

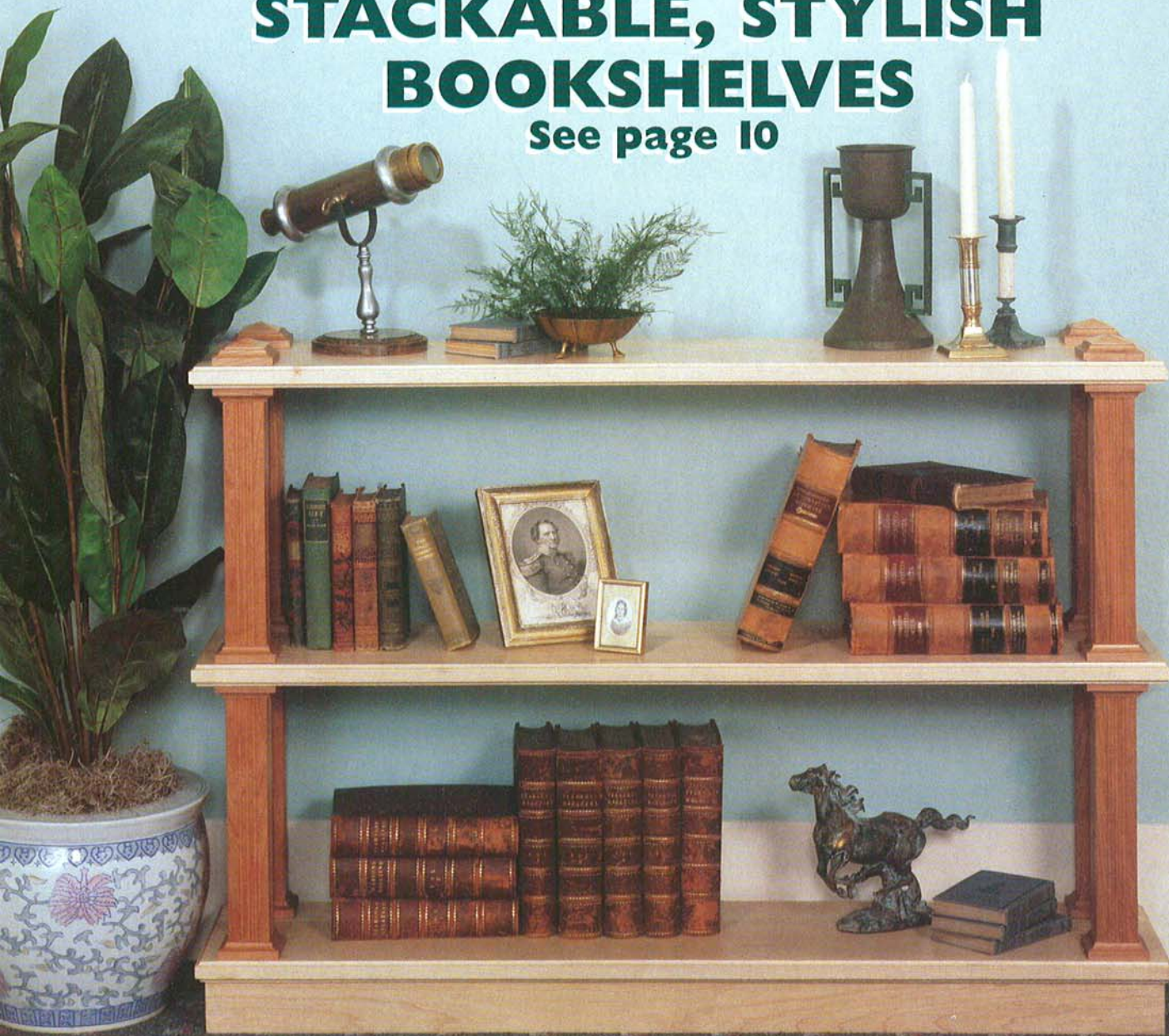
Weekend Woodworking™

FROM THE EDITORS OF WOOD® MAGAZINE

July 1996
Vol. 9 No. 4 • Issue 52

STACKABLE, STYLISH BOOKSHELVES

See page 10



**ALSO IN THIS ISSUE: FOLDING TABLE, TOY SPEEDBOAT,
SALT & PEPPER SHAKERS, GARDEN BENCH, OVAL MIRROR**

**PLUS: 5 GREAT SHOP TIPS, WOODWORKER'S GUIDE TO
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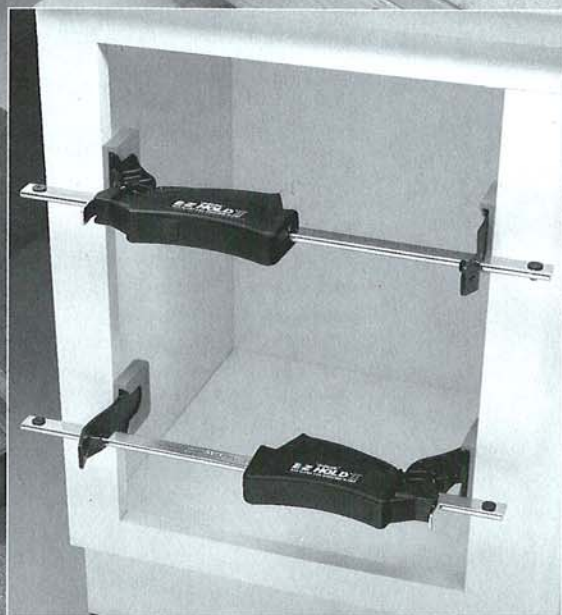


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Weekend Woodworking™

FROM THE EDITORS OF WOOD® MAGAZINE

JULY 1996

VOL. 9, NO. 4 • ISSUE 52

FOLDING TABLE 6

A unique folding action transforms our easy-to-store oak table into a sturdy, attractive piece of furniture in seconds.



Page 6

SHELVING SYSTEM 10

This shelving system knocks down for storage or shipping, making it ideal for students or families on the move.

MODEL SPEEDBOAT 18

The powerful runabouts of the 1920s and '30s inspired the design of this handsome craft. Float or display it as you wish.

SALT AND PEPPER SHAKERS 22

Discover how to chuck bandsawn blanks into your drill press and power-sand the round-overs on this spicy project.

GARDEN BENCH 24

Build this weather-tough curved bench for your favorite backyard spot. Or make several, and join them to create an inviting conversation area.

OVAL MIRROR 27

Here's a project brimming with clever techniques, including a jig for fool-proof angle-cutting, a router template, and our exclusive link-spline joint.



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Page 24



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SHOP-SMART TIPS 5

Varnish storage solution • Calibrated wedges for angled drilling • Generic alternatives to honing oils • Dust-free shelves • Handling masking tape

JIGS & TECHNIQUES 16

Eliminate guesswork and uncertainty from gluing. Our handy chart guides you to the right adhesive for a wide variety of uses. You'll enjoy easier assembly and longer-lasting results.

Thanks a Million... It's Been Great!

As the editor of *Weekend Woodworking*TM magazine, I have the unenviable task of telling you that effective with this issue, we are ceasing publication, mainly because of recent substantial price hikes in paper and postage. The staff and I continue to believe that our product is one of the very best published anywhere, and we're sorry that we will be unable to serve you with this publication.

I do have good news for you, though. If you have some issues remaining on your subscription, I have been authorized to offer you your choice of two excellent magazines—*WOOD*®, the world's leading woodworking magazine (and the sister magazine to *Weekend Woodworking*), or *Decorative Woodcrafts*®. If you already subscribe to either magazine, we'll extend your subscription.

I can't tell you how enjoyable it has been bringing you *Weekend Woodworking* these last 9 years. It truly has been a labor of love for us, and we know from hearing from lots of you that you have put the information that we presented to good use. And that's our greatest satisfaction.

Once again, I'd like to thank you for the support you have given us, and I do hope that your interest in woodworking will grow in the years ahead and that you will continue enjoying what I consider to be one of the greatest hobbies to ever come along.

My personal best to you and yours.



Weekend Woodworking

FROM THE EDITORS OF WOOD® MAGAZINE

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Our Pledge to You: Prior to publication, we build every project featured in *Weekend Woodworking*TM step-by-step in our shop. Then, a team of editors reviews the how-to directions, technical drawings, illustrations, and Bill of Materials of each project to make sure the instructions we provide to you are clear, concise, and complete.

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SHOP-SMART TIPS

THANKS FOR SHARING YOUR FAVORITE SHOP TIPS!

Thanks to all of you who shared your original shop tips and solutions to make this page so helpful to your fellow woodworkers. All submissions

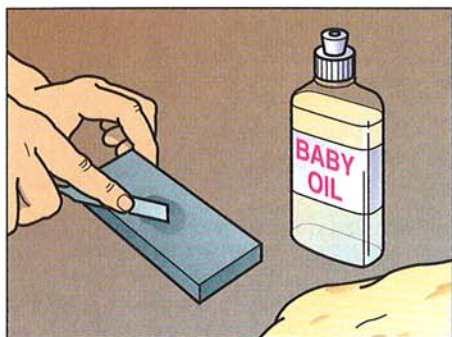
that have not yet been acknowledged have been turned over to WOOD® magazine for further consideration. You will soon receive a letter letting

you know whether your tip has been accepted for publication or not. Again, thanks to every one of you—contributors and faithful readers alike.

Use baby oil to stay sharp

Special honing oils can cost a pretty penny (some are over a dollar an ounce!). For that reason alone, you've put off sharpening your cutting tools.

Try using inexpensive, generic baby oil or mineral oil from the drugstore. It has



the right viscosity, and is clear for easy visibility. One other tip: if the bottle has a twist-off cap, replace it with a push-pull cap from a detergent bottle.

—Thos. T. Bebic, Akron, Ohio

Oil-can your varnish to extend its life

Buying varnish by the gallon saves money, but once opened and partially used, the air trapped inside the can starts gelling and spoiling the varnish, not to mention your plan to save money.

Store your varnish in emptied quart-sized plastic motor oil bottles. After an oil change, thoroughly drain and then wash the bottles. Let them dry thoroughly. Stir the varnish, then transfer to the clean containers. Make sure to clearly relabel them. Squeeze partially filled bottles to eliminate air, then tighten the cap.

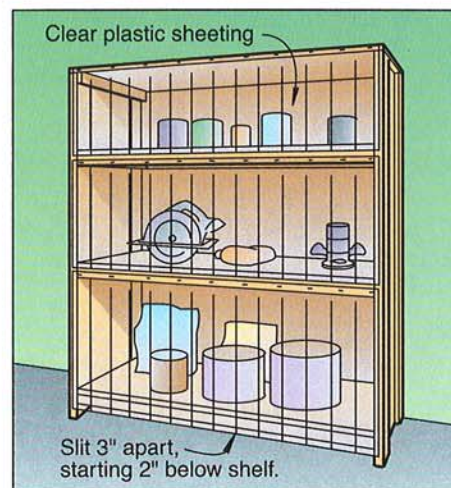
—J. C. Vasan, Minneapolis, Minn.

Make shelves dust-free without hiding the goods

Try as you may, it is very hard to keep goods stored on your workshop shelves clean, yet have the contents visible and accessible for easy use.

Staple clear plastic sheeting (4 mil or thicker) from the top edges of your shelves. Cut vertical slits spaced about 3" in the sheeting to within two inches of the top edge. Now you have instant visibility and access while keeping the workshop dust at bay.

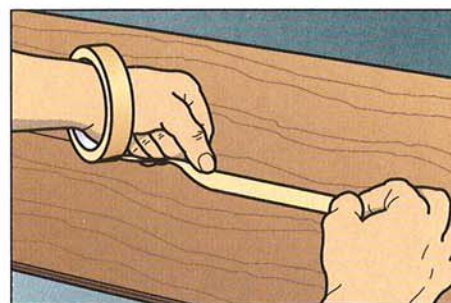
—Darl Johrim, Santa Fe, New Mexico



A helping hand for masking

Masking a project for painting can be a frustrating experience. You have to guess tape lengths, tear the tape, and then look for a place to set down the roll. An extra hand sure would help.

Take a tip from auto painters, and slip a roll of masking tape onto your wrist. You'll get more accurate results much faster, and eliminate waste. Best of all, you won't misplace the roll.

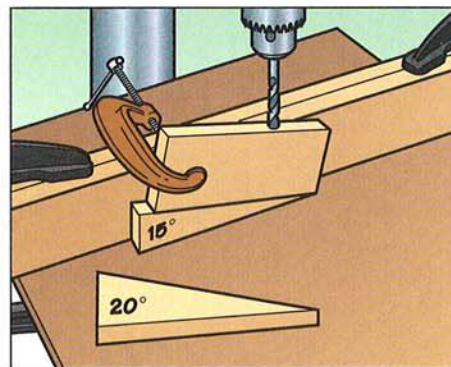


—Chet B. Tobis, St. Louis, Mo.

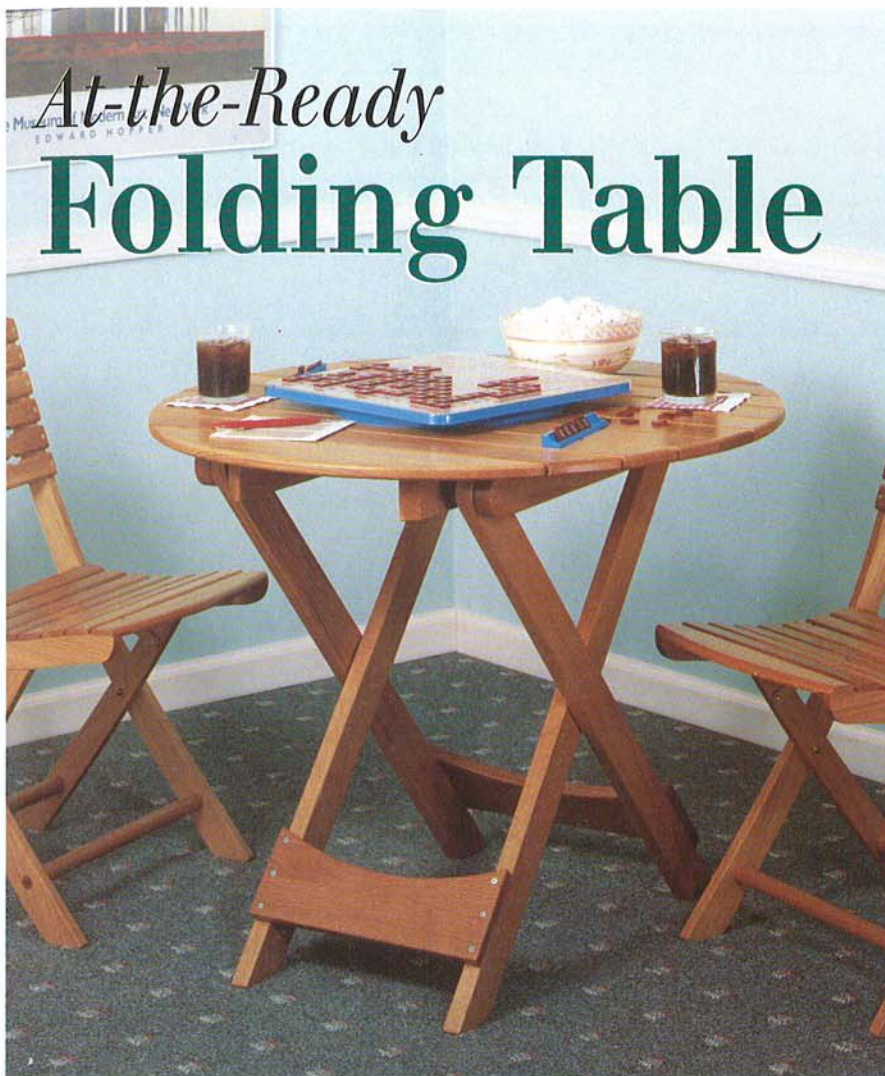
Calibrated wedges aid angle-hole drilling accuracy

If you frequently drill angled holes, you know the frustration of getting the angle just right. Setting and resetting your drill-press table takes time and is an imprecise science at best.

Making a set of calibrated wedges in 5° increments saves time and fuss. Cut the wedges on a bandsaw, and belt-sand them to achieve the precise angle. Check the wedges with a protractor; then label them for easy reference

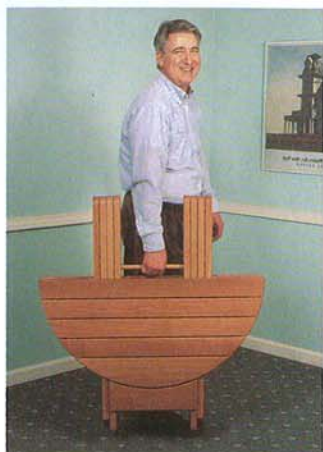


—Mack Philips, Cedar Rapids, Iowa



At-the-Ready Folding Table

With this handsome oak folding table, you can plan a party anywhere you like. It folds flat for easy transport. And once assembled, it's strong enough to hold table settings for four—or a card game, drinks, and a bowl of chips.



FOLDING TABLE COMPLETES THE SET

This project complements the folding chair design featured in *Weekend Woodworking* #51 (May, 1996).

START WITH THE FOLDING BASE

1 Rip and crosscut the legs (A) and top supports (B) from 1½"-thick white oak to the dimensions listed in the Bill of Materials. Rip and crosscut blanks for the leg cleats (C and D) from ¾"-thick white oak to 6×14⅝" and 6×16⅝" respectively.

2 Set the miter gauge on your tablesaw to 41°, and miter-cut one end of each leg as shown in **Figure 1** opposite page, bottom right. We attached a wooden extension to our miter gauge for cleaner cuts. **NOTE:** The 41° setting is for miter gauges which read 90° in the crosscut position. If your gauge reads 0° when cross-cutting, set it to 49° for this cut. Make a similar adjustment for all miter-gauge settings specified throughout this project. Change the miter gauge to 32°, and chamfer one end of each top support where shown in **Figure 1**.

3 Locate and drill ¾" holes ⅞" deep into (A) and (B), again where dimensioned on **Figure 1**. **NOTE:** The legs are identical, and the supports are mirror images of each other. Label the legs inside or out, right or left as shown. Next, draw a 1¼" radius on the top of (A). Bandsaw the tops of the legs, and disk- or belt-sand the ends smooth. Now, locate and drill countersunk ⅝" holes in the bottom edge of (B) where dimensioned on **Figure 1** as shank holes for the screws that will hold the top slats.

4 Cut a ¾" dowel to 11⅞" long. Refer to the Buying Guide accompanying the Bill of Materials for our source for white oak dowels. You can turn a dowel on your lathe, or make one with your router, as shown in **Figure 2** on page 8, top middle. To do this, cut a blank from ¾×¾" stock at least 3" longer than the finished length of the dowel. Use a ⅜" round-over bit to rout away the corners as shown. Leave a 1" length square at each end of the blank to index each of the cuts.

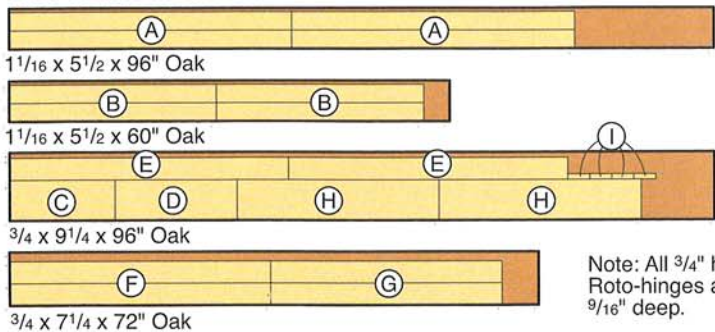
5 Chuck a ⅛" round-over bit into your table-mounted router, and round over all edges and ends of (A) and (B). Hand-sand smooth. **NOTE:** If you wish to apply a surface finish on your table, you'll have to pre-finish parts before assembly. Make sure you mask holes and gluing surfaces before assembly. Or, you can use an oil finish on the completed table.

NEXT, COMPLETE THE BASE ASSEMBLY

1 Now, brush glue in the holes in the ends of (A) and (B), and install the Roto-hinges in all pairs of (A) and (B). Tape ⅛" spacers on either side of each hinge as shown in **Figure 3** on page 8, top right to ensure that the hinges install squarely. Refer to the Buying Guide accompanying the Bill of Materials for our source for Roto-hinges.

Continued

CUTTING DIAGRAM



BILL OF MATERIALS

Part	Finished Size			Matl.	Qty.
	T	W	L		
A* legs	1 1/16"	2 1/2"	38 1/2"	O	4
B* top supports	1 1/16"	2 1/2"	28 1/4"	O	4
C* leg cleat	3/4"	5"	14 3/8"	O	1
D* leg cleat	3/4"	5 1/2"	16 5/8"	O	1
E* top slats	3/4"	3"	38"	O	2
F* top slats	3/4"	3"	35 1/2"	O	2
H* top slats	3/4"	5 1/2"	27 1/2"	O	2
I alignment blocks	3/4"	3/4"	3"	O	4

*Cut part to final size during construction. Please read all instructions before cutting.

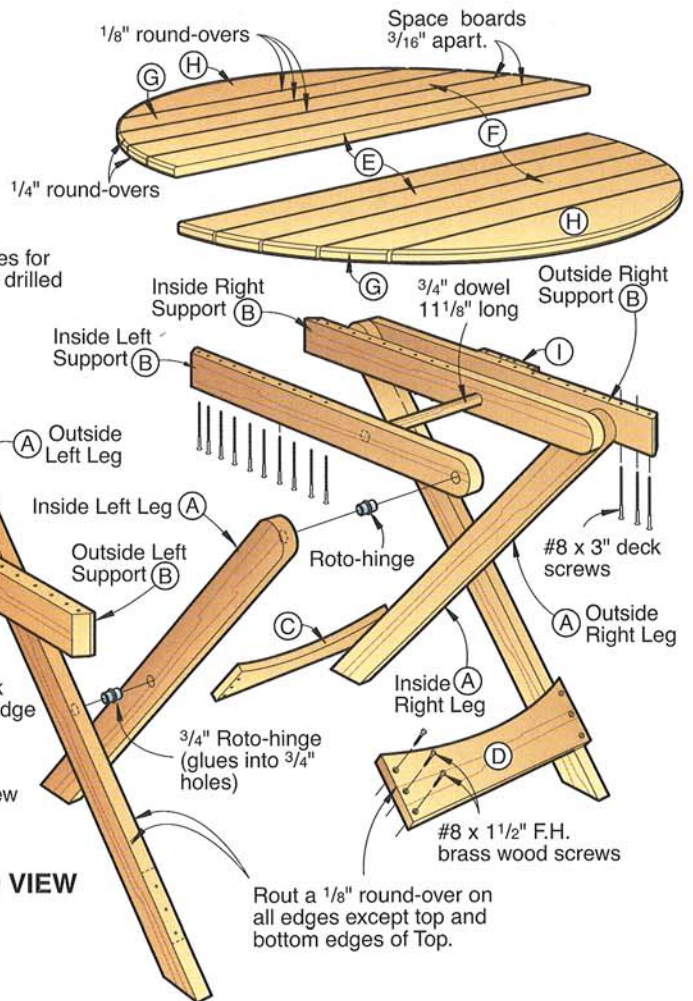
Material Key: O—white oak.

Supplies: 20—#8x1 1/4" brass flathead wood screws; 40—3" deck screws; 1—3/4"-dia. oak dowel 11 1/8" long; finish.

Buying Guide: 3/4" Roto-hinges. Package of 4, catalog No. ROT34, \$9.70 ppd. Order from Constantine, 2050 Eastchester Road, Bronx, NY 10461. Or call 800/223-8087 to order. Florida residents add 6% sales tax, New York residents add sales tax.

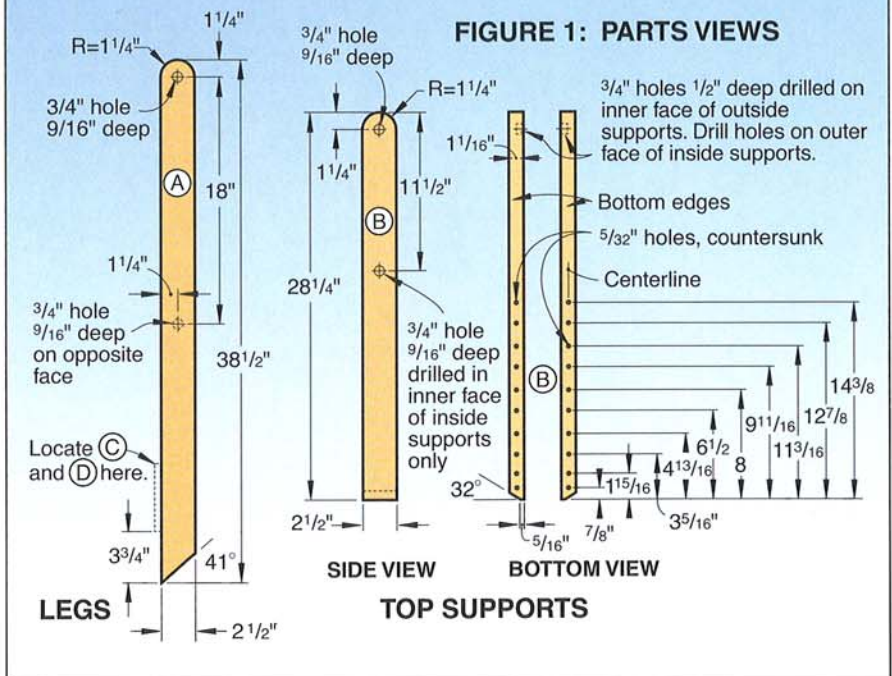
3/4" white oak dowel 36" long, item no. 20966, \$8.70 ppd. Order from The Woodworker's Store, 4365 Willow Drive, Medina, MN 55340. Or call 800/279-4441 to order. CA, CO, FL, MA, MI, MN, NY, OH, WA, and WI residents add applicable sales tax.

2 Cut a 12 1/4"-long spacer block from 3/4" scrap. Drill countersunk 5/32" holes in the cleat (C) where dimensioned in **Figure 4** on page 8 bottom. Position the spacer between two of the legs as shown in **Figure 5** page 9, top, and put the dowel in its holes. Position (C) where shown in **Figure 4**, and drill 7/64" pilot holes through the cleat and 3/4" deep into (A). Screw the cleat temporarily in place. This completes the inside unit of the base assembly.



EXPLODED VIEW

FIGURE 1: PARTS VIEWS

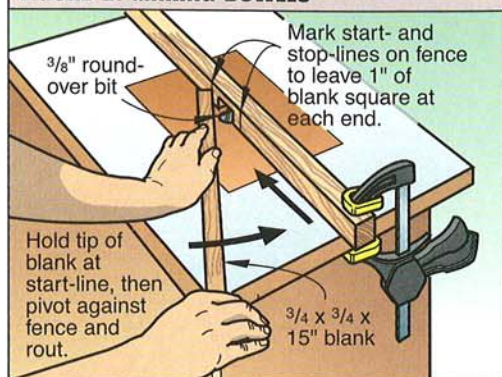


Folding Table

Shop Tip

To prevent breakage of brass screws, drive an equivalent sized steel screw into place first. Then remove, and install the brass screw. Applying wax to the threads of the brass screw before installation also helps.

FIGURE 2: MAKING DOWELS



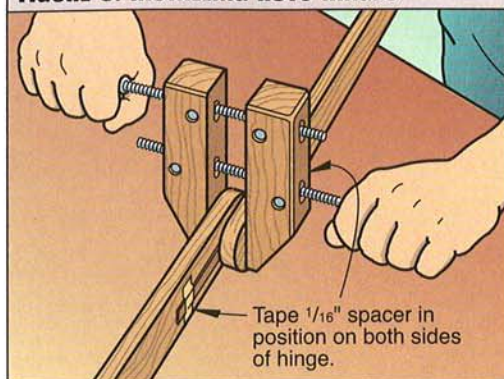
3 Position the outer and inner legs (A) so the centered holes are facing each other, and install the Roto-hinges as you did with the earlier assembly. Let dry.

4 Drill countersunk $\frac{5}{32}$ " holes in (D). Then, position (D) where shown in **Figure 1**, and drill $\frac{7}{64}$ " pilot holes through the cleat $\frac{3}{4}$ " into (A). Screw the cleat temporarily in place.

MAKE THE TOP, AND ADD IT TO THE BASE

1 Rip and crosscut $\frac{3}{4}$ "-thick white oak to form the top slats (E), (F), (G), and (H). With the $\frac{1}{8}$ " round-over bit in your router, round over all edges with the router, and then sand smooth.

FIGURE 3: INSTALLING ROTO HINGES



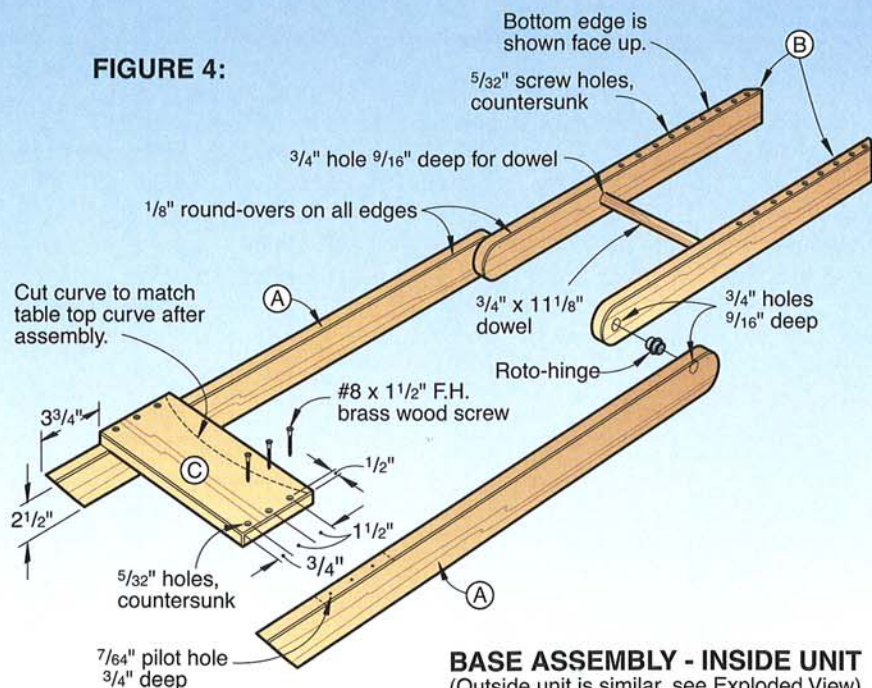
2 Cut 18 spacer blocks from scrap stock to $\frac{3}{16} \times \frac{3}{4} \times 1\frac{1}{2}$ ". Arrange the slats face down as shown in **Figure 6** opposite page, top right on a pair of bar clamps. Insert the spacers between slats directly over the clamps, and clamp lightly in place.

3 Cut $\frac{3}{4}$ "-thick scrap wood into two $3\frac{1}{8} \times 27\frac{1}{2}$ " pieces (x), two $2\frac{5}{16} \times 12$ " pieces (y), and one 10×30 " piece (z). Then, lay the base assembly on the slats, positioning each (x) between (B) and the clamp, (y) between inner and outer (B) pieces, and (z) between the inner (B) pieces as shown in **Figure 7** opposite page, middle left.

4 Mark the location of the screw holes through base member (B) into the slats with a scratch awl. Next, remove the base assembly, and drill $\frac{5}{32}$ " pilot holes $\frac{1}{2}$ " deep into the slats where marked. Replace the base assembly, and screw it to the slats with 3" deck screws. Remove spacer pieces (x), (y), and (z).

5 Cut $\frac{3}{4}$ "-thick oak into four $\frac{3}{4} \times 3$ " pieces to form the alignment blocks (I). Drill two countersunk $\frac{5}{32}$ " shank holes through each block. Position the blocks on the center slats (E), against the outer sides of (B), and touching end to end as shown in **Figure 8** opposite page, middle bottom. These blocks will align the legs side to side, and maintain the $\frac{3}{16}$ " space between the center slats once the spacers are removed. Temporarily clamp the blocks in place, and drill $\frac{7}{64}$ " pilot holes $\frac{1}{2}$ " deep into the E pieces through the shank holes. Unclamp, apply glue, and screw the alignment blocks in place with $\#8 \times 1\frac{1}{4}$ " brass flathead wood screws. See the **Shop Tip** top left for a suggestion on driving brass screws.

FIGURE 4:



BASE ASSEMBLY - INSIDE UNIT
(Outside unit is similar, see Exploded View)

FIGURE 5: ASSEMBLING THE BASE

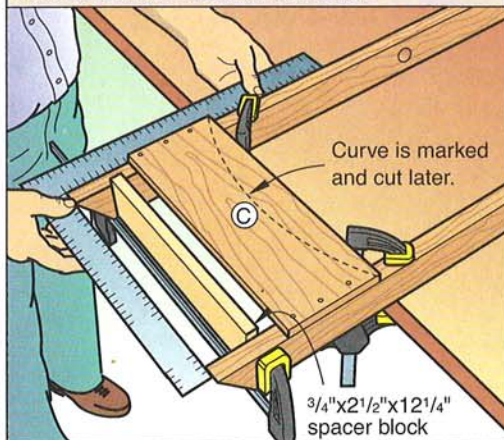
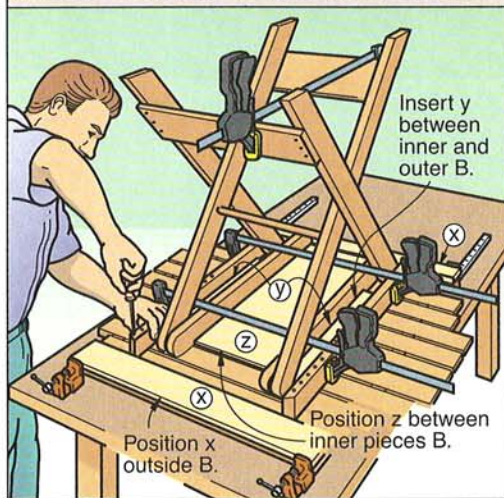


FIGURE 7: ATTACHING THE BASE TO THE TOP

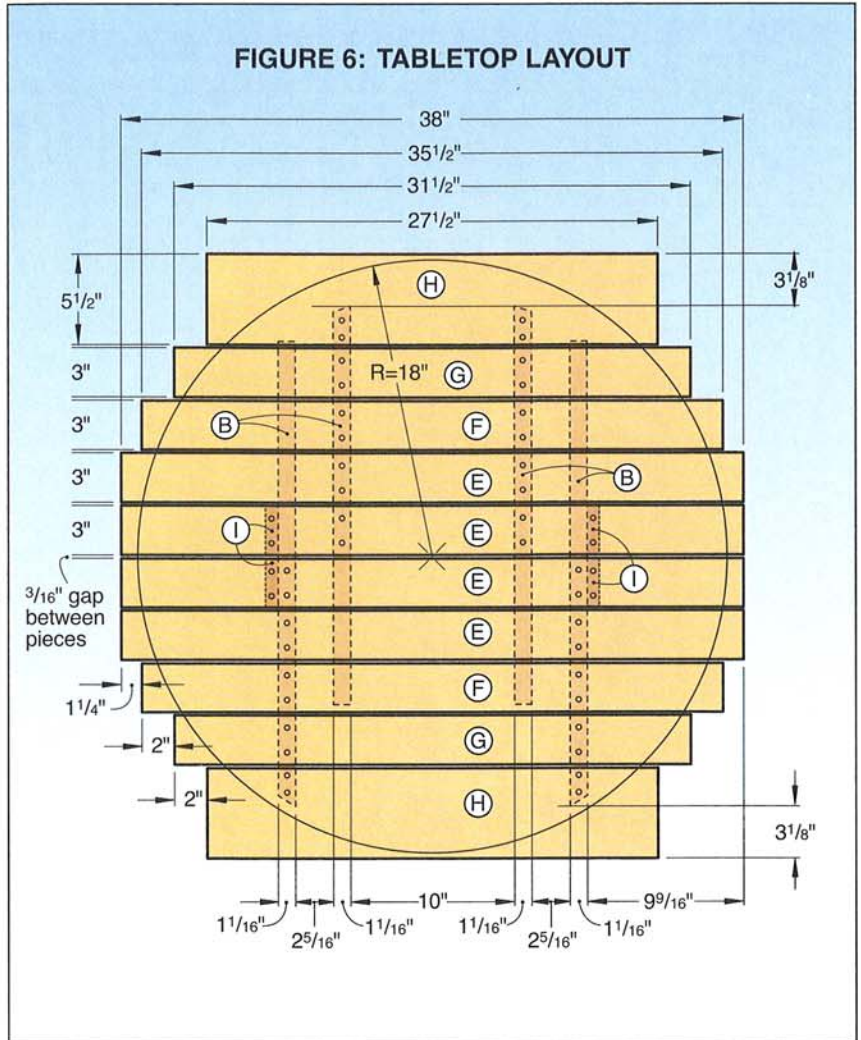


CUT THE TOP TO ITS FINAL SHAPE

1 Set the table upright on its legs. Now, mark the final shape of the tabletop. We made an improvised trammel as shown in **Figure 9** *bottom right*.

2 Cut the marked circle with your jigsaw (we used a 6-tooth-per-inch, hollow-ground blade). Sand the edge smooth. Then, chuck a piloted $\frac{1}{4}$ " round-over bit into your hand-held router, and round over the top edge of the tabletop.

3 Unscrew the top slat (H), and round over the underside (you'll have to remove it from the assembly to avoid hitting the top supports (B) with the router). Screw the top slat back into place. Round over the rest of the underside. Hand-sand the edge of the tabletop.



4 Unfold your table, and lay the ends of the table over the cleats (C) and (D). Trace a line $\frac{3}{16}$ " from the radius of the tabletop along the top edge of both cleats (we used a $\frac{3}{16}$ " spacer between the tabletop and the pencil). Unscrew the cleats, and bandsaw to shape. Sand the curved edge of the cleats to the radius line. Now, round over the top edges and ends of the cleats. Glue and screw them in place. ■

Written by: Jon Greising
Project design: James R. Downing
Illustrations: Kim Downing, Carson Ode
Project builder: Chuck Hedlund
Photograph: John Hetherington

FIGURE 8: POSITIONING ALIGNMENT BLOCKS

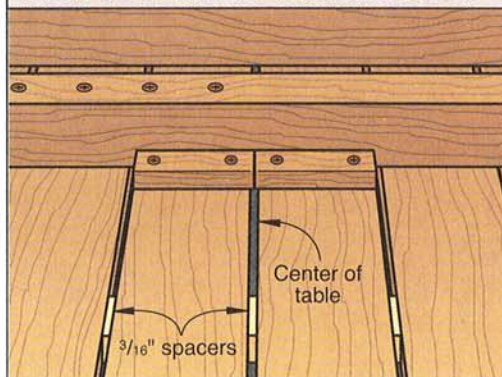
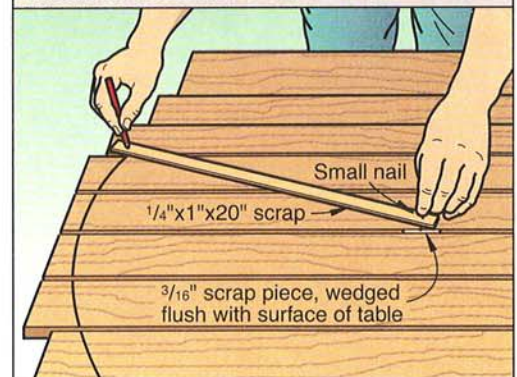


FIGURE 9: MARKING THE SHAPE OF THE TOP



Great Possibilities SHELVING SYSTEM



The modular design and classic lines of this shelving system give it a wealth of advantages. One of the most important is portability. The unit can be knocked down for storage or shipping, making it ideal for students and families on the move.

Strength is another outstanding feature. Locked together with rugged steel-reinforced construction, the unit is exceptionally rigid. This may be the strongest set of shelves you've ever owned.

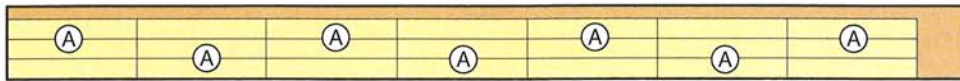
The timeless styling of the columns lets the unit blend effortlessly with any decor. The system is finished on all sides, so you can place it against a wall, or use it as a room divider.

LET'S START WITH THE COLUMNS

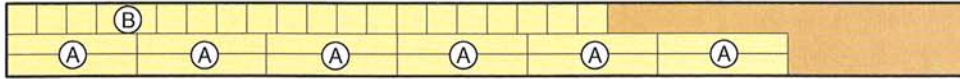
1 Rip and crosscut $\frac{3}{4}$ "-thick cherry into initially oversized $2\frac{1}{4} \times 13$ " blanks for the column sides (A). You'll need 32 for the shelving system shown, but make a few extras in case some are ruined in later machining operations.

Continued

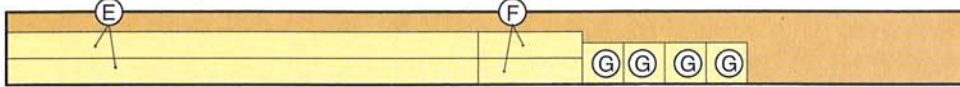
CUTTING DIAGRAM



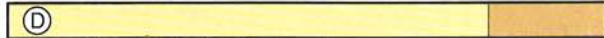
3/4 x 7 1/4 x 96" Cherry (2 pieces)



3/4 x 7 1/4 x 96" Cherry



1 1/16 x 7 1/4 x 96" Maple



1 1/16 x 3 1/2 x 60" Maple (3 pieces)



1 1/16 x 9 1/4 x 60" Maple (3 pieces)

BILL OF MATERIALS

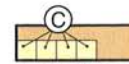
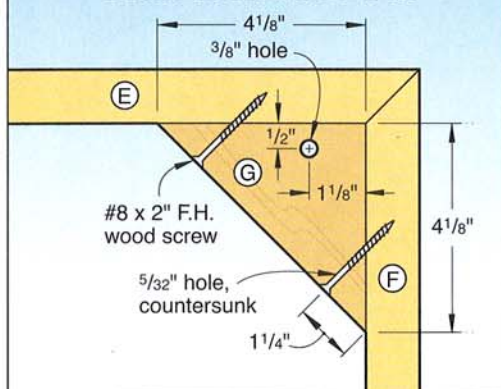
Part	Finished Size			Mati.	Qty.
	T	W	L		
A* column sides	3/4"	2"	12"	C	32
B end caps	3/4"	3"	3"	C	20
C top caps	1/2"	2"	2"	BM	4
D shelves	1 1/16"	11 1/4"	48"	EM	3
E base front/back	1 1/16"	2 5/8"	47 1/8"	M	2
F base ends	1 1/16"	2 5/8"	10 3/8"	M	2
G corner cleats	1 1/16"	4 1/8"	4 1/8"	M	4

*Cut part to final size during construction. Please read all instructions before cutting.

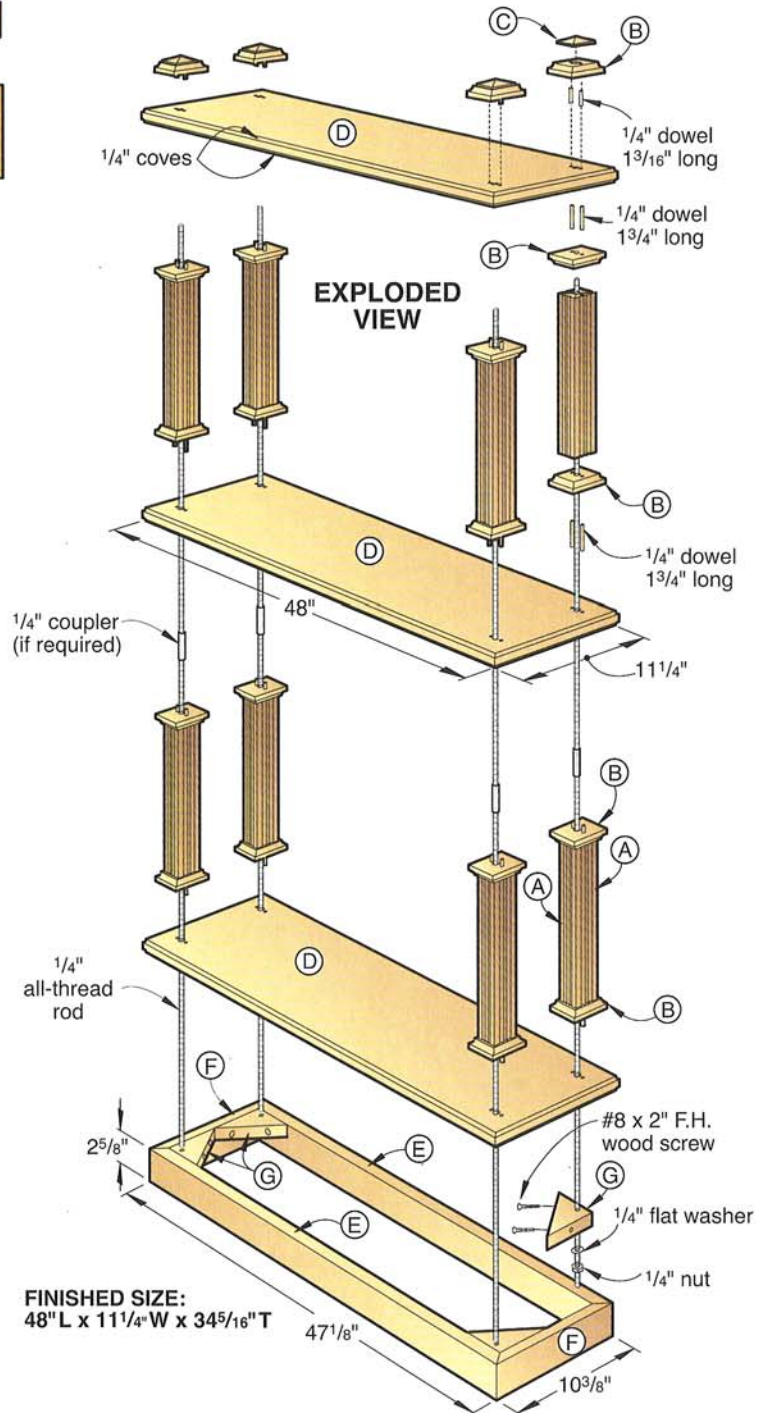
Materials Key: C—cherry; BM—bird's-eye maple; EM—edge-joined maple; M—maple.

Supplies: 4—1/4x32" all-thread rod; 4—1/4" tee-nuts; 4—1/4" flat washers; 4—1/4" nuts; 32—1/4x1 3/4" dowels; 8—1/4x1 3/16" dowels; 8—#8x2" flathead wood screws.

CORNER CLEAT DETAIL



1/2 x 3 1/2 x 12" Bird's-eye Maple



Shelving System

Shop Tip

No. 1—For increased clamping pressure on the column assembly, wrap with filamented strapping tape. This tape will not stretch or break. You also could try duct tape. Other clamping strategies: wrap the column with a spiral of surgical tubing or strips cut from an old inner tube.

2 Bevel-rip the blanks to a finished width of 2" as shown in **Figure 1** below middle. **SAFETY NOTE:** Set your table saw's rip fence as shown so that your stock cannot become trapped between the blade and fence. A trapped workpiece can kick back suddenly and violently, causing serious injury. Also refer to **Figure 2** below right to see how to hide accumulated cutting-angle error inside the columns. Even an error as small as one-fourth of a degree in each cut multiplies eight times into a 2° gap.

3 Put the column blanks face up in groups of four on your workbench. Put two strips of masking tape across the blanks, then turn them over. Brush a thin coat of glue into the joints, then roll up the assembly as shown in **Figure 3** bottom middle and tape it shut. Refer to **Shop**

Tip No. 1 left for ideas on how to supply clamping pressure.

4 Untape the columns when the glue is dry, and sand. Then, cut the columns 12" long.

5 Chuck a 1/4" roundnose bit into your table-mounted router, and set its tip 3/16" above the surface of the table as shown in **Figure 4** bottom right. Then, set your fence 5/8" from the center of the bit, and rout the flutes. **NOTE:** With one fence setting you can rout all the flutes except the center one. Reset the fence, then rout the center flute.

NEXT, MAKE THE END CAPS AND TOP CAPS

1 Rip and crosscut 3/4"-thick cherry into 20 blanks 3" square for the end caps (B).

FIGURE 1: RIPPING THE BEVELS

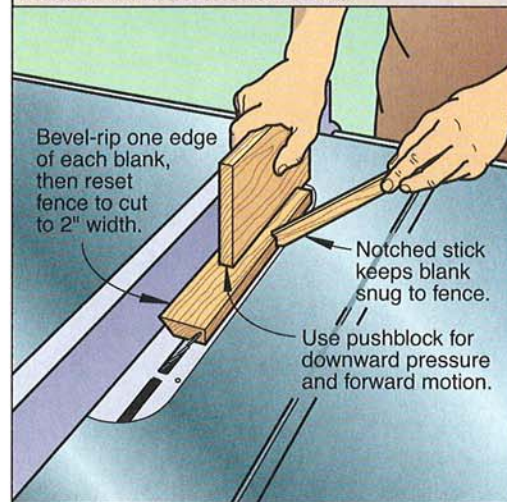


FIGURE 2: HIDING CUTTING ERRORS

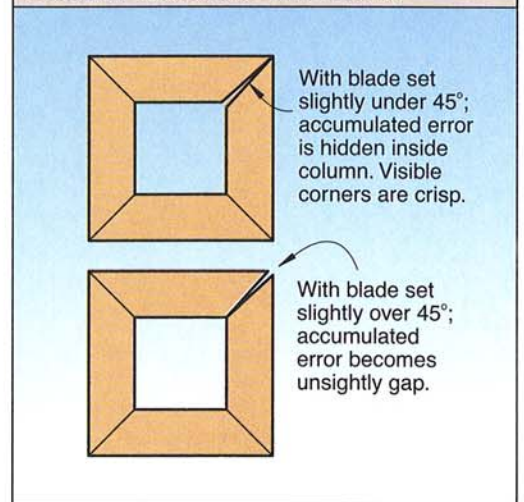


FIGURE 3: ASSEMBLING THE COLUMNS

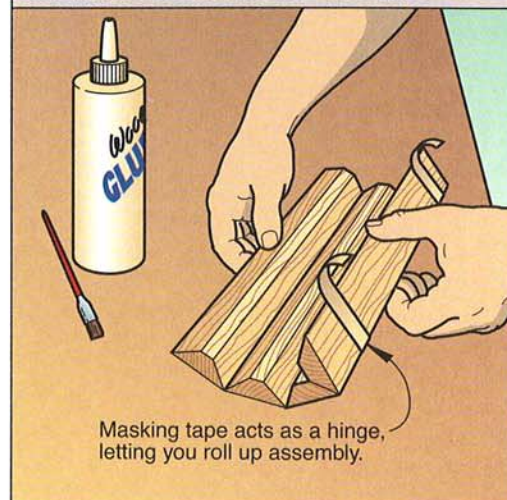
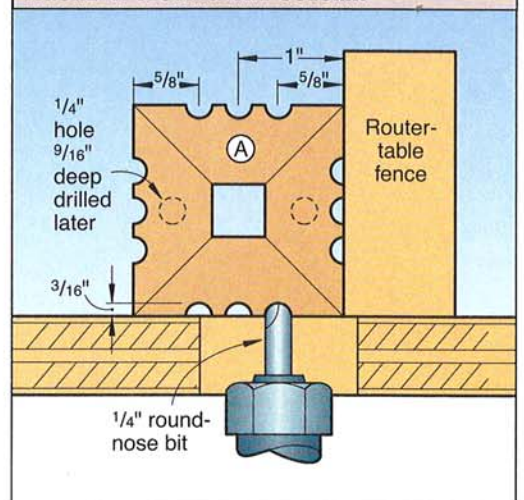


FIGURE 4: FLUTING THE COLUMN



Chuck a $\frac{3}{4}$ " Forstner bit into your drill press, and drill a centered counterbore $\frac{1}{4}$ " deep into four of the blanks (these will become the top end caps).

2 Chuck a $\frac{1}{2}$ " brad-point bit into your drill press, and drill a hole centered through each of the end cap blanks.

3 Chuck a $\frac{1}{4}$ " brad-point bit into your drill press, and drill holes through the end caps where shown in **Figure 5 middle below**, making sure that the holes are aligned with the grain where shown.

4 Chuck a $\frac{3}{8}$ " cove bit into your table-mounted router, and set your fence flush with the bit's bearing. Then, rout the ends and edges of each of the end caps. **NOTE:** We routed the end caps in several passes, raising the bit slightly between each cut, to reduce chipout. Using a backing board will also mini-

mize chipout. For safety, guide the stock past the bit with a pushblock.

5 Tap a $\frac{1}{4}$ -20 tee nut into each of the end caps. See **Shop Tip No. 2** right for installation suggestions. Then, set these parts aside.

6 Glue and clamp an end cap to each end of each column as shown in **Figure 6 bottom left**. Remove the clamp when the glue is dry.

7 Chuck a $\frac{1}{4}$ " brad-point bit into your portable electric drill. Using the holes in the end cap as guides, drill $\frac{9}{16}$ " deep into the column ends. Cut 16 pieces of $\frac{1}{4}$ " dowel stock to $1\frac{3}{4}$ " long, and glue two into each end of the column assembly. No more than $\frac{7}{16}$ " of the dowel should protrude. Cut 8 pieces of $\frac{1}{4}$ " dowel stock to $1\frac{3}{16}$ " long, and glue two into the bottom of each top end cap as shown in **Figure 5** and the **Exploded View**. Again, no more than $\frac{7}{16}$ " of the dowel should protrude.

Continued

Shop Tip

No. 2—To ease installation of tee nuts, drill pilot holes for the prongs. To do this, tap the tee nut with a light hammer blow to mark the prong locations in the counterbores. Remove the nut, then drill pilot holes. For the tee nuts we had, $\frac{1}{16}$ " holes worked great. A short length of $\frac{5}{8}$ " dowel lets you drive the tee nut to the bottom of the counterbore.

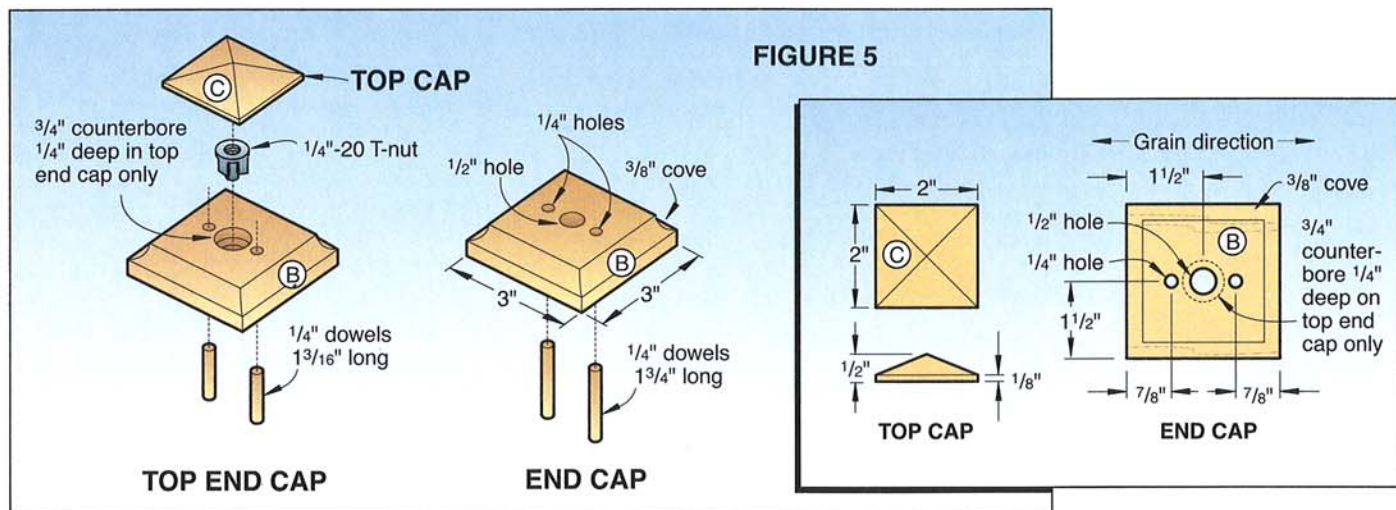


FIGURE 6: CLAMPING THE END CAPS

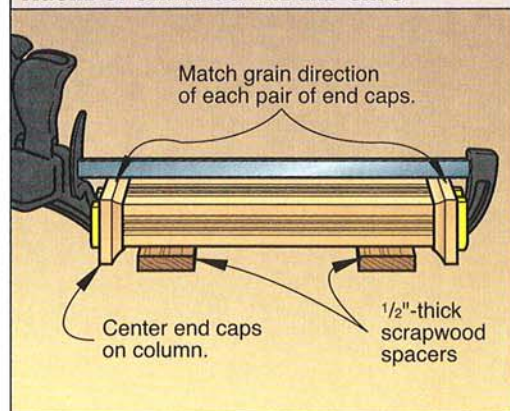
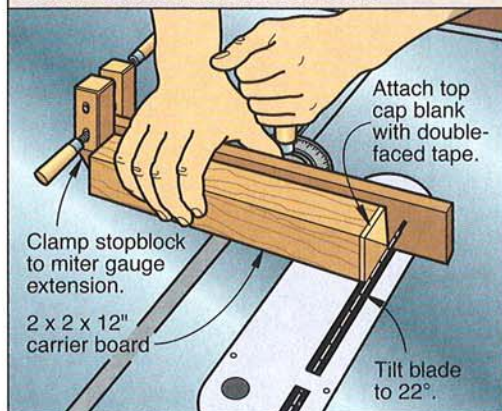


FIGURE 7: CUTTING THE TOP CAPS



Shelving System

8 Rip and crosscut four pieces of $\frac{1}{2}$ "-thick maple ($\frac{3}{4}$ " thick would also work) to 2×2 " to make blanks for the top caps (C). Rip and crosscut a scrapwood carrier board to $2 \times 2 \times 12$ ". Then, cut the top cap to shape as shown in **Figure 7** on page 13, bottom right. Sand the parts, then glue and clamp a top cap to each of the four top end caps. Refer to **Figure 5**.

of each shelf. Sand the cove, then set the shelves aside for now.

NEXT, CONSTRUCT THE BASE ASSEMBLY

1 Rip $\frac{1}{16}$ "-thick stock to $2\frac{5}{8}$ " wide for the base front/back (E) and the base ends (F). Miter-cut these parts to the lengths listed in the Bill of Materials.

THE SHELVES ARE EASY TO MAKE

1 Rip and crosscut the three shelves (D) from $\frac{1}{16}$ "-thick stock to the dimensions listed in the Bill of Materials. Then, sand both sides of the shelves to their final smoothness.

2 Make the shelf-drilling jig shown in **Figure 8** below from pieces of scrapwood. To use the jig, clamp it to the corner of one of the shelves with the "end" and "side" markings on the jig in the correct position. (Mark these words on both sides of the jig.) Then, use the holes in the jig as guides to drill the pair of $\frac{5}{16}$ " holes through the shelves with a brad-point bit in your portable electric drill. Unclamp, and turn the jig over to orient it for the opposite corner. Drill all of the $\frac{5}{16}$ " holes, then repeat the process to drill the $\frac{1}{2}$ " holes. Use a piece of scrapwood under the shelf to minimize tearout where the bit exits the wood.

3 Chuck a $\frac{1}{4}$ " cove bit into your table-mounted router, and then rout the ends and edges of both sides

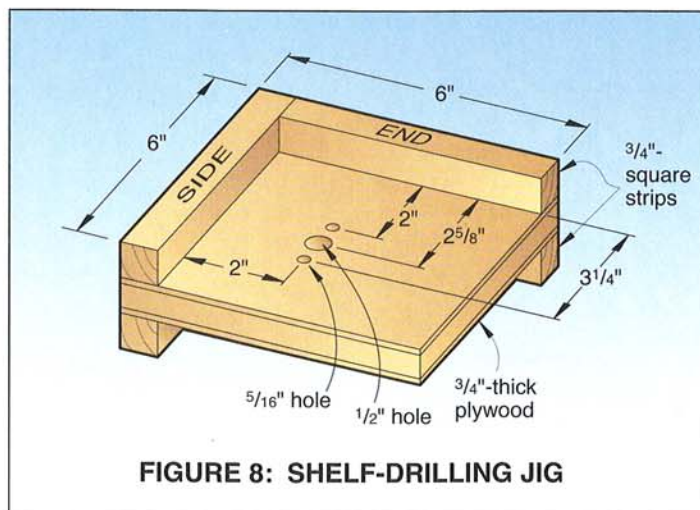


FIGURE 8: SHELF-DRILLING JIG

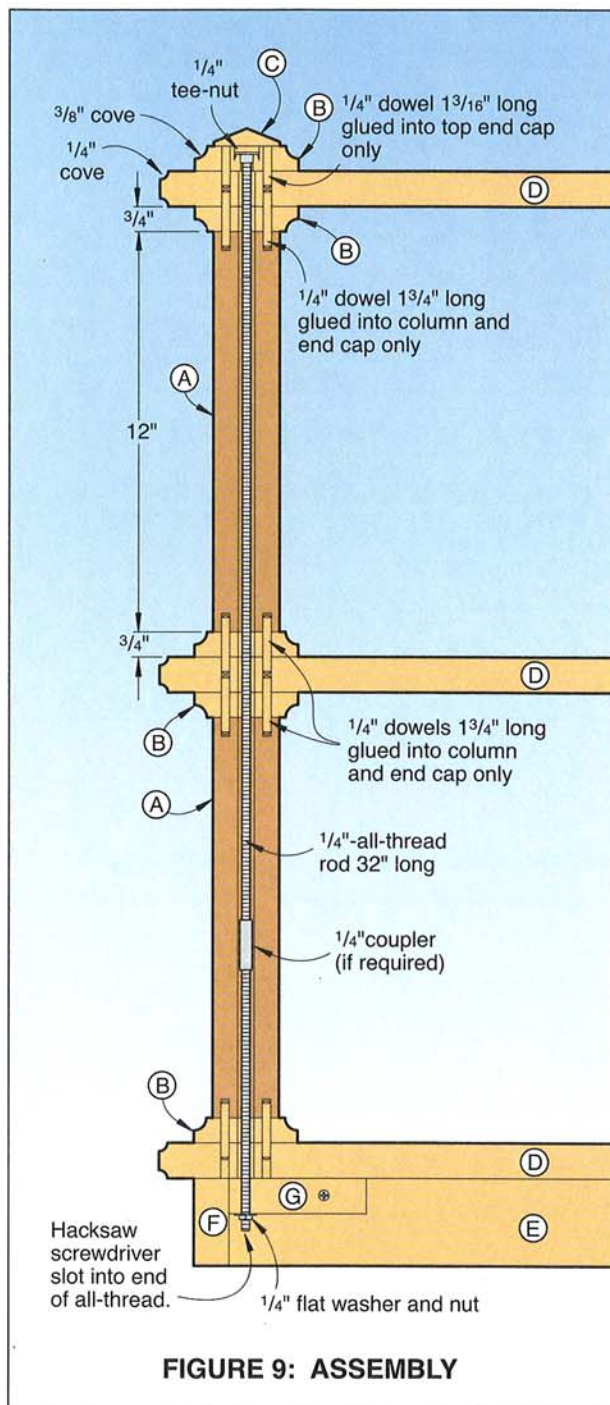


FIGURE 9: ASSEMBLY

2 Rip and miter-cut the four corner cleats (G) from 1 $\frac{1}{16}$ "-thick stock to the size listed in the Bill of Materials. Referring to the **Corner Cleat detail** accompanying the **Exploded View**, drill the $\frac{3}{8}$ " hole through each of these parts. Then, mark the position of the countersunk holes where shown, centering them on the edge of each corner cleat. **NOTE:** Do not drill these holes yet. You will do that after gluing the corner cleats into position.

3 Glue and band-clamp the four base parts (E and F), making sure the assembly is flat and square. Then, apply glue to one of the corner cleats, and position it in one corner of the base assembly, with its top surface flush with the top edge of parts E and F. Use masking tape to "clamp" the corner cleat into position. **NOTE:** Refer to the **Corner Cleat detail** accompanying the **Exploded View** to see the correct position of the hole in the corner cleat. Drill the countersunk $\frac{5}{32}$ " holes through the cleat. Change to a $\frac{7}{64}$ " bit, and drill pilot holes into the base parts, carefully gauging the depth of these holes. Then, drive the screws.

HOW TO ASSEMBLE THE SHELVING UNIT

1 Cut four pieces of $\frac{1}{4}$ " all-thread rod to 32" long. If necessary, you can join shorter sections with couplers to make the lengths you need. Hacksaw or file a screwdriver slot into one end of each rod where shown in **Figure 9** on the opposite page.

2 Do a test assembly before applying your finish to the shelf components. Assemble the unit upside down on a padded surface. Referring to **Figure 9**, insert the four top end caps into the top shelf board, and temporarily secure them with masking tape. Then, turn the top shelf assembly over.

3 Screw an all-thread rod into each end cap in the top shelf. Refer to **Tip No. 3** right for an assembly suggestion. Stack up the components as shown in **Figure 9**, and loosely install the flat washer and nut at each corner cleat. Use the screwdriver slot you made in the end of the all-thread rod to keep it from turning. Square up the components, and tighten each nut a little at a time until they are all snug. ■

Shop Tip

No. 3—Turn the all-thread rod until you feel it bottom out against the top cap, then back it out four full turns. (The rod will still be fully seated in the tee nut.) You could accidentally break the top caps if you left the rods bottomed out.

Project design: James R. Downing
Illustrations: Carson Ode, Roxanne LeMoine
Project builder: Bill Wright
Photograph: John Hetherington

CHOOSE FROM A RAINBOW OF FINISHES

We gave our shelf system a clear finish: three coats of Deft Semi-Gloss Clear Wood Finish. When the finish was dry, we rubbed down the luster with 0000 steel wool.

We also experimented with three other finishes that you could use for the entire project or selected parts. For example, you could apply a clear finish to the shelves and base assembly (E, F, G), and paint all the other parts.

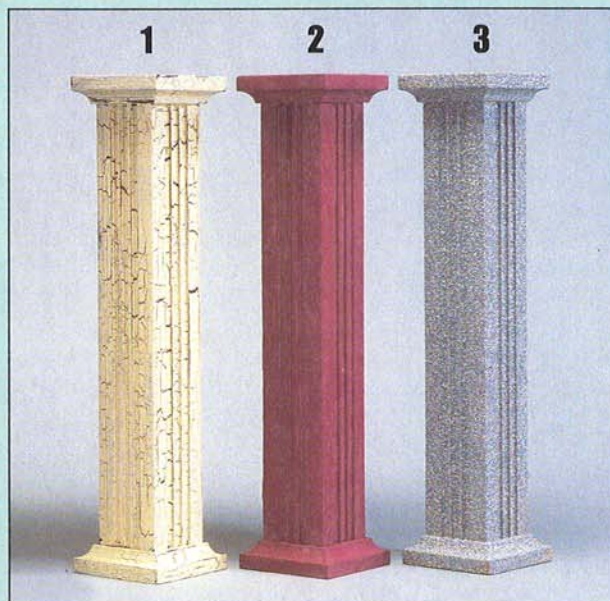
Finish 1 gives you an antique cracked-paint look. To do it, basecoat the piece with latex flat black paint, and let dry. Then, brush on a coat of Franklin Hide Glue, and let it dry for 24 hours. Finally, brush on a contrasting latex topcoat. The cracks appear as the finish dries. Commercial kits also are available for a crackle finish.

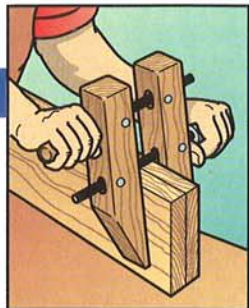
Finish 2 was base painted (Folk Art brand rose garden acrylic), and allowed

to dry. We then brushed on a glaze (Folk Art County Color Decorating Glaze rose pompeii). Before the glaze could dry, we covered it with a sheet of plastic wrap from the kitchen, then pulled it off. The plastic wrap removed some of the glaze, producing a mottled effect.

Finish 3 is a stone-look effect straight from an aerosol can. Krylon paint markets twelve colors at hobby shops, hardware stores, and home centers under their "Stone Craft" brand. Build the finish with several applications of the colored basecoat, then protect

it with the clear topcoat. To economize, we applied an undercoat of Delta Ceramcoat acrylic craft paint. Choose a shade close to the stone-look basecoat.



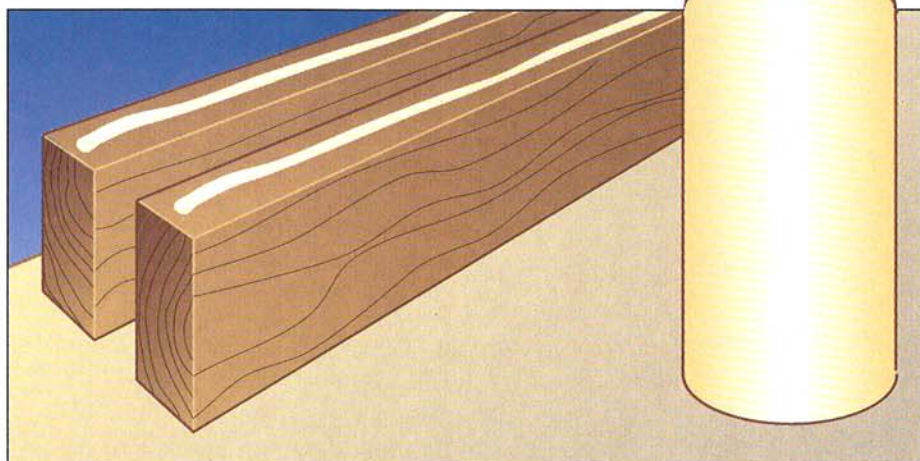


TRIED-AND-TRUE TECHNIQUES & JIGS

Choose the Right Glue For Long-Lasting Results

Choosing a woodworking glue is a decision that literally can make or break your project.

If you are faced with a complex assembly, you probably want a glue that offers a long open time to adjust the parts. If you're making a cutting board, you'll need an adhesive that offers excellent water resistance. You'll find all of these factors and others detailed in our reference chart on the *opposite page*. The lists on this page put you in touch with glue manufacturers and mail-order sources for these products.



To get the best results, read and follow the manufacturer's directions on the label. For example, the strength of a glue joint can be weakened seriously if you try to assemble it on day that is too cold.

Also pay close attention to manufacturer's health and safety warnings. All of these products are safe when used as directed, but the individual craftsman must take the responsibility for putting precautions into action.

OUR CHART GIVES QUICK FACTS

For your convenience, we have listed key items of information on a wide range of adhesives in a handy chart on the *opposite page*.

While this chart represents most of the major types of adhesives, it is not an exhaustive list of every glue on the market. Some manufacturers, for example, are now offering tinted glues that produce less-noticeable glue lines when joining dark woods such as walnut.

PREPARATION IS THE KEY TO SUCCESS

Today's powerful adhesives are not a substitute for good workmanship. You still need to cut and clamp carefully.

A good glue job starts by properly cutting and fitting the joint. You want it to fit together snugly, but not so tightly that you need to hammer the pieces together or apply excessive clamping pressure during assembly. Doing so can force out most of the adhesive, resulting in a glue-starved joint.

The other extreme—a sloppy joint that rattles around—is no improvement. Here's why: a thin film of glue will join wood to wood in a bond that's stronger than the wood itself. But in a thick application, the glue has to try to stick to itself—something it was not designed to do. That's the reason that more glue doesn't make a stronger joint. ■

GLUE MANUFACTURERS

H. Behlen & Bros., 4715 State Highway 30, Amsterdam, NY, 12010-9204; or call 518/843-1380

Borden/Elmer's Products, Inc., R&D Laboratories, 100 Kingsmill Parkway, Columbus, OH 43229; or call 614/431-6680

DAP, Inc. P.O. Box 277, Dayton, OH 45401; or call 800/634-8382 or 513/667-4461

Devcon, 50 Endicott Street, Danver, MA, 01923; or call 800/933-8266

Franklin International, 2020 Bruck St., Columbus, OH 43207; or call 800/347-4583 or 614/443-0241

The Gorilla Group, P.O. Box 42532, Santa Barbara, CA 93140; or call 800/966-3458 or 805/963-2234.

Satellite City, P.O. Box 836, Simi Valley, CA 93062; or call 805/522-0062

Wilsonart International, 2400 Wilson Place, Temple, TX, 76504; or call 800/433-3222 or 817/778-2711

MAIL-ORDER SOURCES

Constantine's, 2050 Eastchester Road, Bronx, NY 10461; or call 800/223-8087

Trend-Lines, 135 American Legion Hwy., Revere, MA; or call 800/767-9999

Garrett Wade, 161 Avenue of the Americas, New York, NY 10013; or call 800/221-2942

Woodcraft Supply P.O. Box 1686, Parkersburg, WV 26102; or call 800/225-1153

GLUE REFERENCE CHART FOR WOODWORKERS

Brand/Manufacturer	Elmer's Glue-All / Borden	Titebond / Franklin	Elmer's Weather-Tite Wood Glue / Borden	Titebond II / Franklin	Weldwood Waterproof Resorcinol Glue / DAP	Weldwood Plastic Resin Glue / DAP	Gorilla Glue / The Gorilla Group
Glue type	polyvinyl acetate	aliphatic resin	synthetic polymer	cross-linking polyaliphatic	resorcinol formaldehyde	urea formaldehyde	polyurethane
Open time (minutes)	10	5	5	5	30	20-30	20
Set time (hours)	40 min.	1	1	1	10	12	1-4
Clean-up solvent	water	water	water	water	water	water	denatured alcohol
Water resistance	poor	good	good	excellent	excellent	excellent	excellent
Shelf life	1 yr. minimum	2 years	1 yr. minimum	5 years	1 yr. minimum	1 yr. minimum	6 mo.-1 year
Price / Ounce	\$.34	\$.20	\$.46	\$.37	\$.84	\$.37	\$1.11
Applications*	IWW	IWW	IWW / EWW	IWW / EWW	IWW / EWW	IWW / EWW	IWW / EWW
Comments	use instead of yellow woodworker's glue for longer assembly time	standard woodworker's glue	not for continuous submersion in water	grabs slightly faster than standard yellow glues	excellent for marine use; work in well-ventilated area and wear safety equipment	long open time useful in veneering and complex assemblies; structurally sound bonds	single-side application for speed and economy; solvent free and odorless; stainable

Brand/Manufacturer	2-Ton Epoxy / Devcon	5-Minute Epoxy / Devcon	Lokweld 600 Contact Cement / Wilsonart	Lokweld H20 Contact Cement / Wilsonart	Pearl or Ground Hide Glue / H. Behlen	Liquid Hide Glue / Franklin	Hot Stuff Instant Glues / Satellite City
Glue type	two-part epoxy	two-part epoxy	solvent-based neoprene	waterborne neoprene	dry forms of hide glue	premixed hide glue	cyanoacrylate
Open time (minutes)	20 min.	5 min.	1 hr.	2 hr.	2-3 minutes	30	5-10 min.
Set time (hours)	8	1	press with roller	press with roller	2	2	1 min.
Clean-up solvent	lacquer thinner	lacquer thinner	lacquer thinner	water	water	water	acetone
Water resistance	excellent	poor	excellent	excellent	poor	poor	good
Shelf life	3 years.	3 years.	1 year	1 year	unlimited if kept dry	1 year	1 year.
Price / Ounce	\$3.00	\$3.00	\$.15	\$.33	\$.56	\$.48	\$4.98
Applications*	IWW / EWW	IWW / EWW	applying plastic laminates	applying plastic laminates	IWW, musical instruments	IWW, furniture restoration	IWW
Comments	good gap-filling ability; bonds metal to wood	good gap-filling ability; bonds metal to wood; not as strong as slower-setting epoxy	poses fire and explosion hazard; use with adequate ventilation	substantially more coverage per gallon than solvent-based type; easier clean-up	mix with water and heat per label instructions; glue accepts stain without splotching	also used for musical instruments; glue accepts stain without splotching	several varieties available, including gap-filling type; small amount goes a long way

* IWW = interior woodworking; EWW = exterior woodworking



A Roaring Runabout

*I*n the Roaring '20s many people were obsessed with fast living in every form. Pilots fearlessly risked their lives to grab a speed record headline. Mechanics would try anything to coax one additional horsepower out of their breakneck race cars. Even the popular hero of boys' fiction was appropriately named Tom Swift.

Some wealthy "sports" of the time chose speedy motorized boats for their recreation. Our model was inspired by the handsome and powerful runabouts of the late 1920s manufactured by companies like Chris Craft, Hacker Craft, and Garwood. The huge engines throbbing under the hatches made these the fastest production boats of the era.

The original boats of the 1920s and '30s had gleaming mahogany decks with accent stripes of white caulking. We simulated that classic touch in this exquisite model by inlaying pine strips into a redwood deck.

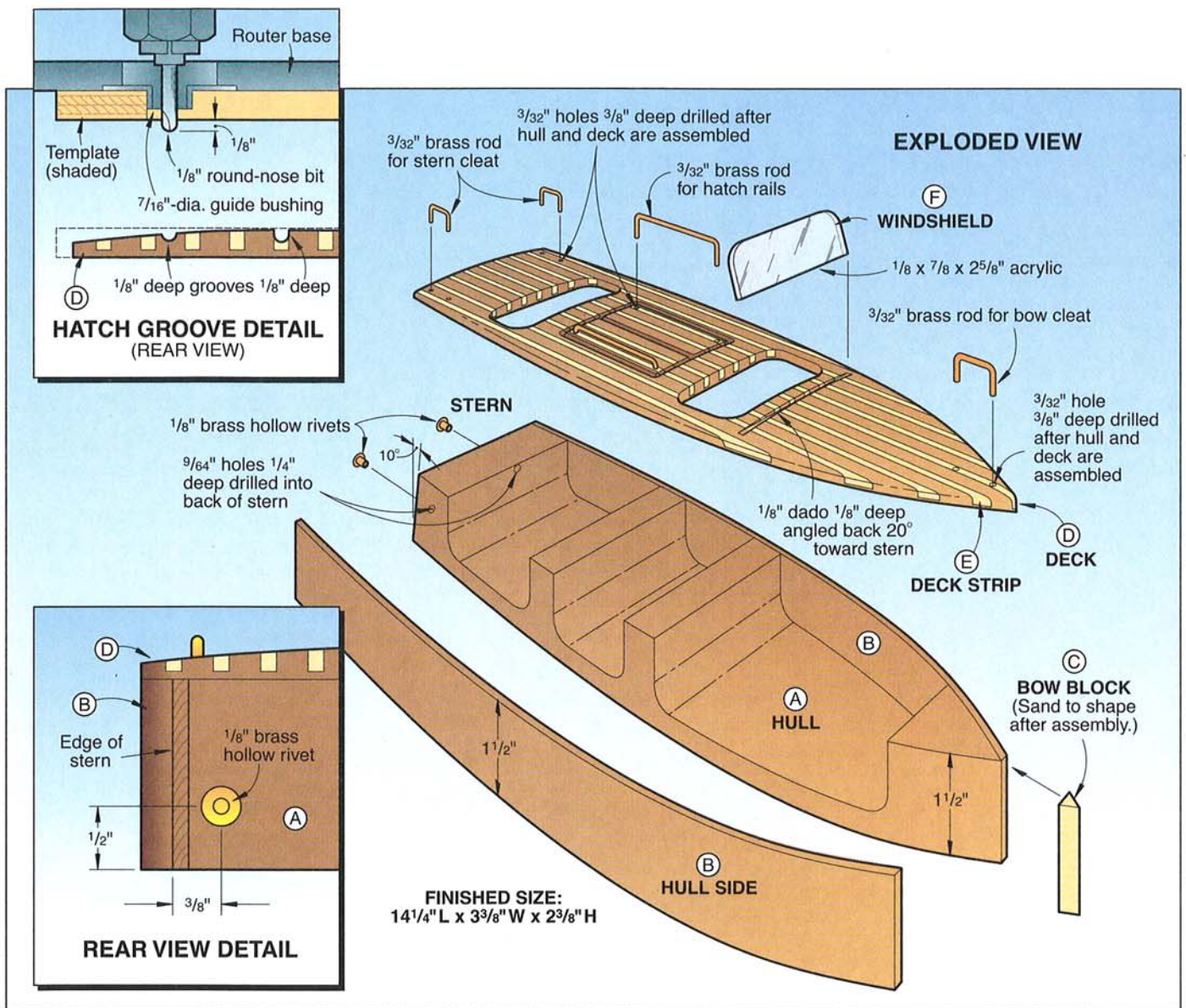
True to the heritage of the original that inspired it, this is a fast-to-complete project. But take your time and enjoy building it.

NOTE: To make this boat, we started with a 3' length of redwood 2x6, and an 18" length of pine 1x6.

LET'S START WITH THE HULL

1 Rip and crosscut a piece of 1½"-thick redwood to 4x14½" as a blank for the hull (A). See **Shop Tip No. 1** *opposite page, bottom right* for a suggestion on stock selection. Tilt your tablesaw blade to 10° from vertical, and bevel-cut the stern of the blank where shown on the **Hull Side View** in the WW PROJECT PATTERNS insert in the center of the magazine. Also refer to the **Exploded View** *opposite page*.

2 Make a photocopy of the **Hull Side View** in the pattern insert. Adhere it to the side of the hull blank with spray adhesive, matching the stern on the pattern with the cut made on the blank. Remove the shaded areas by band-sawing just to the waste side of the line (we used a ¼" blade), then sand to the line. Don't sand the center cutout; it will not be visible when the boat is assembled. This area is cut out so the boat will float higher in the water.



3 Make a photocopy of the **Hull Top View** in the pattern insert, and adhere it to the blank with spray adhesive. Be certain to align the top end of the bevel shown on the pattern with the bevel on the blank.

4 Starting at the bow, bandsaw just to the waste side of the pattern line, then sand to the line. We used a light touch with a stationary disk sander. Save the scrap blocks from the hull. You will use them for clamping blocks later. Set the hull aside for now.

NOW, MAKE AND ATTACH THE HULL SIDES

1 Rip two hull sides (B) to the dimensions listed in the Bill of Materials. For safety, use a pushblock to complete the cut.

2 Apply glue to the sides of the hull blank. Use Titebond II, a weatherproof glue, if the

Continued

BILL OF MATERIALS

Part	Finished Size			Matl.	Qty.
	T	W	L		
A* hull	1 1/2"	3 1/4"	14"	R	1
B* hull sides	1/8"	1 1/2"	14 3/4"	R	2
C* bow block	3/8"	1/2"	1 1/2"	P	1
D* deck	1/4"	3 1/2"	14"	R	1
E* deck strips	1/8"	1/4"	14 1/2"	P	9
F* windshield	1/8"	7/8"	2 5/8"	A	1

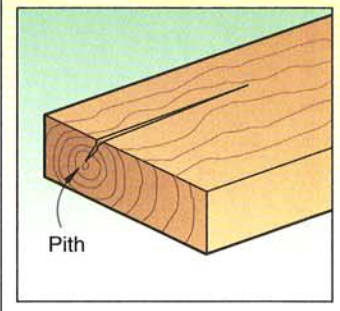
*Cut part to final size during construction. Please read all instructions before cutting.

Materials Key: R—redwood; P—pine, A—acrylic (clear).

Supplies: 2—1/8" split brass rivets; 1—12" length of 3/32"-dia. brass rod; finish.

Shop Tip

No. 1—Avoid stock containing pith (the tree's core growth rings). This type of stock is very likely to split.



Roaring Runabout

Shop Tip

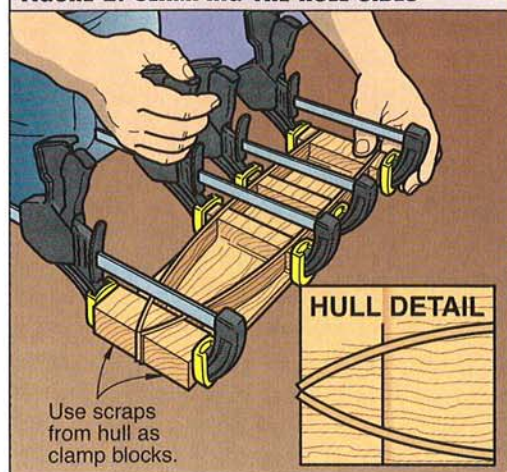
No. 2— Here's how to figure the template size for routing the hatch outlines if you don't have a $\frac{7}{16}$ " guide bushing. Measure the desired distance between groove centerlines. In this case, it is $1\frac{1}{8}$ " x $2\frac{1}{16}$ ". Then, add the diameter of the guide bushing you have to each dimension to obtain the size of the template opening. For a $\frac{3}{8}$ " guide bushing, the opening would be $2\frac{1}{4}$ " x $3\frac{1}{16}$ ". For a $\frac{1}{2}$ " bushing, the opening is $2\frac{3}{8}$ " x $3\frac{3}{16}$ ". Save this handy formula for the next time you want to pattern-route an outline on a workpiece. It will work for any combination of bit and guide bushing.

boat will be placed in water. Place the hull sides in position. **NOTE:** You will later square off the tip of the hull assembly to accept the bow block (C), but you want the ends of the hull sides as close as possible to each other at this time. Now, use the scraps from the hull as clamping blocks to distribute pressure evenly as shown in **Figure 2 right**. Begin clamping at the front of the boat and work your way to the back. Tighten the clamps a little bit at a time, keeping the hull sides flush with the top and bottom of the hull. Let the assembly dry thoroughly, preferably overnight.

3 Unclamp when the glue is dry, and sand the ends of the hull sides flush with the angled end of the stern. Next, sand the ends of the hull sides flush with the bow of the hull where shown in Step 5 of **Figure 1**.

4 Rip and crosscut a piece of pine for the bow block (C) to the dimensions in the Bill of Materials. Note that the grain runs vertically in

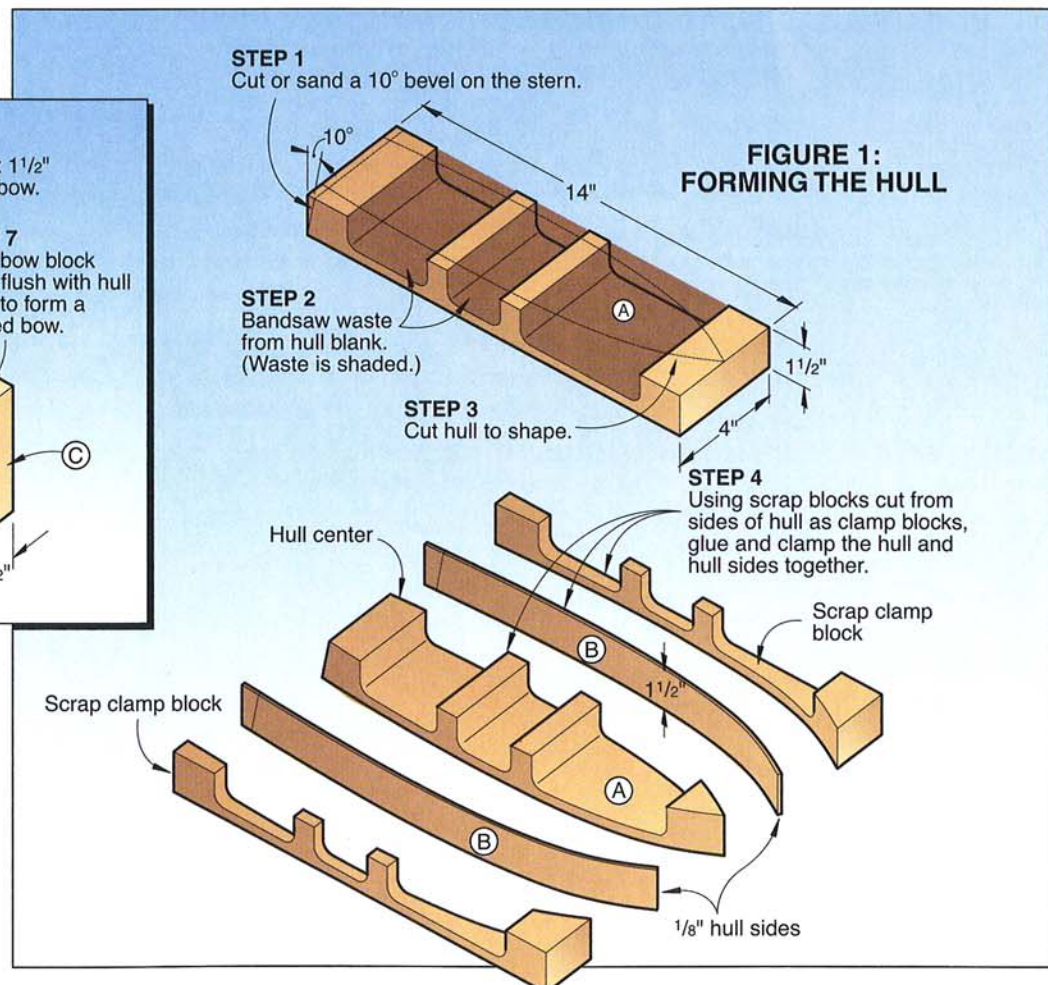
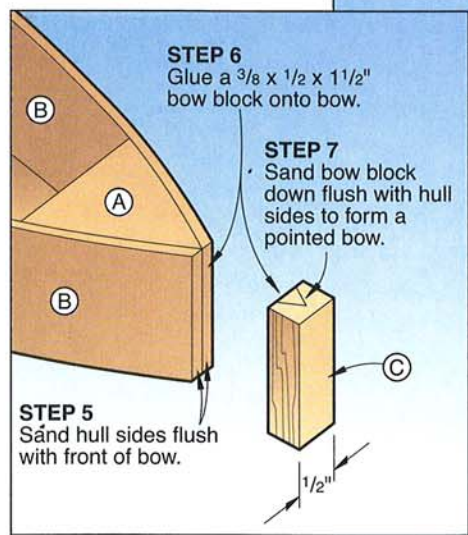
FIGURE 2: CLAMPING THE HULL SIDES



this piece. Glue it to the bow assembly, using masking tape to "clamp" it into place until the glue dries. Then, sand the bow block flush with the hull sides, tapering it to a point.

NEXT, MAKE AND ATTACH THE DECK

1 Rip and crosscut a piece of redwood to $\frac{1}{4}$ " x 4 " x $14\frac{1}{2}$ " as a blank for the deck (D). Chuck a $\frac{1}{8}$ " straight bit into your table-mount-



ed router, and set a $\frac{3}{16}$ " depth of cut. Clamp a fence $\frac{7}{16}$ " from the inner edge of the bit, and rout a groove where shown on the **Deck Top View** in the pattern insert. Move the fence $\frac{1}{4}$ ", and rout another groove. Repeat until you have nine grooves.

2 Rip and crosscut the deck strips (E) from pine stock to the dimensions listed in the Bill of Materials. Test-fit the strips into the grooves. You want the strip to completely fill the groove without forcing it into place. Doing that could split the deck. Glue the deck strips into the deck, and weight the assembly until dry.

3 Sand the deck strips flush with the surface of the deck. Then, make a photocopy of the **Deck Top View**, and adhere it to the deck assembly flush with the stern and carefully centered side-to-side. Be certain that the center stripe on the pattern is aligned with the center stripe on the deck blank.

4 Chuck a $\frac{3}{4}$ " Forstner bit into your drill press, and bore the holes in the two cockpit areas. Next, scrollsaw the remaining waste from these areas, and sand the cut edges.

5 Make a template to help you rout the hatch outlines. Refer to **Figure 3** above for a description of this process. Also see **Shop Tip No. 2** opposite page, top left for an explanation of how to calculate the size of the template opening for other sizes of guide bushings.

6 Referring to the **Windshield Pattern** on the pattern insert, cut a piece of $\frac{1}{8}$ "-thick clear acrylic to size. Disk-sand the top corners to shape, and finish the edges. Refer to **Shop Tip No. 3** right for suggestions on working with plastics. Tilt your tablesaw blade to 20° , and set the height for a $\frac{1}{8}$ "-deep dado for the windshield where shown on the **Deck Top View** in the pattern insert. Make a test cut first in scrap stock to check the setup, particularly the direction of blade tilt in relation to the deck blank. Then, make the cut.

7 Glue and clamp the deck assembly to the hull. Be certain to carefully center the deck assembly to give the boat a neat appearance.

FIGURE 3: ROUTING THE HATCHES

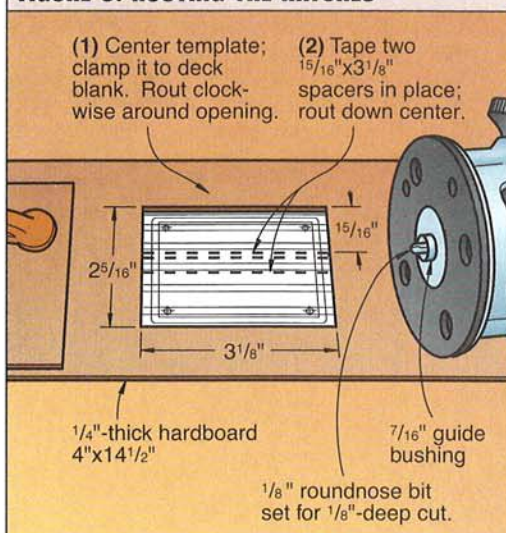
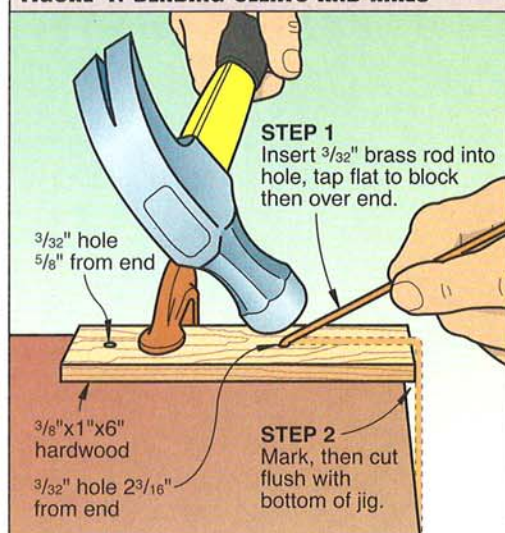


FIGURE 4: BENDING CLEATS AND RAILS



8 Disk-sand the edges of the deck flush with the hull. Sand a slight crown on the deck where shown on the **Deck End View** in the pattern insert. Also refer to the **Rear View detail** accompanying the **Exploded View**. Use a sanding block with 80-grit paper to establish the shape, then smooth it with 120- and 220-grit sandpaper.

YOU'RE NEARLY READY TO LAUNCH

1 Apply finish to the boat. We brushed on three coats of Zar Gloss Polyurethane. Pour finish into the cockpit openings, and move the boat around to coat all interior surfaces, including the bottom of the decks.

2 Make the simple bending jig shown in **Figure 4** above and shape the cleats and rails from $\frac{3}{32}$ "-dia. brass rod from a hobby shop or hardware store. Shine the parts with commercial brass polish, and then spray them with gloss aerosol lacquer to prevent tarnish. Holding a finished cleat with needle-nose pliers, position it on the deck where shown on the **Deck Top View**. Then, gently tap it with a hammer to mark the location. Drill $\frac{3}{32}$ " holes $\frac{3}{8}$ " deep at the marks. Then, install the cleat, securing it with a drop of epoxy wiped on the wall of each hole with a toothpick. Repeat for each cleat and rail.

3 Drill holes in the boat's stern where shown on the **Rear View detail** accompanying the **Exploded View** for the $\frac{1}{8}$ " split brass rivets simulating exhaust ports. Drill a test hole in scrap stock to match the diameter of the rivets you purchase. Ours required a $\frac{9}{64}$ " hole. Then, epoxy them in place. Next, epoxy the windshield into position. ■

Shop Tip

No. 3—Leave the protective paper on clear acrylic while you scrollsaw and sand the edges. In addition to preventing surface scratches, the paper helps scrollsaw blades run cooler, preventing the plastic from fusing together after sawing. For best results, use a relatively coarse scrollsaw blade, like a No. 7. Use a scraper to remove the saw marks. Then, using a sanding block, hand-sand the edge to a frosted finish by ending with 220-grit paper. For a polished edge, continue sanding with 320- and 400-grit paper, then use a buffing compound especially formulated for use with plastics.

Project design: Jan Hale Svec
Illustrations: Carson Ode, Kim Downing
Project builder: Bill Wright
Photograph: John Hetherington



Shaker Sensations

*To spice up
your meals*

MAKE SETS FOR YOURSELF AND AS GIFTS

Spice up your next meal with these contemporary salt and pepper shakers. They're an attractive addition to any table setting, and a great way to keep your woodworking skills front and center for all to enjoy. Or, wrap up a pair as a thoughtful and practical gift.

Supplies you will need include 1 1/16"-thick walnut stock, 1 1/16"-thick maple stock, finish, and 1/2" rubber stoppers. See the Buying Guide *left*.

BUYING GUIDE

Shaker kit. Package of ten 1/2" rubber stoppers and one pint Behlen's Salad Bowl Finish. Kit no. 1330. \$11.29. Add \$4.95 per order for shipping. Meisel Hardware Specialties, P.O. Box 70W, Mound, MN 55364-0070. Or call 800/441-9870 to order.

START YOUR SHAKERS FROM BLANKS

1 To make the shaker blanks, cut two 2x6" pieces from 1 1/16"-thick maple. Glue and clamp the pieces face-to-face. Do the same with two pieces of 1 1/16"-thick walnut.

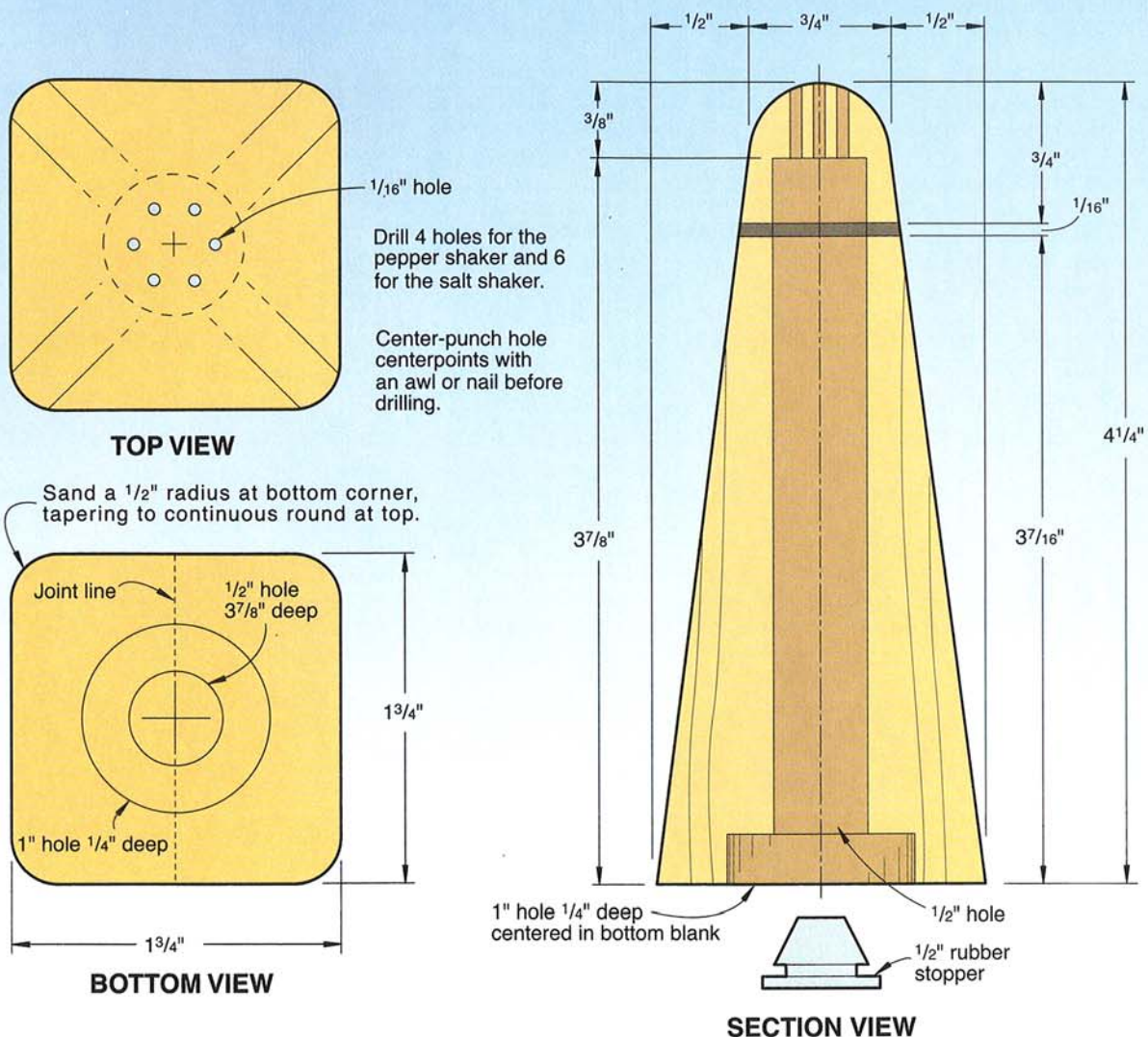
2 After the glue dries, remove the clamps, and crosscut both ends of each blank to square

the ends. Next, carefully saw a 1/16"-thick slice from one end of each blank. We covered the open space around our saw blade with masking tape to prevent losing the thin pieces.

3 Set a stopblock, and crosscut the shaker blanks to 3 7/16" long. Next, glue and clamp these pieces back together, sandwiching the thin walnut slice between the two maple pieces (salt shaker), and the thin maple slice between the two walnut pieces (pepper shaker).

4 When the glue is dry, trim both shaker blanks to 1 3/4" square and 4 1/4" long. See the dimensions on the Section View drawing.

5 Draw diagonal lines to mark the center on the bottom of each blank. Next, bore a 1" counterbore 1/4" deep on these centermarks where shown on the Section View and Bottom View drawings. We used a 1" Forstner bit in



our drill press. To hold the shaker blanks while drilling their interiors, we clamped each one in a handscrew clamp; then clamped the handscrew to the drill-press table. Switch to a 1/2"-diameter brad point bit, and using the same centerpoints, bore 37/8" deep into both shakers.

6 Make a photocopy of the Top View pattern. Center it on the tops of your shaker blanks. Mark the hole centerpoints on each blank (six for salt, four for pepper). Next, drill 1/16"-diameter holes through the tops of the shaker blanks, deep enough to penetrate into the 1/2"-diameter body cavity.

7 Mark the 1/2" tapers (toward the top) on two opposite sides where shown on the Section View. Bandsaw these tapers, cutting just to the waste side of the lines. Then, sand to the lines. Mark the tapers on the two remaining sides. Then, bandsaw and sand those sides to shape.

8 Cut a 4" length of 1/2"-dia. dowel. Insert one end of it into the hole in the shaker bottom far enough to hold it firmly by friction. Next, chuck the dowel's free end into your drill press. Set the drill press to its slowest speed, and sand the tapered edges on each shaker to the shape shown on the Section View drawing. To do this, we handheld a sanding block against the shaker blank as it turned, starting with 80-grit sandpaper, and working up to 320-grit sandpaper. Sand the second shaker the same way.

9 Remove the dowel and all sanding dust from the shakers. Apply the finish of your choice. We applied Behlen's Salad Bowl Finish, following label instructions. It will be food-safe after drying 72 hours. Redrill the 1/16" holes in the tops to make sure they're open. Fit 1/2" rubber stoppers or corks into the bottom holes of the shakers. ■

Project design: Doug Nicolet
Illustrations: Jamie Downing
Project builder: Chuck Hedlund
Photograph: John Hetherington

Curvaceous Country Garden Bench



If you've always thought that you can't produce attractive furniture with thick stock, have we ever got a pleasant surprise for you. And not only is it great looking; this bench is also easy to build. Just wait until you see how easy it is to give the seat its elegant curves.

START WITH THE BENCHTOP

1 Rip and crosscut 1½"-thick cedar into two 7¼×48" pieces and one 6⅞×48" piece to form the seat (A). Next, chuck a piloted 45° chamfer bit into your table-mounted router, and adjust it to a cutting depth of ¼". Rout a chamfer along both top edges of the 6⅞" piece, and one top edge of each 7¼" piece. Position the 6⅞" piece between the 7¼" pieces so that the chamfers are adjacent to each other as shown in **Figure 1** page 26, top left, then glue and clamp (we used Titebond II, a weather-proof glue).

2 Mark the final shape of the top as shown in **Figure 1**. Bandsaw the top to its final shape. Cut just to the waste side of the line, then sand to the line.

THE UPRIGHTS COME NEXT

1 Rip and crosscut blanks for the feet (B) to the dimensions listed in the Bill of Materials. Rip and crosscut four pieces for the uprights (C) to 5½×11½". Edge-glue the pieces in two pairs to form two 11×11½" blanks for the uprights, and let dry.

2 Mark the center on one of the feet. Next, mark and drill two ¾" holes 1⅜" deep into the bottom of the foot where shown on the WW PROJECT PATTERNS insert in the middle of the magazine. Then, drill ⅜" holes the rest of the way through the foot. Repeat for the other foot.

3 Align the center mark of the foot with the center seam of the upright, and clamp in place. Next, with a ⅞" bit in your hand drill, drill through the holes in the leg into the upright. Unclamp, and continue the holes in uprights to a depth of 2¾". Screw the foot to the upright with ⅜×4½" lag bolts and flat washers. Do not use glue on this joint.

4 Make two photocopies of the full-sized pedestal patterns in the pattern insert.

Continued

BILL OF MATERIALS

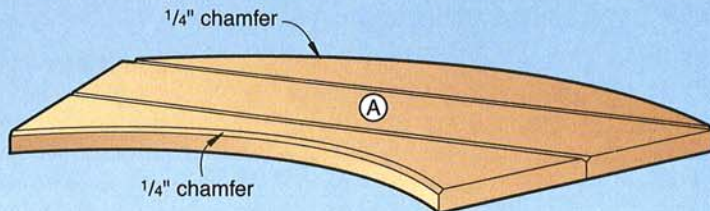
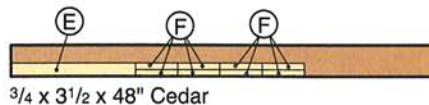
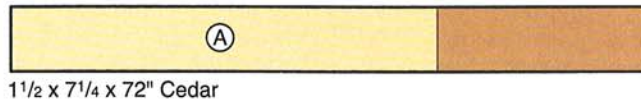
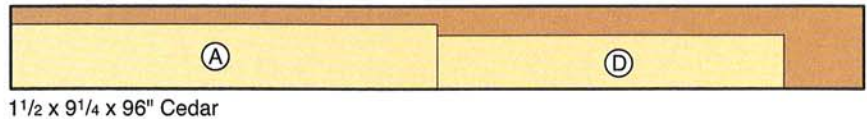
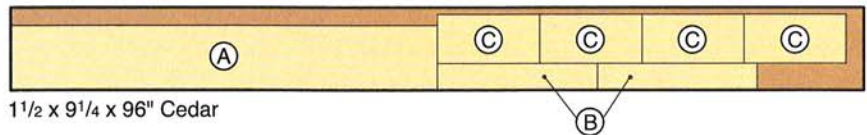
Part	Finished Size			Mati.	Qty.
	T	W	L		
A top	1½"	20¼"	48"	EC	1
B feet	1½"	3"	18"	C	2
C uprights	1½"	11"	11½"	C	2
D stretcher	1½"	6"	39"	C	1
E center cleat	¾"	1½"	14"	C	1
F pedestal cleats	¾"	¾"	4¾"	C	8

*Cut part to final size during construction. Please read all instructions before cutting.

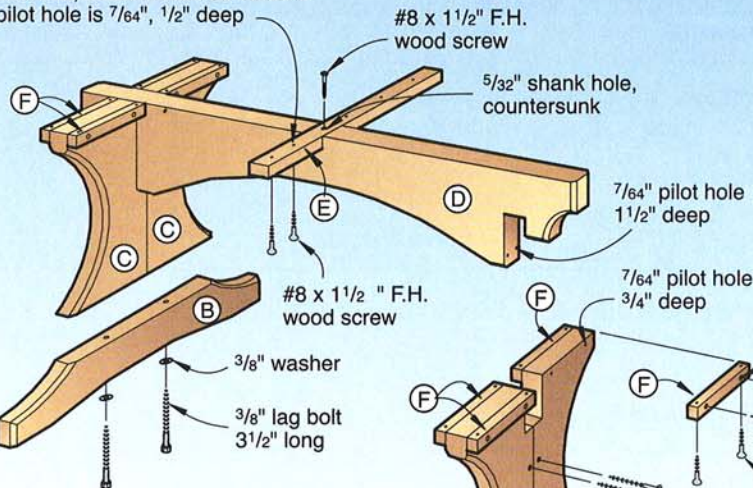
Materials Key: C—cedar; EC—edge-jointed cedar.

Supplies: 4—#8×3" flathead wood screws; 23—#8×1½" flathead wood screws; 16—#8×1¼" flathead wood screws; 4—¾×4½" lag screws; 4—¾" flat washers; 4—1" nylon tack glides.

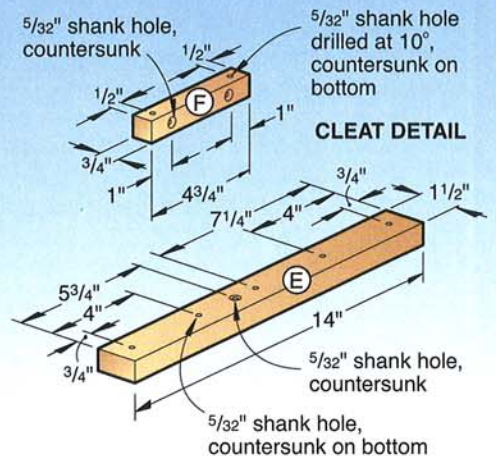
CUTTING DIAGRAM



5/32" shank hole, countersunk on bottom.
Mating pilot hole is 7/64", 1/2" deep



EXPLODED VIEW



CLEAT DETAIL

Garden Bench

FIGURE 1

Step 3. Make a trammel $1/4 \times 1 \times 50"$, drilling pencil holes $32"$ and $48"$ from the pivot point nail hole. Set the nail at each end of this seam, and strike arcs to mark the pivot point.

Step 1. Clamp the blank for (A) to your workbench.

Step 2. Clamp a $30"$ -long 2×4 centered perpendicular to (A).

Step 4. From the pivot point, draw arcs to mark the inner and outer curves.

Step 5. Draw straight lines from ends of the $48"$ arc to pivot point. Cut to shape.

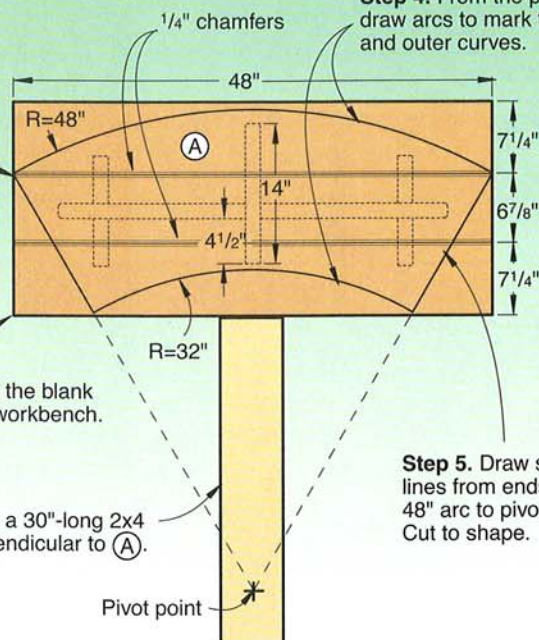
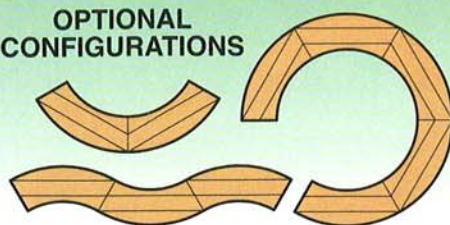


FIGURE 2

OPTIONAL CONFIGURATIONS



Exploded View drawing. Position the cleat over the stretcher, and drill a $7/64"$ pilot hole $1/2"$ deep into the stretcher. Next, countersink the cleat. Now, screw the cleat to the stretcher with a $\#8 \times 1 1/2"$ flathead wood screw.

ADD CLEATS TO THE PEDESTALS, AND FINISH

1 Cut eight pedestal cleats (F) from $3/4"$ -thick stock to the dimensions listed in the Bill of Materials. Drill two countersunk $5/32"$ shank holes through one side of each piece where shown on the Cleat detail accompanying the Exploded View. Next, drill a second set of holes—in this case angled at 10° —through a face of the cleat perpendicular to the first set. See the **Shop Tip** left for a jig that will enable you to drill these holes at an angle.

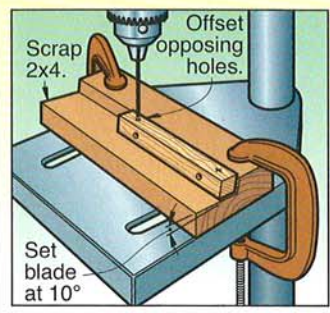
2 Attach the uprights to the stretcher. Drill $7/64"$ pilot holes through the shank holes in the uprights into the stretcher, and screw together with $\#8 \times 3"$ flathead wood screws. Lay the completed pedestal assembly top down on a table, and temporarily clamp the cleats in place, making sure the offset holes are facing down and away from the uprights. Drill $7/64"$ pilot holes through the cleats into the uprights, and screw (F) to (C) with $\#8 \times 1 1/4"$ flathead wood screws.

3 Place the top facedown on your workbench. Center the assembly on the top, and drill $7/64"$ pilot holes through the shank holes in the center cleat into the top. Screw in place with $\#8 \times 1 1/2"$ wood screws through the cleats.

4 Finish-sand the bench, then apply your finish. Since the bench is intended for outdoor use, use a durable exterior finish (we used spar varnish). Install 1" nylon tack glides in the feet of the bench. You can make several of these benches, and attach them as shown in **Figure 2**. Use $3/4 \times 3 \times 12"$ cleats screwed from below to join the bench units. ■

Shop Tip

To drill angled holes, make the drilling jig shown below from a piece of scrap 2×4 , and clamp it to your drill press. With (F) in the jig, drill another two shank holes through a face perpendicular to the first holes.



Adhere the pedestal patterns centered side-to-side on the top of the blanks with spray adhesive. Bandsaw the pedestal assemblies to their final shape (the counterbore in the bottom of the assembly are deep enough for the sawblade to clear the lag bolt). Drill two countersunk $5/32"$ holes where shown on the patterns. Remove the patterns.

5 Sand the pedestal assemblies to remove any rough marks left by the bandsaw. Next, with the $1/4"$ chamfer bit in your table-mounted router, rout chamfers along the curved edges of the pedestals where shown on the pattern.

NOW, MAKE THE STRETCHER ASSEMBLY

1 Rip and crosscut a blank for the stretcher (D) to the dimensions listed in the Bill of Materials. Adhere the stretcher pattern to the blank with spray adhesive, and bandsaw to shape, again cutting just to the waste edge of the pattern lines. Sand the contours, and chamfer the edges where shown on the pattern.

2 Rip and crosscut the cleat (E) from $3/4"$ -thick cedar to the dimensions listed in the Bill of Materials. Drill five $5/32"$ shank holes through (E) (countersunk on the bottom) where shown on the Cleat detail accompanying the

Written by: Jon Greising
Project design: James R. Downing
Illustrations: Roxanne LeMoine, Carson Ode
Project builder: Bill Wright
Photograph: Craig Carpenter

Wall-Mirror Marvel



This One's a Real Looker

One of the appeals of woodworking is that there are many ways you can approach a project. This mirror is a good example: we've seen many different techniques for making an oval (actually elliptical) frame. Unfortunately, many of these involve the time-consuming construction of elaborate router jigs. Not this one! Our pattern insert gives you a full-sized template that lets you skip all that hard work.

The one jig we do suggest for this project is a carrier board for cutting the angles on the frame blanks. It's well worth the few minutes it takes to build. See **Figures 1 and 2** on *page 29*. Make sure that its plywood base has square corners, and you're guaranteed absolutely accurate results.

Another innovation you'll discover in this project is the link spline that reinforces the joints. You'll see exactly how to make and use this unique and strong joinery method for this project and many others.

We used bird's-eye maple and mahogany for this project because of their harmonious contrast. You could substitute cherry for the mahogany and get a similar effect. We started with a maple board $\frac{3}{4} \times 6 \times 48$ ", and a mahogany board $\frac{3}{4} \times 6 \times 96$ ".

RESAW THE BIRD'S-EYE MAPLE OVERLAY

1 Rip and crosscut two pieces of $\frac{3}{4}$ "-thick maple to $6 \times 23\frac{3}{4}$ ". **NOTE:** After laminating the mahogany and maple blanks, you will trim them to 22". Cutting them slightly longer at this time makes the glue-up a less critical operation.

2 Resaw both pieces of maple down the center of the boards' edge, then plane to a finished thickness of $\frac{1}{8}$ ". Refer to **Tip No. 1** on *page 28 upper left* for resawing suggestions.

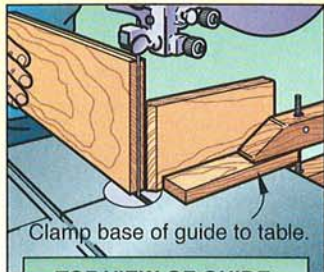
CUT THE MAHOGANY PARTS, THEN LAMINATE

1 Rip and crosscut four pieces of $\frac{3}{4}$ "-thick mahogany to $6 \times 23\frac{3}{4}$ ". We also cut two additional pieces to this size from scrap stock (solid lumber or plywood work equally well) to use as clamping cauls. These help to distribute pressure across the entire face of the laminations for a trouble-free bond.

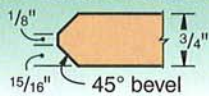
Wall Mirror

Shop Tip

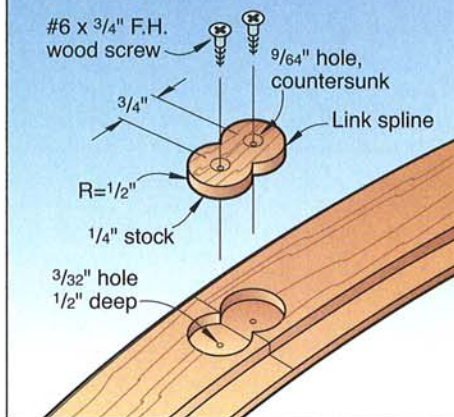
No. 1—Make and use a resawing guide on your bandsaw as shown below. This fence will allow you to steer the wood to compensate for any tendency of the blade to wander. For best results, use your widest blade, and make sure it is perpendicular to the table.



TOP VIEW OF GUIDE



ANATOMY OF A LINK SPLINE JOINT



2 Lay one of the cauls on your workbench, and cover it with waxed paper to keep glue from sticking it to the lumber. Then, spread glue on one piece of mahogany and one piece of maple, and stack them face-to-face on top of the waxed paper. Driving brads through the maple near opposite corners will keep the laminations from slipping. Add another piece of waxed paper, then repeat the gluing process until all the pairs of pieces are in the stack. Add a final piece of waxed paper, then the top caul. Clamp until dry, preferably overnight.

3 Remove the clamps, and scrape away the glue squeeze-out. Trim the ends of the laminations to 22".

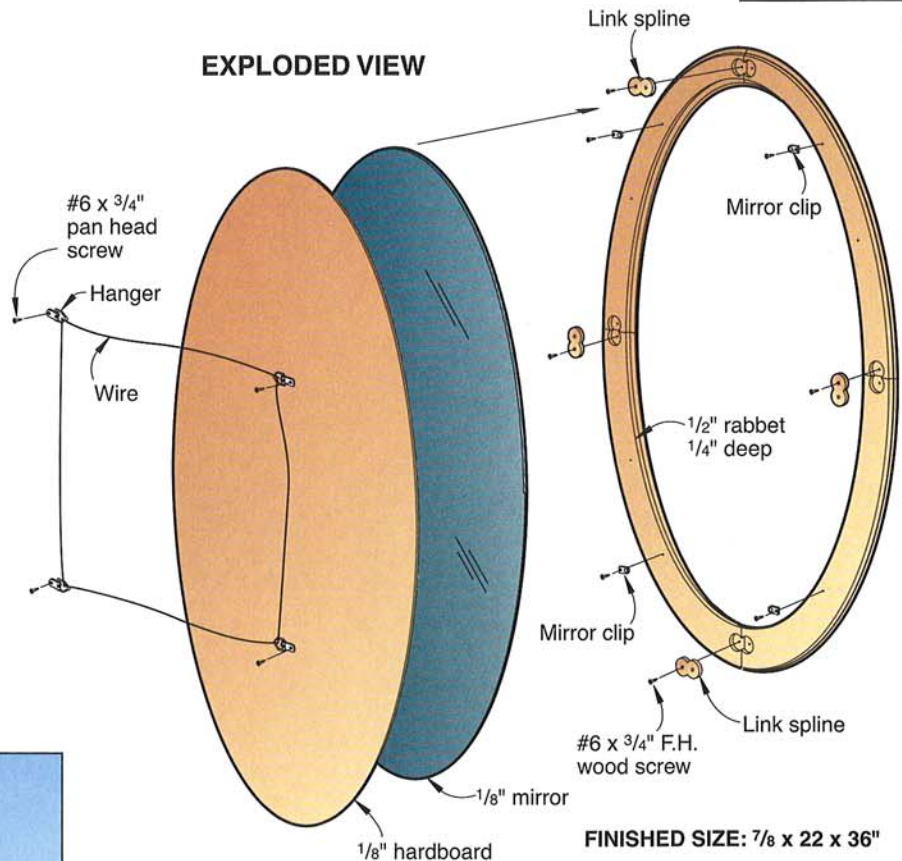
HOW TO MAKE AND USE OUR CUTTING JIG

1 Build the jig as shown in **Figure 1** opposite page, top. Take your time to make sure that the base of the jig is square; accomplishing this will virtually guarantee you perfect results.

2 Clamp one of the laminations at a time to the cutting jig, set the rip fence 22" from the inner edge of the blade, and make the first cut in each of the pieces as shown in step 1 of **Figure 2**. Then, move the rip fence to 15 3/16" from the inner edge of the blade as shown in step 2. Rotate the jig 90° clockwise, and then make the second cut on each of the pieces.

3 Mark the bird's-mouth notches on the laminations where shown on the WW PROJECT PATTERNS insert in the center of the magazine. Then, cut them with a bandsaw to provide bearing surface for your clamps.

EXPLODED VIEW



WIRE DETAIL

Loop wire ends together, then wrap at least four times as shown.



YOU'RE READY TO ASSEMBLE THE FRAME

1 Clamp the frame assembly as shown in **Figure 3** on page 30, top. Make certain that the assembly lies flat. Remove the clamps when the glue is dry.

2 Make a hardboard template to mark and trim the frame. To do this, begin by making and assembling a photocopy of the template in the pattern insert. Next, adhere the pattern to $\frac{1}{4}$ "-thick hardboard with spray adhesive, and bandsaw just to the waste side of the line. Then, sand to the line. **NOTE:** Cut the ends of the template $\frac{3}{4}$ " past the joint line as shown to provide an extended surface for your router bit's bearing.

3 Chuck a $\frac{3}{32}$ " bit into your drill press, and drill through the template at the marked centerpoints.

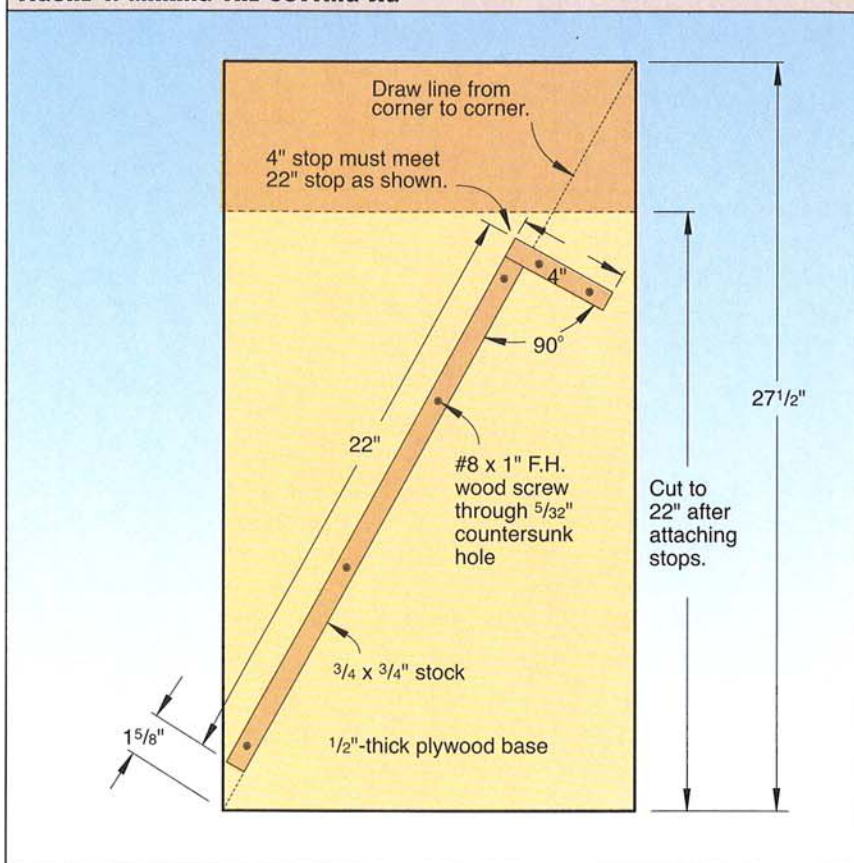
4 Match the joint lines on the template with the actual joints on the back side of the frame assembly, then clamp the template in position. Mark the inner and outer frame edges with a pencil. Then, using the holes through the template as guides, drill holes into the frame assembly to the depths shown.

5 Unclamp the template, then rotate it to mark and drill the other half of the frame.

6 Use a Forstner bit to drill overlapping 1" holes $\frac{1}{4}$ " deep for the link splines. We reinforced the joints with scrapwood as explained in **Tip No. 2 right**.

7 Referring to **Figure 4** on page 30 bottom, and the **link spline detail** accompanying the **Exploded View**, shape and install these parts into the frame assembly.

FIGURE 1: MAKING THE CUTTING JIG



NEXT, CUT AND SHAPE THE FRAME

1 Remove the scrapwood reinforcements from the frame assembly, then jigsaw approximately $\frac{1}{8}$ " to the waste side of the inner frame outline. Jigsaw or bandsaw the outer perimeter in the same way.

2 Screw the template to the back side of the frame assembly. Chuck a flush-trimming bit (we used a $\frac{1}{2}$ "-dia. bit) into your table-mounted router. Then, carefully adjust the bit's height so that the bearing is centered on the thickness of the template.

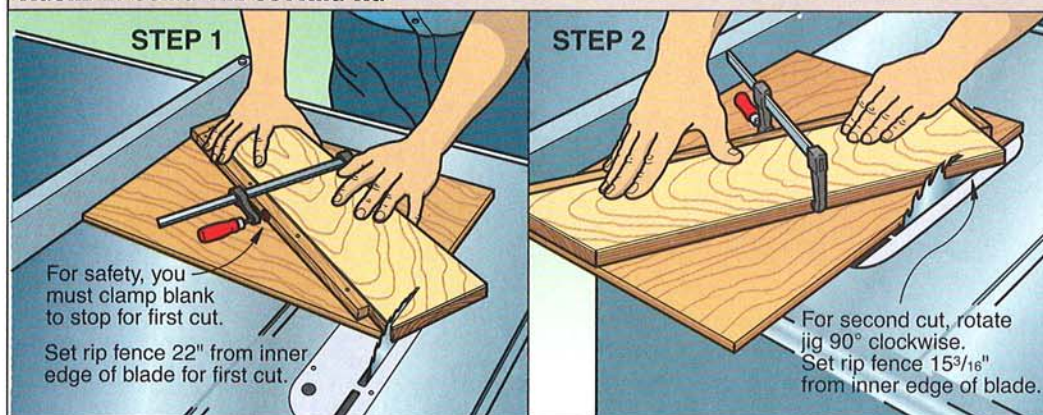
Continued

Shop Tip

No. 2—Reinforce the joints with scrapwood strips while drilling the holes for the link splines. We cut eight pieces of $\frac{1}{2}$ "-thick plywood to 3×12 ", and attached them to waste areas of the frame assembly with #8x1" screws as shown below.

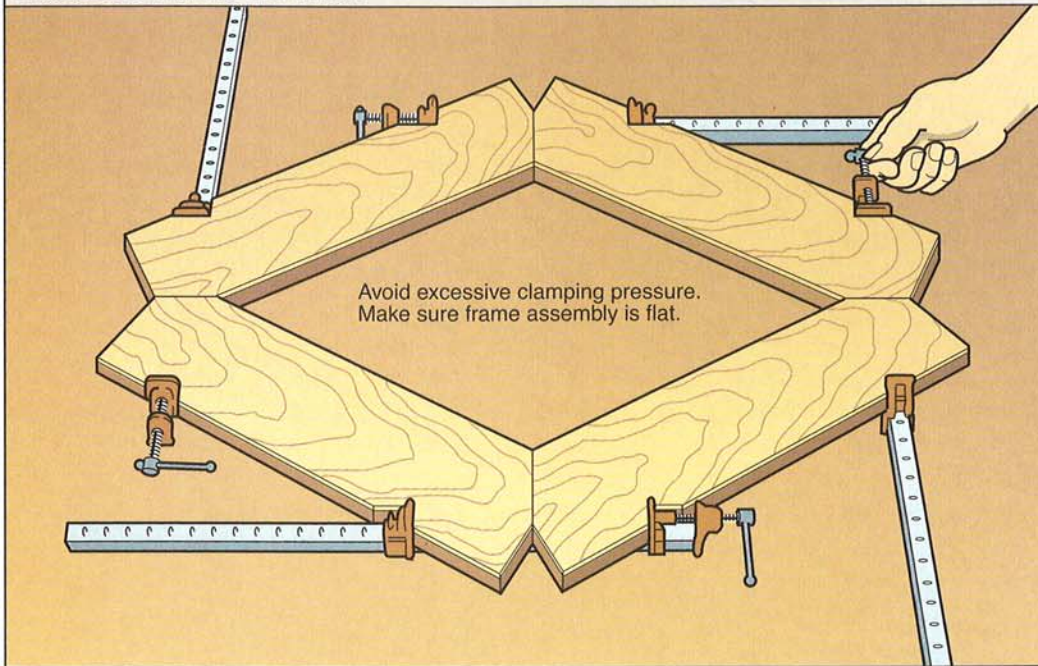


FIGURE 2: USING THE CUTTING JIG



Wall Mirror

FIGURE 3: CLAMPING THE FRAME



FINISH THE FRAME, AND INSTALL THE MIRROR

1 Apply your choice of finish to the mirror. We rubbed in two coats of Minwax Antique Oil Finish, following instructions on the label of the can. We rubbed the dry finish with 0000 steel wool, then applied a coat of paste wax.

2 Take the frame to a mirror shop, and have them cut a piece of $\frac{1}{8}$ "-thick mirror $\frac{1}{8}$ " undersized. This allowance permits seasonal wood movement without straining the glass or the joints of the frame. Purchase silicone adhesive, four mirror clips, four flat triangle hangers, and picture-hanging wire while you are at the shop.

3 Rout to the joint lines on the inner and outer perimeters of the frame to match the shape of the frame assembly to the template. **NOTE:** *Be careful not to let the bearing go past the end of the template.* Move the template to the other frame half to repeat the procedure. Do any touch-up sanding necessary by hand.

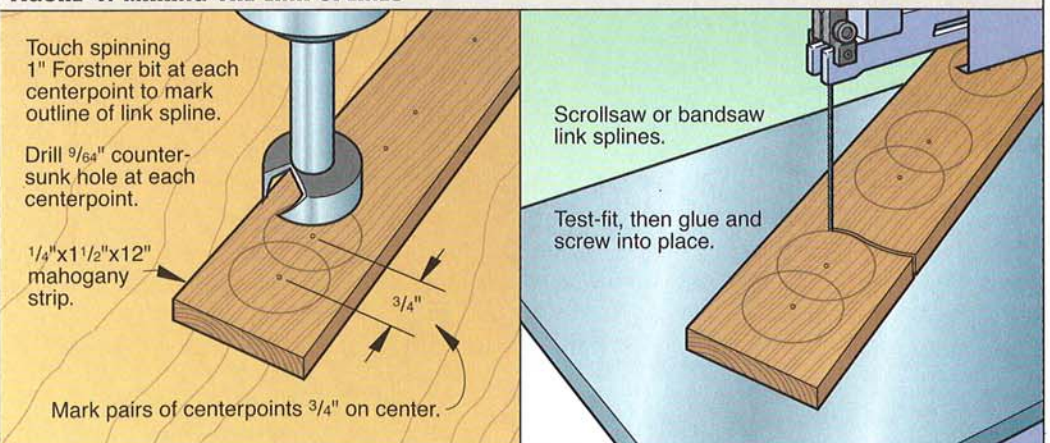
4 Referring to the **Frame Section View** on the pattern insert, rout the profiles on the inner and outer frame perimeters, then rout the rabbet. For smooth cuts, use multiple passes to form the profiles, raising the bit slightly between cuts. Sand the frame smooth.

3 Use the mirror as a template to mark the shape of the back on $\frac{1}{8}$ "-thick hardboard, then cut it to shape, using a bandsaw or hand-held jigsaw.

4 Place the mirror in the frame, and secure it with a few spots of silicone adhesive.

5 After the silicone dries, attach the back with mirror clips. Then, secure four flat triangle hangers to the frame. Next, string picture-hanging wire through the hangers, and secure the ends as shown on the **wire detail** accompanying the **Exploded View**. Hang the mirror on the wall, using two hooks for security. ■

FIGURE 4: MAKING THE LINK SPLINES



Project design: Chuck Hedlund
 Illustrations: Roxanne LeMoine,
 Carson Ode
 Project builder: Chuck Hedlund
 Photograph: Craig Carpenter

Craftsman's Most Powerful Vac... Wet or Dry



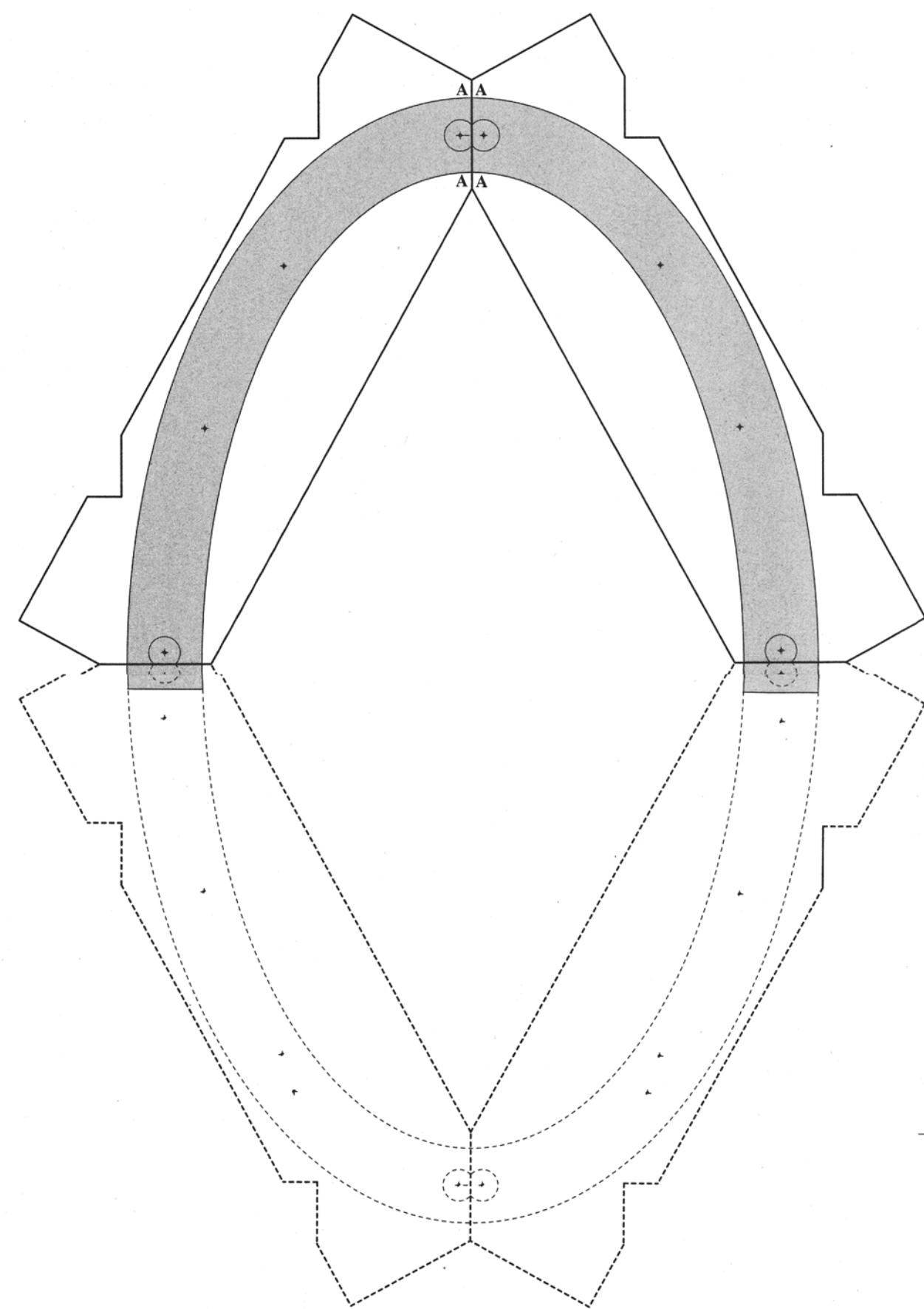
With six peak horsepower, Craftsman's new wet/dry vac is the most powerful, detachable blower vac on the consumer market.

It's at home in your workshop, kitchen, garage... even in the yard, thanks to the detachable blower that cleans up leaves and yard debris with a 200 MPH blowing velocity.

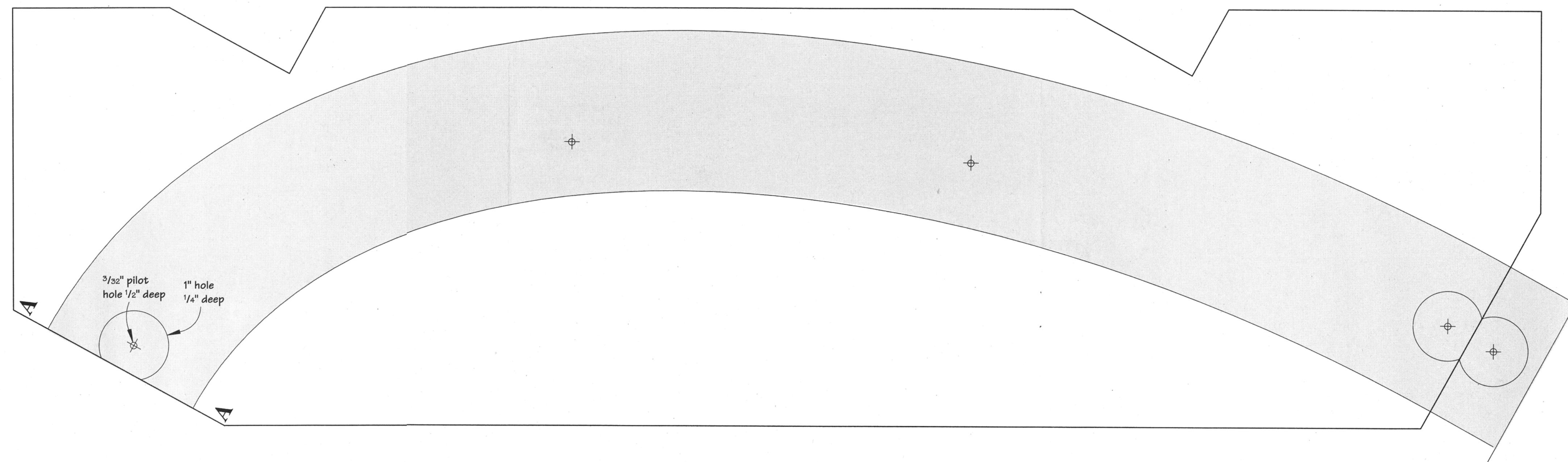
To complement its power, we developed a sturdy vac caddy supported by oversized wheels to resist vac tipping. There's an extra-long 20-foot cord and convenient on-board accessory storage so tools are always right at hand. The large 16-gallon capacity, built-in drain and reusable filter make cleanup a breeze. Accessories include two extension wands, four nozzles, blowing diffuser and blower adapter.

Check out this new detachable blower vac with 6 peak horsepower at your Sears store, or for convenience, call the "Sears Shop at Home" service, 1-800-377-7414.





Assemble full-sized pattern pieces along line A-A to make router template as shown in reduced drawing at left.



Oval Mirror pages 27-30

