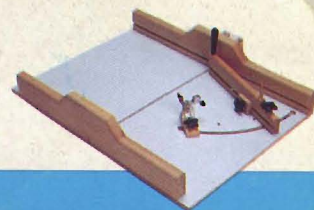


BONUS!
Full-size
Patterns



- Full Size Patterns for a Bedside Table and a Tambour Breadbox
- Shop Project: Build a Crosscut Jig for Table Saw Accuracy
- Step by Step Directions for the Ultimate Futon Sofa Bed



TODAY'S

Issue 26

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PROJECTS, TIPS AND TECHNIQUES



TODAY'S

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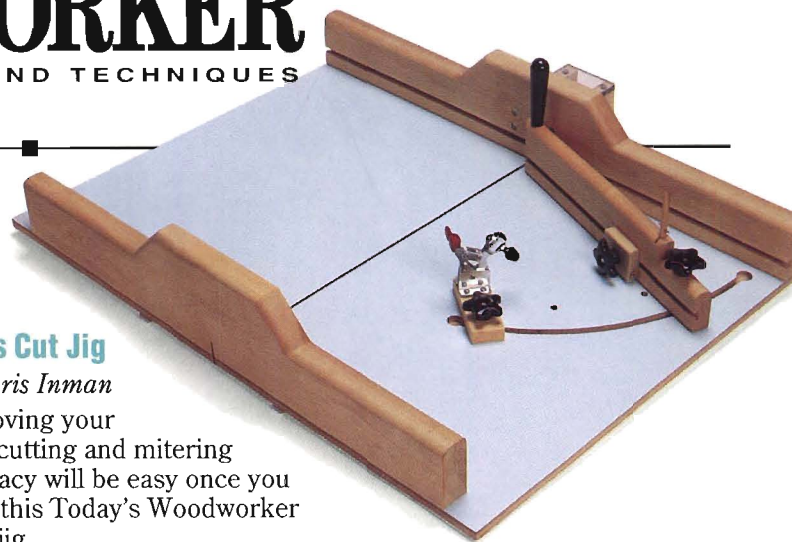
PROJECTS, TIPS AND TECHNIQUES



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Safety First

Learning how to properly operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary safety guards have been removed from the equipment shown in some of the photos and illustrations in Today's Woodworker. We in no way recommend using this equipment without safety guards and urge readers to strictly follow manufacturer's instructions and safety precautions.

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Material List Virus

Notwithstanding Bill Tyrrell's wonderful letter (below), we do occasionally make a mistake around here. In the case of the Entertainment Center in Issue 24 (November 1992), it seems we outdid ourselves. The problems occurred when we increased the size of the drawers slightly so that a compact disc would neatly fit. However, we failed to see all the consequences of this little alteration and, unfortunately, several related measurements were never updated. The effect of this oversight spread like a virus through the material list, and even affected two elevation drawings. Thankfully, several readers brought the problem to our attention and all corrections are now in place.

The revised material list below includes all the affected pieces, with the corrected measurements shown in bold type. Please take a moment to photocopy this page and insert it right in your copy of issue 24. If you don't have this issue yet, but are thinking about ordering it in the future, don't worry. Every back issue that goes out from the home office has a correction sheet included whenever it's necessary. And by the way, we appreciate the help you give us by finding these errors, so don't be shy — try as we might, sometimes they still slip through.

In addition to the material list below, please make the following two fixes right in your issue. Correct the face frame layout elevation shown on page 16 so that the height

is 60½" instead of 60¾", and the door elevation on page 18 so that the height is 60¾" instead of 59¾".

We've had a lot of great comments on this project and apologize for the mistakes.

Larry N. Storken

MATERIAL LIST (corrections in bold type)

	T x W x L
6 Lower Dividers (2)	3/4" x 23½" x 8¾"
12 Upper Divider Stiles (2)	3/4" x 2" x 63"
21 Banding (6)	1/4" x 3/4" x 54"
30 Upper Drawer Front and Back (4)	1/2" x 6¼" x 6¼"
32 Upper Drawer Bottoms (2)	1/4" x 5¼" x 21"
33 Upper Drawer Faces (2)	3/4" x 6¼" x 7¼"
42 Small Door Panels (2)	3/4" x 15" x 9¾"
44 Door Stiles (4)	3/4" x 2" x 60¾"

Even though I subscribe to several woodworking publications and have seen many fine furniture projects over the years, this is the first time I've felt compelled to sit down and write a letter in reference to one. The "Entertainment Center For Two" in Issue 24 is a unique and innovative approach to furniture design and functionality. It's obvious that a great deal of thought and insight went into the making of this project and I would like to extend my compliments to the entire staff and to Rick White in particular, for a masterful job. Entertainment centers have certainly secured a stronghold in the furnishing of American homes. However, I generally find their design to be somewhat short sighted and their functionality far too limited. Rick's project knocked my socks off. It's a beautiful, multifunctional piece of furniture, it easily lends itself to design alter-

ations, it accommodates today's more popular large screen televisions along with an array of audio/video equipment, and it accomplishes all this while blending effortlessly with the decor and furnishings of nearly any room in the house.

Looking back over previous issues of Today's Woodworker (I have them all), I can remember thinking at times that you've really outdone yourself in this issue, that you couldn't possibly come up with a better project idea or design than this. Well, I'm happy to say that you've done it again. However, even with the oft renewed respect that you've earned from this woodworker over the years, I am now more confident than ever that, with the entertainment center in issue #24 you have finally peaked.... Well, at least until issue #25.

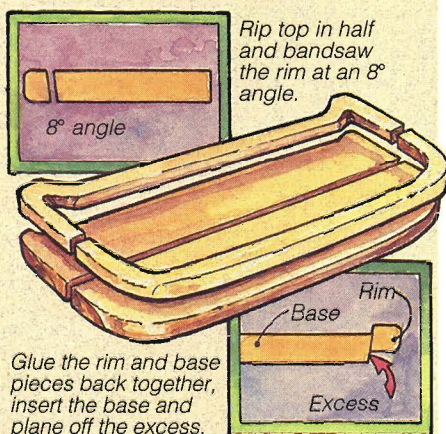
Bill Tyrrell
Tracy, California

PICK OF THE TRICKS



Bevel Cutting Relief

When making a relieved panel, as with the high chair tray in issue 22, I've come up with a better method than tediously hogging out the waste with a router. My bevel-cutting technique is less time consuming and requires considerably less sanding.

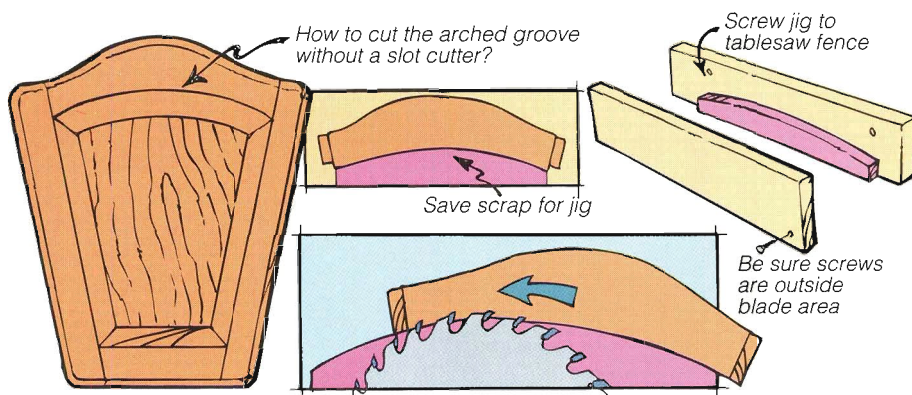


Make the workpiece in two equal halves, then butt these halves together to draw the rim pattern of the tray. Tilt your band saw table 8° and, using a 1/16" or 1/8" blade, cut along the rim layout line in each piece. Now glue the two inside pieces together to form the base and glue the two border pieces together. Once the glue dries, drop the inside panel into the rim assembly and you'll see that it hangs out the bottom a bit. Remove the inside piece to plane its bottom surface so it's flush with the rim, then glue the two pieces back together.

Linda Bolay
Oak Harbor, Ohio

TRICKS OF THE TRADE

Small Shop Solutions



Grooving Curved Rails

I stumbled across this idea while building a magazine rack featured in a back issue of *Woodsmith* magazine. When it came to grooving the inside edge of the curved rails, I didn't have the correct tool.

I saved the waste from the curved rail, then sandwiched it between two pieces of lumber. Next, I clamped this assembly to my table saw fence. With the blade retracted, I moved the fence to position the arched waste piece directly over the blade. I then slowly raised the blade through the waste piece until the saw protruded 1/2", at which point I fed my curved rail over the jig to cut the groove. Since I needed a 1/4" wide groove, I lowered the blade to repeat the process and cut a wider kerf.

William Borowski
LaGrange, Illinois

Sanding Saver

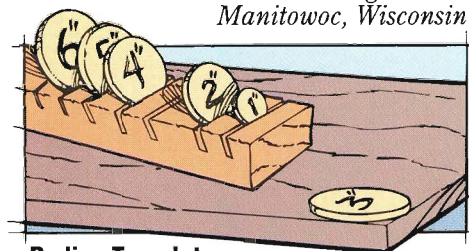
I love my palm sander, but I get irritated when a perfectly good sheet of paper is ruined because it tears along the sander's clamps. To avoid this waste, I reinforce the back side of the sandpaper by running masking tape along the edges that slip into the clamps. The tape helps prevent the tears and also keeps the paper from slipping — another problem I run into with the finer grit papers. To save time I usually stick tape onto the full sheet of sandpaper before I cut it into quarters.

Leslie McElderry
Fairhope, Alabama

Cleaning J-Rollers

Everyone who uses a J-roller to press down veneer or plastic laminate knows how it gets covered with contact cement. Rather than dip the roller in solvent, which is unhealthy for you and dries out the tool's bearings, you can clean the roller on a disc grinder. Find a spot on your grinder so the roller spins slowly enough for the cement to come off. The method will also clear any wood resin trapped in the grinding wheel.

Hugh Foster
Manitowoc, Wisconsin

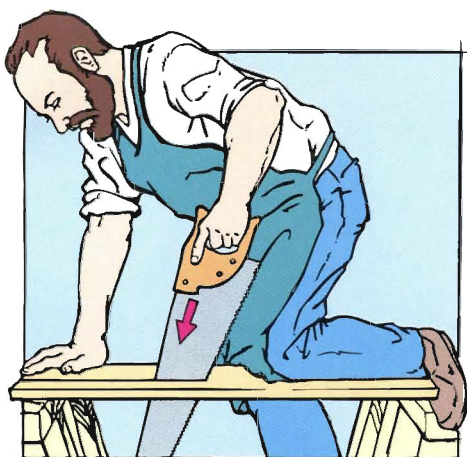


Radius Templates

A lot of woodworking projects call for rounding off some corners with a given radius. I usually grab a coffee can or some other shop item to use as a template, but it seems they're never the exact size I need. Recently, I came up with a simple solution to my problem.

On pieces of 1/8" plywood or hardboard, I drew circles with varying radii using a compass. Next, I band sawed the circles and sanded their edges, then marked each circle with its radius. I made circles with 1", 2", 3", and 4" radii. To organize my templates, I cut a series of angled slots in a short piece of 2 x 4.

Bruce Kieffer
St. Paul, Minnesota



Handsawing Advice From An Old Pro

When I started my carpentry career in 1946 there was no such thing as a power saw on the job site. If you wanted a 2 x 12 cut in half you got out your trusty hand saw and started sawing, and after covering a house frame with 1 x 8 shiplap on a 45° angle, letting the top end run wild, we got out our saws again. Everyone had two saws—one was being sharpened while you were dulling the other one, and one man's job was doing nothing but sharpening saws.

Out of all this I learned the right way to hold a hand saw. The key to successful hand sawing is positioning your fingers on the handle correctly. You have to get your index finger to point along the sawblade to get good control of the cutting. My boss was adamant about this. When a carpenter came looking for work he'd tell him to cut a board. If he pointed his index finger, he went to work.

*Lowell E. Reistad
Vason, Washington*

Router Post Protector

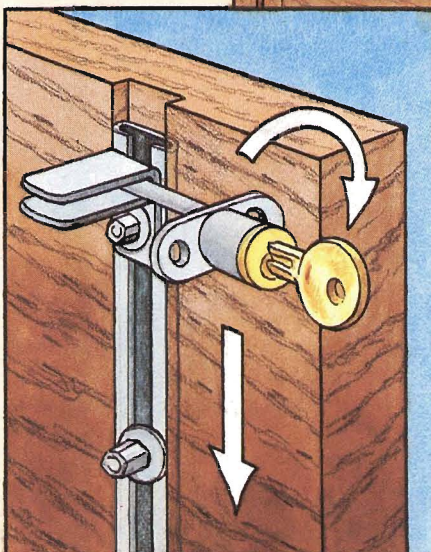
To protect a plunge router's posts from a mishandled wrench when changing bits, wrap the posts in short lengths of pipe insulation. Pipe insulation measures 2" thick with a 7/8" center hole. The slit along its length allows you to slip it onto the posts once it's cut to length.

*George O. Ecker
Westminster, Maryland*

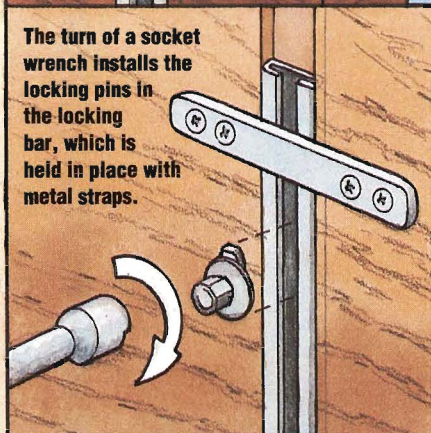
Today's Woodworker pays from \$35.00 (for a short tip) to \$150.00 (for each issue's "Pick of the Tricks") for all Tricks of the Trade published. Send yours to Today's Woodworker, Dept. T/T, Rogers, MN 55374-0044.

HARDWARE HINTS

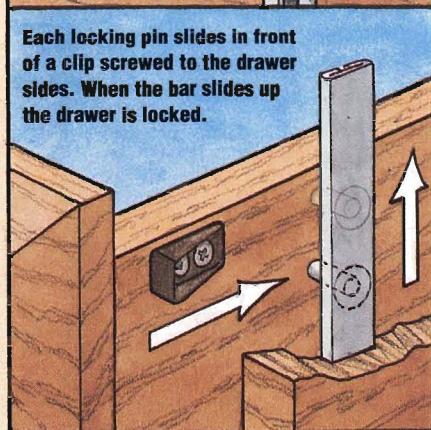
Secured Under Lock and Key



The key to the gang lock mechanism is its offset pin, or cam. The cam slips into a U-channel secured to the locking bar. Turning the lock will slide the bar downward so the adjustable locking pins release each drawer.



The turn of a socket wrench installs the locking pins in the locking bar, which is held in place with metal straps.



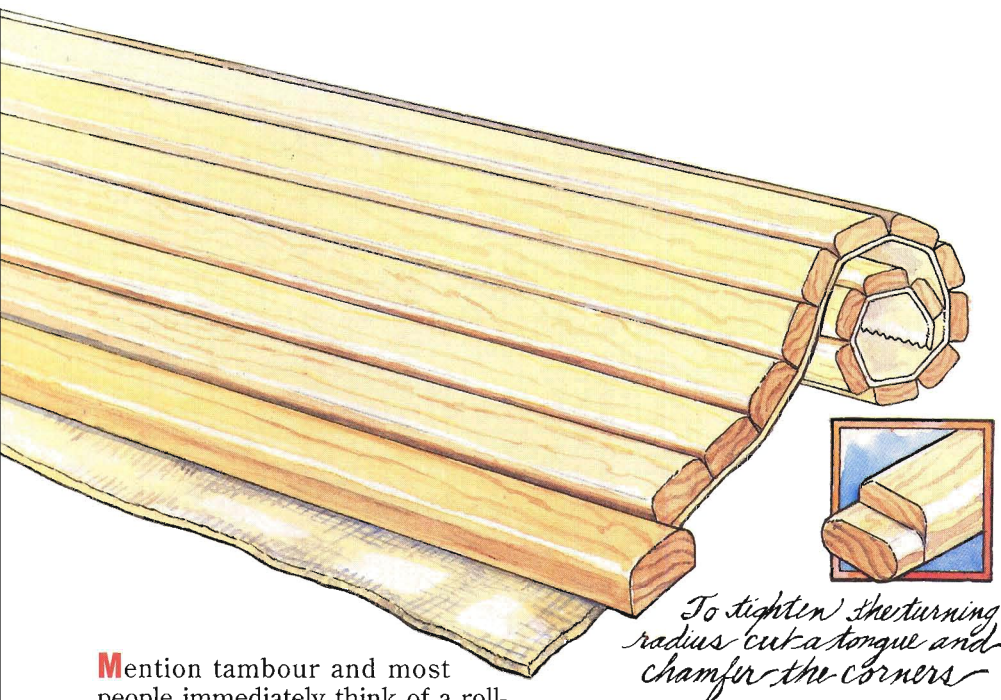
Each locking pin slides in front of a clip screwed to the drawer sides. When the bar slides up the drawer is locked.

Has your collection of valuables, computer software and documents outgrown your one locked desk drawer? Your next project can solve this problem if you incorporate a gang lock designed to secure a complete stack of drawers with only one lock. Because most of the mechanism mounts on the interior, an unobstructed exterior design is retained.

The locking bar is installed in a shallow groove cut on an interior side wall of the drawer cabinet. The lock itself may be installed on a drawer front or on a fixed rail above or below the drawers. A cam projecting from the rear of the lock activates the bar to provide the travel needed for the locking action. Adjustable pins on the bar engage drawer clips to prevent the drawers from opening.

This easy to install hardware will expand your storage space for valuables and eliminate the need for individual locks on each drawer. And since this lock mounts on the front, it can be used on built-in drawers that do not allow side access.

How to Make Tambour Doors



Mention tambour and most people immediately think of a roll-top desk. However, this type of door is actually suited for a wide variety of cabinets, and what's more, making a tambour panel is easier than building a common frame and panel door.

If you're unfamiliar with tambour, a quick review will help clear things up. A tambour door typically consists of narrow wood strips glued to a cloth backing, although some doors are made with wood strips connected by a wire cable or even linked together with sophisticated interlocking joints. The cloth backed type is the easiest to make in the home shop. With the cloth acting like a hinge connecting all the pieces, the door is capable of turning gradual corners. Once the tambour is made, it's installed in a cabinet with two parallel grooves which guide the panel into its open and closed positions.

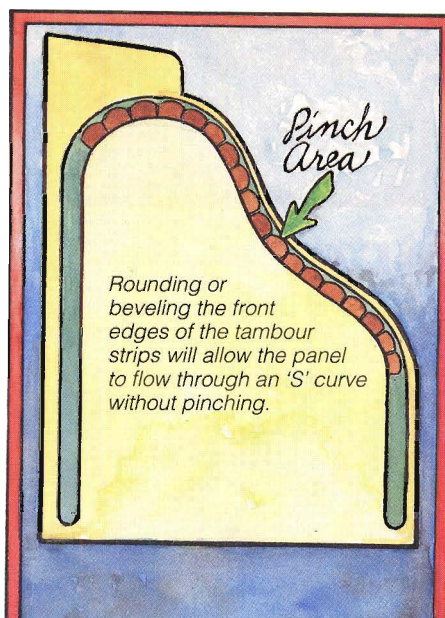
Tambour is usually made with wood up to 1" thick, although it's important to keep in mind that tambour panels will have a more difficult time turning corners as the thickness or width of the wood strips increases—narrower strips allow a tighter turn. Increasing the width of the cabinet grooves also accommodates thicker or wider stock, as does cutting a thin tongue on the ends of thicker strips.

Most often, the cabinet grooves follow one of two patterns; a single curve or an 'S' curve. In order for the tambour to glide through an 'S' curve, the front edges of the wood strips must be rounded or beveled so they don't pinch against each other as the panel flexes forward (See **Figure 1**). Relieving the edges isn't necessary on a door used in a single curve.

Making the Wood Strips

For the *Bread Box* project on page 13, the author used 1/4" thick by 5/8"

Figure 1:



wide strips—thin strips work best for a project of this scale. Cutting the strips can be done in one of two ways. If you rip a 5/8" thick board into 1/4" thick strips your tambour will have a quarter sawn appearance. If you prefer a plain sawn appearance, use 1/4" thick lumber and rip it into the 5/8" wide strips. With this second method, be sure to draw a large triangle on the face of each board before ripping so you can install the strips in the same order later on.

No matter which cutting method you choose, some of the strips will warp. It's always best, therefore, to cut about 25% more strips than you need for your panel. It's also a good idea to let your strips air dry for a few days to guarantee their stability. Once your material is stable, set up your router table for beveling or rounding over the the front edges of the strips. Relieving

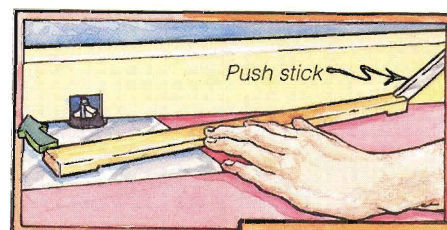


Figure 2: To keep the strips stable while routing, cut them six inches longer than necessary, then rout all but the last two inches on each end.



the edges will create a V-shaped gap between each pair of strips on the assembled tambour, allowing it to bend forward slightly in the 'S' curve, as shown in **Figure 1** at left.

Be sure to use a push stick to safely rout such small material, and make it a rule to cut the strips about six inches longer than you actually need (See **Figure 2**). If you can avoid routing the last few inches of each strip you'll always have a flat, stable surface contacting the router table while the rest of the strip gets increasingly tippy.

A Leggy Solution

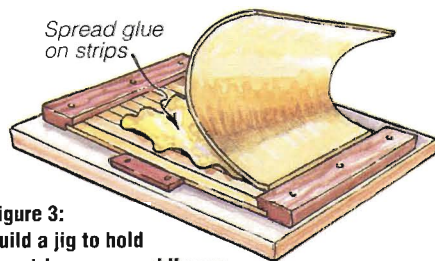


Figure 3: Build a jig to hold the strips square while you glue on the canvas backing.

Making the Panel

The ideal tambour backing is lightweight artist's canvas, available at art supply stores. For a project like this issue's breadbox, cut your fabric a few inches longer than the door size and 1/2" narrower than the length of the slats (you don't want the fabric reaching the cabinet grooves).

To hold the strips square while you apply the fabric, build the simple framing jig shown in **Figure 3**. Set the strips face side down in the jig and snug them together, then layout a line 1/4" from each side edge to use as a guide for spreading the glue and laying the canvas. Often, the last strip in a tambour is shaped differently for use as a handle, so be sure it's properly positioned in the panel. Apply yellow glue to the strips with a small brush, carefully working up to the pencil line, then lay the fabric on the wood and press it down evenly with hand pressure. After the glue dries for an hour, gently bend the tambour to break any glue bonds between the slats. Once this glue is removed with a knife, loosely curl the tambour and set it on end so the glue cures thoroughly.

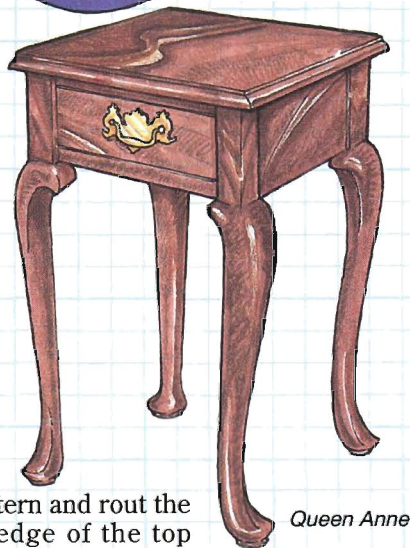
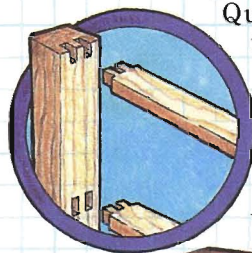
Trim off the excess canvas so about 1/8" on each end strip is revealed. To complete your tambour, install the panel in the cabinet, then cut one of the leftover wood strips 1/2" shorter than the rest and screw it to the fabric on the back side of the handle strip in the panel (**See Figure 4**). This will prevent the fabric from unraveling or coming loose from the wood.

Figure 4: Covering the end of the canvas with a back-up strip will keep the fabric from unraveling.



Often, woodworkers look at a magazine project and like the piece generally, but want to change some aspect of the design to suit their own taste. Many of us, however, don't know where to begin —what's the magic formula designers use? The real trick is to break a project down to its bare bones, where you'll usually find that a few basic changes can completely transform a piece.

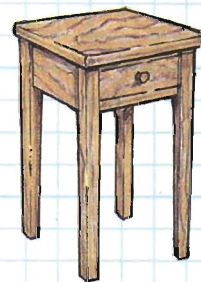
A side table like the one featured on page 16 provides a good example. Stripped down, it has four legs, a drawer, rails and a top. Now if you want to change the piece into a Queen Anne side table, approach each of these components separately. Replace the finely turned legs with a cabriole pat-



Queen Anne

tern and rout the edge of the top with a Roman ogee bit. The rails and drawer can remain virtually the same, as can the the joinery and the overall dimensions. With appropriate hardware and a glossier built up finish you'll complete the transformation.

Once you get rolling with this idea, design changes become second nature and you begin to see many common links between different fur-



Shaker

niture styles. For instance, if you appreciate the plain, understated simplicity of Shaker furniture, taper the legs on the side table and keep the edges on the top square. The plain wood knob is also a trademark of this style. Just remember, the Shakers usually tapered their legs on the two inside faces only.

A more elaborate Federalist furniture pieces of the 1790s. Adding flourishes such as spectacular veneer and inlay will transform what looked very much like a Shaker piece into this fancy urban cousin.

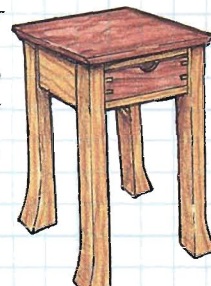


Federal

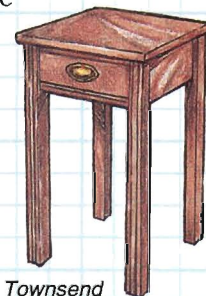
You can also make very specific changes to fit your furniture into a well defined style. Straight legs with reeding were typical of some Philadelphia Chippendale furniture and the work of the Townsend-Goddard family of Newport, Rhode Island. Beading around the drawer and rails will also contribute to this style change.

For an updated look, oriental styles are popular. Make legs that flair at the bottom and expose some of the joinery. Carving your own handles or cutting holes in the drawer rather than using hardware is also typical of this style.

Clearly there are many design options available, but these examples demonstrate how easy it is to change one or two basic elements in a project to give it a completely different look.



Oriental



Townsend Goddard

A Contemporary Futon Sofa Bed

You may need practical furniture, but who says it can't be beautiful and comfortable?

By Rick White



I stumbled onto some very unique hardware a while back, and I've been thinking about it ever since. It was a special hinge for a convertible futon couch and bed. I've seen plenty of futon couch designs, including our own in issue 4, but none have operated on a system as simple as this one, and the price is right. At about \$30.00 for the pair of hinges—and this is the only hardware required for the project—this is an unbeatable product.

To operate the hinge, you just lift up on the seat frame to rotate the couch forward (See Figure 1). When the back frame lays all the way down and the hinge reaches its limits, a catch is released allowing you to set the seat down in the bed position. One person can convert the couch to a bed with ease, and not only does the futon remain in place, but there's no need to move the couch as long as it's at least six inches from the wall.

A futon couch is ideal for people who have limited space but still need an extra bed. In my house it's a couch 90% of the time, but having a spare bed sure is handy when someone comes to visit. I imagine it's also a good solution for studio apartments and other tight living quarters.

For my taste, contemporary designs are best for futon couches, and in this case I needed large side panels to cover the hinges. However, I didn't want the sides to get too large or the couch would look monstrous. The compromise I made was to keep the hinges covered in the couch position, but when I convert the couch to a bed they show in the side opening.

I made my couch with walnut lumber, although you can substitute any wood you like. The project requires seventy

board feet of 1½" thick material, thirty board feet of ¾" stock and four board feet of 2" thick lumber. With the addition of a few screws and wood plugs, this is all you need. Futons are usually available in larger cities, but if you have no local source you can order several styles and sizes from KBM Inc. (P.O. Box 1001, 205 E. Lincoln, Fergus Falls, MN). This couch is designed for a full size mattress (sometimes called a double size).



The full size patterns in this issue feature all the shaped pieces needed for our futon couch project.

Out To The Shop

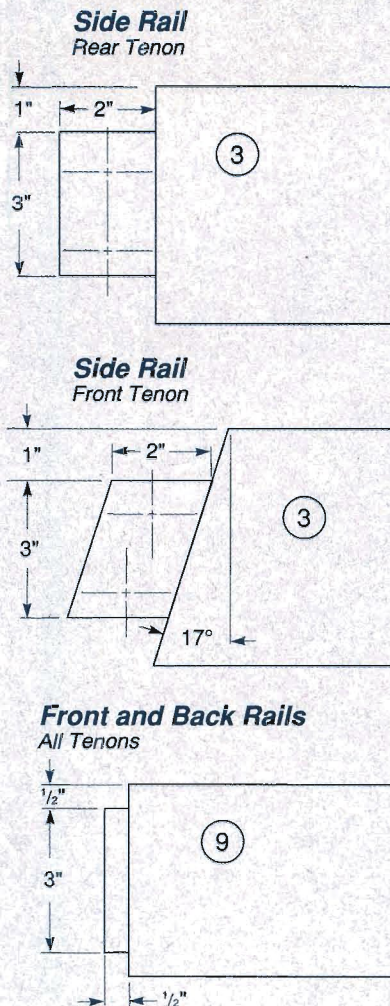
Begin working on your couch by building the two side assemblies, which consist of the rear legs (pieces 1), the front legs (pieces 2), and the side rails (pieces 3). First joint and glue up a panel for the rear legs, choosing stock with similar color and grain. Next, cut out the **full size patterns** of the rear leg and the front leg from the insert between pages 12 and 13, and make hardboard templates. Be sure to transfer all the joint location to the templates, and use a drill press to rough out the mortise openings on the face of each template. Clean up the mortise openings with a file to fit a 5/8" inside diameter rub collar.

Now cut stock to size for the front legs and clamp the template to the inside surface of one piece —make sure the projection for the mortise and



Figure 1: Converting the couch to a bed is easily accomplished by one person, and you only need 6" of clearance between the couch and the wall.

tenon joint is flush with the edge of the board (See **Figure 2**). Chuck a 1/2" straight bit in your router and install a 5/8" inside diameter guide bushing. Set the bit to cut 1/2" deep and rout the mortises in the face of the leg. Square the mortise ends with a chisel, trace around the template, then repeat the whole operation on the other front leg, making sure it mirrors the first piece. For the 2" deep mortises in the edge of the legs, use a *Dowl-it* jig and a 1/2" drill bit to rough in the openings, and a chisel to clean them out. Be sure to avoid drilling beyond the mortise angle at the top of the layouts (see *note on the full size pattern*).



Since the front legs slope at a 17° angle, for appearance sake it's best to match the grain direction on the rear leg to that same angle. Clamp the template on each rear leg panel so the grain runs across it at 17°, then trace around the pattern and rout the surface mortises.

The hinge installation requires a shallow mounting groove in each rear leg (see **rear leg full size pattern**). To cut the 1/2" deep grooves, clamp a straight edge to the panels and use your router with a 1/8" straight bit. When you complete this step, band saw all the legs to shape and sand their edges smooth.

Making the side rails is a bit more straightforward than making the legs. First rip your material to size, then crosscut one end of each piece square and the other end at a 17° angle — the length in the material list includes the tenons. Next, to form the tenons (see tenon details above), chuck a 1/2" straight bit in your router and

mount a straight edge guide to the router base. Adjust the bit to cut 9/32" deep and set the guide 1 1/2" from the bit. Pass the router over the stock several times to form each tenon cheek, then cut the edge shoulders with a hand saw.

Test fit the side rail tenons in the leg mortises and, once you're satisfied, chamfer the ends of the tenons a bit with a file. The chamfer will keep the tenon from forcing all the glue to the bottom of the mortise during the side assembly, which you can go ahead and do now. In order to clamp the legs squarely, make a few angled clamping blocks before you assemble the side frames.

When the glue has dried, sand the assembly smooth and drill 3/8" counterbores with 5/32" pilot holes at each joint (see **full size leg patterns**). Drive #8-3/4" screws (pieces 4) and fill the counterbores with end grain plugs (pieces 5). These screws reinforce the joints against excessive stress. Sand the plugs flush after the glue sets for about fifteen minutes.

Chances are, the ends of the legs in each side assembly aren't aligned. Use a long straight fence to reach from leg to leg and mark a cutting line to even out the leg ends. Now clamp the fence a few inches away so that a 1/2" bit in your router aligns with the layout line. Lower the bit and trim the leg ends.

To form tenons on the top end of each leg, install a 1/2" dado blade in your table saw and clamp a protective wood face to your fence. Slide the fence up to the blade and adjust the

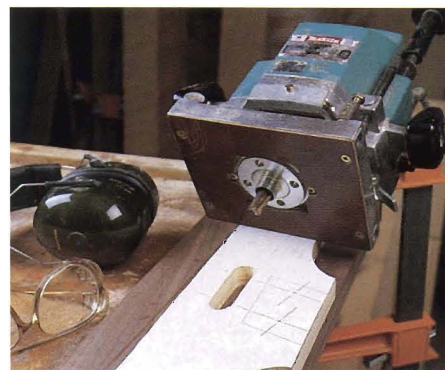
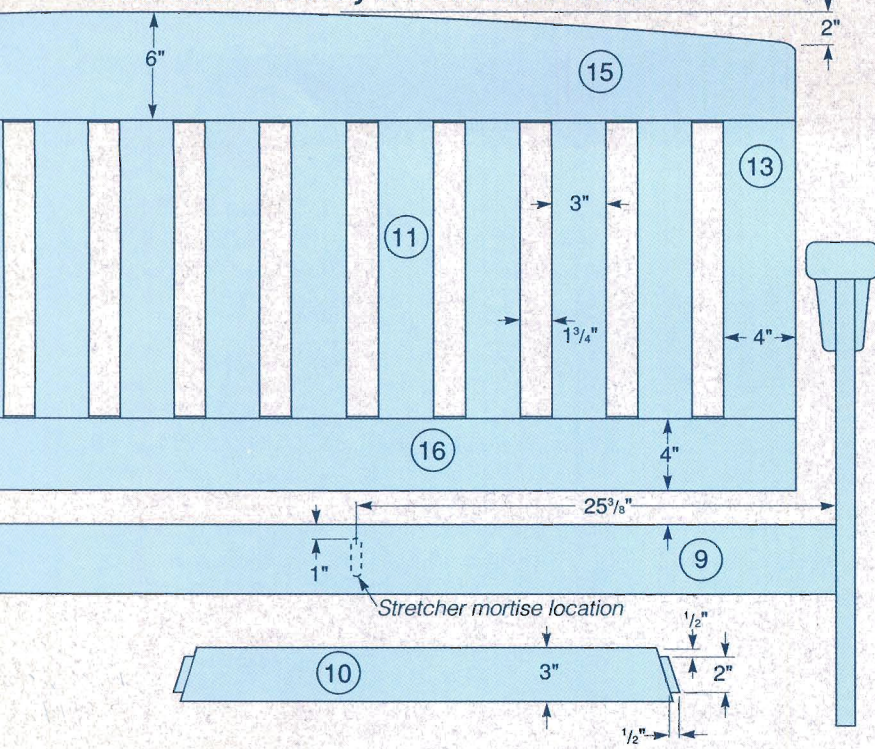


Figure 2: After drilling out the mortise location in the front leg template, clamp it to your stock and use a guide bushing to rout the face mortise.

Back Frame Assembly and Stretcher Details



saw to make $9/32$ " deep cuts. Pass the side assembly over the blade with the tops of the legs bearing against the fence. Cut the tenon edge shoulders by hand, then complete the sides by routing all the edges (except the bottom and top of the legs) with a $1/2$ " roundover bit.

Making The Arms

Shaping the arms (pieces 6) follows a specific sequence. First cut out the **full size arm patterns**, then cut your stock to size and layout the mortises for joining them to the side assemblies. Be sure to double-check these mortise positions against your actual sides and make any adjustments on the layouts. Now rout the mortises

with a $1/2$ " bit and a straight edge guide, following up with a chisel to square their ends.

Trace the side view arm pattern onto the edge of the stock and band saw this profile. Next, trace the top view pattern onto the arms and cut this shape as well. Glue the arm blocks (pieces 7) to the arms and rasp them into shape. Now rout the top edges of the arms with a $1/2$ " roundover bit, stopping a few inches short of both ends (**see full size pattern, top view**), then use a rasp and file to ease the remaining edges to about a $1/8$ " roundover.

Set the arms onto the sides and drill counterbored pilot holes at the joint locations. Next, spread glue in the

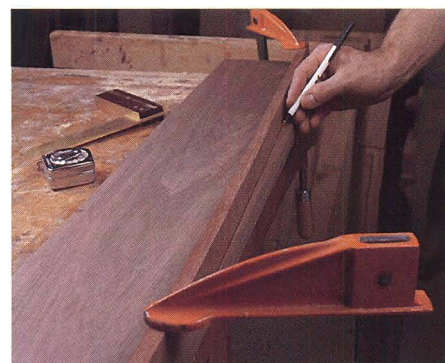


Figure 3: To layout a long curve, mark the end points on your stock, then clamp a wood strip from point to point. By flexing the strip in the middle you'll obtain a nice, even curve.

two smaller mortises, fit the joints and drive #8-2" screws (pieces 8) in all the pilot holes. Cover the screws with plugs (pieces 5) and sand them flush when the glue sets.

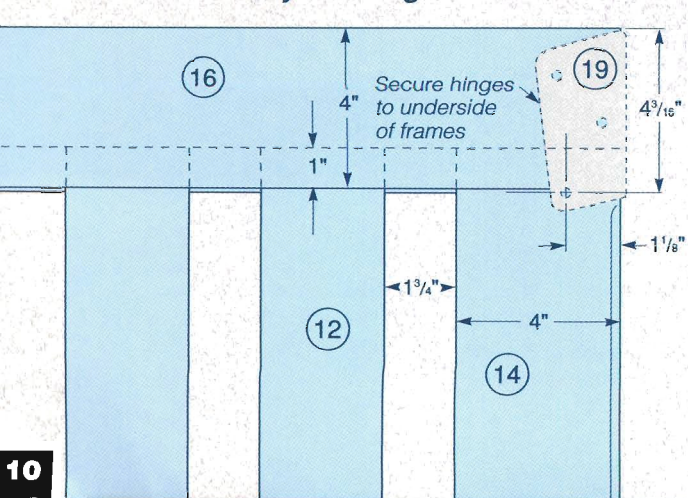
Connecting The Side Assemblies

Making the rails (pieces 9) and stretchers (pieces 10) that connect the side assemblies is similar to the method you used earlier to make the side rails. Cut the pieces to size, keeping the ends of the rails square and angling the ends of the stretchers 17° , then layout the two mortises on the inside face of the rails (**see elevation drawings at top left**). Rout the tenon cheeks with your router, a $1/2$ " straight bit and an edge guide, then remove the edge guide and clamp a straight fence to the rail stock for routing the mortises. Cut the edge shoulders by hand, and rout the rail and stretcher edges with a $1/2$ " roundover bit. Next, fit all the tenons in their corresponding mortises and drill counterbored pilot holes for #8-2" screws. Now spread glue in the joints and assemble the structure. Wrap up this step by filling the counterbores with plugs and sanding them flush when the glue sets.

Making The Seat and Back Frames

The seat frame and back frame are nearly identical, so it's easy to make the two assemblies at the same time. Cut all the pieces to size, including the slats (pieces 11 and 12), the stiles (pieces 13 and 14), the curved back rail (piece 15) and the remaining straight rails (pieces 16). Next, plough a groove down the inside edge of all four rails with a $1/2$ " dado blade raised 1 ". Once the grooves are cut, lower your blade to $9/32$ ", clamp a protective

Seat Assembly and Hinge Installation Detail



To install the hinges, first drill the pilot hole shown at left at the appropriate corners of the back and seat frames. Next, secure the hinges to the side panels (**see full size pattern for location**), then set the seat frame into the hinges and drive a screw in the pilot holes. Now that the seat frame is positioned, drill the remaining pilot holes and drive in the screws. Repeat this procedure for the back frame.

MATERIAL LIST

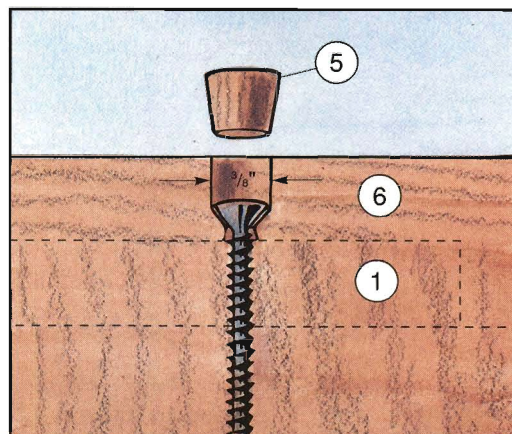
	T x W x L
1 Rear Legs (2)	1 1/8" x 21" x 25"
2 Front Legs (2)	1 1/8" x 5 1/2" x 28"
3 Side Rails (2)	1 1/8" x 5" x 15 1/4"
4 Screws (8)	#8-3/4"
5 Plugs (32)	3/8" dia. end grain
6 Arms (2)	2" x 4" x 35"
7 Arm Blocks (2)	1" x 4" x 5"
8 Screws (24)	#8-2"
9 Rails (2)	1 1/8" x 4" x 77 1/4"
10 Stretchers (2)	1 1/8" x 3" x 28 5/16"
11 Back Slats (14)	3/4" x 3" x 18 1/2"
12 Seat Slats (14)	3/4" x 3" x 17"
13 Back Stiles (2)	1 1/8" x 4" x 18 1/2"
14 Seat Stiles (2)	1 1/8" x 4" x 17"
15 Curved Back Rail (1)	1 1/8" x 6" x 75"
16 Straight Rails (3)	1 1/8" x 4" x 75"
17 Spacers (30)	1/2" x 1 1/8" x 1 3/4"
18 Handle (1)	1 3/4" x 2 1/2" x 75"
19 Hinges (1 pair)	Futon/couch conversion

Futon Sofa Hardware Kit

A hardware kit is available for this project that includes two futon sofa conversion hinges and fifty walnut end grain plugs.

Item # 20875 (use order form) ...\$29.95

Arm Joinery Detail



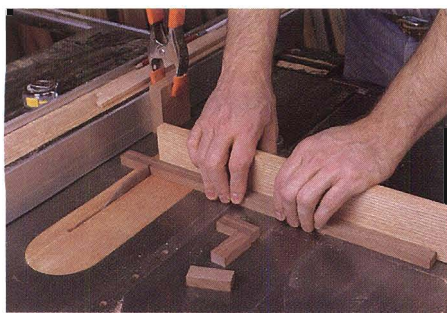


Figure 4: Clamp a set up block to your rip fence to cut the 1 1/2" long spacers, occasionally stopping the saw to clear the pieces away from the blade.

wood face onto your saw fence, and form a 1/2" thick by 3/8" deep tongue on the front edge of one straight rail. The tongued rail will serve as the front rail on the seat assembly.

Laying out the curve on the back rail is easily done with a few clamps and a flexible strip of wood (See **Figure 3**). Measure down 2" from the top edge of the board at each end and clamp a 1/4" thick strip at the marks. Now bend the strip at the center of the board's length and clamp it in place. Use a pen to trace the curve and cut the board with a saber saw.

The stiles and slats fit into the rail grooves with 1/2" thick by 1" long tenons. To cut the tenons, install a 5/8" dado blade in your table saw and clamp a protective wood face to the fence. Set the fence 3/8" from the blade and raise the blade 9/32" for cutting the stile tenons. Make two passes to cut each cheek, then lower the blade to 1/8" and cut tenon cheeks on the slats.

Spacers (pieces 17) must be placed between each slat in the frame assemblies to fill the rail grooves. Rip long 1/2" thick by 1 1/8" wide strips for the spacers and make sure they fit snugly in the grooves. Cutting the spacers to length depends on the time of year you're building the futon couch. If it's summer, cut the spacers to fit snugly in each gap. If it's winter, leave the spacers a little short so the slats can expand when the weather turns more humid. In any case, the spacers should be about 1 3/4" long, but be sure to check your assembly against this measurement—the spacers should be cut to fit. To make these repetitive cuts, clamp a set up block to your fence and set it 1 3/4" from the blade (See **Figure 4**). Make sure the block is clamped well away from the blade, and use your miter gauge to push the stock through. The spacers are

designed to rise above the rails just a little when they're installed (it would be very hard to sand the spacers between each slat if they were meant to be flush with the rails).

Gluing up the two assemblies is best done with a helper. Spread glue in the rail grooves and install the stiles, all the slats and all but the center spacers. Cut the last few spacers for a perfect fit, then draw the assembly tight with bar clamps. After the glue dries, sand the joints flush and roundover the outside edges of each frame except where you need square edges to install the hinge hardware (See **Figure 5**).

Cut out the seat handle (piece 18) from the full size patterns and use it to make a hardboard template. Now cut your material for the handle to size, and shape the handle following the steps shown in **Figure 6**. For the inside curves, you must adjust your core box bit several times to cut

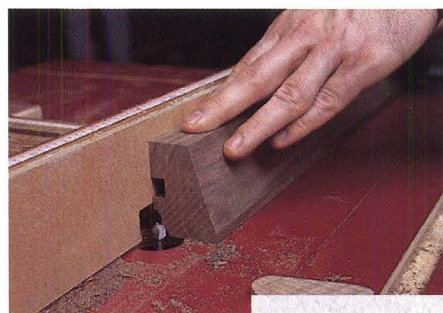


Figure 6: Four steps to shape the handle.

Step 1: Begin shaping the handle by cutting a 1/2" wide by 3/8" deep groove in the back and beveling the front at 17°.

Step 2: Next, make several passes over a 1/2" radius core box bit to shape the profiles of the inside curves.

Step 3: On three outside corners, use a 3/8" roundover bit and adjust each cut to match your full size template.

Step 4: Refine the bottom inside corner with a 1/4" roundover bit, then file and sand the piece smooth.

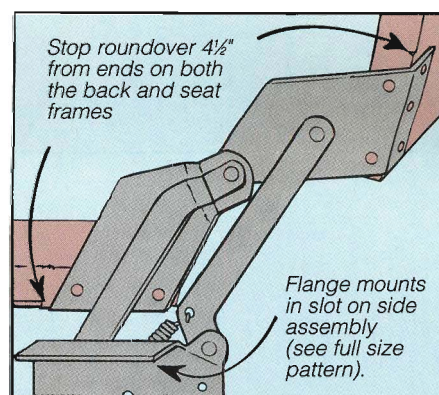
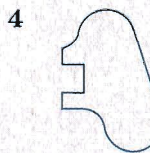
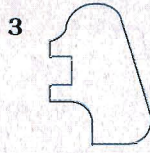
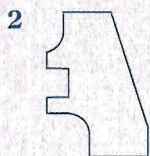
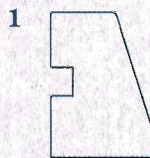


Figure 5: Rout the outside edges of the seat and back frames with a 1/2" roundover bit except at the hinge installation locations.

the full profile. When the handle is sanded smooth after the routing steps, glue it onto the tongue on the seat frame front rail.

Now that all the parts are made you can put together the couch. Because the frames are so big, I suggest getting help to hold them while you drive the screws for the hardware. First hold each hinge (pieces 19) in position against the sides to drill pilot holes (see **full size pattern for locations**), then secure them with screws. Next, set the seat frame in position and drill the pilot holes (see **frame elevation drawings on page 10 and Figure 5 above**). Secure the seat to the hinges, then repeat this procedure for installing the back frame. Try the hinge operation a few times to make sure it all works correctly, then disassemble the parts to do the finishing.

I coated my futon couch with Sam Maloof's rub on oil, which is a mixture of polyurethane and natural oils. This finish provides adequate protection, although, if you expect your couch to get hard use, you could top it off with a varnish for added durability. After allowing the oil to dry for several days, put the couch back together and set your futon in place.

I've found the couch comfortable and easy to care for. I put a slip cover over the futon so it can easily be washed when dirty, or replaced if damaged. All in all, this fold out futon has been easier to operate and more comfortable to sleep on than any sofa bed I've ever tried, and it's a heck of a lot lighter to boot.

Rick White, a professional woodworker, serves on the editorial advisory board of Today's Woodworker.

Build A Tambour Breadbox

Take a break from conventional door designs to discover new possibilities with tambour.

By David Larson

When a bakery recently opened down the street, no one in the neighborhood could resist the aroma of fresh bread and cinnamon rolls. Eating these delights reminded me of my childhood, when we always bought our baked goods in waxed paper bags and stored them in a breadbox. This kept the bread fresh for days.

Once I became a regular at the corner bakery, I decided to make a birch breadbox like the one I had as a child, right down to the sliding tambour door. Birch is a fairly easy wood to work and I like the warm honey color it takes on after a natural finish is applied. The breadbox doesn't require very much wood, but you'll need it in several thicknesses. I used three board feet of 3/4" thick stock and four board feet of 1/2" material for the carcase, and three board feet of 5/8" thick lumber for the tambour door. In addition, I used a small amount of 3/8" thick stock for the back rail and a piece of 3/8" birch plywood for the back. If you have a band saw, use 3/4" material for all the solid wood parts and resaw it into the thinner material. The breadbox took me about fifteen hours to complete.

Having purchased a biscuit joiner recently, I was anxious to use it on this project. With all the end grain to side grain joints, the biscuit joiner is a lot faster than routing dadoes and cut-

ting tenons. However, if you don't have access to a biscuit joiner, this box can easily be made with dowel joints. I recommend using a *Dowl-it* jig for all the end grain drilling if you do choose to dowel the joints. Be sure to take advantage of the joint layout lines **shown in the full size pattern insert** for whichever joining method you choose.

Glue And Machine Your Panels

Start constructing the breadbox by gluing together 3/4" thick stock for the two sides (pieces 1) and the cutting board (piece 2). I made one long panel, then cut it into the three pieces later. Also, join 1/2" thick material for the base (piece 3) and the false back (piece 4). When the glue dries, scrape and sand the panels flat, then cut the pieces to size. Cut stock for the middle shelf (piece

5) and top shelf (piece 6) as well. After the pieces are sized, rout the front edge of the shelves and the bottom with a 1/4" roundover bit.

Now cut out the **full size pattern** for the sides from the insert between pages 12 and 13 of this issue. Cut along the pattern's solid outside line, then trace this shape and all the layout lines onto the side panels. Make sure the two panels mirror each other after the layouts are completed. At this point, you probably will want to band saw the panels to shape, but I recommend suppressing this urge until after all the biscuit joints are cut and the tambour groove is routed.

Routing the tambour groove in the sides is done with the aid of a template. To make the template retrim the breadbox side



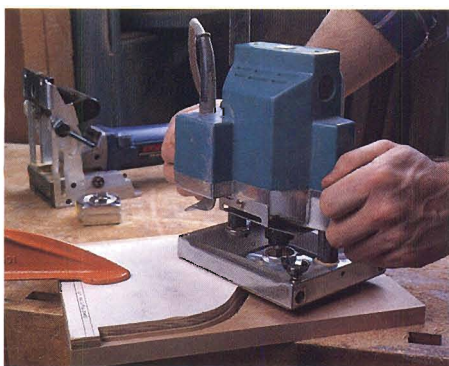


Figure 1: After clamping the template to your panel, rout the groove for the tambour door using a 5/16" straight bit with a 1/2" guide bushing.

pattern along the dashed line and trace this new shape onto some 1/2" thick scrap plywood. Band saw the plywood just outside the pattern line, then drum sand its edges to finalize the template shape. Now clamp the template to the inside face of one side panel and install a 5/16" straight bit with a 1/2" outside diameter guide bushing in your router. Set the router bit's cutting depth at 3/8" and rout the tambour groove in the panel—be sure to stop routing when you reach the corner on the template (See **Figure 1**). Rout the other side panel, then begin cutting the biscuit slots.

You've already laid out the joint center lines on your side panels so now you must mark the biscuit slot locations. Hold the base, false back, middle shelf (piece 5) and top shelf (piece 6) in position against the sides and mark locations for the biscuits, then cut the slots with your biscuit joiner. Use a fence to keep the joiner

steady while cutting into the face of the panels (See **Figure 2**). Once the biscuit joints are cut, use your router with a 5/16" straight bit and a straight edge guide to rout the dados for the cutting board. When the dados are completed, adjust your guide and bit depth to rout rabbets along the back edge of each panel for installing the plywood back panel (piece 7) and rail (piece 8).

Now band saw the sides to shape. Cut just outside the line, like you did with the template, then file and sand the edges to meet the line. Next, put the box together to make sure everything fits, and collect all the things you'll need for the real assembly. Take apart the box and spread glue in the joints, then press the project together with clamps. Be sure to check for squareness, and clean up any glue squeeze out when it sets to a rubbery consistency.

Completing the Breadbox Carcase

There are three parts left to complete the breadbox carcase. Rip and cut the back panel (piece 7) and rail (piece 8) to size, then set up a 1/4" dado blade in your table saw. Clamp a wood face to your fence and move the fence until it just brushes against the blade. Raise the blade to 1/2" and cut rabbets along the side edges of the cutting board (piece 2). Test the fit of the cutting board in the carcase dados and, if it fits too tightly, raise the dado blade a hair and make another pass. To

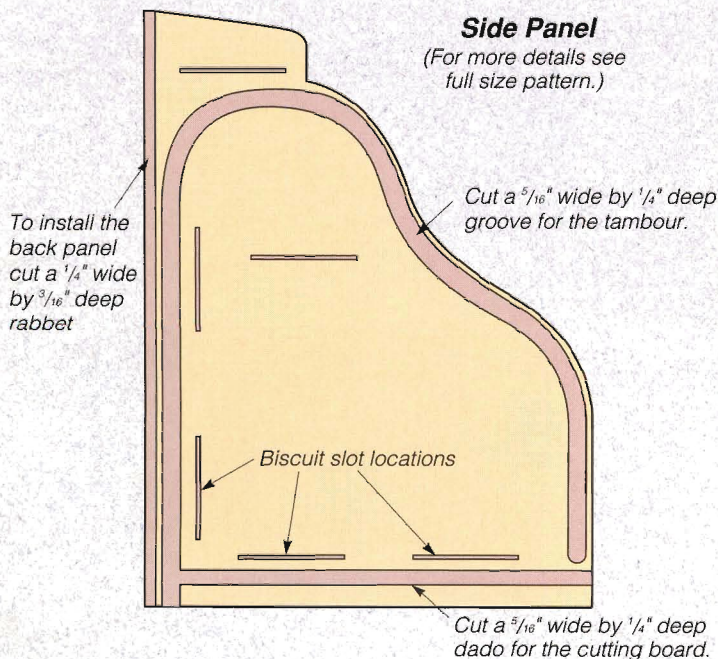


Figure 2: To keep the biscuit joiner steady during a face cut, first position the machine on the cutting line, then clamp a fence to your stock.

cut rabbets in the back panel and rail, lower the dado blade to 3/16", then glue and nail them to the back edge of the sides.

Making the Tambour

The tambour door and handles are all that remains to finish the project, and the instructions for building the door are detailed in the *Techniques* article on page 6. Rip about 25% more slats (pieces 9 and 14) than you'll need for the door, and cut them about 6" longer than the finished dimension. Rip a couple of 3/8" thick strips for the end slat (piece 10) as well. Allow the slats to sit for a few days so they adjust to their surroundings, then cull out the twisted slats. Set up your router table with a 1/4" roundover bit and rout the edges of the slats, but start and stop the routing 2" from the



MATERIAL LIST

	T x W x L
1 Sides (2)	3/4" x 9 1/4" x 12 5/8"
2 Cutting Board (1)	3/4" x 7 1/8" x 15 1/8"
3 Base (1)	1/2" x 7" x 15"
4 False Back (1)	1/2" x 9" x 15"
5 Middle Shelf (1)	1/2" x 3 3/4" x 15"
6 Top Shelf (1)	1/2" x 3" x 15"
7 Back Panel (1)	3/8" x 11 1/8" x 15 3/8" (plywood)
8 Rail (1)	3/8" x 1 1/4" x 15 3/8"
9 Slats (18)	1/4" x 5/8" x 15 1/2"
10 End Slat (1)	3/8" x 5/8" x 15 1/2"
11 Canvas (1)	1/16" x 15" x 14"
12 Door Handle (1)	1/2" x 1 3/8" x 2 1/4"
13 Cutting Bd. Handle (1)	1/2" x 1 1/4" x 2 1/4"
14 Back-up Strip (1)	1/4" x 5/8" x 15"
15 Screws (6)	#4-1/2" brass round head
16 Screws (2)	#6-1 1/4" brass round head

ends of each slat as described in *Techniques* on page 6. Leaving the ends square will keep the slats steady during the routing process. After the routing is finished, cut the slats to length.

Since it's thicker than the others, the end slat must have tenons cut on its ends to fit into the tambour grooves. Set up your table saw with a 1/4" dado and raise the blade 1/8". Clamp the protective wood face to the fence and move it so it just touches the blade. Now pass the ends of the slat over the blade to form the tenons. Next, raise the blade to 1/4" and cut the bottom edge of each slat end.

Cut the canvas (piece 11) to width and glue it to the slats as described on page 6. When the glue dries, trim the canvas to length (1/8" short on the front end) and slip the door into the tambour groove in the carcase. The door should glide easily around to the front of the breadbox.

Cut out the **full size patterns** of the handles (pieces 12 and 13) and trace these shapes onto some 1/2" thick stock, making sure the straight edge on each pattern aligns with the edge of the board. Now mark the center of the cutting board handle and cut a biscuit slot at this location. Also, center a corresponding slot in the front edge of the cutting board. Next, use a 3/8" bit to drill just outside each

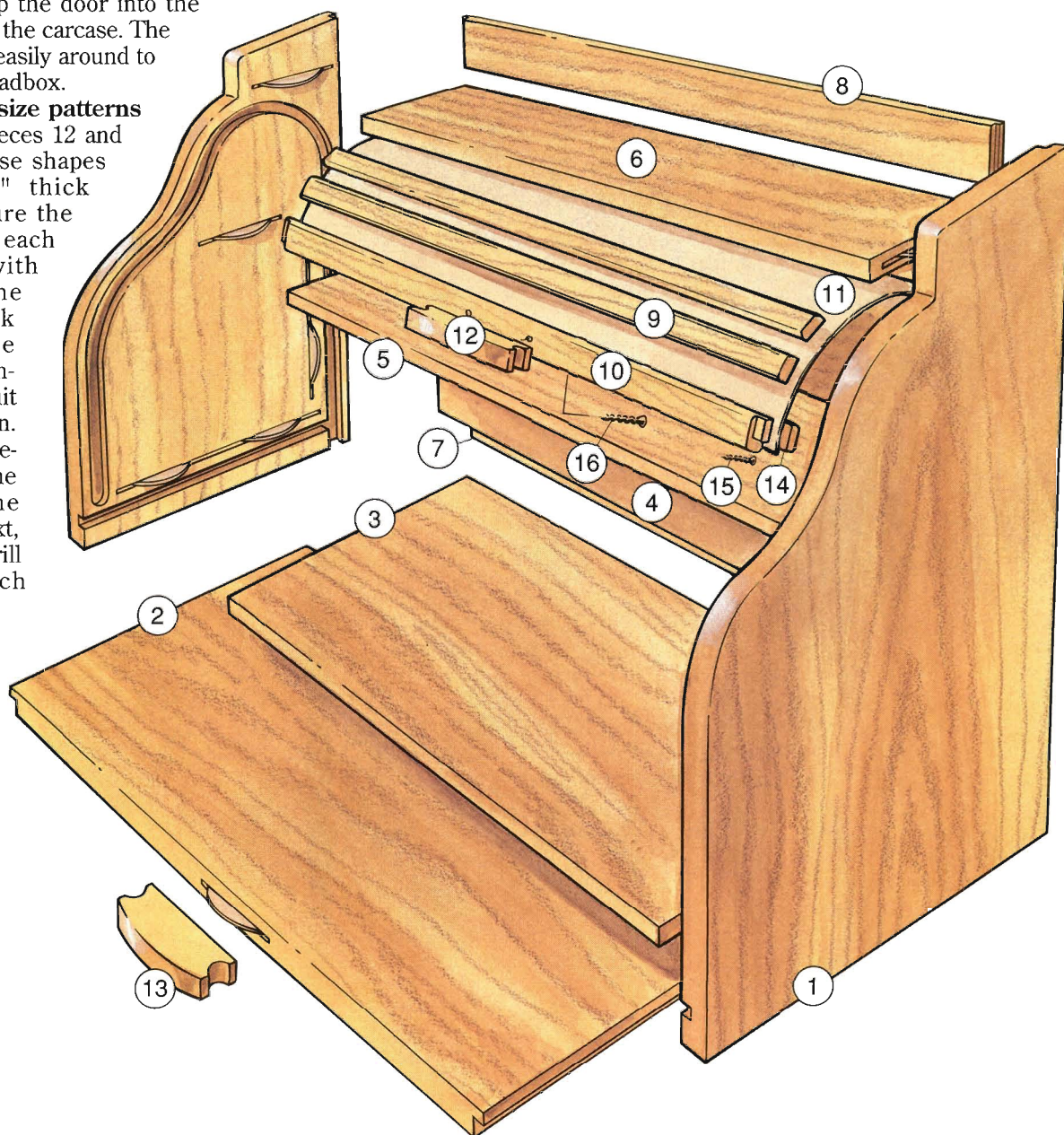
handle pattern to form the finger pulls, then cut the rest of the shape with a band saw. Shape the handle edges with a file until they're smoothly rounded. Glue the cutting board handle into place with a biscuit, but hold off on the other handle until the door is finished.

Remove the tambour door and give the entire breadbox a thorough sanding, including the extra handle and back-up strip. Since I prefer a light finish on birch, I hand rubbed the box with a tung oil type finish, making a special effort to avoid getting oil on the canvas. After the oil dries, wax the tambour grooves and reinstall the door. Secure the back-up strip (piece 14) to the end slat with #4-1/2" brass round head screws (pieces 15). Don't

spread glue between these strips or you'll never get the door back out of the breadbox if it needs to be repaired. To mount the door handle, drill 1/8" pilot holes through both the end slat and back up strip and drive in #6-1 1/4" brass round head screws (pieces 16).

The breadbox looks great in the kitchen, and my bakery goods are staying fresh for a few extra days (that is, if they have the chance to stay there that long). And now that I know how easy it is to make tambour panels, I'm thinking about all the other possibilities for this method of door construction.

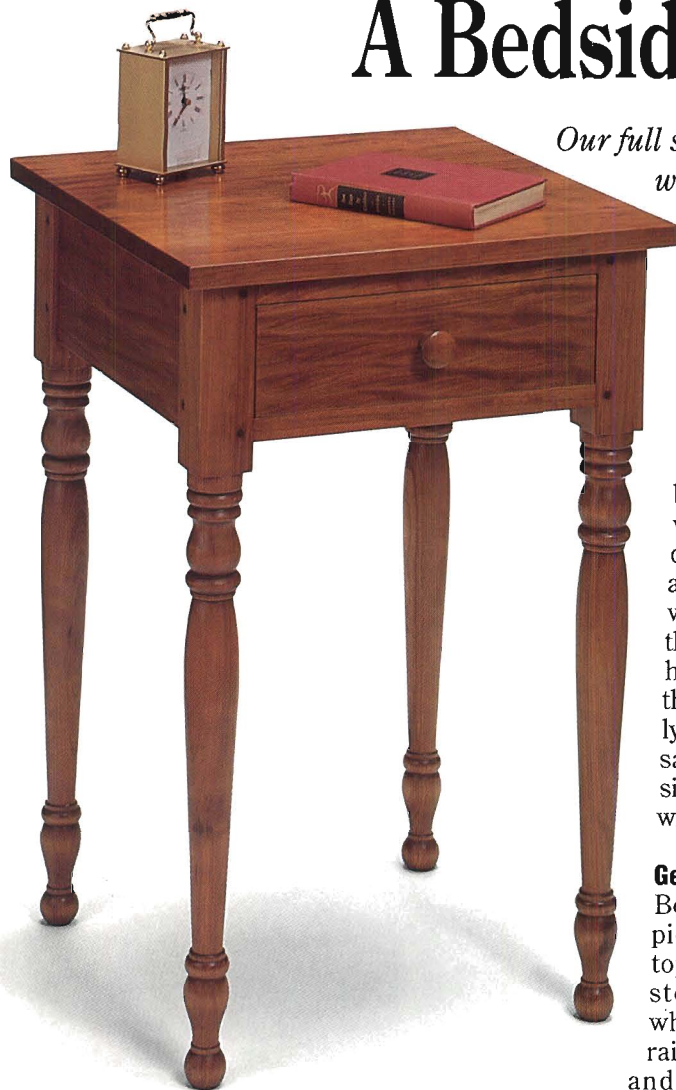
David Larson is an amateur woodworker who spends much of his spare time building a houseful of furniture.



A Bedside Table

Our full size leg pattern and the author's step by step instructions will guide you through this antique inspired project.

By Tim Johnson



ommend cutting your pieces from one continuous length of lumber.

You'll also need three board feet of secondary wood for the hidden drawer parts. Traditionally pine, poplar, or basswood were used because they're easily worked by hand. Unfortunately, these woods wear quickly, so I generally use rift sawn oak for the drawer sides and back, and stick with pine for the bottom.

Getting Started

Begin by gluing up three pieces of cherry for the top (piece 1) and cutting stock for the carcase, which includes the front rails (pieces 3), the sides and back (pieces 4), the drawer runners (pieces 5), filler strips (pieces 6) and drawer stops (pieces 7). Label each piece and set them aside.

Cut your legs (pieces 2) to size and layout the shoulders on each piece. I like to press masking tape along the shoulder lines at this stage. If I get a little tearout while turning, the tape holds onto the small pieces so they're easy to glue back in place. Now use a compass to layout a 2" circle on the foot end of each piece. Tilt your band saw table 45° and trim the corners on each leg up to the 2" circle layout (See **Figure 1**). Cut from the foot end of the legs to within 1/2" of the shoulders. Trimming the legs now makes turning the stock that much easier.

The next step is to make a template, or story stick, to assist you during the turning operation. Cut out the **full size pattern** of the leg from the insert between pages 12 and 13, and glue it onto some hardboard. Trim the hardboard to match the box



Figure 1: To make your legs easier to turn, tilt your band saw table 45° and trim the edges off each blank from the foot end to the shoulder lines.

around the leg pattern, then use a band saw to notch the template just a hair at each of the major layout lines.

Chuck a leg blank in the lathe so its square end is near the head stock. With the lathe speed at 800 rpm, turn the blank round using a large gouge, then switch to a 1/2" parting tool to nibble up to the taped shoulders. Now hold your story stick against the blank while the lathe is running and set a pencil in each notch to layout the major points on the leg. I use a red pencil so the marks show up well (See **Figure 2**). Adjust the lathe speed to 1200 rpm and, using a 1/8" parting tool and a caliper, turn the reference marks to their proper diameter (See **Figure 3**). At reference points between the beads, leave the turning a little fat so you can cut deeper with a skew chisel later. Once the reference points are cut, use a small gouge and rounded scraping tools to shape the vase and the coves (See **Figure 4**). Trust your eye to create evenly rounded rings and smooth transitions. Remember that like an antique, part of this table's charm is having legs that aren't perfectly matched and show the hands of the maker.

When the leg is fully shaped, reduce the lathe speed to its slowest setting and sand with 100 grit paper to remove any tool marks, then use 120 grit paper to smooth the surface. A wood block will help you control the sanding on long, gentle tapers.

Small, single drawer tables have been a favorite of furniture makers and their patrons for generations. As an antique dealer, I've bought and sold nearly one hundred of them over the years, ranging in style from prairie primitives to city sophisticates. It's this broad capacity for variation that attracts me to these tables. Curiously, I've never owned a matching pair of antique side tables—they've all been one of a kind. In fact, I built this table in 1986, intending for it to be the first of a pair. Seven years later, it still has no mate.

My table requires only seven board feet of 3/4" thick cherry and four 30" long leg blanks. When choosing your material, look for 6" to 7" wide boards so that the sides, back and drawer front will be single planks and the top a three piece lamination. Look for color and grain similarities in all your wood, and for the leg stock I rec-

Drilling The Mortises

On many old furniture pieces I see marks at the bottom of mortises left by center point drills. In keeping with the craftspeople of yesterday, I prefer to follow this same method. Arrange the legs in the order that suits you, and label them for each position on the table. Be sure to hide sapwood or turning flaws by positioning that spot away from view on the table. Layout the mortises as shown in the elevation on page 18, and scribe a line down the middle of each mortise layout to help you position the entry point for the drill bit.

Clamp a fence to your drill press table to center each mortise under the bit and set the drilling depth at 15/16". Now drill holes at each end of the mortise layout, then drill out the rest of the waste (See Figure 5). I leave about 3/16" between the first set of holes, then come back and drill out the small bridges. Drilling this way keeps my mortises very straight and square. Chisels will make quick work of cleaning up the mortises. While you're at the drill press, layout and drill the 1 1/4" deep drawboring holes in the legs as shown in the full size leg pattern.

Machining the Sides and Back

Cutting tenons on the sides and back (pieces 4) is done with a table saw and a 1/2" dado blade raised 1/4". Set the fence 3/8" from the blade to yield 7/8" long tenons. Make test cuts in scrap until you get a nice slip

fit in a leg mortise, then cut your table pieces. Once the cheeks are cut, raise the blade height to 1/2" and cut the edge shoulders.

To cut the double stub tenons on the front rails (pieces 3), set your dado blade height at 3/8" and cut the outside cheeks (see elevation drawing on page 18). Cut the 5/8" wide gap between each pair of tenons with a hand saw and chisel.

Now install a 1/4" wide dado blade and raise it 1/4" to rip a groove in each side piece 1/4" from the bottom edge. Next, clamp a wood face to your fence, slide the fence up to the blade and rip the edges of each drawer runner (pieces 5) to form 1/4" thick tongues.

Assembly

It's time for a test assembly of the table base. Fit the major pieces together and, if the joints are too tight, check the tenon edge shoulders first—that's usually where the problems are. If the joints are loose, shim the tenons to achieve a slip fit. Mark the members of each joint with a letter to make reassembly easier.

With the table fully assembled, use a 1/4" center point drill bit to mark the drawboring holes in the tenons. Slip the bit into each leg hole and tap it with a hammer. Disassemble the table and you'll see the marks left by the bit. Now use an awl to make new marks next to the old ones 1/32" closer to the tenon shoulders, and drill these locations with the 1/4" bit (see



Figure 5: To rough in a mortise, first drill at the ends of the layout, then bore holes every 1/2". Finish up by drilling out the stock between the holes.

detail on the next page). I use the drill press to assure straight holes.

I prefer the old time look of square pins, so I used a 1/4" chisel to square the holes in the legs to a depth of 3/8". To prevent tearout during this step, make a scrap tenon to fit in the leg mortises and be sure to back up the tenons with another piece of scrap.

When the joints are reassembled the holes won't line up. However, when the pegs (pieces 9) are driven in, they will draw the tenoned pieces tightly into the legs. These are drawpinned joints. To make the pegs, rip stock into 1/4" x 1/4" strips and cut these strips into 1 3/8" long pieces. Leave the first 3/8" of each piece square, then wittle the rest of the peg round (see elevation detail on page 18). Taper the end of each peg to make driving them easier and so they won't force all the glue to the bottom of the holes.

Three Steps for Turning Your Side Table Legs



Figure 2: Once you've turned the blank round with a large gouge and nibbled up to the shoulder lines with a parting tool, use your story stick to layout the major parts of the leg.



Figure 3: The story stick lines represent the high and low areas of the leg. Use your caliper and a parting tool to cut the low areas to a slightly larger diameter than their finished dimension.



Figure 4: A small gouge and a diamond shaped scraper work well for cutting the beads and coves on the legs, while a large gouge and a skew chisel are best for shaping the long tapers.

Before assembling the table base, drill expansion holes in the sides and back, and fixed holes in the upper front rail for attaching the top. Use a 3/4" Forstner bit to form pockets for the screw heads in the sides and back, drilling at a 10° angle, followed by 3/16" pilot holes (see detail drawing below). In the upper front rail, drill countersunk 5/32" pilot holes.

Now glue up the carcase in three stages: first the front legs and rails, then the back assembly, and finally pull these two assemblies together with the sides. As soon as you get each joint assembled, put a little glue on each peg and drive them in. Complete the base by adding the drawer runners and fillers (pieces 5 and 6). Remove any excess glue with a chisel when it becomes rubbery.

Cut the top to its finished dimensions and sand it thoroughly, then turn it upside down and center the base on it. Clamp the pieces together and extend the pilot holes from the base into the top with a 3/32" bit. Now secure the top to the base with #6-1 1/4" screws (pieces 8).

Building The Drawer

The last thing to build is the drawer. Cut the drawer front (piece 10), back (piece 11) and sides (pieces 12) to size, but be sure to double-check your actual drawer opening with the drawer sizes in the material list. Next, lay-out the dovetail pins. For cutting the

half-blind pins on the front I saw the walls partway, then remove the waste with a 1/4" chisel as described at right. Once the half blind pins are formed, cut the through pins on the back, then hold the sides in position against the pins and mark the tails (for more details on cutting through dovetails see Issue 19, January 1992).

Use a dado blade to cut 1/4" wide by 1/4" deep grooves in the sides and front (see exploded view detail at right) for holding the bottom panel (piece 13). Dry fit the drawer, and make sure it slips into the carcase opening easily—remember, wood expands in the summer. Also, check to see that the bottom edges of the sides and front sit flat on the drawer runners. If the drawer is twisted, shave the offending side until all edges slide smoothly on the runners.

Glue up pine stock for the drawer bottom, then cut it to size and sand it smooth. Next, tilt your table saw blade 12° to bevel the underside of the panel on its side and front edges so it fits the drawer dadoes. Slide the bottom into place and drill a 5/32" countersunk pilot hole to drive a screw through the bottom and into the back. With the same set up, drill a pilot hole for the knob (piece 14) as well. I turned my own knob, but many similar styles are available that will do just as well. After the drawer fits properly, customize the stops (pieces 7) so your drawer front sits flush with the front



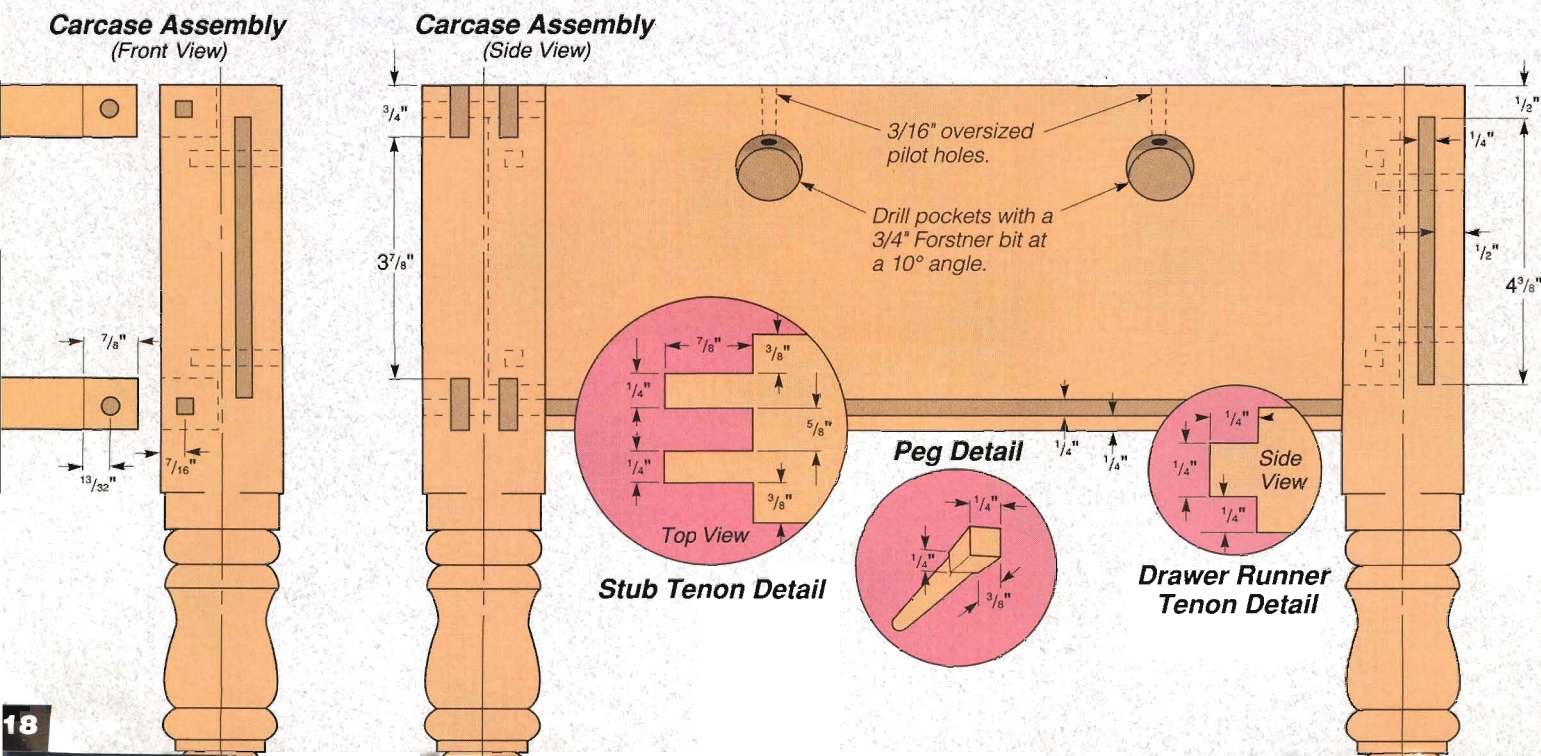
Figure 6: Marking gauge layout lines, slightly irregular dovetails and square drawboring pegs are telltale signs left by the hand of a craftsman.

rails, then glue them to the inside surface of the carcase back.

Sand everything to 180 grit, then apply a wash coat of shellac as a sealer (otherwise cherry can be blotchy), followed by at least two coats of varnish and a final rubbing. After the varnish dries, wax the drawer runners to make them a little slippery.

As you can see, I'm strongly influenced by the antiques that come through my shop. For me, this connection with craftspeople of the past is part of why I'm a woodworker. But remember, if you want a pair of tables, build them right away, otherwise it's likely to slip away from you, just as it has for generations of woodworkers before you.

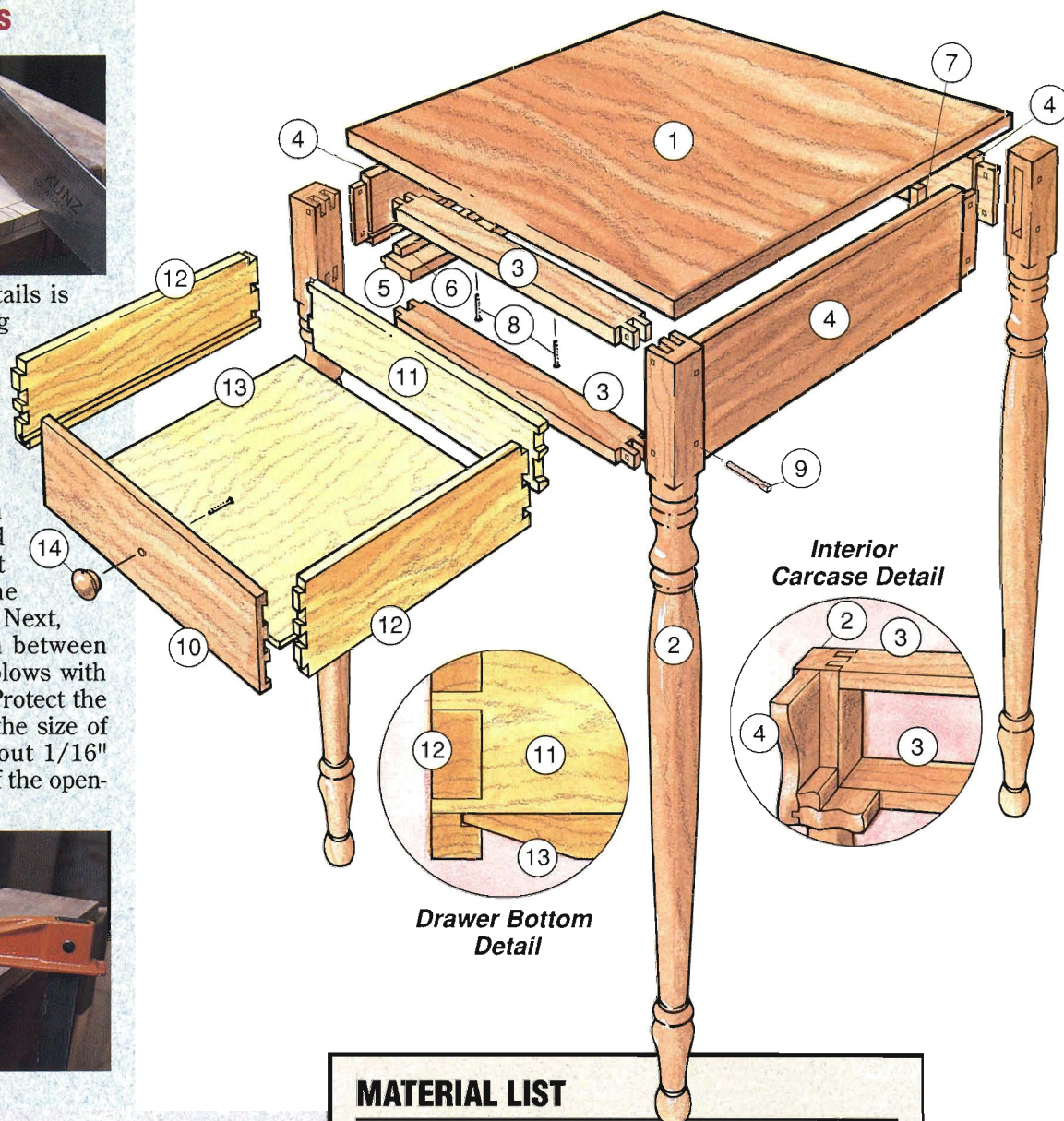
Tim Johnson owns Complements, an antique store in Minneapolis, Minnesota, and is a professional woodworker.



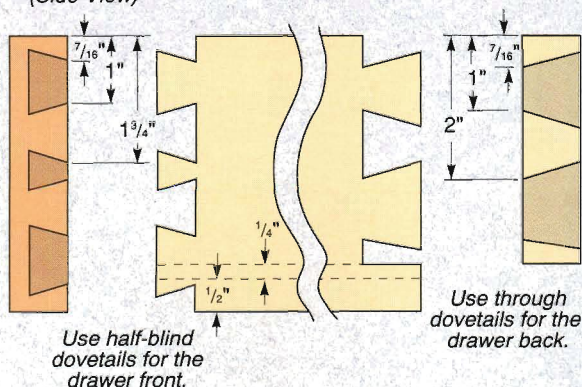
Half-Blind Dovetails



Cutting half-blind dovetails is very much like cutting through dovetails. Use a marking gauge to lay-out the depth of the joint on the ends of the drawer front, then lay-out the half-blind pins. Cut halfway down each pin wall with a fine hand saw, making sure to cut on the waste side of the lines (as shown above). Next, remove the waste from between the pins, making light blows with your chisel and mallet. Protect the pin corners by limiting the size of the waste pieces to about 1/16" thick by half the width of the opening (see below).



Drawer Joinery (Side View)



MATERIAL LIST

	T x W x L
1 Top (1)	3/4" x 17 5/8" x 17 5/8"
2 Legs (4)	1 1/2" x 1 1/8" x 27"
3 Front Rails (2)	3/4" x 1 5/8" x 14"
4 Sides and Back (3)	3/4" x 5 3/8" x 14"
5 Drawer Runners (2)	3/4" x 1 5/8" x 12 1/2"
6 Filler Strips (2)	3/4" x 3/4" x 12 1/2"
7 Drawer Stops (2)	3/4" x 1" x 3 1/2"
8 Screws (8)	#6-1 1/4" flat head
9 Square Pegs (16)	1/4" x 1/4" x 1 3/8"
10 Drawer Front (1)	3/4" x 3 3/4" x 12 1/8"
11 Drawer Back (1)	3/4" x 3" x 12 1/8"
12 Drawer Sides (2)	3/4" x 3 3/4" x 13 5/8"
13 Drawer Bottom (1)	3/4" x 13 3/4" x 11 5/8"
14 Knob (1)	1 1/2" Diameter

Precision Crosscutting Jig

Spend a day or two making this project and the results will improve your woodworking accuracy for years to come.

By Chris Inman

Woodworking is an exercise in precision. A fine joint that crisply mates two pieces of wood into a single, strong unit depends on a craftsman's ability to make the cuts accurately. It's possible to carry this to ridiculous limits (as when people talk about tolerances in thousandths of an inch), but in woodworking, differences under 1/64" are generally acceptable. Trimming a board to the correct length with square ends lays the foundation for all subsequent layout and joint cutting steps. It's essential, therefore, to make these first cuts as perfect as possible, and there's no better tool for getting this done than a crosscutting jig for your table saw.

While 90° cuts are the first priority of a crosscutting jig, it's a bonus if it handles miters as well. This jig has a mitering accessory for cuts from 0° to 65°, with positive stops at 22½° and 45°.

Building the Jig Base

The core of the crosscutting jig is a piece of 1/2" thick Baltic birch plywood (piece 1). The jig described

here was made for a Delta Unisaw. You should size your jig for your saw—a good rule of thumb is to cut the plywood the same size as the saw table. Make sure the plywood is perfectly flat, then cover both faces with plastic laminate (pieces 2) for a durable, long lasting surface. Choose a light color that allows you to see any pencil marks drawn on the jig.

Trim the laminate with a flush cutting router bit, then layout the entry holes and the pivot hole for the miter fence accessory (see **base elevation drawing on page 21**). Use a drill press and a 3/4" Forstner bit to bore 3/8" deep entry holes for the T-bolt slot, then flip the panel over to drill a 1/4" deep counterbore at the pivot hole location. Now switch to a 5/16" bit to complete the pivot hole.

Cutting the curved T-bolt slot in the base requires a simple circle routing jig (See **Figure 1**). Make the jig and attach it to your plunge router. Chuck a 3/8" straight bit in the collet and align the pivot hole in the jig with the pivot hole in the crosscutting jig base. Press a 5/16" bolt through the holes

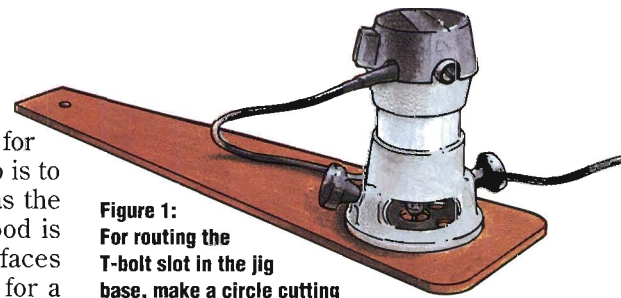


Figure 1:
For routing the T-bolt slot in the jig base, make a circle cutting jig from 1/4" plywood.

and adjust the bit so it touches the bottom of the entry holes. Now rout a slot to connect the two entry holes, then switch to your T-slot cutter, adjust its cutting depth, and complete the slot.

The runners (pieces 3) must fit the miter gauge slots in your saw table, yet not be so tight that the jig binds. Using wood runners is common, but wood changes with airborne moisture. A better choice is to use a stable, self-lubricating plastic, like polyethylene.

To install the runners, first cut shallow dadoes in the underside of the base so they're laid out just like the miter gauge slots in your saw table. Clamp the jig base squarely on your saw table and mark the miter gauge slots, then measure the width of your slots and install a dado blade of the very same size. Now set your rip fence to align each set of marks with the blade and cut 1/16" deep dadoes. These cuts must be as accurate as possible.

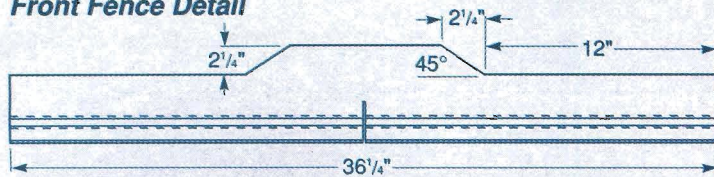
Rip your plastic stock to the exact width of your dadoes, then place the two runners in the dadoes and drill 5/32" countersunk pilot holes. Use #8-3/4" screws (pieces 4) to secure the runners. Test the jig base on the table saw and, if the runners bind in the slots, use a cabinet scraper to shave them until they operate smoothly.

Installing The Fences

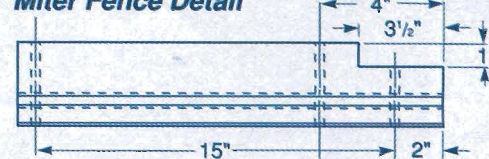
Now that the jig base is constructed build the three fences (pieces 5, 6 and 7). Cut your stock to size and shape following the **elevation drawings at right**, then set the rear fence aside so you can rout T-bolt slots in the front fence and miter



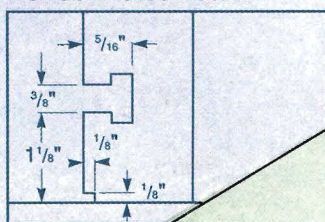
Front Fence Detail



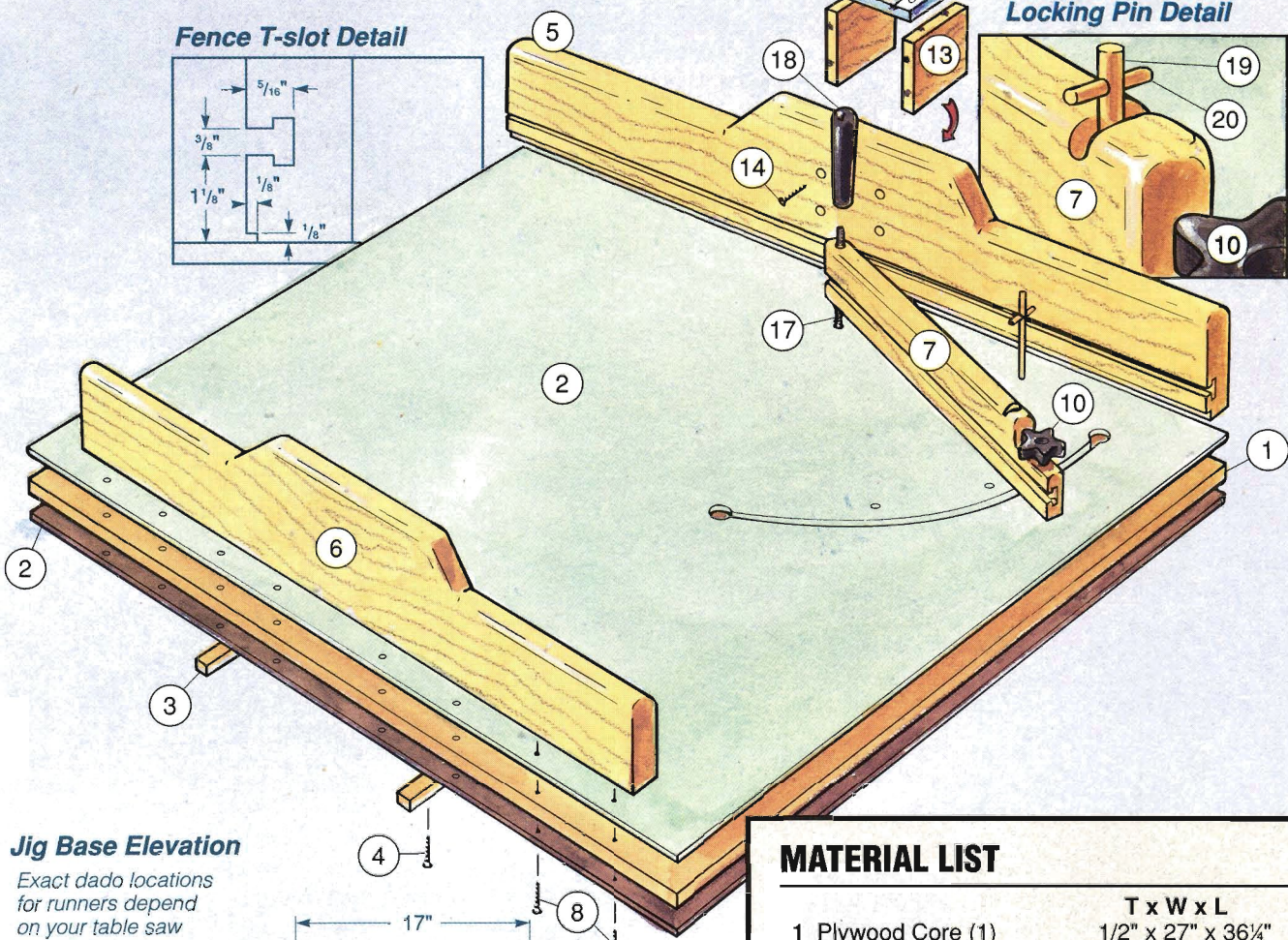
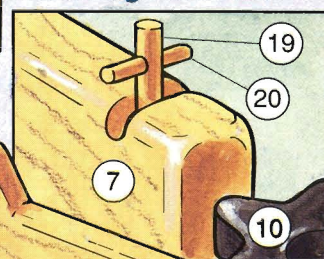
Miter Fence Detail



Fence T-slot Detail

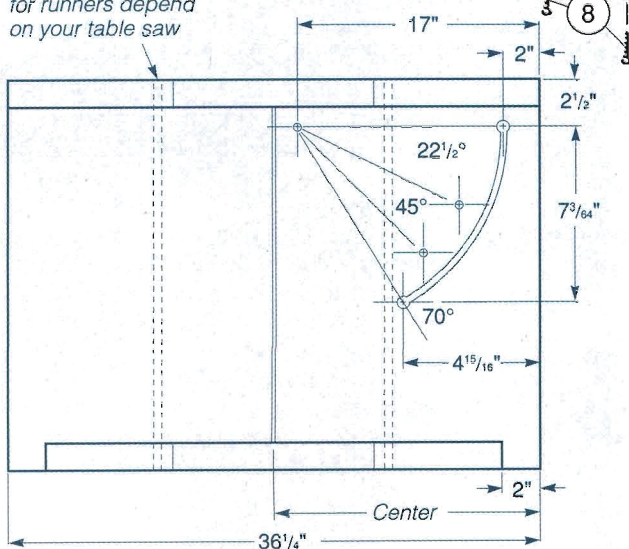


Locking Pin Detail



Jig Base Elevation

Exact dado locations for runners depend on your table saw



MATERIAL LIST

	T x W x L
1 Plywood Core (1)	1/2" x 27" x 36 1/4"
2 Plastic Laminate (2)	1/16" x 27" x 36 1/4"
3 Runners (2)	3/8" x 3/4" x 27"
4 Screws (16)	#8-3/4" (flat head)
5 Front Fence (1)	1 1/2" x 5 1/2" x 36 1/4"
6 Rear Fence (1)	1 1/2" x 5 1/2" x 32 1/4"
7 Miter Fence (1)	1 1/2" x 3 1/2" x 17 1/4"
8 Screws (16)	#8-1 1/2" (flat head)
9 Short T-bolts (2)	5/16" x 1 3/4"-18
10 Hold Down Knobs (3)	5/16"-18 threading
11 Wood Block (1)	3/4" x 1 1/4" x 5"
12 Micro Adjust Bolts (2)	1/4" x 1 1/2"-20 (flat head)
13 Guard Walls (2)	3/4" x 4" x 4"
14 Screws (4)	#8-2 1/2" (flat head)
15 Plastic Shield (1)	1/4" x 4" x 4"
16 Long T-bolt (1)	5/16" x 3 1/2"-18
17 Carriage Bolt (1)	5/16" x 4"-18
18 Post Handle (1)	5/16"-18 threading
19 Locking Pin (1)	3/8" x 5"
20 Cross Dowel (1)	1/8" x 1"
21 Wood Block (1)	3/4" x 2" x 2"
22 Toggle Clamp (1)	Right angle type

Crosscutting Jig Hardware Kit

A hardware kit is available for this project that includes a stop block, 2 brass stove bolts, a post handle, 2 hold down knobs, a toggle clamp, the T-slot bolts, a carriage bolt, a plastic shield and the dowels for the locking pin.

Item # 89103 (kit: use order form)\$24.95

Item # 89111 (T-slot router bit: required for this project)\$24.95

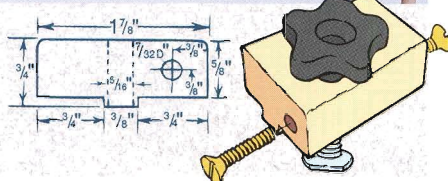


Figure 3: The micro adjustable stop block brings great precision to your jig, especially when cutting many pieces to the same length.

fence for mounting the stop block. For each slot, make your first pass with a 3/8" straight bit routing 5/16" deep, then follow with the T-slot cutter routing to the same depth. After routing the slots, rip a 1/8" x 1/8" rabbet along the bottom inside edge of both fences for dust relief. Next, drill the three holes in the miter fence for the hold down bolts and pin lock, and pass the fence over the table saw blade to cut a 3/8" deep kerf at the pin hole lock location (see **miter fence detail on page 21**). Finally, rout the top edges of all three fences, as well as the pivot hole end of the miter fence, with a 1/2" roundover bit.

Installing the back fence to the base isn't that critical, but mounting the front fence requires great care to ensure the accuracy of your crosscutting jig. Clamp the back fence so it's aligned with the edge of the base and drill countersunk pilot holes to secure the assembly with #8-1 1/2" screws

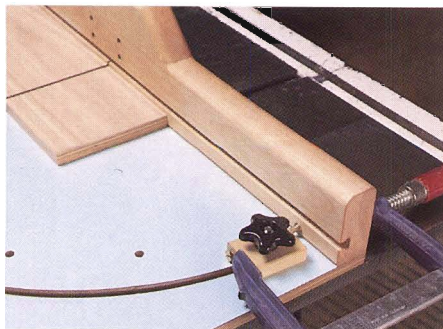


Figure 4: When you're ready to install the front fence, use your new stop block and a clamp for making fine adjustments to get perfect 90° cuts.

(pieces 8). Now clamp the front fence to the base and drill one countersunk pilot hole to secure the right end of the fence (leave the left end free for the time being).

The micro adjustable stop block (pieces 9, 10, 11, and 12) is really great for accurately setting repeat crosscuts (See **Figure 3**), but it also comes in handy for precisely setting the front fence. Make the jig and slip it into the T-slot in the jig base, then use a framing square to adjust the fence square to the blade. Now slide the stop block up to the fence and tighten the hold down knob. Clamp the fence to the stop block (See **Figure 4**) and make your first pass completely through the crosscutting jig.

Test the accuracy of the front fence by crosscutting a scrap piece having perfectly parallel edges. After cutting the scrap, flip one piece over and slide the freshly cut ends of the two pieces together, holding both pieces firmly against the jig fence. If the ends don't match perfectly, loosen the clamp to turn the micro adjustment bolt a tiny bit, then reclamp the fence and cut another piece of scrap material. Continue this process until the cut ends match perfectly, at which point you can drill countersunk pilot holes and screw the front fence in place.

Completing The Jig Accessories

The guard on the front fence helps protect you as the jig passes beyond the blade. Cut the material and clamp the walls (pieces 13) to the front fence 1 1/4" from the blade kerf, then drill 5/32" counterbored pilot holes. Secure the walls with long screws (pieces 14), and complete the guard by drilling pilot holes and screwing down the plastic shield (pieces 4 and 15).

Now install the miter fence to the base with a long T-bolt (piece 16) and a carriage bolt (piece 17). Slip the miter fence onto the bolts and spin on the hold down knob and post handle (pieces 10 and 18).

Setting the miter fence lock positions at 22 1/2° and 45° requires the help of an artist's adjustable triangle (available at art supply stores). First set the triangle to 45° and slip it between the front fence and the miter fence. When you have the angle dead on, slip a 3/8" brad point bit in the miter fence pin lock hole and use a hammer to tap it lightly against the laminate. Next, move the miter fence

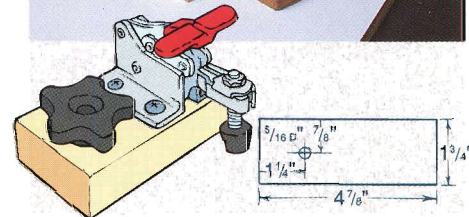
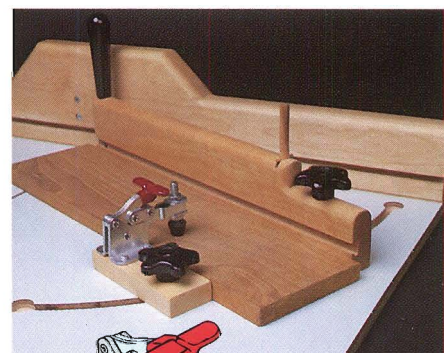


Figure 5: While mitering, boards sometimes creep along the fence and spoil the cut. Using the hold down jig solves the problem entirely.

out of the way and drill a 3/8" deep hole at the mark with the 3/8" bit. Reset the triangle to 22 1/2° and follow the same procedure for marking and drilling this hole.

Make a locking pin (pieces 19 and 20) by cross drilling a 3/8" dowel with a 1/8" bit (see **exploded view detail**), then glue a short piece of 1/8" dowel in the pin. Sand the pin so it easily slips through the hole. When you insert the pin and align the cross dowel with the saw kerf you cut earlier, the pin will reach into the locking holes in the base.

To use the stop block you've already made, slide it into a fence slot and use a tape measure to set it a particular distance from the saw kerf. If the length is off, just give the stop block bolt a turn and make another cut.

The hold down jig (pieces 9, 10, 21 and 22) is designed to lock a workpiece onto the jig base during a cut. It's especially effective at preventing creep while mitering. Make the jig shown in **Figure 5**, and install it in the T-bolt slot in the jig base. Adjust the toggle clamp to work on 3/4" thick stock since that's what you'll cut most often. If you frequently cut thicker stock, you may want to make a second hold down jig suited for this material.

Now that the crosscut box is complete, oil all the wood parts to keep them free of glue and dirt.

Chris Inman is the executive editor of Today's Woodworker magazine and a professional woodworker.

American Chestnut

By Gordon Hanson

Castanea dentata



"Under the spreading chestnut tree, the village smithy stands...." These opening words to Henry Wadsworth Longfellow's classic 1842 poem, *The Village Blacksmith*, immortalized the chestnut tree in American folklore. Tragically, however, the native chestnut has declined from its status as one of the most abundant trees in North America to near extinction today. A catastrophic blight killed virtually all the trees, leaving the species' existence hanging on by a thread. Fortunately, organizations like the American Chestnut Foundation are working to restore this species to its former grandeur in our national forests.

American chestnuts once made up twenty five percent of the trees in the Appalachian forests spreading from the Gulf of Mexico to Maine, according to the American Chestnut Foundation. The chestnut's high quality timber and flavorful nuts were important commercial resources. Around the turn of the century, it was commonplace to find American chestnuts towering ninety feet tall with trunk diameters of about six feet. Not to be confused with the horse chestnut—a member of the buckeye family that produces low quality lumber and inedible nuts—the American chestnut ruly belongs in the chestnut family.

Chestnut timber was highly valued for making everything from fences to fine furniture. Chestnut is lighter

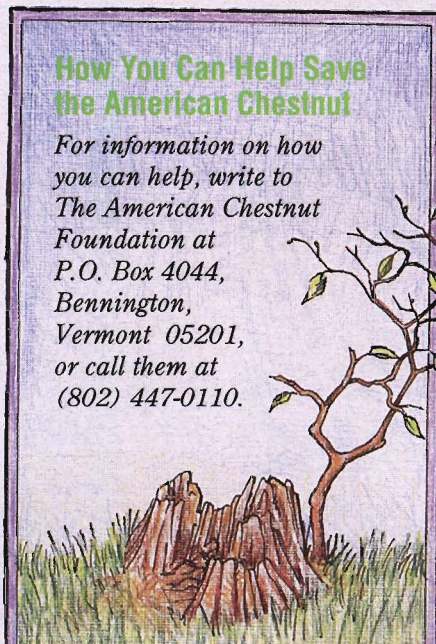
in weight than oak, yet it's strong enough for heavy construction, and it features an attractive golden brown color and open grained texture. Woodworkers prized this once common wood for its excellent machining, finishing and gluing properties.

The tragic blight that swept across the chestnut's range was first noticed in New York's Bronx Zoo in 1904. A shipment of chestnut trees imported from China and Japan came with an unfortunate stowaway—a fungus destined to ravage the native chestnut forests. Oriental chestnuts evolved with a resistance to the fungus, but American chestnuts were so susceptible that eighty five percent of them in the Great Smokey Mountains were killed by the late 1930s. Huge stands of dead chestnuts became known as "ghost forests."

The fungus cuts off the chestnut's flow of sap, causing the tree to die above ground. Ironically, the fungus cannot live in the soil, so the root systems of chestnuts often survived, sending up shoots that last only a few years until they're stricken by the blight themselves.

How You Can Help Save the American Chestnut

For information on how you can help, write to
The American Chestnut
Foundation at
P.O. Box 4044,
Bennington,
Vermont 05201,
or call them at
(802) 447-0110.



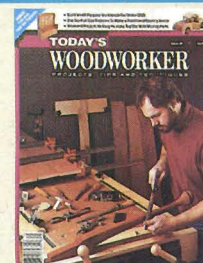
Crossbreeding American chestnuts with blight resistant Chinese chestnuts is one of the most promising restoration efforts. Chinese chestnuts are small orchard size trees, unlike the large forest specimens produced by the American species. Ideally, a crossbred tree will have the size and strength of the American chestnut with the blight resistance of the Chinese variety. Breeding trees with just the right balance is a long process, but researchers are confident they'll eventually succeed.

Tomorrow's woodworkers will benefit the most from the current restoration work, but for now limited amounts of old chestnut lumber are still available. As a testament to their exceptional decay resistance, chestnut trees are still harvested decades after their death. Most newly harvested chestnut wood is riddled with worm holes, which are considered character marks by many furniture makers.

In the heyday of the American chestnut, the trees grew so densely that their white flowers reportedly made many mountain crests look like they were covered with snow in early summer. With enough commitment and perseverance, the seedlings of blight resistant chestnuts will be planted in our lifetime, eventually returning this species to prominence in our nation's forests once again.



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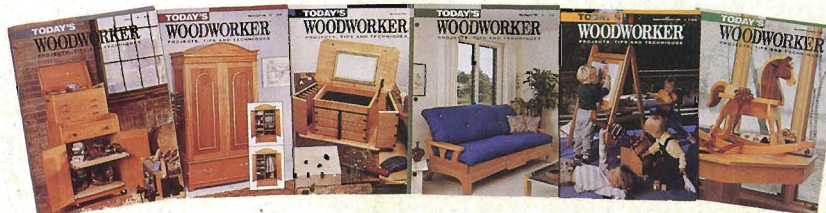
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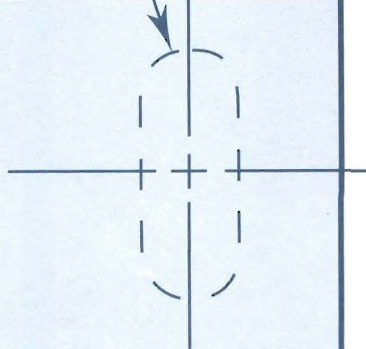
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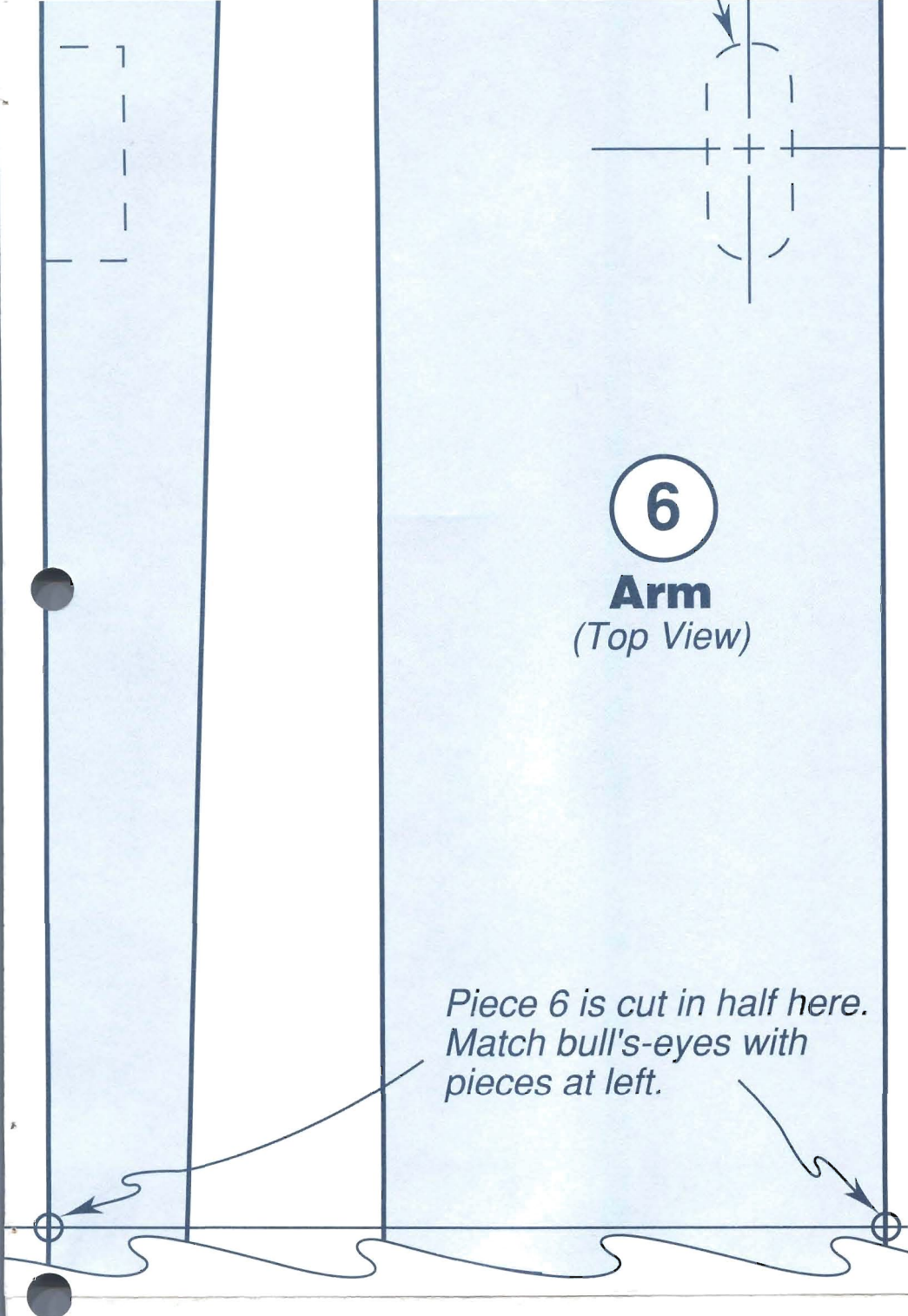




6

Arm
(Top View)

*Piece 6 is cut in half here.
Match bull's-eyes with
pieces at left.*



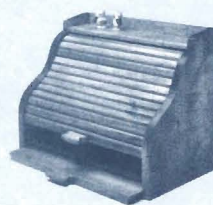
Full-Size Patterns™

- Open staples carefully, remove pattern and fold staples back in place.
- Use graphite paper (available at most art supply stores) or cut and trace the pattern onto your stock.



Contemporary Futon Sofa Bed
Includes patterns for the rear legs, front legs, arms and handle.

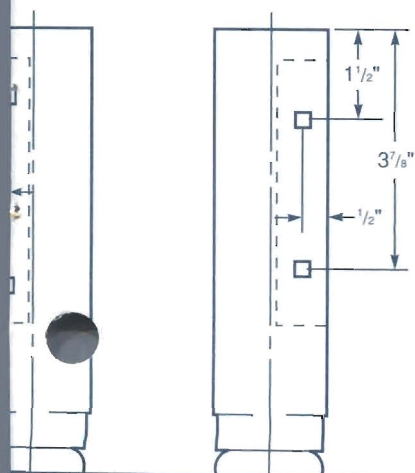
Tambour Breadbox
Includes patterns for the side panels and handles.



Cherry Side Table
A complete story stick for the turned legs along with all drawboring hole locations for the pegs.

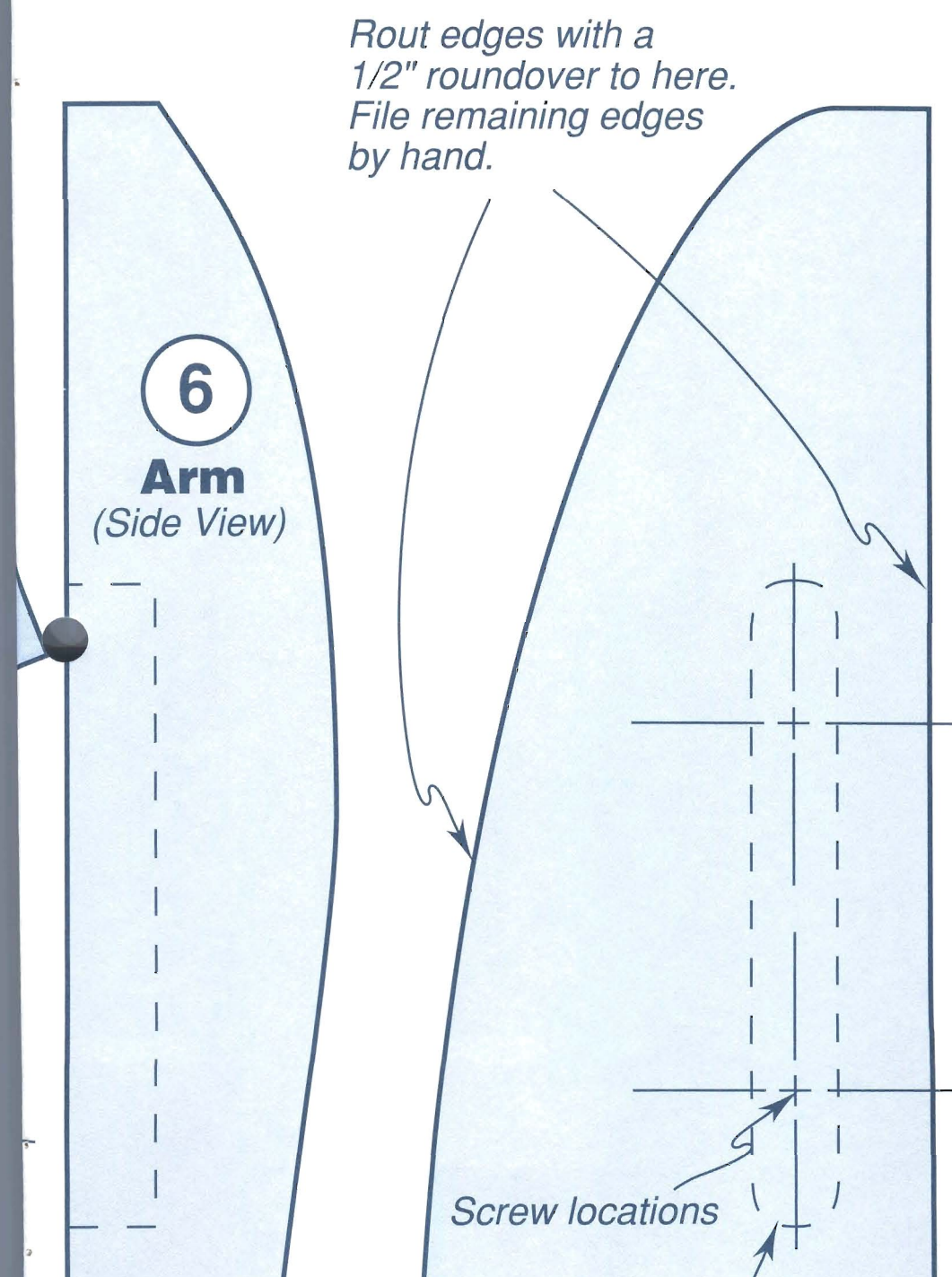
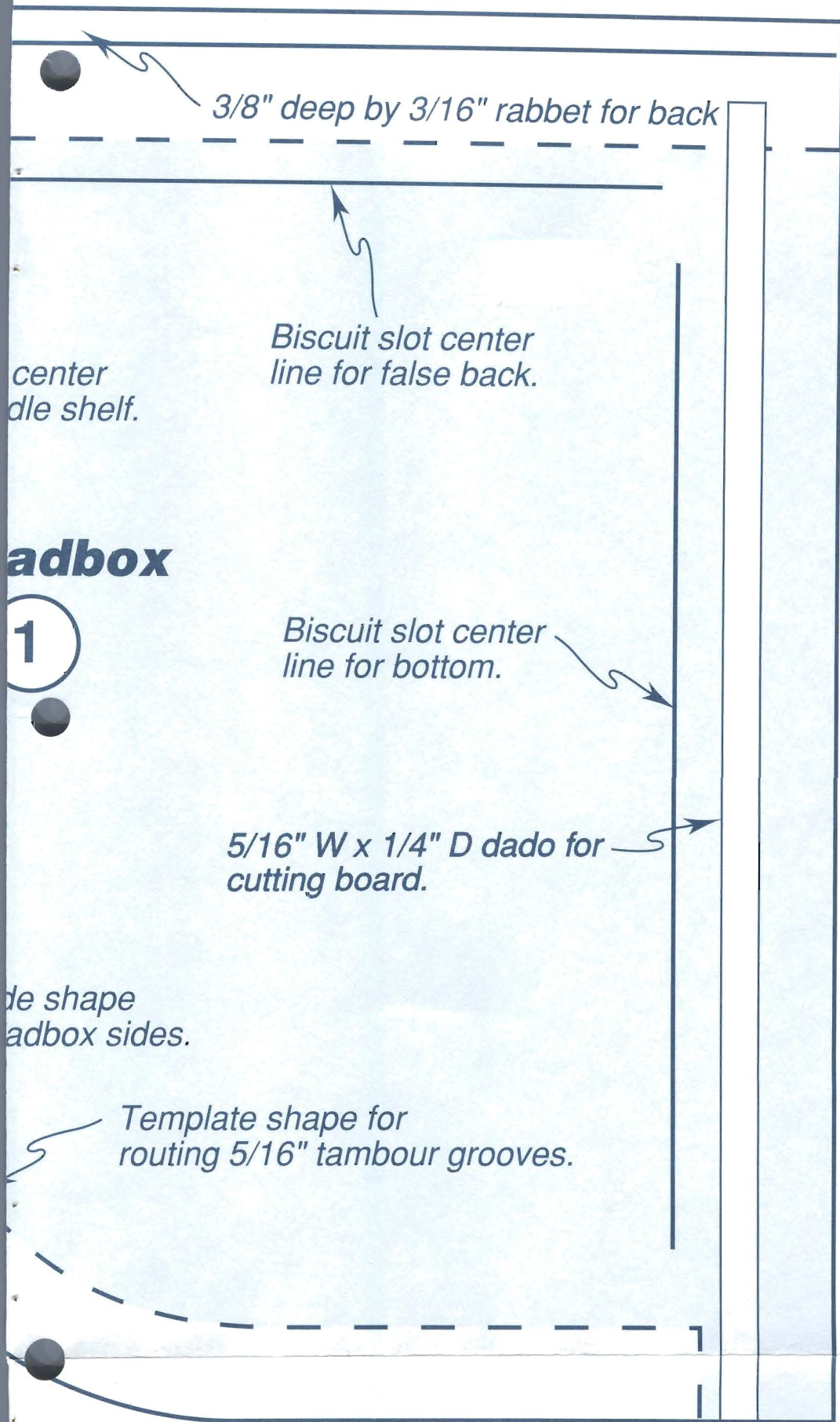
Front Pegs

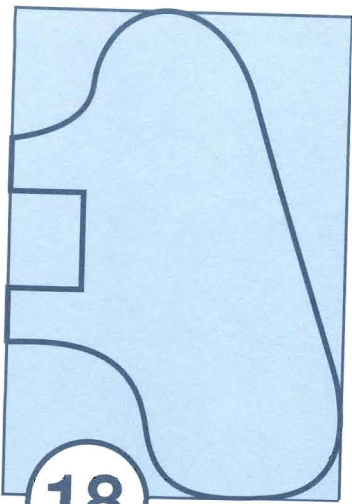
Back Pegs



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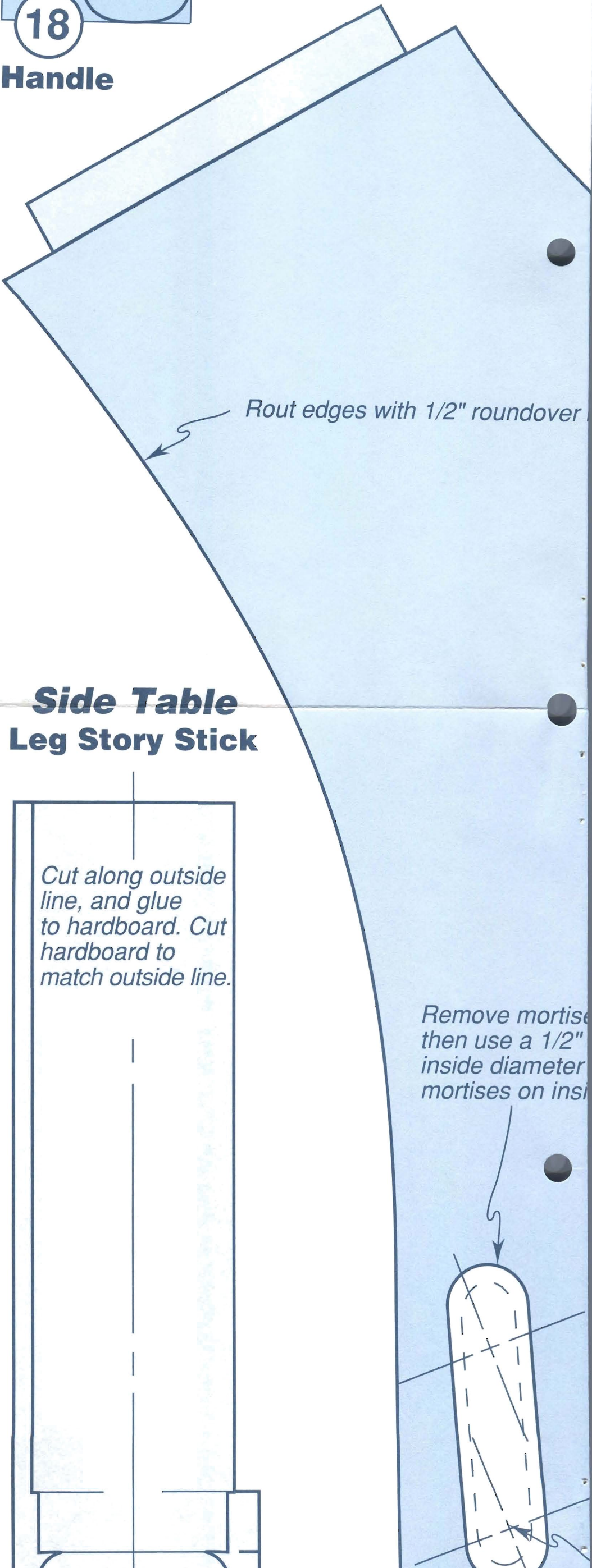




Glue handle pattern to hardboard, then bandsaw shape to make a template.

18

Handle



Rout edges with 1/2" roundover

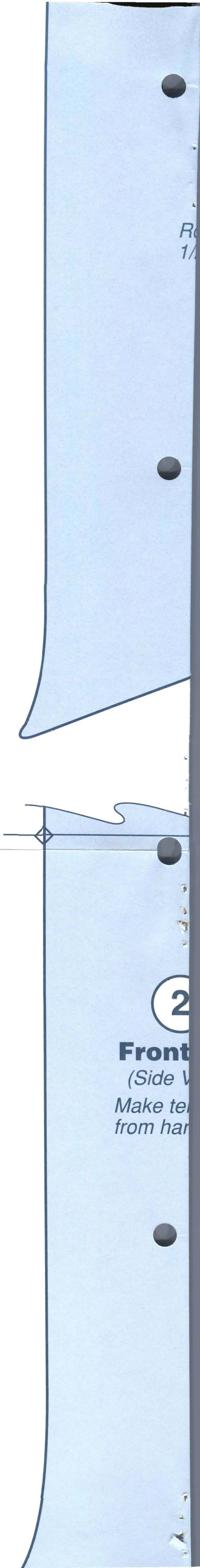
Side Table Leg Story Stick

Cut along outside line, and glue to hardboard. Cut hardboard to match outside line.

Remove mortise then use a 1/2" inside diameter mortises on inside



Make a notch at each hash mark to guide your pencil while laying out the leg pattern at the lathe.



Ro
1/2

2
Front
(Side V
Make ten
from har

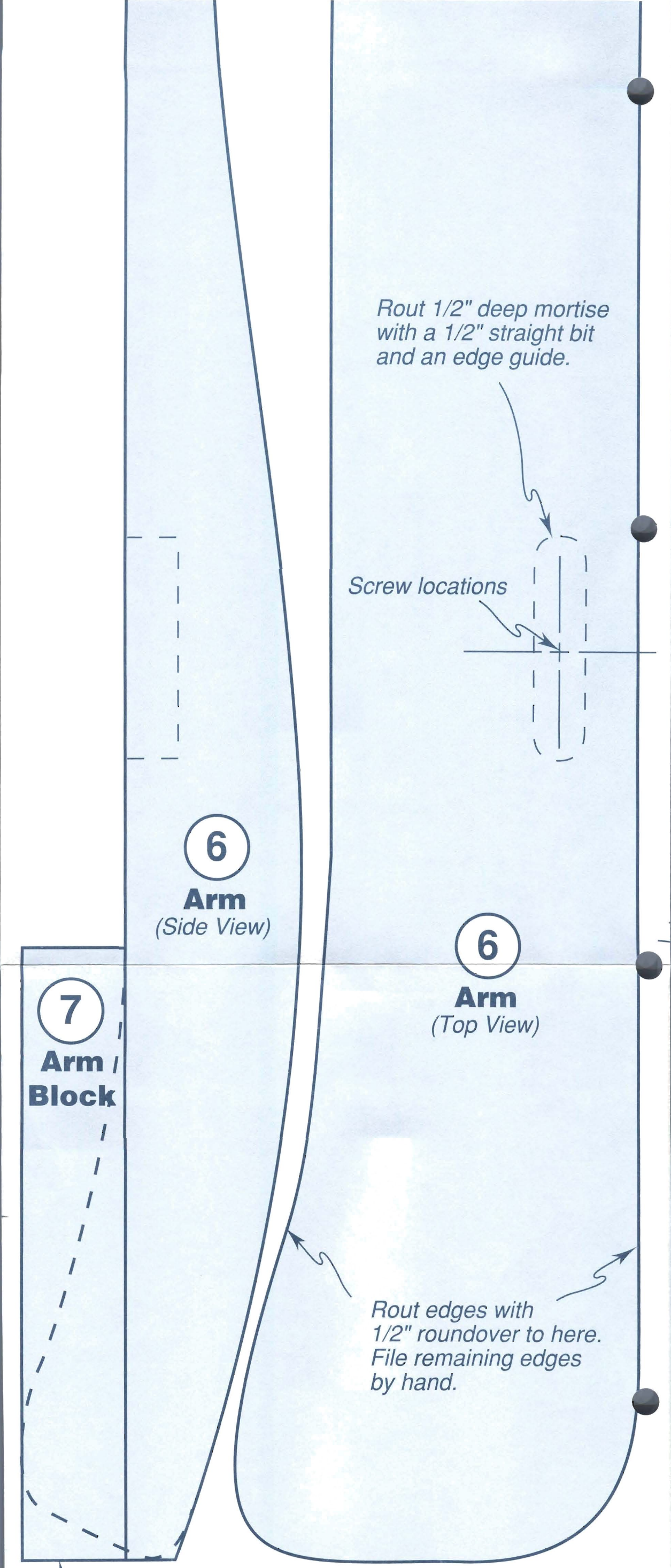
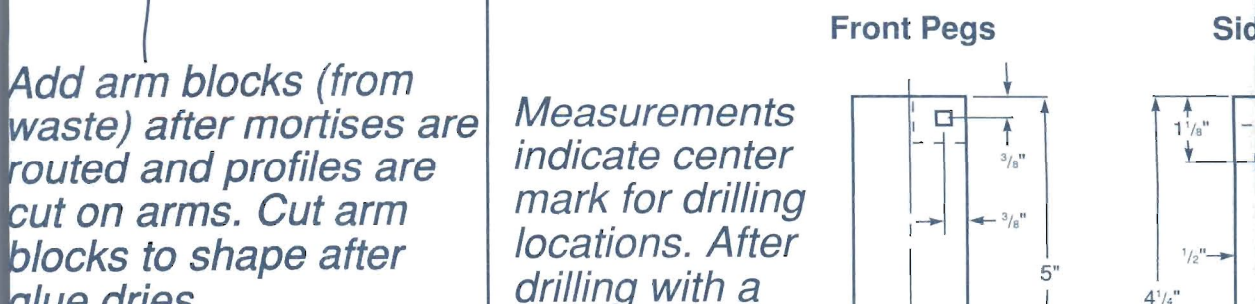


Table Peg Locations



Biscuit slot center line for top shelf.

Biscuit slot line for mid

Bre

Outside of bre

Handles

12

13

" deep groove
nges on inside
panels.

Pilot holes for installing hinges.

Use Dowel-it jig to drill
out 1/2" wide mortise
in front edge for the side
stretcher tenons.

out edges with
2" roundover bit.

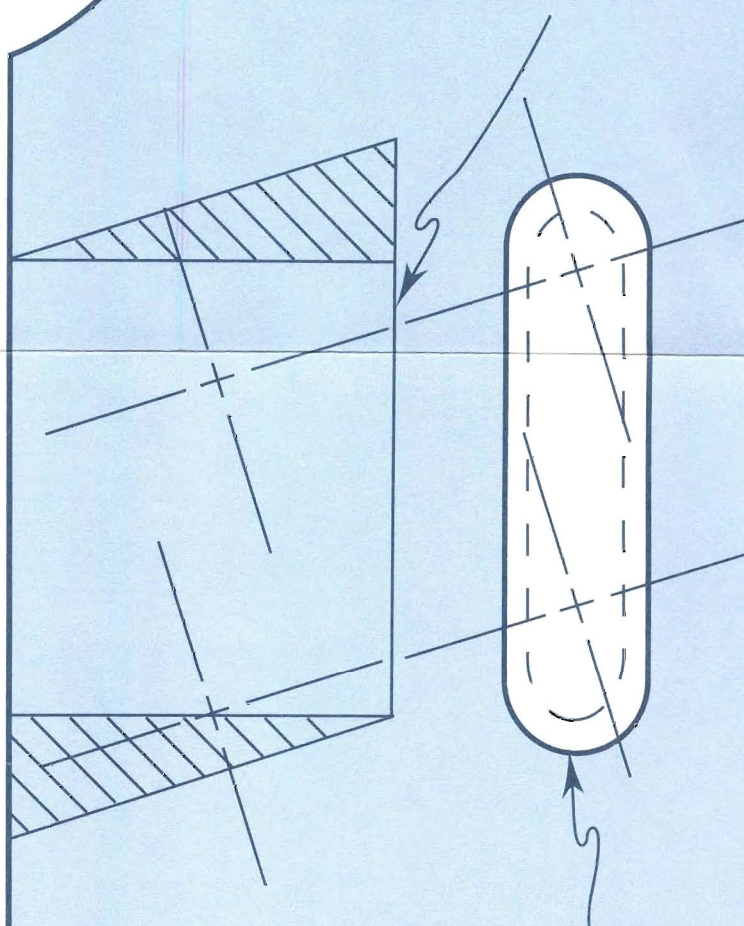
2

Front Leg

(Side View)

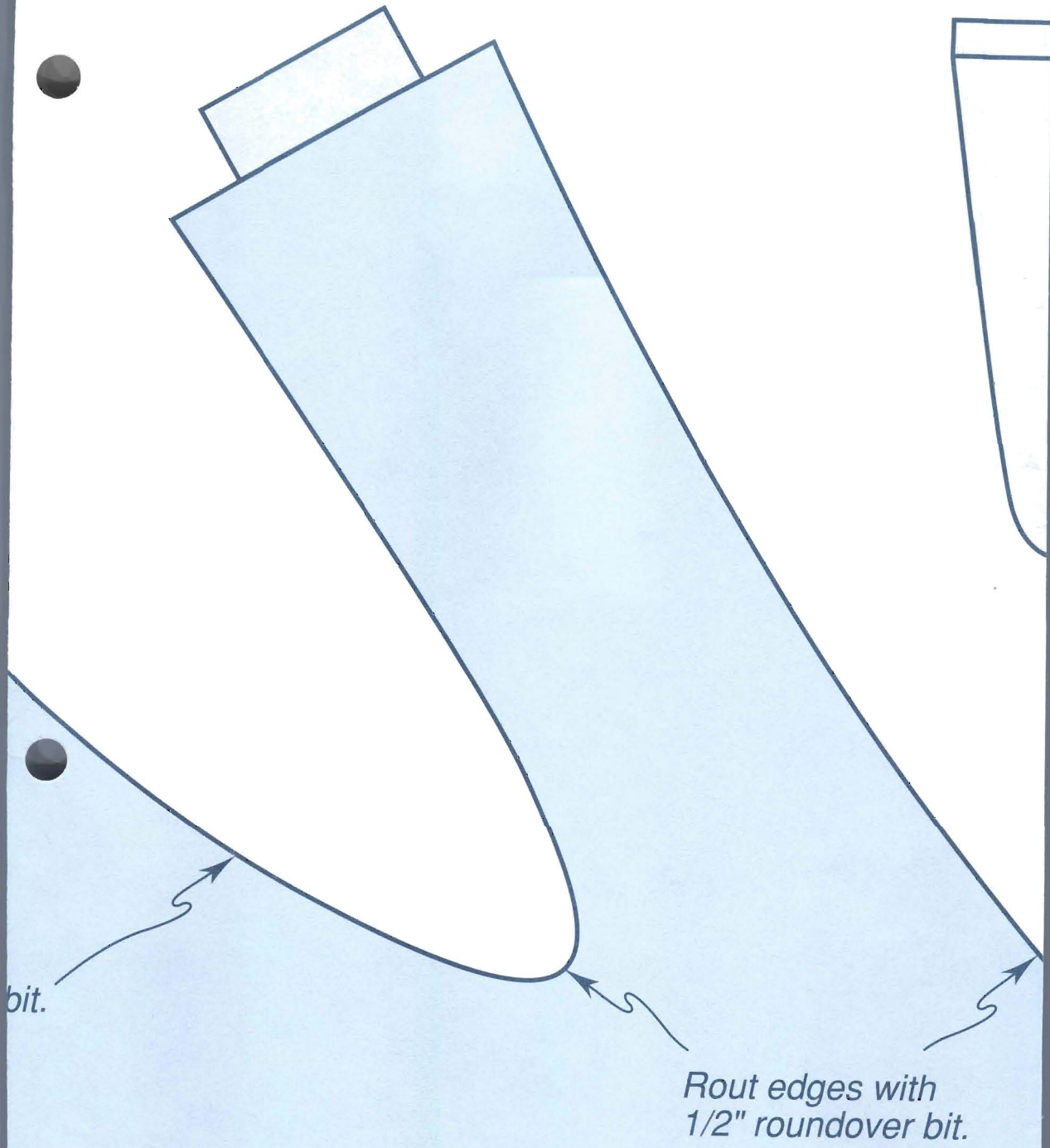
Make template
from hardboard.

Use Dowel-it jig to drill this
area, then use a chisel to
complete the mortise.
(shaded area)



Remove mortise area in
template, then use a 1/2"
straight bit with a 5/8"
inside diameter bushing
to rout mortises on inside
face of front legs.

Piece 2 is cut in half here.
Match bull's-eyes with
piece at left.



1

Rear Leg

(Side View)

Make template
from hardboard.

the area in template,
straight bit with a 5/8"
bushing to rout
side face the of rear leg panels.

1/8 wide by 1/2
for mounting hi
face of rear leg

