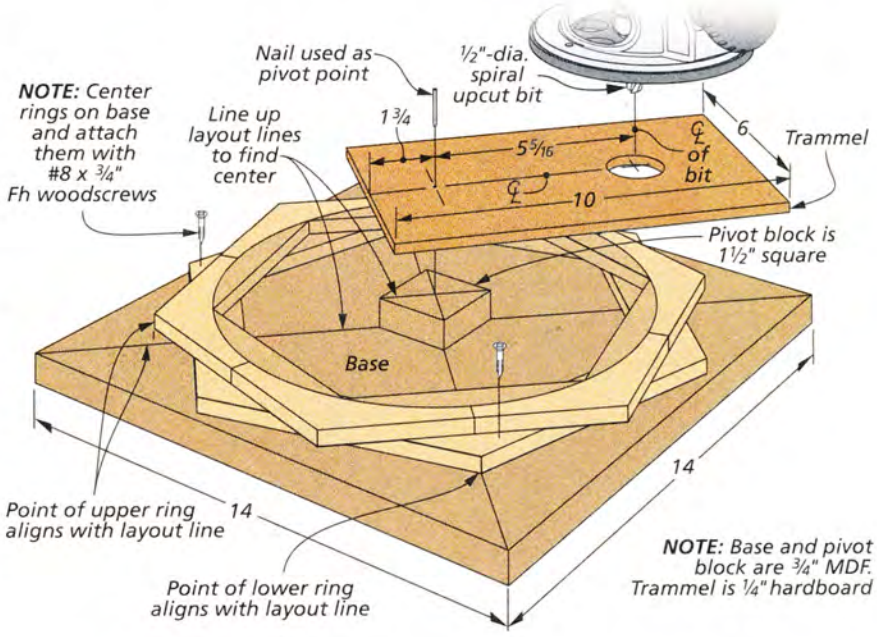
The answer was a simple drilling template. The key was being able to register the template against a reference edge, in this case, the bottom.

I made the body of the jig out of ¼" hardboard and attached cleats at one end to register against the ends of the legs and stiles. You can see the dimensions for the distances between holes in the drawing at left. I drilled the holes in the template using a fence on the drill press to keep the position consistent. With the template, the process of drilling shelf support holes was a snap.

Router Trammel

Cutting the inside edge on the upper ring assembly for the wastepaper basket on page 18 is an ideal job for a router and a trammel. Since it only needs to be used once, I've kept the construction very simple.

DETAILS. The base and pivot block are simple squares cut from MDF. Draw a line from corner to corner on each piece to help line them up and to find the center for the pivot pin. The trammel is nothing more than a piece of ¼" hardboard mounted to the base of the router. It fits over a steel pivot pin to guide the router in a perfect circle. (I used a nail as my pivot pin.) Secure the upper ring assembly to the base of the jig with woodscrews through the waste portion of the bottom ring. Start by making a shallow pass and gradually increase the depth.



traditional Baker's Rack

You might not need to cool a dozen fresh-baked pies, but this baker's rack can be put to good use in any kitchen.

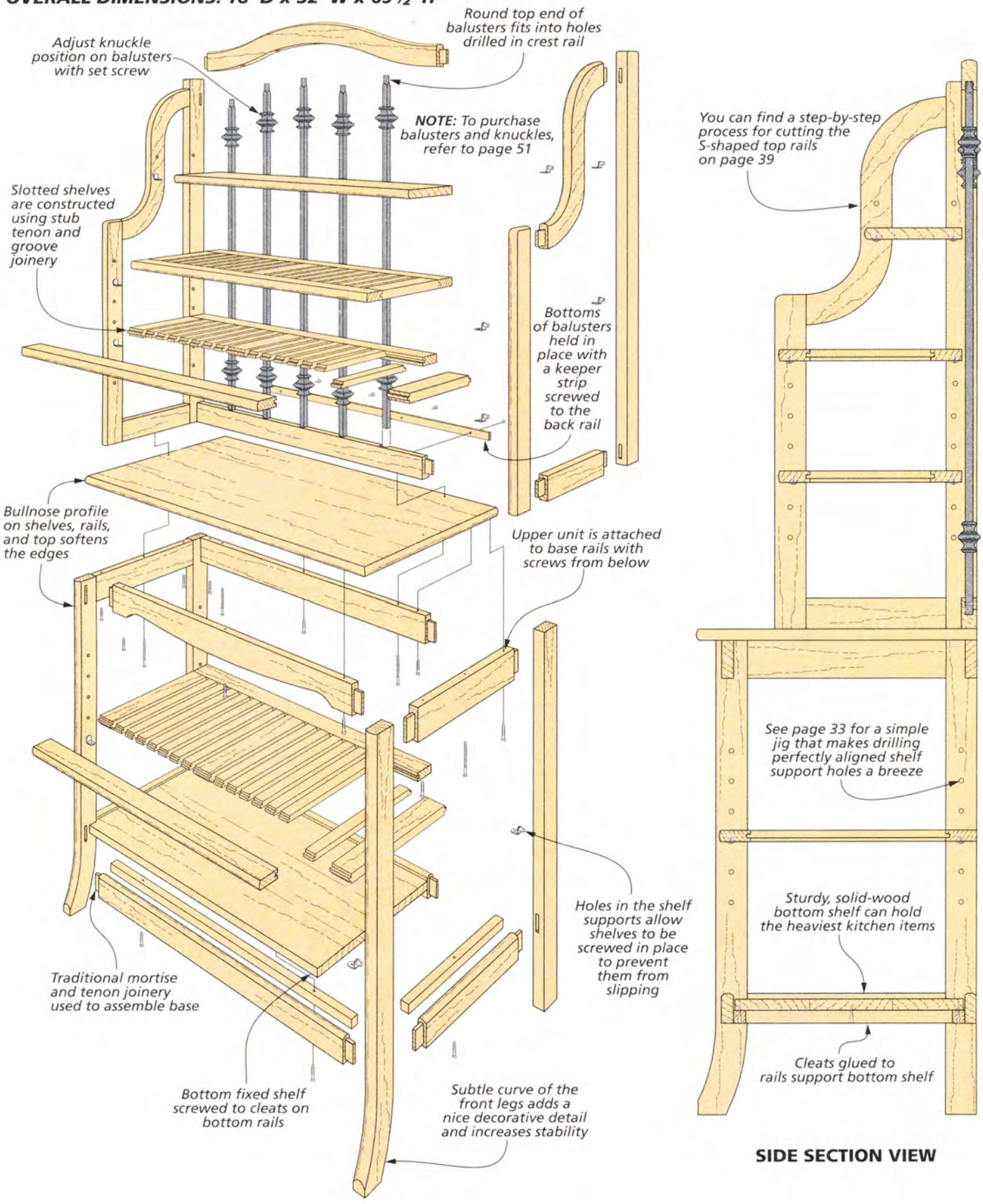
The modern kitchen is often seen as a streamlined, color-matched, high-tech playground. But there was a time, not that long ago, when Grandma baked pies for the boys working in the fields. And then she had to turn her attention to a big supper.

That's the image this baker's rack brings to mind for me. And whether you use it to cool off your pies and fresh-baked bread, or just to store your food processor, toaster, or some other kitchen appliance, it's a handy piece of kitchen furniture.

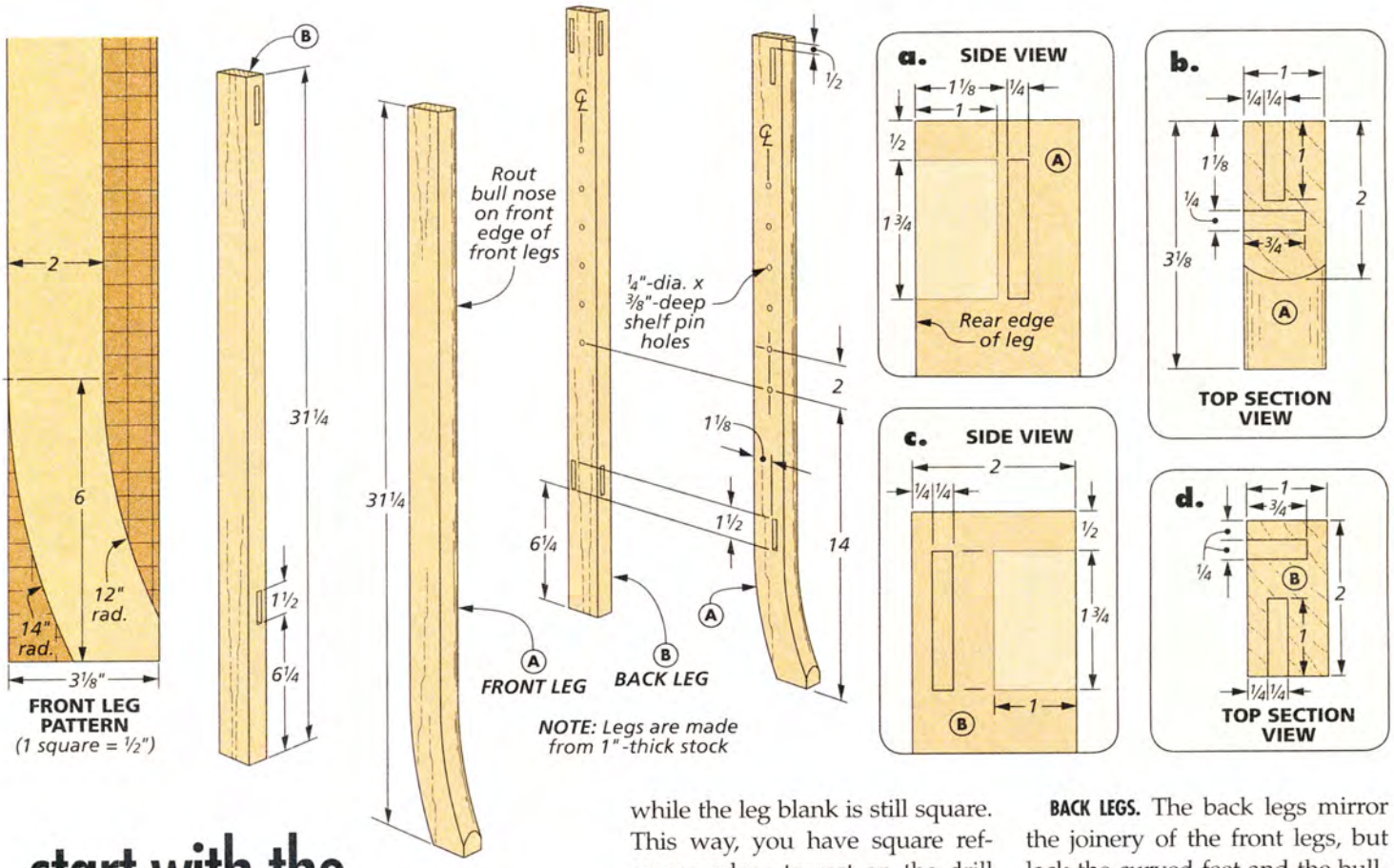
It's also a great project for picking up a few new woodworking skills, like incorporating interesting metal balusters into your furniture. On top of that, there are a lot of curved parts that call for special consideration when it comes to creating the joinery. But I've broken everything into easy-to-learn segments for building each part of the rack. With this approach, you're sure to find making this modern antique a worthwhile project to spend your shop time on, as well.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS: 18"D x 32"W x 69½"H



SIDE SECTION VIEW



start with the BASE FRAME

The baker's rack consists of two units: An open-shelf base and the three-tiered upper rack that features the ironwork. The base is the place to get started.

FRONT LEGS. The front legs of the base have gently curved feet. But before you get busy with the curves, it pays to cut the mortises while the leg blank is still square. This way, you have square reference edges to rest on the drill press table while you drill out most of the waste, as shown in the left drawing below.

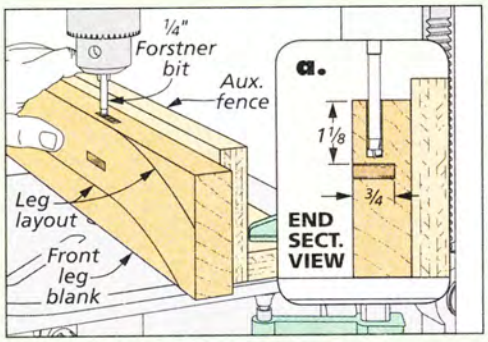
At this point, you're ready to take the front leg blanks to the band saw and cut the curved feet. Start by laying out the shape on the face of each blank. Then, keep the blade on the waste side of the cut.

After sanding the edges smooth, I routed a bullnose profile on the front edges of the legs. For this, I used a roundover bit and made two passes (right drawing below).

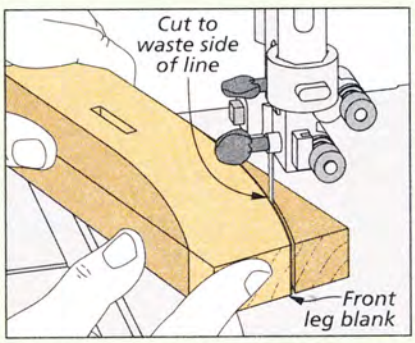
BACK LEGS. The back legs mirror the joinery of the front legs, but lack the curved feet and the bullnose profile on the front edge. You can start by cutting the pieces to final size and drilling the mortises. Then drill the shelf pin holes in the legs. You can find the plan for a drilling jig that will keep the holes in the legs aligned in Shop Notebook on page 33.

TOP RAILS. I worked on the top rails all at one time because of the offset tenons on each piece. This way, you can be assured of getting the tenons positioned correctly by using the same saw setups.

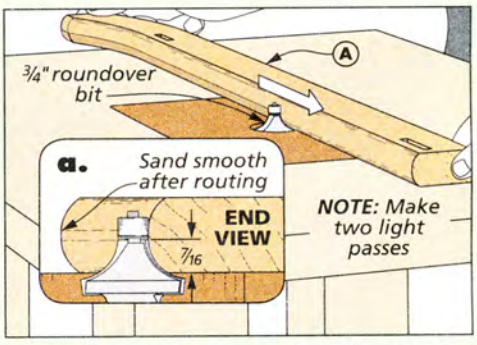
How-To: Leg Mortises & Profile



Mortises. *Set the drill press fence to account for the offset of the mortise, then drill out most of the waste.*



Curves. *Lay out the curved front leg using the pattern above. Then cut it to shape at the band saw.*



Bullnose. *A roundover bit is all you need to rout a bullnose profile on the legs. A little sanding, and they're ready to go.*

I started by cutting the front, back, and side rails to final size. Then you can cut all the tenon cheeks on the top rails, as in the upper left drawing in the box below. Just install a dado blade in the table saw and an auxiliary fence on the miter gauge. Raise the dado blade to just under ¼" and make a test cheek cut on a scrap piece. You'll want to check the fit and sneak up on a snug fit.

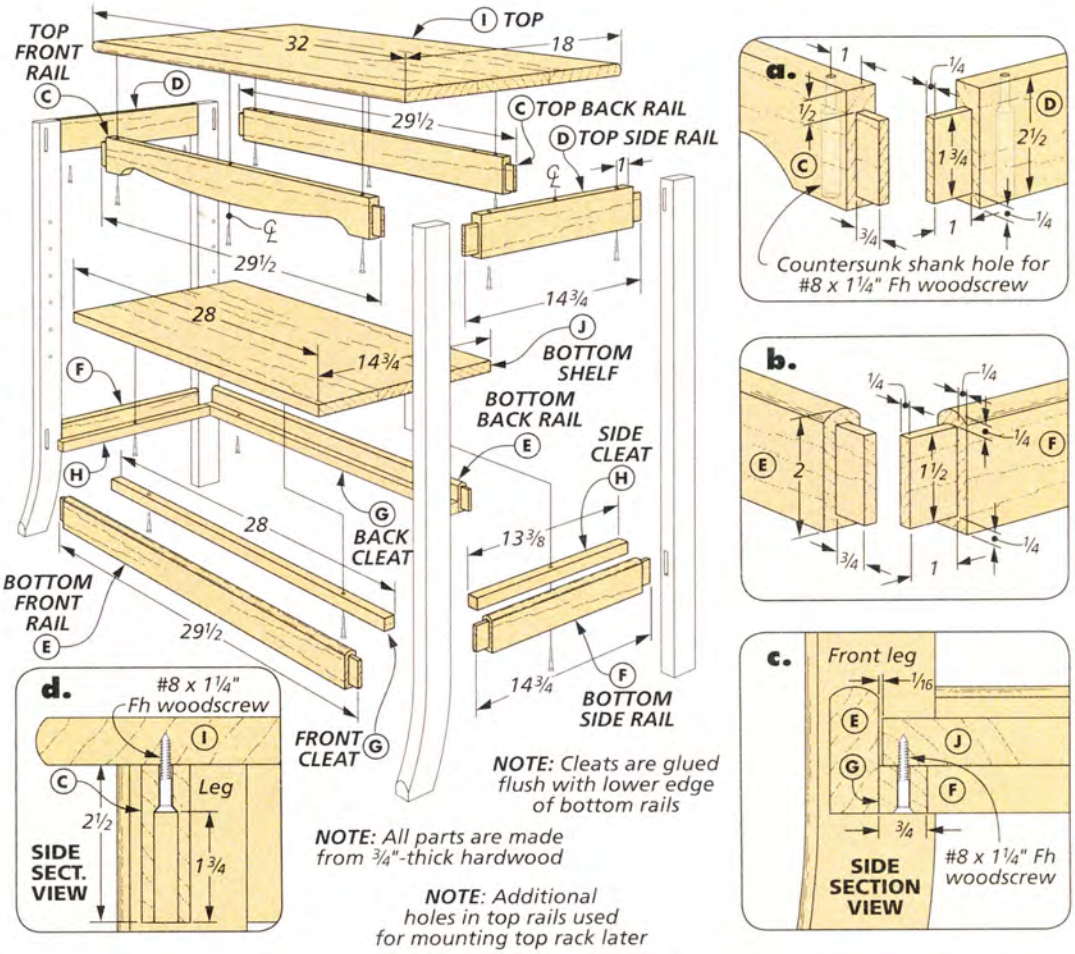
To cut the lower shoulder, flip the workpieces on edge. I used the test piece again and raised the dado blade to cut the upper shoulder (upper right drawing below). Check each piece for a good fit, then take them to the drill press and drill the deep countersunk screw holes you'll use to mount the top and the upper rack (bottom drawing).

All that remains now is to lay out the curve on the front rail and cut it to shape at the band saw. The pattern in the right margin has all the information you need. With a little sanding to clean up the cut, it's ready to go.

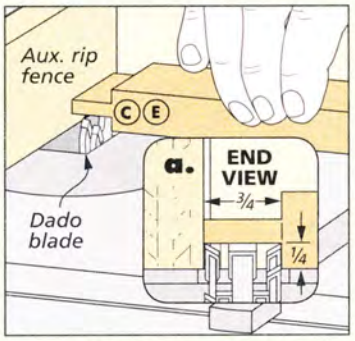
BOTTOM RAILS. The bottom rails are pretty straightforward. These tenons have equally spaced upper and lower shoulders. The goal is for the rails to be flush with the inside of the legs. The top edges of the rails are bullnosed as before, but this time using a ½" roundover bit instead. After routing the bullnose profile, you can assemble the base.

When the glue dries, you can cut the cleats that will be glued to the inside face of each bottom rail. The cleats support the bottom shelf. Just drill the screw holes as shown in the main drawing above and glue them to the rails.

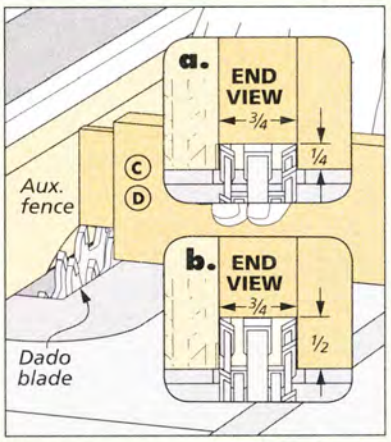
TOP & SHELF. The top and the bottom shelf are both hardwood, glued up to attain the finished width. Choose the pieces for the top carefully to find a good color and grain match, then add glue and clamps. The top is bullnosed on the front edge and the sides. You can attach both pieces with screws from below.



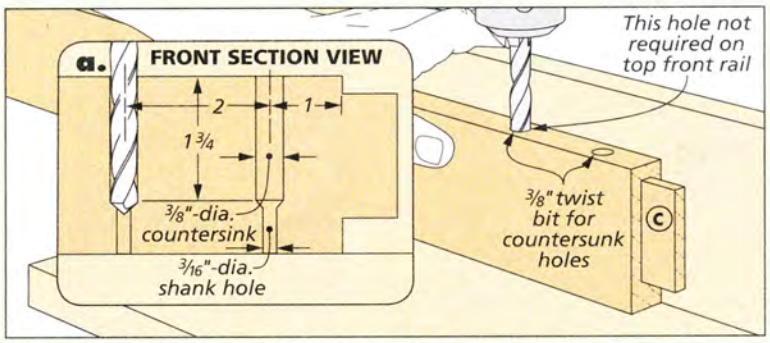
How-To: Rails



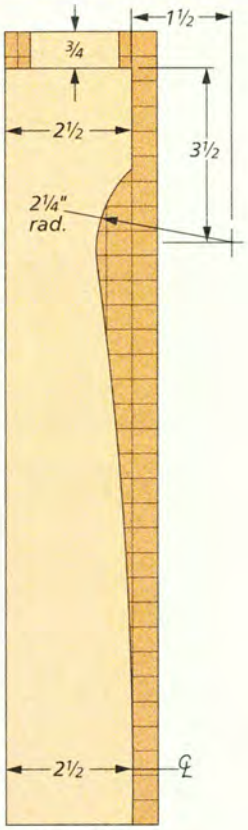
Tenon Cheeks. *The cheeks for the tenons on all the top and bottom rails are cut the same.*



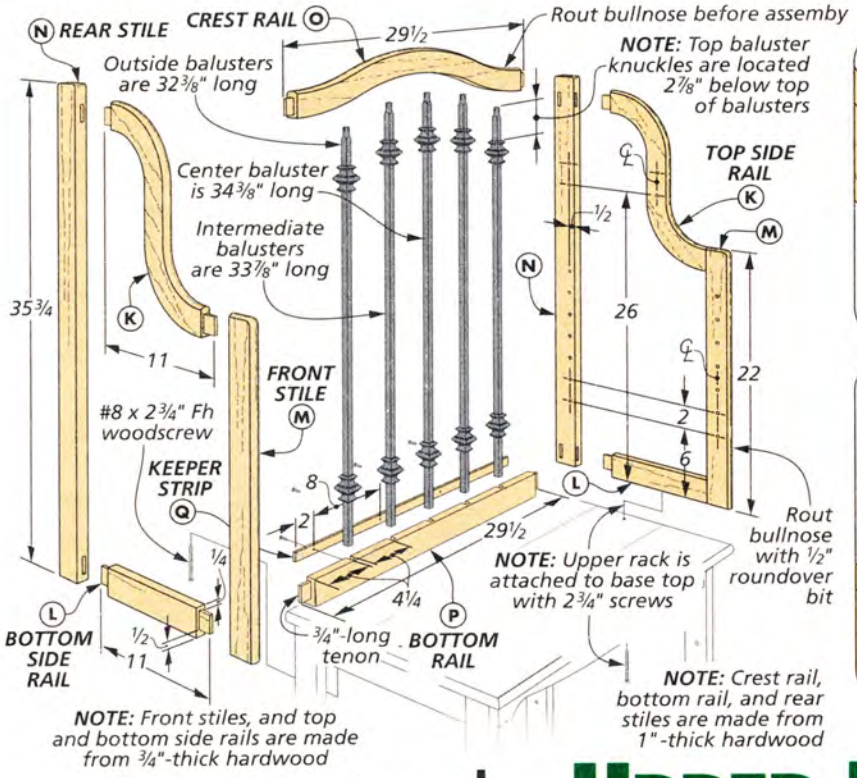
Shoulders. *The shoulders for the the top rail tenons are offset to be flush with the top of the legs.*

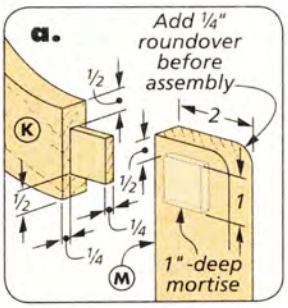


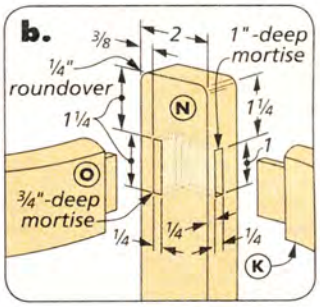
Drilling the Countersinks. *The deep countersinks for the screws you'll use to attach the top and upper assembly are drilled in two stages. First the countersink, then the shank hole.*

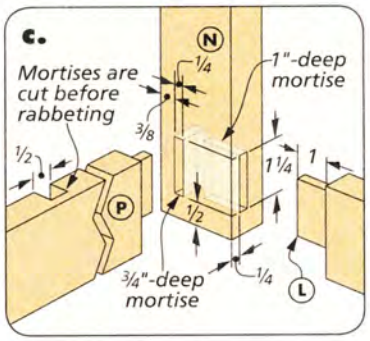


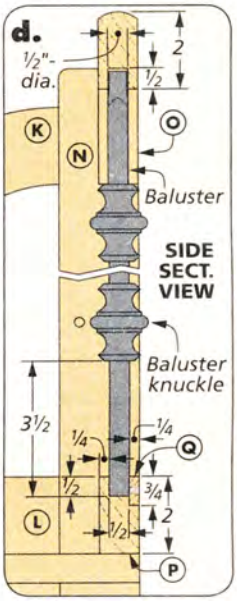
BASE TOP FRONT RAIL PATTERN
(1 square = ½")











constructing the UPPER RACK

Now you can turn your attention to the upper rack. The sides of the upper rack incorporate an S-shaped top rail and a curved crest rail on the back. The back features metal balusters with decorative knuckles. The balusters fit into holes in the crest rail and mortises in the bottom rail.

CURVED TOP SIDE RAIL. Normally, I would make the stiles for an assembly like this first because they contain the mortises. It's usually preferable to cut mortises before tenons, so you can adjust a tenon to fit the mortise. However, in this case I decided to start with the curved rails because I can then use them to accurately lay out the position of the mortises on the stiles. And to ensure that the rails were identical and connected to both stiles properly, I made a hardboard template.

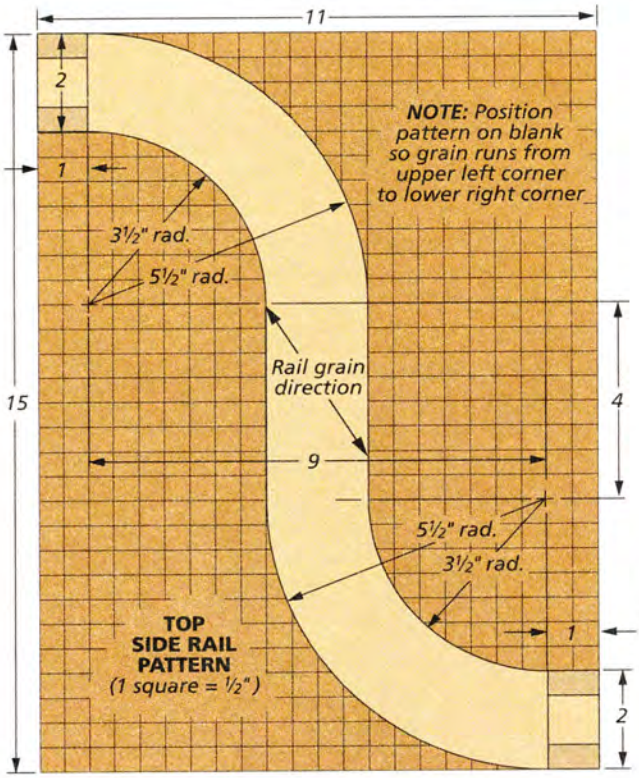
The pattern at left has all the details for making the template. With it, you can trace the shape on the blanks and then use it to flush trim the workpieces later.

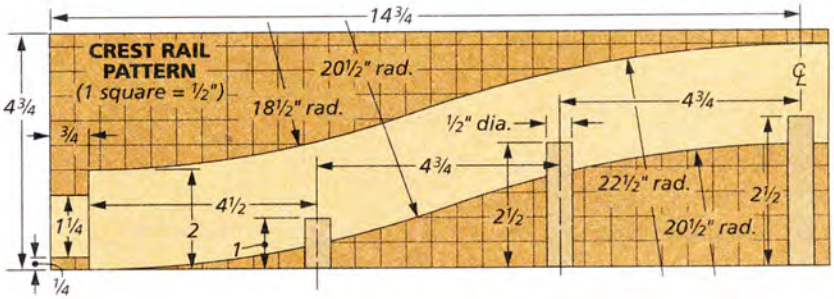
Using the template, trace the curved shape on the oversize blanks. As you lay out the shape on the blank, be mindful of the grain direction. You want the grain to flow from corner to corner.

I made a sled for the table saw so I could cut the angles on the blanks before shaping the pieces. You can see the whole process for making the curved rails in the How-To box on the opposite page. To find the details for making the sled, refer to page 33.

After cutting the tenon cheeks and cutting out the shape of the rails, cut the shoulders at the band saw. Then use double-sided tape to attach the template to the blank and head to the router table. With a flush-trim bit installed, clean up the rough edges of the workpieces.

BOTTOM SIDE RAIL. The bottom side rails are much easier to make. All you need to do is cut them to size





and cut the tenons. The only thing to keep in mind is that while the tenon is centered on the ¾"-thick rail, the mortise is offset on the 1"-thick stile (detail 'c,' opposite page). You'll cut the tenon so the inside edges are flush.

FRONT & REAR STILES. Now you're ready to cut the front and rear stiles and start laying out the mortise locations using the actual rails to guide you. (Mark the left and right pieces, so you offset the mortises on the correct faces.)

I assembled the rails and front stile first before marking all the mortise locations on the rear stile. Having the front joints in place makes laying out the rear mortises nearly foolproof. I also routed the bullnose profile now. Now you're ready to cut the mortises on the rear stiles. Then round over the top end with a sanding block (details 'a' and 'b,' opposite page).

At this point, you can glue the side assemblies together and drill the shelf support holes. Shop Notebook on page 33 has the details for a simple jig for this.

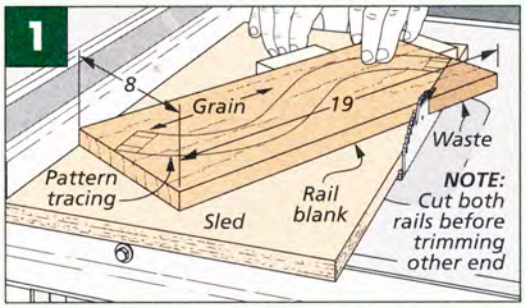
CREST RAIL. The curved crest rail caps off the back. Once again, I've included a pattern at the bottom of the opposite page to make the layout work a bit easier. Before cutting out the shape, you'll need to cut the tenons and drill the deep counterbores for the balusters while the blank is still square.

BOTTOM RAIL. I drilled the mortises on the bottom rail and squared them up with a chisel. Then I cut the rabbet that exposed the mortises. I also cut the keeper strip.

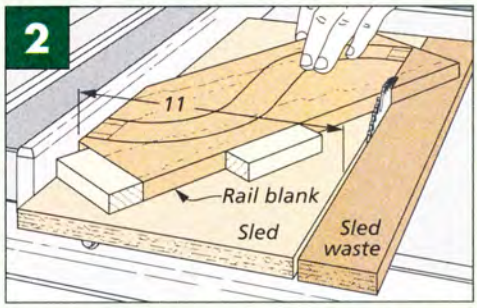
ASSEMBLY. The final assembly begins by connecting the end assemblies with the crest rail and bottom rail. Take the measurements for the balusters and cut them to length with a hack saw.

After the glue dries, add the knuckles to the balusters (detail 'd,' opposite page). Then install the top end of the balusters in the holes in the crest rail and slide the bottom into the mortises in the bottom rail from the back. Add the keeper strip to hold everything in place.

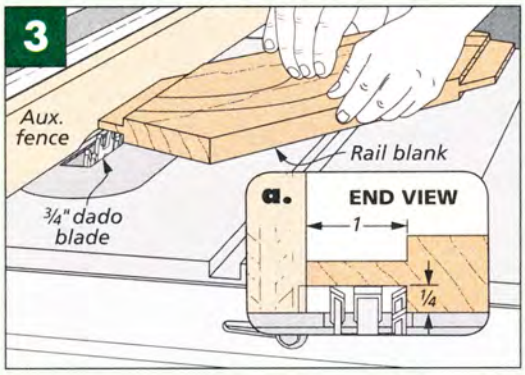
How-To: Make the Frame Parts



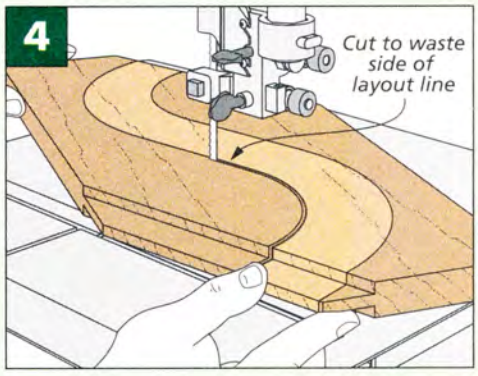
Sled. *Using the sled described on page 33, set the rip fence so the edge of the sled contacts the blade and cut the first corner of both blanks.*



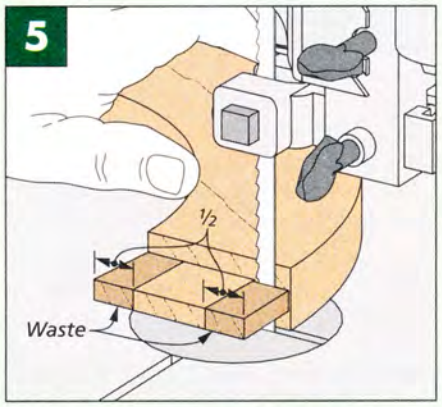
Reverse. *Now reset the fence to the position shown in the drawing and flip the sled to cut off the opposite corner.*



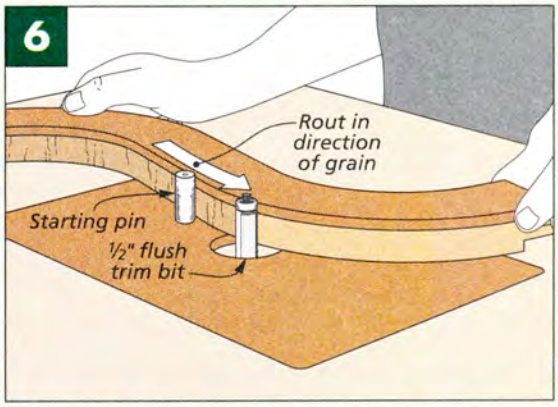
Tenons. *With a dado blade installed, cut the tenon cheeks on the blank. Raise the blade slowly to sneak up on a snug-fitting tenon.*



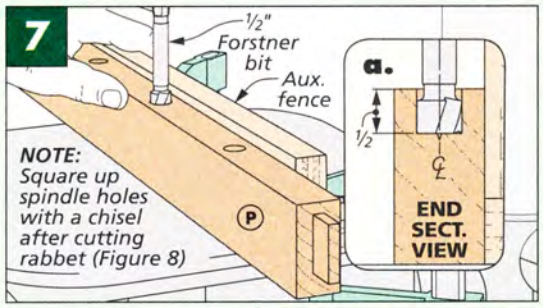
Curve. *After laying out the shape using the template, cut the curved shape at the band saw, staying on the waste side of the cut.*



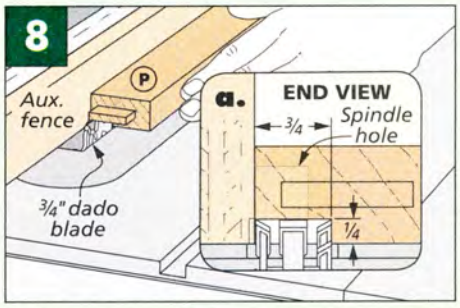
Shoulders. *The band saw is also the perfect tool for cutting away the waste from the shoulders of the tenon.*



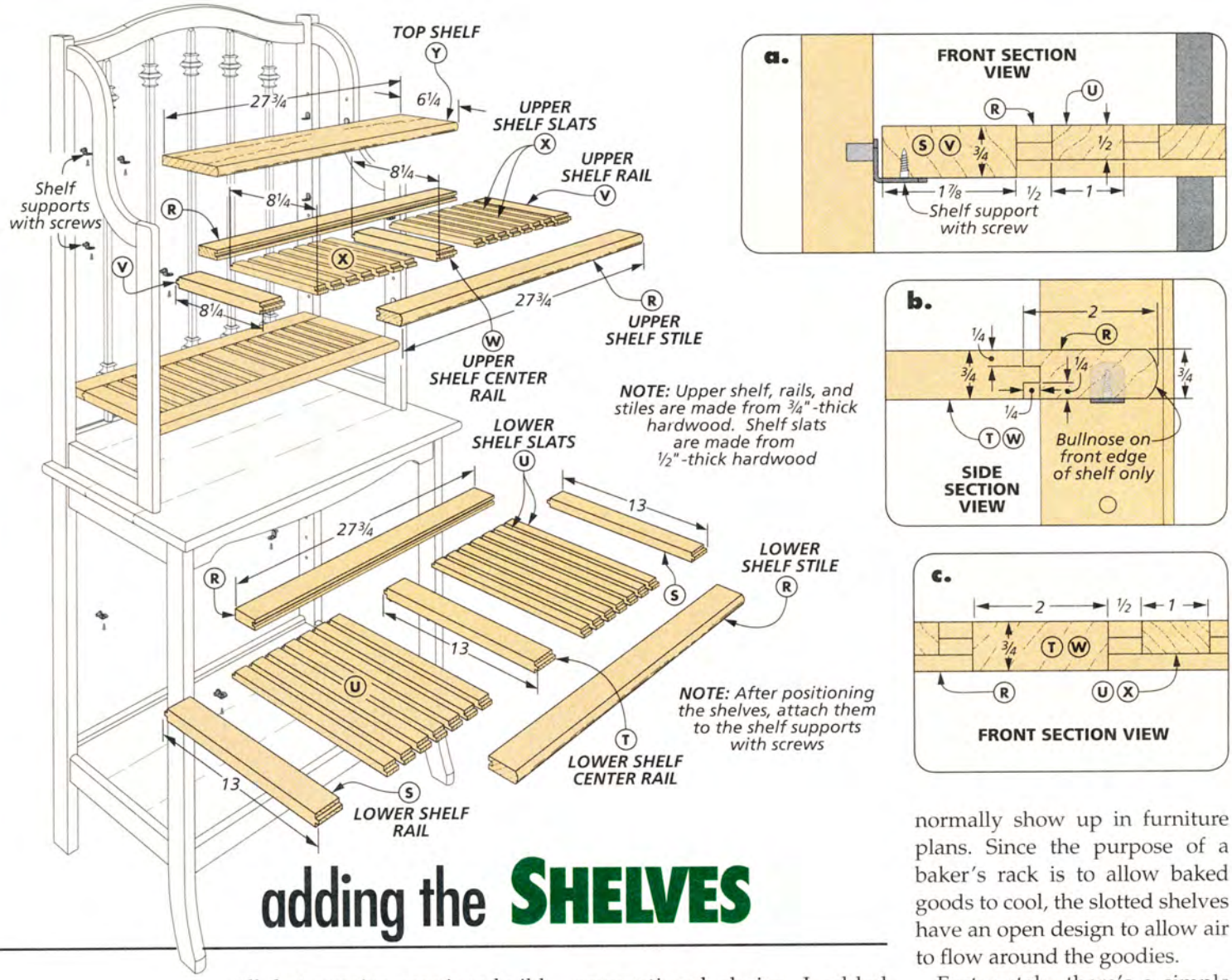
Trimming. *To rout with the grain on both ends of the curved rail, you'll need to attach the template to the opposite face after routing the first curve.*



Mortises. *Cut the mortises in the bottom rail by drilling out the waste first. Square the corners after cutting the rabbet and exposing the holes.*



Rabbet. *By cutting a rabbet on the back face of the bottom rail, you open up the mortises, so you can slide in the balusters.*



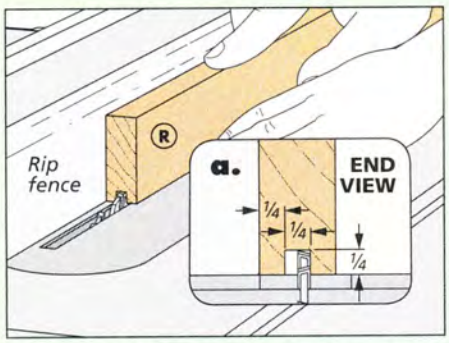
adding the SHELVES

All that remains now is to build the four adjustable shelves and finish the project. The upper and lower shelves are of similar design, featuring frame and panel construction and slats. The solid hardwood top shelf is a more conventional choice. I added plenty of holes for shelf supports so you can configure the baker's rack in a variety of ways.

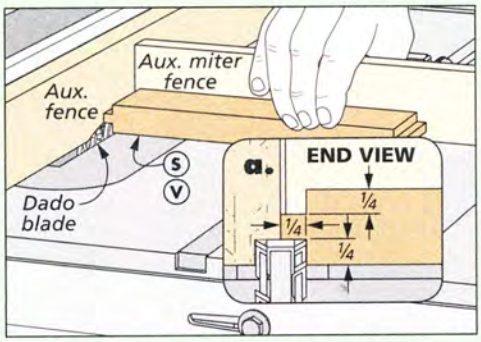
LOWER ADJUSTABLE SHELF. The adjustable shelf is a real departure from the kinds of shelves that normally show up in furniture plans. Since the purpose of a baker's rack is to allow baked goods to cool, the slotted shelves have an open design to allow air to flow around the goodies.

Fortunately, there's a simple way to make the shelves. They start like a frame and panel door — a pair of stiles on the outside run the full length of the shelf. Then rails fit into the stiles. But rather than filling the frame with

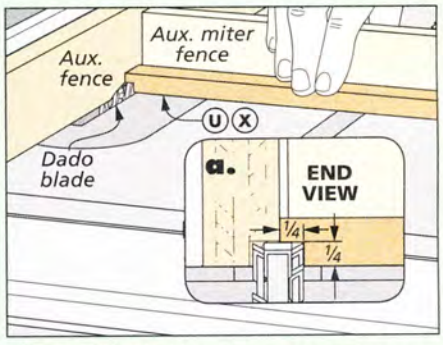
How-To: Make the Shelf Components



Centered Groove. *Set the rip fence so the blank is slightly off center and make the first cut. Then flip the blank and repeat.*



Rail Tenons. *Install a dado blade to cut the tenons on the rails for the slatted shelves. Guide the cut with a miter gauge.*



Slat Rabbet. *Use the same setup you used for cutting the tenons to cut the rabbets on the ends of the slats.*

a panel, you'll install a series of slats to fill the void.

STILES. The first step is cutting a centered groove on the inside edge of the stiles. The groove houses tongues on the rails and slats. You can see how I cut the groove in the left drawing at the bottom of the opposite page.

RAILS. For the two end rails and the center rail, I cut tenons on both ends of each piece at the table saw (center drawing on the facing page). Shoot for a snug fit with the grooves by raising the blade in small increments.

SLATS. The ½"-thick slats are rabbeted on the ends to form tongues that fit into the groove in the stiles. You can use the same table saw setup to cut the rabbets as you used for the tenons (right drawing, bottom of the opposite page).

ASSEMBLY. To assemble the shelf, I started with all the pieces upside down on my assembly table. This way, each piece is sitting flat on the surface, with the slat faces flush with the rails and stiles (like they'll be when completed).

Begin by marking the center line on the center rail and the on the stiles. Install the slats in approximate position without glue. Add glue to the rails and clamp the assembly, as shown in the top drawing at right.

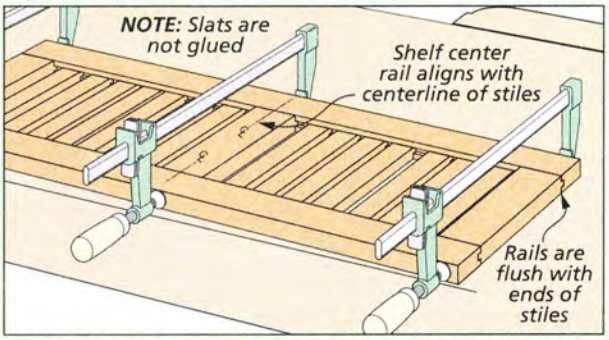
SPACERS. I cut several ½" spacers and used them to position the slats. By starting in the center and working outward with the slats, you're assured of an evenly spaced installation. The spacers keep things aligned while you nail the slats in position with pins.

BULLNOSE. When the glue dries, rout the bullnose profile on the front edge. Test the fit by installing the shelf supports and putting the shelf in place.

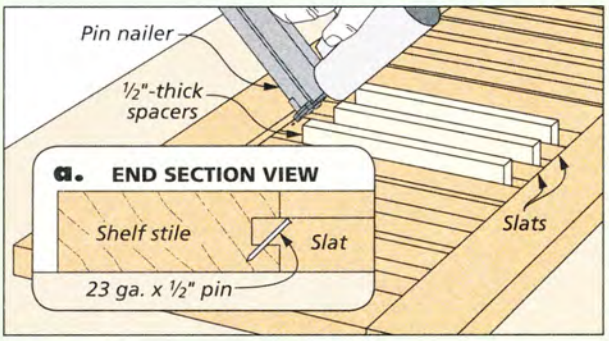
UPPER SHELVES. Repeat the process for the upper shelves. Only the sizes are different. Then size the top shelf and bullnose the front edge.

By now, you probably have some ideas where to put the baker's rack. You can stain and finish it to match your decor. Or you can see how I finished mine in Sources on page 51. W

How-To: Shelf Assembly



Assembly. *After marking the centerline of the center rail and the midpoint of the stiles, add glue on the rails and insert the slats and the end rails, then clamp it up.*



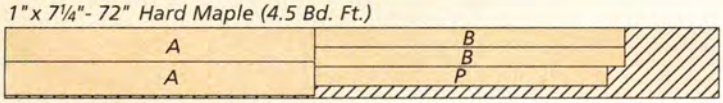
Slats. *After the glue dries, use spacers to position the slats evenly across the width of the shelf. A pin in each end, as in detail 'a,' holds the slats in place.*

Materials, Supplies & Cutting Diagram

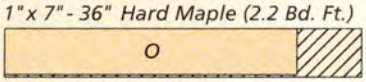
A	Front Legs (2)	1 x 3⅛ - 31¼	**K**	Top Side Rail Blanks (2)	¾ x 8 - 19
B	Back Legs (2)	1 x 2 - 31¼	**L**	Bottom Side Rails (2)	¾ x 2- 11
C	Top Front/Back Rails (2)	¾ x 2½ - 29½	**M**	Front Stiles (2)	¾ x 2- 22
D	Top Side Rails (2)	¾ x 2½ - 14¾	**N**	Rear Stiles (2)	1 x 2- 35¾
E	Bot. Front/Back Rails (2)	¾ x 2- 29½	**O**	Crest Rail (1)	1 x 4¾ - 29½
F	Bottom Side Rails (2)	¾ x 2 - 14¾	**P**	Bottom Rail (1)	1 x 2 - 29½
G	Front/Back Cleats (2)	¾ x ¾ - 28	**Q**	Keeper Strip (1)	¼ x ¾ - 28
H	Side Cleats (2)	¾ x ¾ - 13⅜	**R**	Lower/Upper Shelf Stiles (6)	¾ x 2 - 27¾
I	Top (1)	¾ x 18 - 32	**S**	Lower Shelf Rails (2)	¾ x 1⅞ - 13
J	Bottom Shelf (1)	¾ x 14¾ - 28	**T**	Lower Shelf Center Rail (1)	¾ x 2 - 13
			U	Lower Shelf Slats (14)	½ x 1 - 13
			V	Upper Shelf Rails (4)	¾ x 1⅞ - 8¼
			W	Upper Shelf Center Rails (2)	¾ x 2 - 8¼
			X	Upper Shelf Slats (28)	½ x 1 - 8¼
			Y	Top Shelf (1)	¾ x 6¼ - 27¾

- (5) Balusters w/10 Knuckles
- (4) #8 x 2¾"Fh Woodscrews
- (20) #6 x ¾"Fh Woodscrews
- (16) #8 x 1¼"Fh Woodscrews
- (16) ¼" Shelf Supports

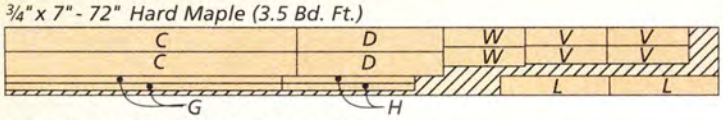
1"x 7¼"- 72" Hard Maple (4.5 Bd. Ft.)



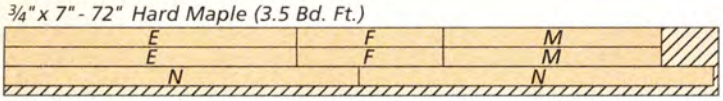
1"x 7" - 36" Hard Maple (2.2 Bd. Ft.)



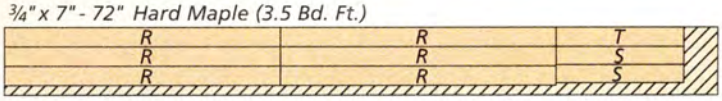
¾"x 7" - 72" Hard Maple (3.5 Bd. Ft.)



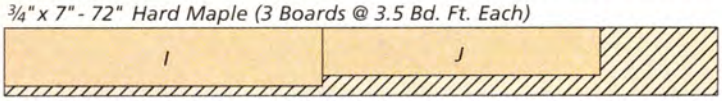
¾"x 7" - 72" Hard Maple (3.5 Bd. Ft.)



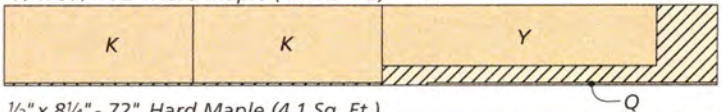
¾"x 7" - 72" Hard Maple (3.5 Bd. Ft.)



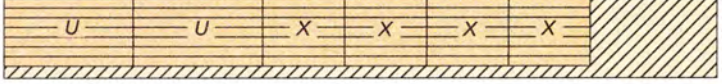
¾"x 7" - 72" Hard Maple (3 Boards @ 3.5 Bd. Ft. Each)



¾"x 8¼" - 72" Hard Maple (4.1 Bd. Ft.)



½"x 8¼" - 72" Hard Maple (4.1 Sq. Ft.)



multi-sided

Glue Joint Bits

Cutting gap-free joints for multi-sided projects can be difficult to get right. Here are a few router bits that nail it every time.

Chances are, you've got a reliable method for cutting 45° miter joints. There are plenty of ways to do so with accuracy and precision. But when you're working on a project with other angles, like a planter or a column with more than four sides, things can get tricky. It's especially true when the joints will all be visible and on display for close examination.

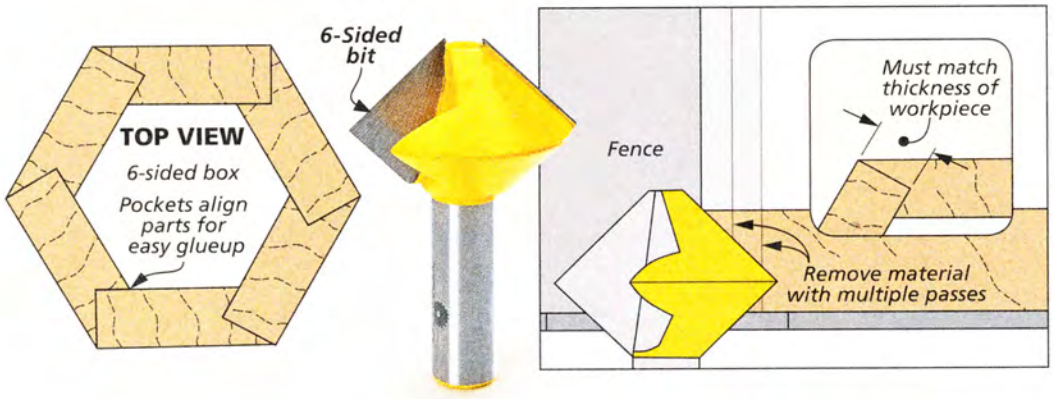
Getting the angles right for six, eight, or twelve-sided creations doesn't have to be baffling. While tilting a table saw blade to cut the odd angles can be difficult, a set of router bits can take care of the setup for you. All you need to do is install one in the router table, and you're off. Well, almost. There are a few things you need to know.

SIMPLE GEOMETRY. When planning a project like this, it's common to cut the joinery by simply routing matching complementary angles, much like you would cut on the table saw. But the key is getting the angles dead on. The box on the opposite page shows how you can use chamfer bits to rout this type of joint.

ANOTHER OPTION. That method works fine. But if you can think outside the box, that is, beyond the conventional matching angle joint, there's another way.

All you really need is a joint that ends up at the correct angle, no matter what the angle for each half turns out to be. A glue joint bit, like the one shown in the photo at left gets you the same result, but only requires you to rout one edge of the workpiece. The other end stays at 90° and fits into a pocket created by the router bit. The main photo and the drawing at left show the process of cutting the joint.

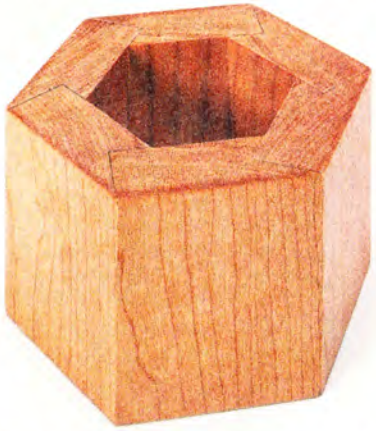
On top of getting the angle right, these bits also make it easier than ever to clamp the



assembly for a seamless fit. The pocket stops the workpieces from shifting like conventional joints are prone to doing when glue is applied. A band clamp is all it takes to assemble a flawless joint.

HOW IT WORKS. There's not a lot to learn to get the most out of these bits. But before you start, it's a good idea to make a few test pieces when you're milling the stock for your project. It's important to test the setups using stock that is the same thickness as the project pieces for an accurate result.

I should mention that these bits are meant to rout along the edge of a workpiece. So the grain in your projects needs to be oriented vertically, like in the photo below.



▲ A six-sided column can be routed and assembled in no time with perfect-fitting joints.

SETUP. After installing the bit in your router table, the first step is to set the approximate height. For this, I place the workpiece on the table and "eyeball" the position. What you're looking for is a cut that will match the thickness of the workpiece on the top part of the profile. The drawing at the bottom of the opposite page shows you what I mean. Note that the position of the bit and fence leaves the top corner of the workpiece to ride against the fence.

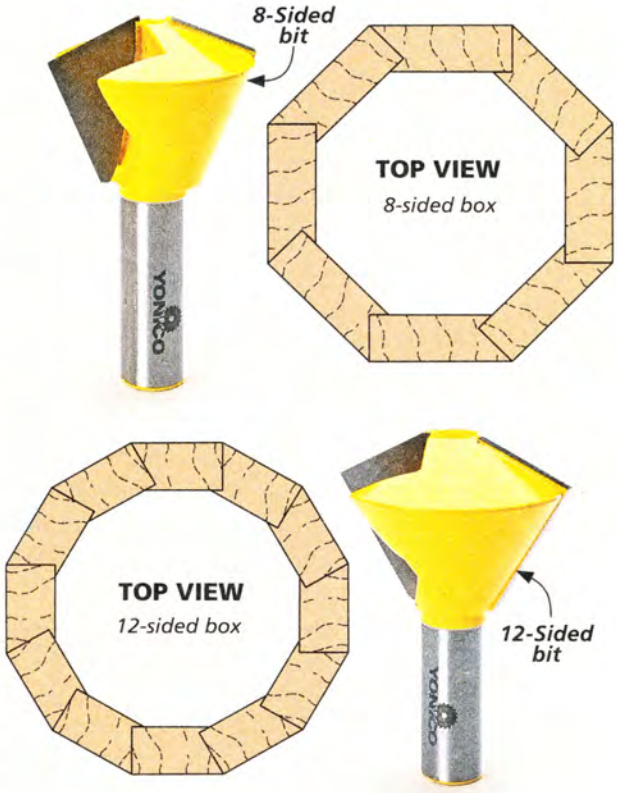
You'll also need to adjust the fence position. Here again, I simply set a test piece by the bit and sight down the length of the fence. Move the fence to expose enough of the bit to cut the pocket.

There's one more thing to set before making a cut: the router speed. Since these bits are between 1¼" and 1¾" in diameter, I like to slow the speed down to about 20,000 RPM. (Check your owner's manual for the setting.)

TEST CUTS. Now you can make a test cut. Use another piece to check the fit into the pocket created by routing. If the piece fits proud of the pocket, just lower the bit and rout another piece until the two are flush.

After a few test cuts, you'll be able to determine the final fence position. I make a small pencil mark on the table to use as a reference for this spot. This way, you can rout the joint in multiple passes and still get a good fit. Then it's just a matter of routing the joints in a few passes and gluing up the assembly.

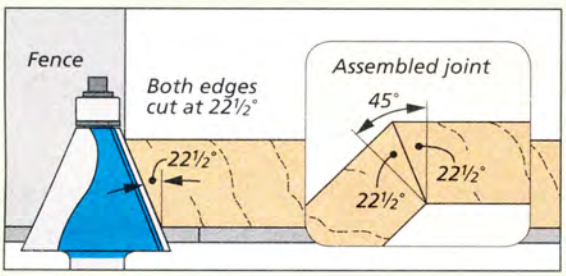
If you're ready to add a new dimension to your woodworking, these bits can open the door for a little creativity. And you can master them in an afternoon. W



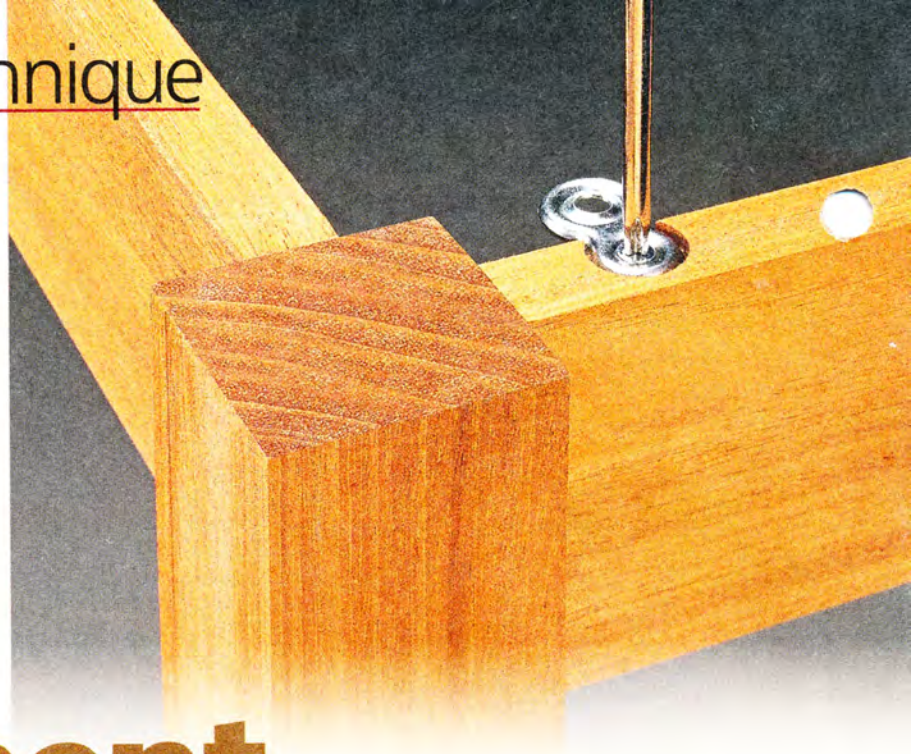
Worth a Look: Chamfer Bits

For a conventional bevel-edge joint, I often turn to chamfer bits. The 22.5° bit shown at right is one example, but they're available in several other angles. I found 11.25°, 15°, 30°, and 45° bits, as well. So you can create many different forms with these bits.

The drawing below shows a typical setup for your router table. For most projects, you won't need to use the bearing. You just want to bevel the entire edge and preserve the top corner to travel against the fence. Unlike the larger bits discussed above, you aren't removing quite as much material. So I usually rout these profiles in a single pass.

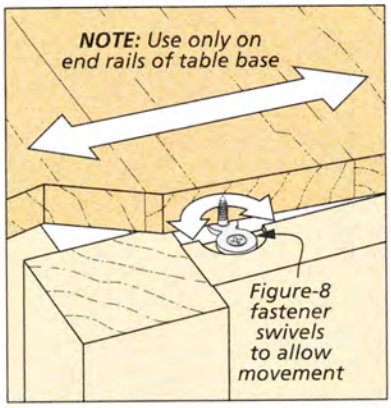


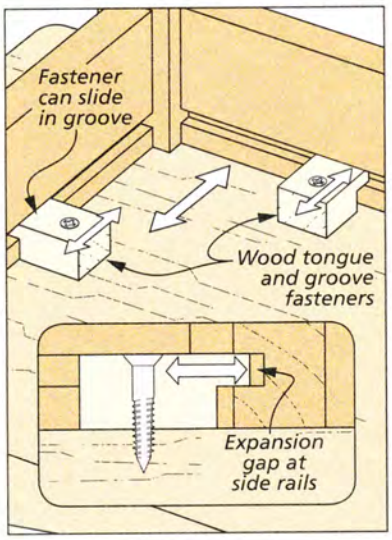
► The 22.5° chamfer bit makes a seamless eight-sided column.

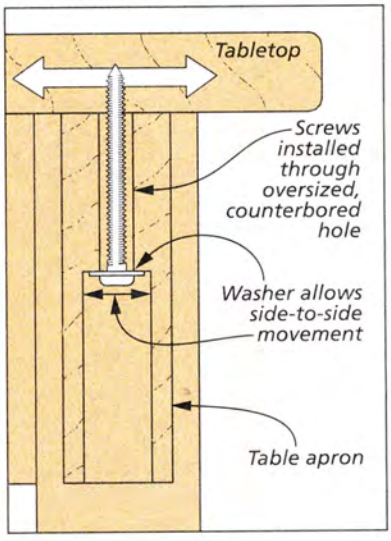


managing Wood Movement

No matter what you do, the wood in your projects is going to move as the seasons change. Here's what you need to know to deal with it.







I learned the harsh truth about wood movement like many other woodworkers — by watching a project fail. Oh, it didn't fall apart. Nothing that drastic. The glued-up tabletop that I had spent hours on to get the perfect grain match split.

I had read about wood movement, but I guess I thought it didn't apply to me. Wrong. It's something that must be taken into account on every project, large or small.

As the humidity changes during the year, the cells in the wood in your projects are either swelling as they absorb moisture or shrinking as they release it. But shrinking and swelling don't always occur evenly. As the cells expand or shrink, the wood moves, mostly across the grain. If you trap a piece, such as a tabletop, by screwing it firmly in place, the wood will still move, but it will have no choice but to split as it contracts in dry air.

DEALING WITH CHANGE. Since we can't eliminate wood movement, we have to find ways to work with it. That means developing techniques that allow the wood to move but still preserve the joinery and look of the project.

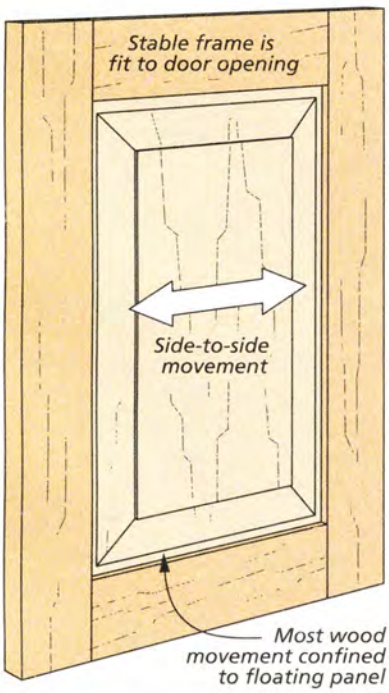
ACCLIMATE. To minimize problems, give the stock a week or two on a shelf in the shop in order to reach equilibrium with the humidity of the environment. And if you can keep the air in your shop around 45% relative humidity that will help.

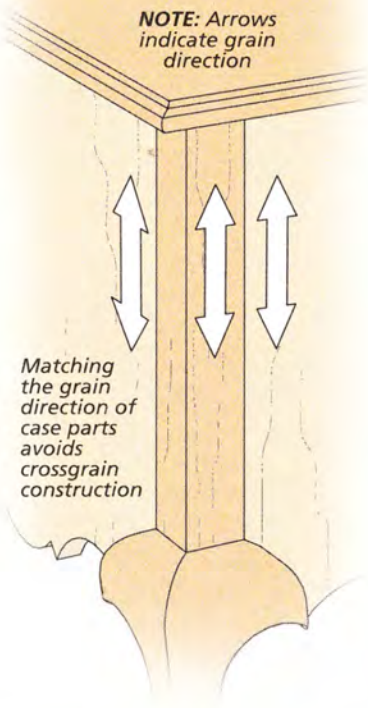
CONSTRUCTION TECHNIQUES

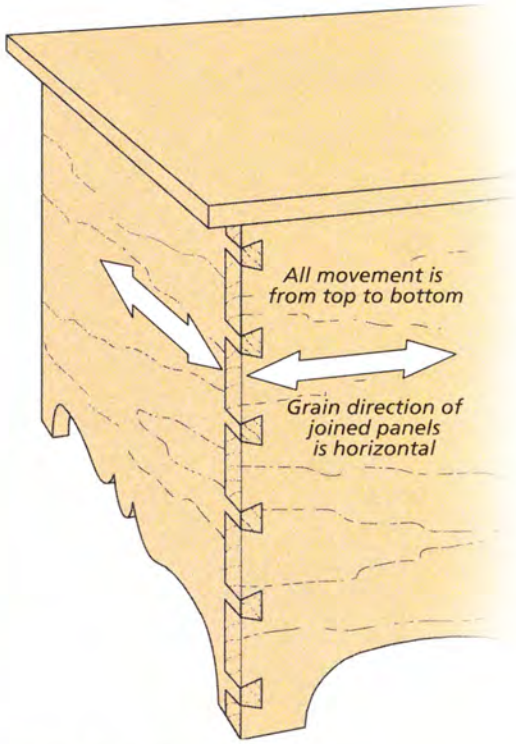
There are several techniques you can use while designing and building a project that can help prevent problems. Most of these tips, however, serve to illustrate just two key rules of thumb: First, don't trap the wood so that it can't move. Second, avoid crossgrain assemblies whenever possible. I'll walk you through these two concepts with some concrete examples.

LET IT MOVE. The temptation to trap wood in place is seldom greater than when building a table. Your first instinct is to make a solid connection between the tabletop and the base. So the obvious move is to screw and glue the tabletop to the aprons. Unfortunately, this is a bad idea. A screwed down top has nowhere to go. And when the humidity drops, the wood will shrink and the top will split. The main photo on the opposite page and the drawings below it illustrate a better method.

Most woodworking supply stores and online retailers carry metal tabletop (or desktop) fasteners. Some suppliers refer to these as "figure 8" fasteners. You can find out where to buy them in Sources on page 51.



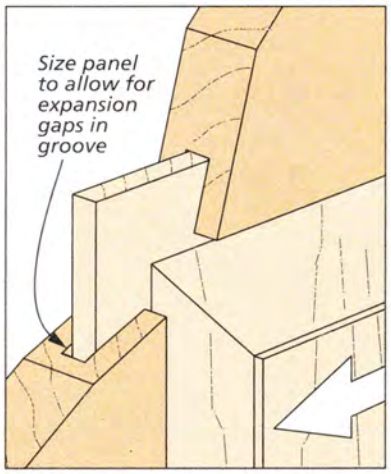




To install the fasteners, all you do is drill a shallow counterbore in the table's apron and screw the fastener in place. Then attach the top with screws through the other hole in the fastener. Now your top is free to move, and the fastener will pivot to accommodate movement.

The bottom two drawings on the opposite page illustrate a couple of alternative strategies that work on the same principle.

Another example of trapping wood is the frame and panel door shown in the drawings at left and below. If you glue the panel into the grooves of the rails and stiles of the frame, there's no room for expansion or contraction. If you built the door when it was dry, the common failure would be a separating of the rail and stile. If it was glued in place during a period of high humidity, the panel would probably split instead.



By letting the center panel "float" without glue in the frame, you're allowing it to move with the changes in humidity and ensuring a long life for the door.

CROSSGRAIN CONFLICTS. The other common problem with wood movement happens when you assemble a project with adjacent crossgrain pieces. By crossgrain, I mean vertical and horizontal-grained pieces glued together.

The two drawings above show the advantages of keeping grain aligned. In the left drawing, where large hardwood panels are joined to legs, it's best to keep the grain of the panels in line with the legs. Letting the grain run the other way would prevent the panels from expanding and contracting.

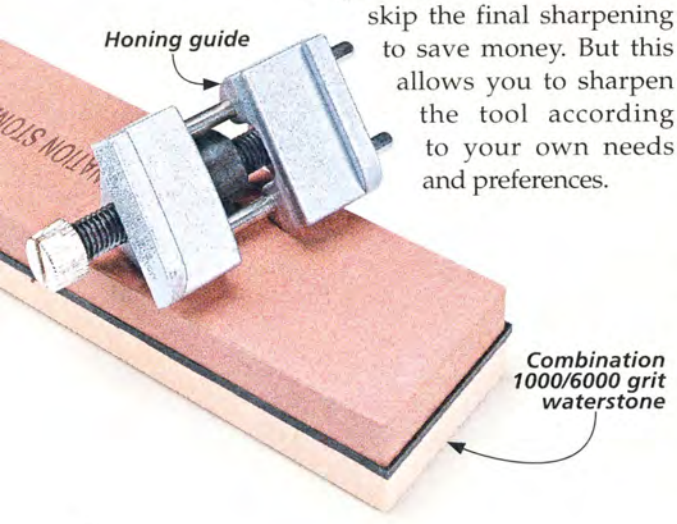
The right drawing shows the advantage of horizontal grain in a case. This design channels the movement across the grain in a vertical direction that has no impact on the joinery.

By learning to deal with movement, you can give your projects a longer life. Hopefully, you won't have to learn the hard way. W

fundamental Sharpening

Learning to sharpen your hand tools is the key to precise cuts. Here's what you need to know to get a razor-sharp edge.

A basic honing guide and a combination waterstone are all you need to sharpen your tools well.



Many woodworkers are surprised to find out that a new set of chisels or a new hand plane blade aren't fully sharpened and ready to use right out of the box. Although the edge seems sharp, and it will certainly cut, it's not as refined or as sharp as it can be. Manufacturers skip the final sharpening to save money. But this allows you to sharpen the tool according to your own needs and preferences.

Putting a sharp edge on a chisel or plane iron is an important first step in learning to use the tool properly. But for some reason, many woodworkers find this basic task intimidating. Frankly, there's no mystery or secret to honing a sharp edge. It just takes a little knowledge, a sharpening stone or other abrasive, and a little bit of patience to get started.

FIRST, THE KNOWLEDGE PART. A sharp edge is nothing more than the intersection of two planes: in the case of tools, the back and the bevel. Honing is the process of sharpening an edge. You must hone both surfaces to produce a sharp edge. Honing relies on an abrasive medium to flatten steel.

You can use any of several different abrasives to get excellent results. Most woodworkers use either traditional oilstones, Japanese waterstones, diamond plates, or sandpaper on glass. In the photos, I'm using a combination 1000/6000 grit waterstone. As the name implies, these stones rely on water to create a slurry of abrasives that do the cutting. Sources, on page 51, gives you the details on where to find one.

HONING PROCESS. Regardless of which abrasive medium you choose for sharpening, the process is pretty much the same. You start by flattening the back of the blade, then hone the bevel.

FLATTEN THE BACK. Flattening the back levels one of the two intersecting planes. This part is pretty straightforward. Most tools will have grinding marks (grooves or scratches) left in the steel. The goal is to remove the scratches

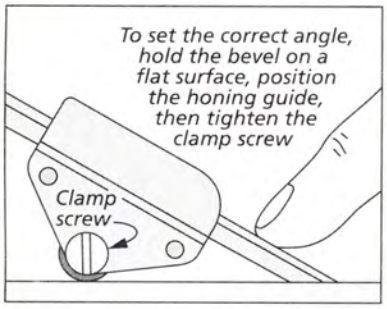
and polish the surface. The photos at right show how to proceed.

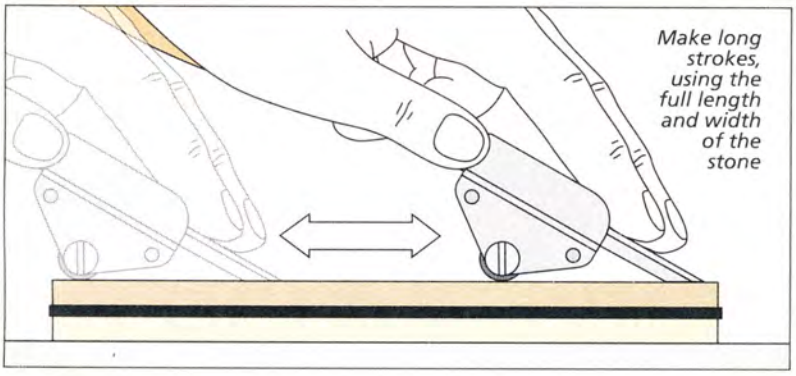
Starting with the 1000-grit side of the stone, move the back in a circular motion until you replace the scratches with a finer set from the stone. Then flip the stone over to the 6000-grit side and repeat. After a few minutes, you should get a smooth, mirror-like finish.

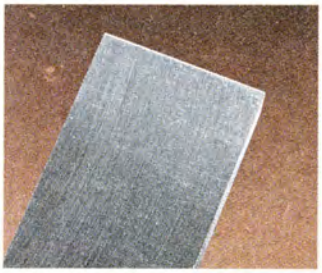
SET THE BEVEL ANGLE. It's honing the bevel that presents a problem for most people. Fortunately, there's an easy way to preserve the bevel angle during sharpening — a honing guide. There are several different honing guides available. The one shown in the lower photo on the facing page is the simplest and least expensive. But it's still a very effective tool.

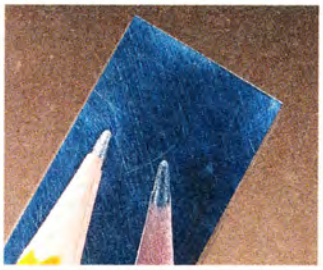
The first step is to set the proper angle for the bevel. This is simple to do with the honing guide. Just use the angle already ground on the blade. Hold down the bevel on a hard surface and slide the guide up to meet the blade (top drawing, below). Then tighten the guide to clamp the tool in position and you're ready to begin.

As your woodworking skills improve, you might want to change the bevel angle on some tools. Several honing guides come with angle gauges to assist you.









▲ Flattening the back of this chisel begins on the coarse stone. Your goal here is to remove the grinding marks left from the manufacturing process. After switching to the fine stone, you can polish the back to a mirror surface.

HONING TECHNIQUES. When you sharpen, you'll want to move in long strokes across the full length of the stone (bottom drawing). You don't need to press down hard. Use only enough pressure to keep the edge engaged evenly across the width.

It's also important to use as much of the surface of the stone as possible to avoid prematurely dishing out the stone (creating a low spot in the surface). With a dished surface, it's impossible to hone a straight edge on your tool. Dishing will inevitably happen. But by paying attention to your honing technique, you can prevent it for a while.

When the stone becomes dished, you'll need to flatten it with a coarser stone, a diamond plate, or a ceramic abrasive stone designed for the task. I prefer a diamond plate, like the one in the photo above. The plate stays flat and cuts quickly.

▲ A touch-up on a diamond plate will keep your stone flat.

SECONDARY BEVEL. There's one last trick that many woodworkers use — a secondary bevel. The plane blade in the main photo shows what I mean. It's just another angle ground on the front edge of the blade. This makes repeat sharpening easier since you only need to remove a little material.

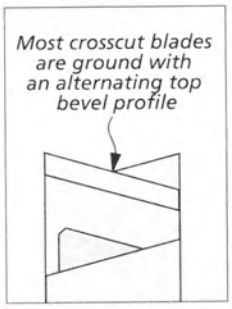
To hone a secondary bevel, you need to increase the bevel angle by a couple of degrees. Some honing guides can be adjusted to change this angle without removing the tool. But a simple way to add a couple of degrees is to place a playing card under the wheel of the honing guide.

Experienced woodworkers know that dull tools are more dangerous than sharp ones. These tips will help you get in the habit of keeping your tools sharp. W

table saw

Crosscutting

A smooth and square cut goes a long way toward making sure your project parts fit accurately. Here are a few tips for great crosscuts.



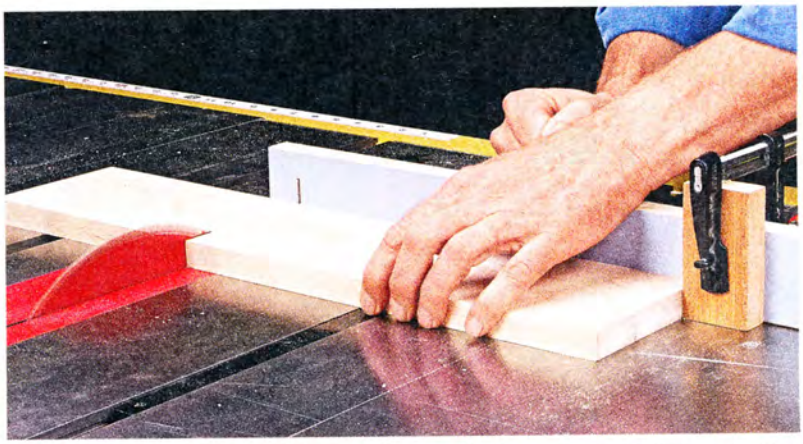
Crosscutting is fundamental to successful woodworking. Where rip cuts run in the direction of the grain, crosscuts are perpendicular. But like ripping, it's tough to beat the table saw for doing it right.

There are different considerations for crosscutting than ripping. The first is selecting the right blade. You might not think that a 3000-RPM blade would even notice the difference, but unless you treat the two cuts differently, you won't get clean results.

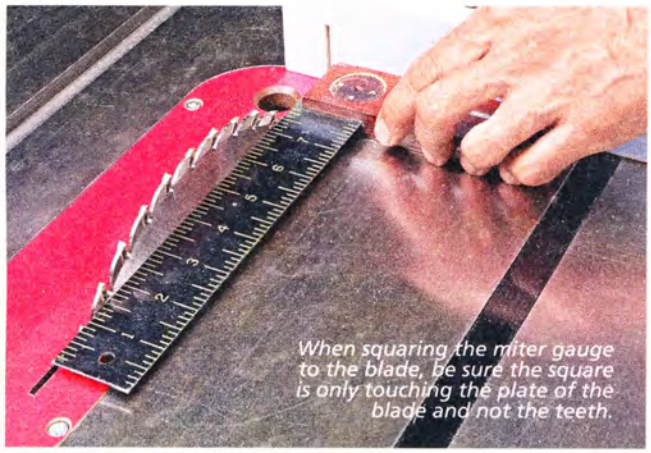
CROSSCUT BLADES. When you examine a crosscut table saw blade, the first thing you'll notice is that the crosscut blade has more teeth than a rip or combination blade, usually in the range of 60-80. But beyond just a greater number of teeth, the individual teeth are configured differently, as well.

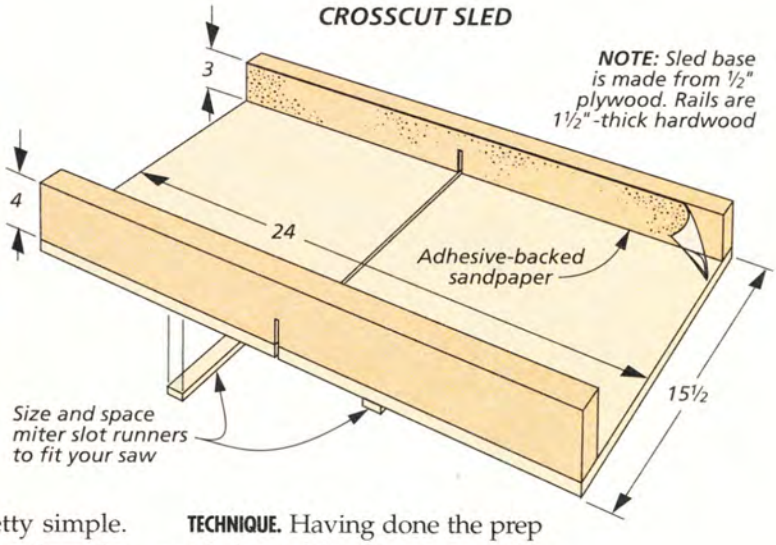
Most crosscut blades are ground with an alternating top bevel profile (drawing at left). That is, each tooth is ground at an angle so the points alternate

◀ A crosscut blade features anywhere from 60 to 80 carbide teeth.



▲ An auxiliary fence backs up the workpiece to avoid tearout. The sandpaper on the fence prevents the workpiece from sliding, and a stop block makes it easy to repeat cuts accurately.


When squaring the miter gauge to the blade, be sure the square is only touching the plate of the blade and not the teeth.



between the adjacent teeth. This configuration is very good at slicing the fibers and reducing splintering and tearout at the cut line.

You'll also notice that the gullets aren't as deep as those on a rip blade. That's because the feed rate for crosscutting is typically slower. So each slice across the grain removes less waste to be carried away in the gullet.

SAW SETUP. The next thing to check is that the miter gauge is at a perfect 90° to the blade for a square end (photo above). You'll also benefit from installing a zero-clearance throat insert in your saw. This helps prevent tearout by backing up the fibers of the wood. The box below has some additional tips for preventing tearout.

MITER GAUGE. If you use a miter gauge, backing up the trailing edge of the cut is pretty simple. A wood auxiliary fence does the job. You'll need to install it on the head of your miter gauge using screws in the holes.

CROSSCUT SLED. Another option is a crosscut sled. The drawing above shows how hardwood rails at the front and back edges hold the sled together since the body is cut all the way through in use. A pair of runners glued to the underside of the sled fit into the miter slots on your saw.

OTHER BENEFITS. One big benefit of using either of these methods is that you can install a stop block for making repeat cuts. I also like to attach adhesive-backed sandpaper to the fence to prevent the workpiece from moving during a cut. The photos on the opposite page show both in action.

TECHNIQUE. Having done the prep work for making the crosscut, the task itself isn't difficult. I start by cutting one end of each workpiece to establish a square end.

Make sure to push the workpiece all the way past the blade and allow the blade to stop before sliding the miter gauge or sled back. Moving a workpiece while the blade is running can result in nicking the end or the piece catching and kicking back at you.

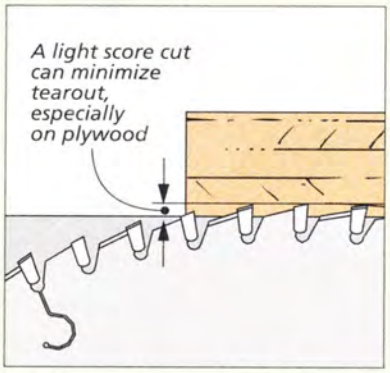
After squaring one end, you can measure from that end to mark the final length. As a general rule, I always try to cut workpieces that are the same length using one stop block setting. This guarantees they'll be the same length.

With these ideas in mind, you're ready to make clean crosscuts for all your projects. W

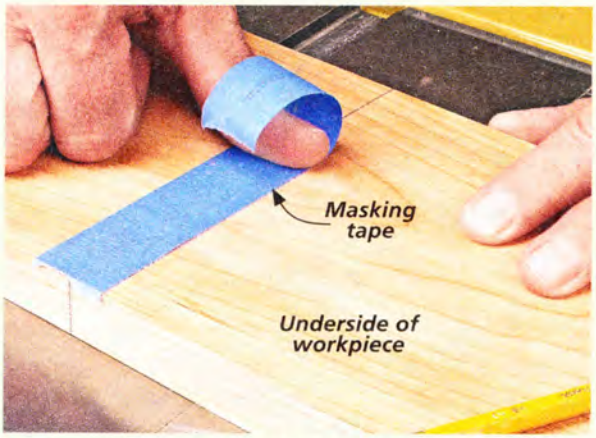
Tips: Taming Tearout

Even if you do everything right, you can still get some tearout when crosscutting. So here are a couple tricks to keep in your troubleshooting arsenal. These techniques are especially useful when crosscutting plywood.

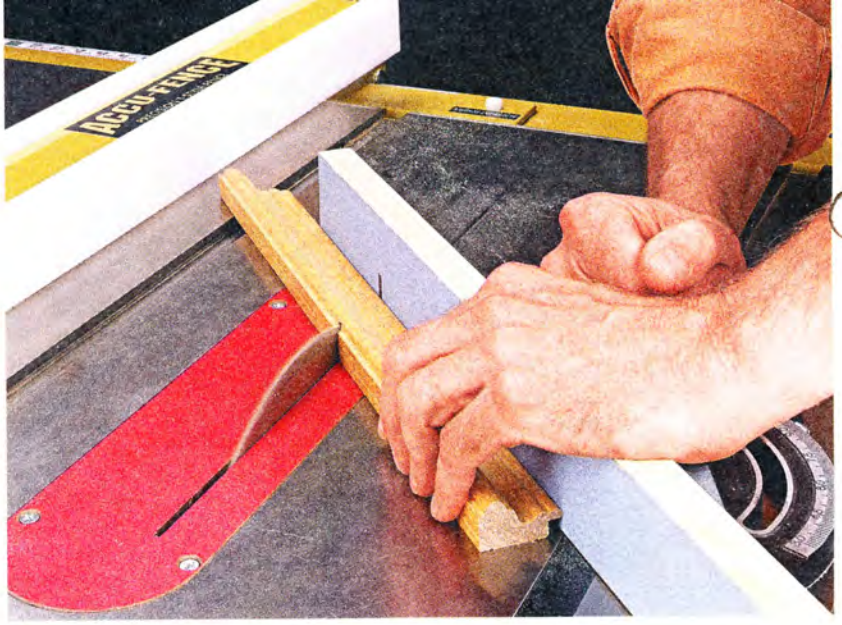
SCORING. Scoring one face of a workpiece can minimize tearout by cleanly slicing through the fibers. Start by setting up your workpiece for the cut, but lower the blade to around ⅛". This will leave the surface cleanly cut. Then just raise the blade and cut all the way through.



TAPE. Another option is to cover the underside of the cut line with masking tape. The tape helps reinforce the fibers while the blade slices through the workpiece.



By applying a strip of masking tape across the cutline, you can prevent the fibers from tearing out when you crosscut a workpiece.



Questions & Answers

Miter Saw vs. Table Saw

Q ***You guys always talk about cutting miters at the table saw. The rest of us bought miter saws years ago for this task. What's up?***

Lyubov Burleson
Reno, Nevada

A This is a question that comes up quite often. After all, it seems reasonable to assume that a miter saw is the best tool for cutting miters. But there are a couple of drawbacks.

▲ A miter saw can cut a number of angles, but cutting miters on the table saw is still a very common practice.

The miter saw is a construction site tool. And because it's a "portable" tool, I've always found it difficult to achieve the consistent level of accuracy I can get with a stationary tool, like a table saw.

Yes, you can fine-tune the adjustments, but it's usually not enough. This is especially true with sliding compound miter saws. With these, you have to worry about fine-tuning both axes.

SMALL PIECES. On top of that, I've found that cutting small pieces on the miter saw can quickly turn a workpiece into a projectile. It's also harder set up a stop for cutting pieces the same length.

SPACE. Another drawback is the space requirement. To get the most out of a miter saw, you have to dedicate a lot of shop space to it. You need long supports on both sides of the blade to support long workpieces. And if they aren't set up perfectly, it can be difficult to get an accurate cut.

TABLE SAW. Instead, I usually rely on the table saw and miter gauge for seamless miters. For me, it's easier to zero in on the perfect setting, and the miter gauge is designed to hold those subtle changes. The same is true for the vertical setting. It's much easier to set a table saw blade to exactly 90° using a square.

EXCEPTIONS. Of course, your situation and preferences may differ. For instance, I've talked to several finish carpenters who routinely install trim and molding at just about every conceivable angle. Obviously, this work is just as finicky as furniture making, and the results undergo just as much scrutiny.

Most of them use their miter saw to handle all their angle cuts. But even they agree that it's not the optimum tool for furniture making. Here's why.

Installing trim and molding in a house is a different task than building furniture. First of all, there simply aren't very many perfect 45° and 90° angles in even the best-built modern homes.

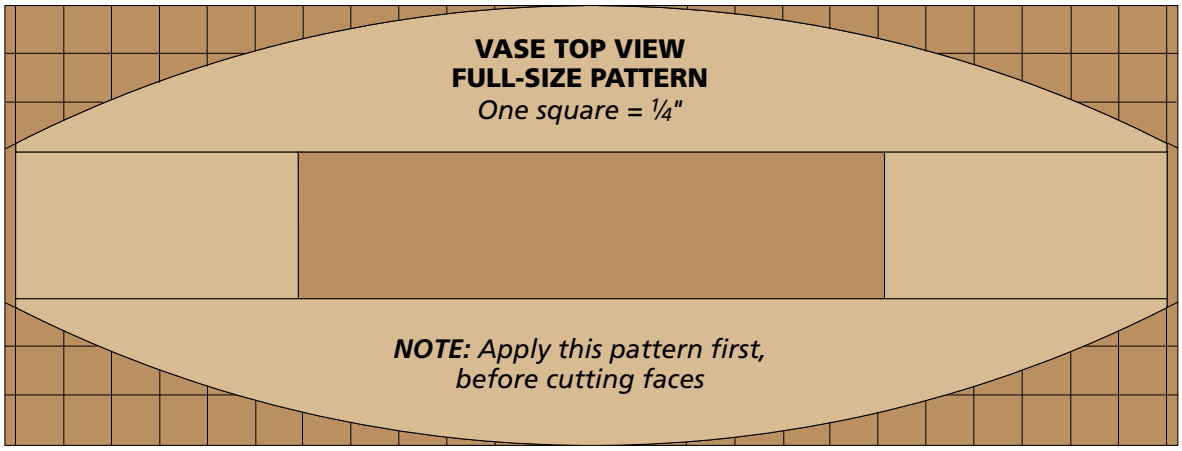
To accommodate the variations in each wall, most finish carpenters have developed a system for measuring and marking angled workpieces. Whether a joint comes together at 90° or 92° really doesn't matter as long as the joint closes and looks tight.

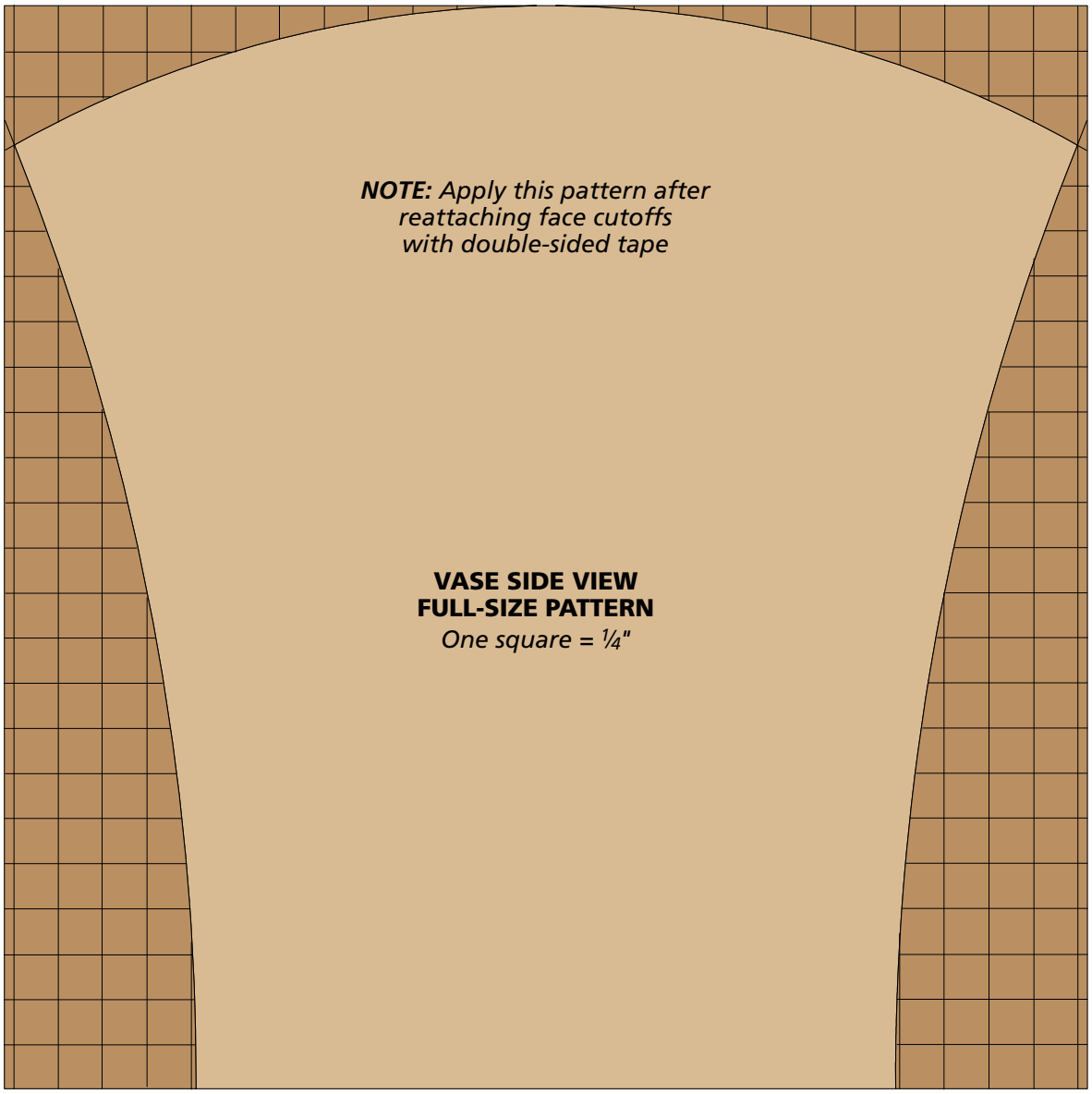
An experienced hand can measure, mark, and cut these joints on the miter saw and work around a room without ever measuring an angle. He simply cuts the first half of a joint, then uses it to mark the mating piece. Now he can match the line for a perfect fit.

I don't think I'm revealing a secret when I say that you can do the same thing if you ever apply molding to a case or cabinet that ends up slightly out of square.

But it really comes down to this: If you're getting good results, then keep up the good work, no matter what the tool. W

sculpted wood Vase





Sources

Most of the materials and supplies you'll need to build the 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.

CABINET LEVELERS *(p.8)*

- **Lee Valley**
  Concealed Leveler 01S19.22
- **Woodworker's Supply**
  Ultra-Glide Leveler 158-504
- **Rockler**
  Adjustable Leveler Leg 32183

COPING SLEDS *(p.12)*

- **Woodhaven**
  Small Coping Sled 528
- **Amazon.com**
  Rail & Stile Bits 891.503.11

LOOSE TENONS *(p.14)*

- **Rockler**
  ¼" Spiral Upcut Bit 82652
  Guide Bushing Kit 59031

WASTEPAPER BASKET *(p.18)*

The wood plugs for the wastepaper basket were stained with *General Finishes' Java Gel Stain* before being glued in place. The entire basket was then sprayed with two coats of lacquer.

SAWBUCK DESK *(p.22)*

- **Lee Valley**
  8" Drawer Pull 02A50.62
  5½" Drawer Pulls 02A50.61
  30mm Shoulder Bolts . 00N14.30
  17mm Bolt Caps 00N20.17
  5mm Bumpers 00S21.04

The plastic laminate was purchased locally. The legs and stretcher were primed and painted with black satin spray paint. Then all the parts were sprayed with three coats of lacquer.

SCULPTED VASE *(p.29)*

You can find exotic woods or veneers for the vases from a number of the retailers listed at right. These vases were all finished with three coats of lacquer.

BAKER'S RACK *(p.34)*

- **Baluster Store**
  Iron Balusters & Knuckles . . 2557
- **Rockler**
  Shelf Supports 33902

Rather than staining the baker's rack, I used *Trans Tint Dye (Golden Yellow)* to shade the lacquer. Then I sprayed on two coats.

GLUE JOINT BITS *(p.42)*

- **Rockler**
  22.5° Chamfer Bit 24798
  30° Chamfer Bit 24805
- **Precision Bits**
  Multi-Sided Joint Set 15330

WOOD MOVEMENT *(p.44)*

- **Rockler**
  Desk Top Fasteners 21650

SHARPENING *(p.46)*

- **Rockler**
  1000/6000 Grit Waterstone . 47506
  Honing Guide 92651

MAIL ORDER SOURCES

Project supplies may be ordered from the following companies:

Woodsmith Store
800-444-7527

Rockler
800-279-4441
rockler.com

amazon.com

Baluster Store
balusterstore.com

General Finishes
800-783-6050
generalfinishes.com

Lee Valley
800-871-8158
leevalley.com

Precision Bits
732-276-9850
precisionbits.com

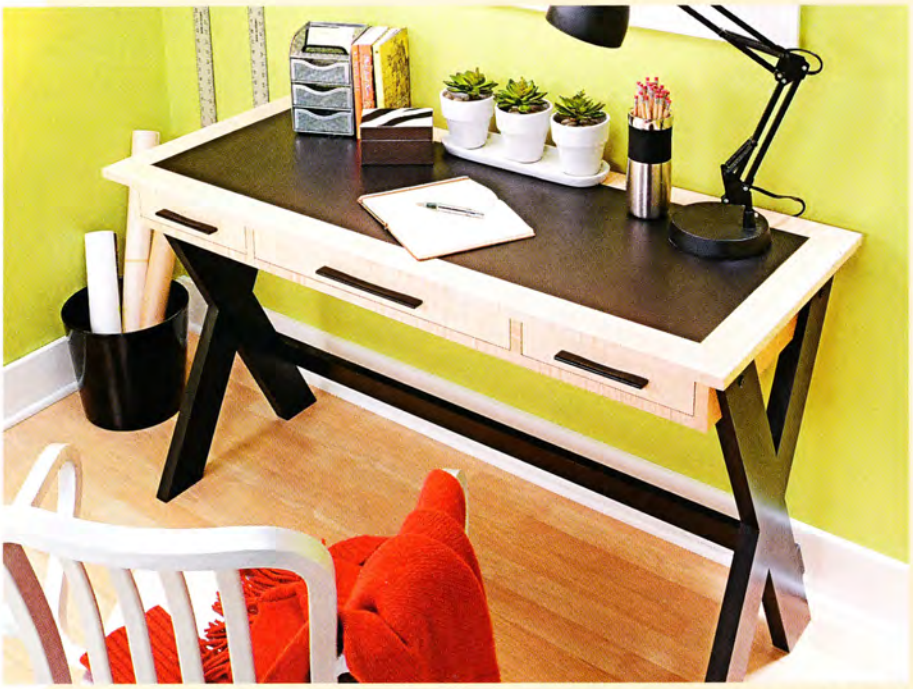
Woodhaven
800-344-6657
woodhaven.com

Woodworker's Supply
800-645-9292
woodworker.com

looking inside

Final Details

▲ *Wastepaper Basket.* Tapered oak slats and wood plug "rivets" give this wastebasket a Craftsman look. You'll be surprised by all the techniques you'll get to learn while building it. Complete plans start on page 18.



▲ *Sawbuck Desk.* Perfect for a home office or a corner in a den, this small yet stylish desk features X-shaped legs reminiscent of sawbucks used in the logging trade. You'll find step-by-step instructions on page 22.

◄ *Band-Sawn Vase.* This simple vase also makes a great desk organizer. Best of all, you can knock out several of them in a weekend for last-minute gifts. We'll walk you through the process, starting on page 29.

► *Baker's Rack.* Patterned after traditional cooling racks, this baker's rack has multiple uses. It's ideal for storage or display and works well in almost any room of the home. Turn to page 34 to learn how it's built.