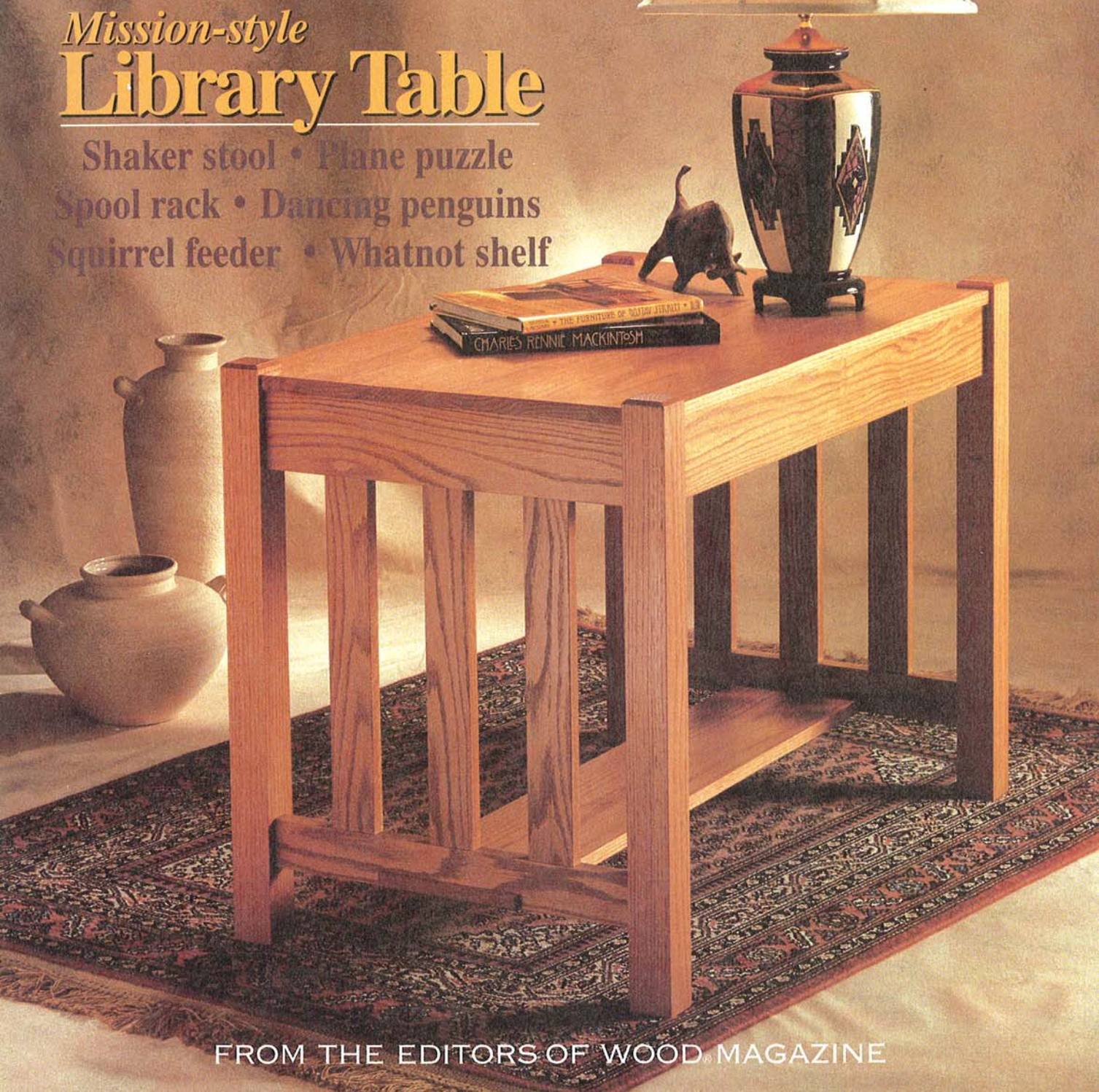


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FROM OUR SHOP

DEAR READER,

When a scrollsaw manufacturer dropped by recently to demonstrate his firm's product line, he hauled out a cartload of lumber to cut. After I reminded him that we always have lots of wood in our shop, he replied, "Hey, some woodworking magazines don't even have a real shop—let alone wood."

His remark reminded me how much we value the shop and our primary project builders, Don Wiperman and Ron Hawbaker. Between them, they bring 69 years of woodworking experience to the job.

Despite their knowledge, it usually takes Ron and Don twice as long to build the prototype project as you'll spend building. Why? Like chess masters, they plan many steps down an uncharted road. After we hand them a stack of drawings and patterns, they painstakingly develop a construction plan that becomes our how-to instructions—and your road map for success. And as home builders have learned from working with architects, our project builders know that not all designs go together as the editors and technical illustrators imagine them. Dimensions change. Angles require alterations.

Along the way, Don and Ron snap Polaroid pictures to document clamping methods, unusual tablesaw setups,

and other critical building steps. (Our illustrator uses key photos to develop the hands-on drawings.) Often they take time to figure out a helpful jig—perhaps one that makes an operation safer or easier.

"We do make a few assumptions," Don says. "We try to imagine the reader as a woodworker with a limited number of tools—or at least someone who isn't going to buy a special tool just to complete a project. Take joinery, for example. I think dowels are a pain to use—I'd much rather use biscuits. But, not many of our readers have invested in plate jointers. So, we stick with doweled construction. The woodworkers who do own plate jointers can easily convert the instruction."

"Toys can be a real stinker," Don adds, "some of them have pretty complex building steps. But we enjoy the challenge. For the plane puzzle (see pages 20-25), Ron and I talked about the wings and stabilizers over a couple of coffee breaks before we figured out a safe and accurate way to cut and rout these parts."

After Editor Chuck Sommers writes the how-to copy from their builder's notes, we invite Don and Ron to make a final review of the complete package. Because without their stamp of approval, we don't publish. Thanks, guys!



Project builders Ron Hawbaker, left, and Don Wiperman have 69 years of woodworking wisdom.

Carl Voss

Cover photograph: Wm. Hopkins

OUR PLEDGE TO YOU

PRIOR TO PUBLICATION, WE BUILD EVERY PROJECT FEATURED IN WEEKEND WOODWORKING PROJECTS STEP-BY-STEP IN OUR SHOP. THEN, A SEASONED 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.

THE WEEKEND WOODWORKING PROJECTS STAFF



WE CARE!

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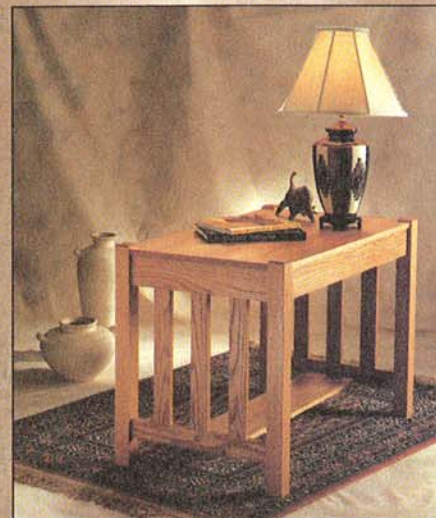
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6 Classic spool rack

Show off a rainbow of colors in our sewing center with this display rack—it holds up to 64 spools! Or, use the federal-style frame as a springboard for your next mirror project.



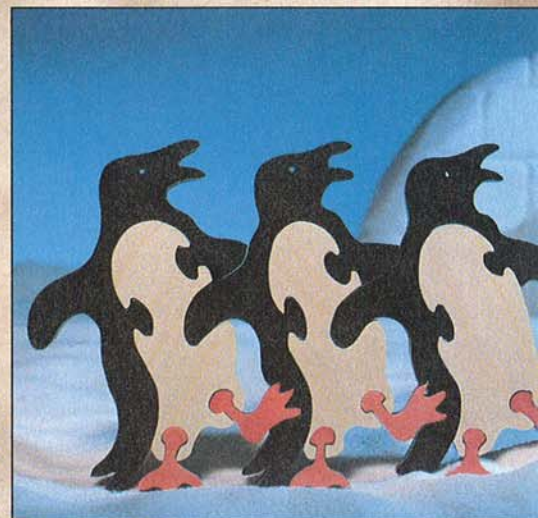
10 Mission possible

You won't have to look long to find a place for this sturdy 42x25x30" table in your home. It's our fifth piece in a series of timeless mission-style designs crafted from oak.



14 Table for one

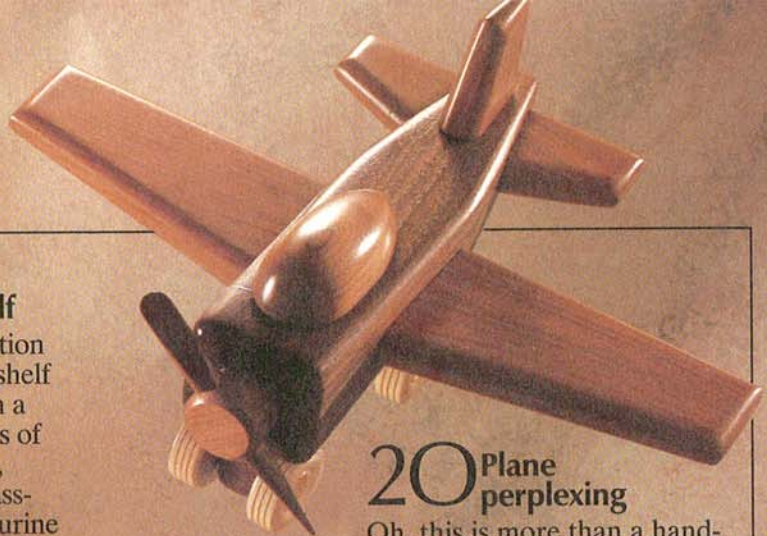
Become a hit with all of your furry-tailed friends with a backyard feeder that forces the guest to sit—believe it!—in a chair for ear corn. You'll have hours of fun watching the squirrels entertain you.





16 Mirrored whatnot shelf

Bring Victorian tradition to your home with a shelf project you can cut in a jiffy from three pieces of $\frac{1}{2}$ "-thick stock. Then, display collectible glassware or a favorite figurine in front of the mirror.



20 Plane perplexing

Oh, this is more than a handcrafted plane. On closer examination, you'll discover a 10-piece puzzle that must be taken apart in a specific order. A great challenge!

26 Two-stepper simplicity

This stool, patterned after a 19th-century design from New York's New Lebanon community, captures the essence of clean Shaker lines and no-nonsense function.



29 Penguins on parade

Brighten your day with three comical penguins that will march right from your scrollsaw and into your heart.

*Nice threads,
don't you think?*

CLASSIC SPOOL RACK

Show off a rainbow of colors in your sewing center with this display rack for up to 64 spools. Or, with minor alterations, you can turn this Federal-styled frame into a great-looking mirror. Either way, you'll reap plenty of praise for your efforts.



Photograph: Wm. Hopkins

Our frame has easy-to-make mortise-and-tenon joints

1 From $\frac{3}{4}$ "-thick stock (we used red oak), rip and crosscut two stiles (A), one bottom rail (B), and one top rail (C) to the dimensions listed on the Bill of Materials *opposite*. See the Cutting diagram *opposite* for how we laid out our material.

2 Mount a $\frac{1}{4}$ "-wide dado set to your tablesaw, and elevate it to cut $\frac{3}{8}$ " deep. Next, saw a groove centered along one edge on both of the stiles and rails as shown on the Frame and Panel drawing and the Groove detail on *page 8*.

3 To form the tenons on the top and bottom rails as shown on the Tenon detail on *page 8*, first lay the rails grooved-edge down, and make the $\frac{3}{8}$ "-deep shoulder cut at each end. (We set a stop block to limit the tenon length to $\frac{3}{8}$ ".) Make test cuts on scrap to ensure the settings produce a snug-fitting tenon. Next, set the dado to cut $\frac{1}{4}$ " deep, verify cutting depth, turn the rails on their sides, and make the cheek cuts on the ends of both rails.

4 Finish-sand all parts. Next, dry-assemble the frame as shown on the Frame and Panel drawing on *page*

8 to test-fit the joints. Sand the tenons if necessary. Measure the span between the grooves, and then cut a piece of $\frac{1}{4}$ " oak plywood to fit into the back (D) opening. (Ours measured $16\frac{5}{8} \times 20\frac{1}{8}$ ". We ran the grain of the plywood back vertically.)

5 Lay out and drill the $\frac{1}{8}$ " screw holes in the back panel using the dimensions on the Frame and Panel drawing. Finish-sand the back.

6 Brush glue on the rail tenons, and assemble the back and frame. Square the frame, and clamp until the glue dries. (We did not glue the back in the grooves.)

Part	Finished Size			Matl.	Qty.
	T	W	L		
A stile	¾"	1½"	23¾"	O	2
B bottom rail	¾"	1½"	16¾"	O	1
C top rail	¾"	2¾"	16¾"	O	1
D* back	¼"	16⅝"	20⅞"	OP	1
E bottom plate	¾"	1⅜"	20¼"	O	1
F* top molding	¾"	1"	21"	O	1
G* top molding	¾"	1"	1¾"	O	2
H top plate	½"	2⅞"	21⅝"	O	1
I* dentil	⅜"	¾"	19¾"	O	1
J* dentil	⅜"	¾"	1⅞"	O	2
K* bar	¾"	1¾"	16"	O	8

*Cut parts marked with an * to final size during construction. Please read all instructions before cutting.
Material Key: O-Oak; OP-Oak plywood
Supplies: ¼" dowel, #6×⅝" flathead wood screws, hangers, finish.

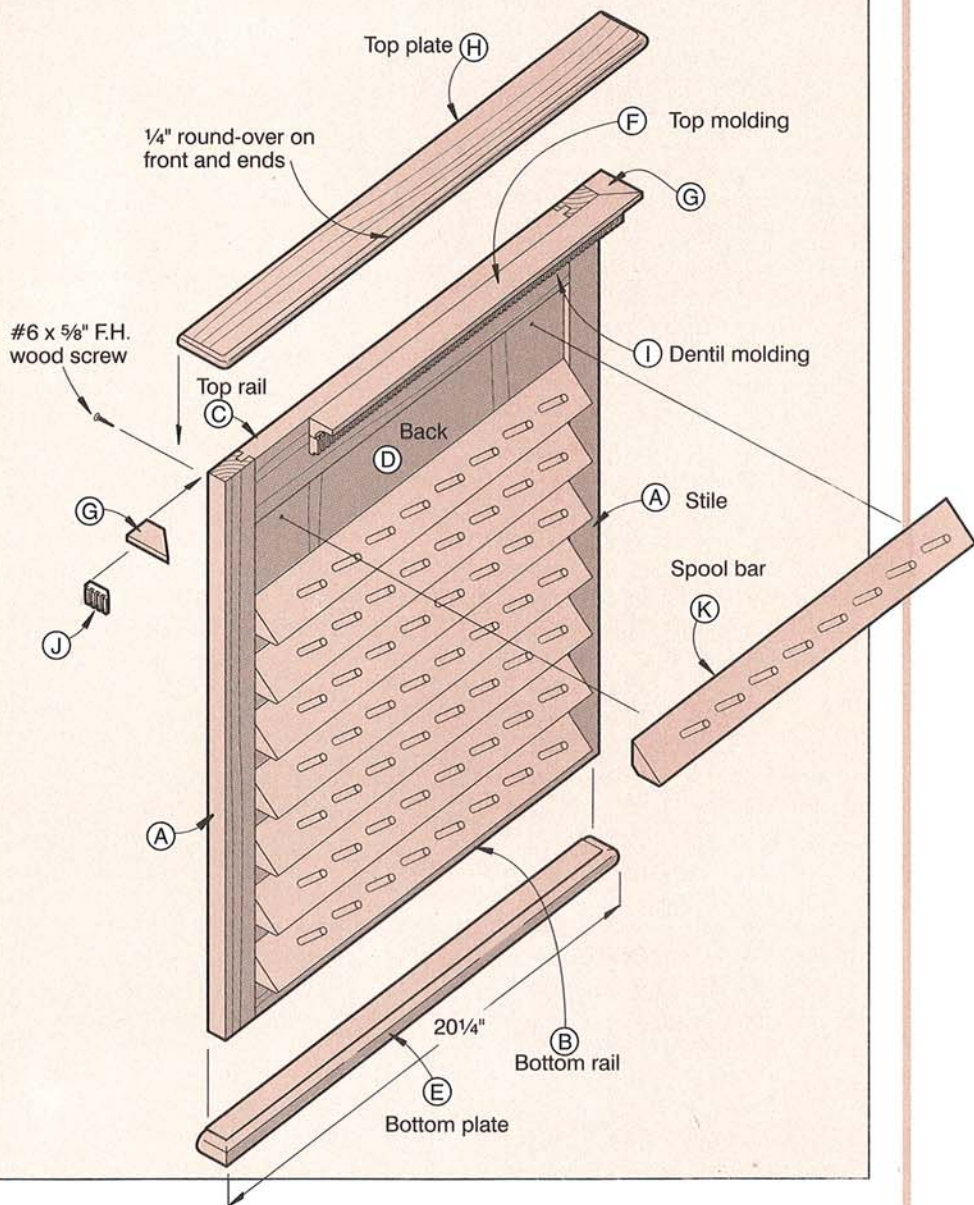
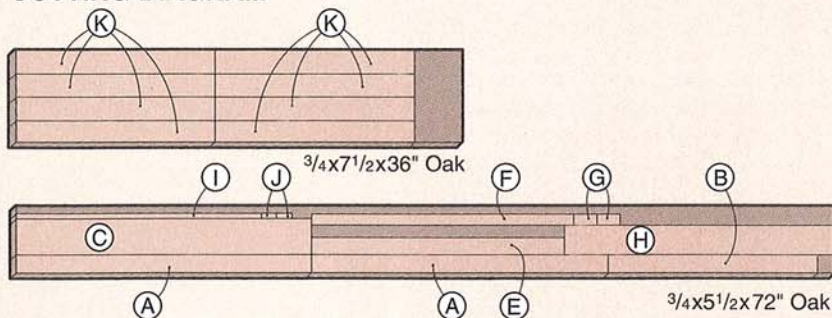
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*Cut parts marked with an * to final size during construction. Please read all instructions before cutting.
Material Key: O-Oak; OP-Oak plywood
Supplies: 1/4" dowel, #6x5/8" flathead wood screws, hangers, finish.

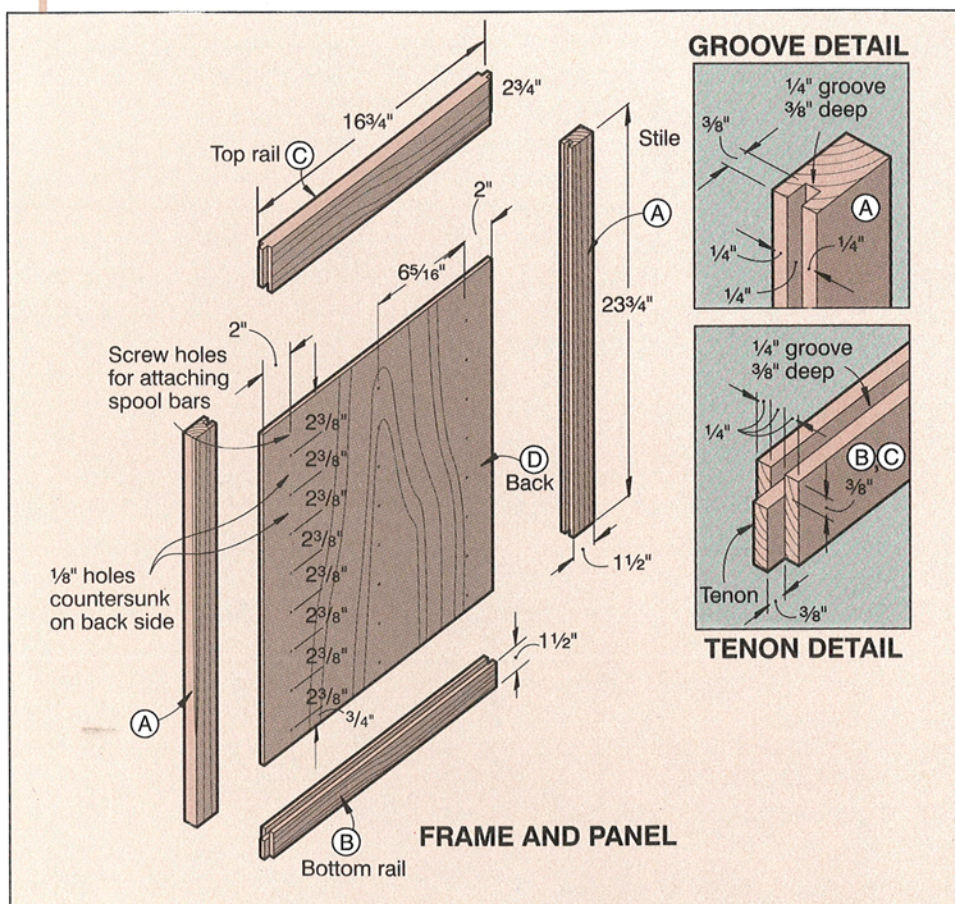
1 From 3/4"-thick stock, cut the bottom plate (E) to dimension. Using a 1/2"-radius piloted round-over bit, rout the bead along one edge and the ends of the piece as detailed on the Side View drawing on *page 8*. (When routing the ends, we clamped a scrap piece to the back edge so the router bit wouldn't chip the ends.)

3 To make the dentil molding (I) as dimensioned on the Dentil detail on *page 8*, first rip and crosscut a piece of $\frac{3}{4}$ "-thick stock to $\frac{3}{8}$ " wide and 28" long. Next, make the jig fence

CUTTING DIAGRAM



Spool rack



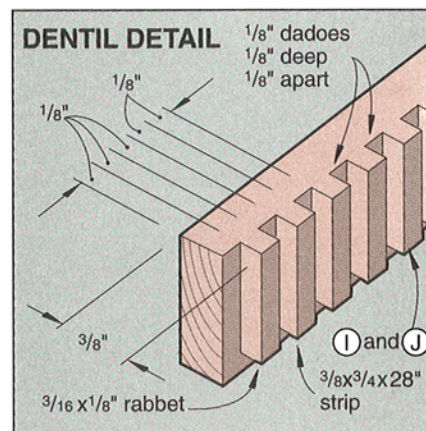
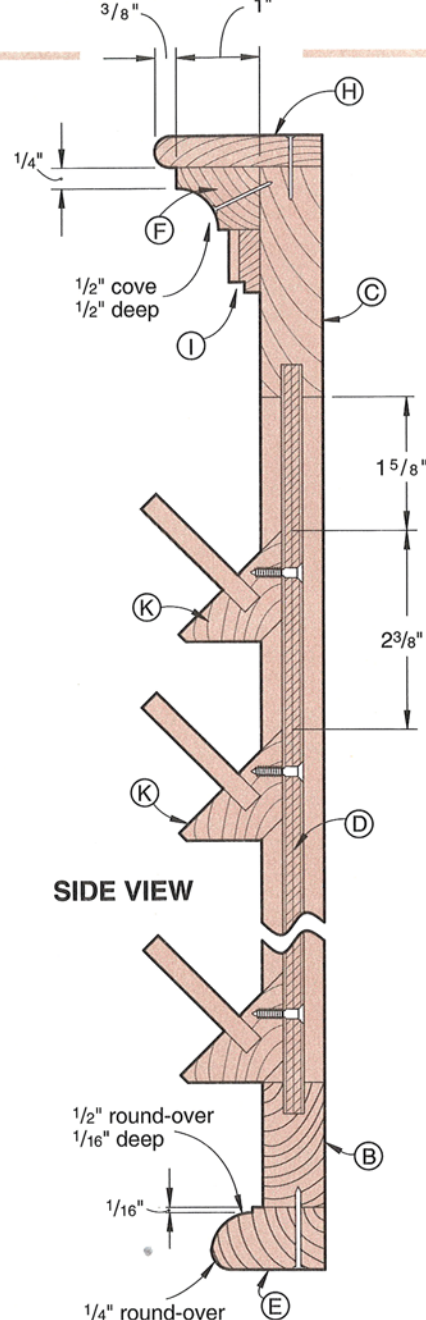
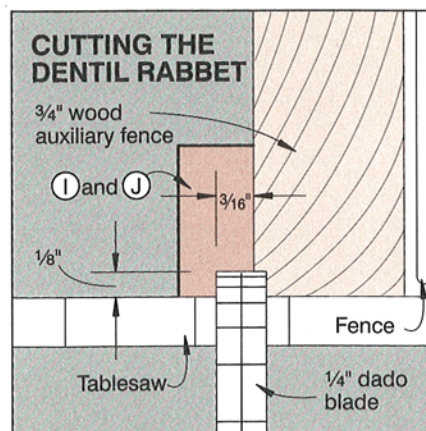
illustrated on the three-step drawing *opposite top*, and attach it to your saw's miter gauge. Mount a 1/8"-thick saw blade on your tablesaw, and elevate it to cut 1/8" deep.

4 Place the $\frac{3}{8}$ "-wide strip you just cut facedown on the table and against the jig and the $\frac{1}{8}$ " peg. Make the first cut. Now, move the strip, placing the dado over the $\frac{1}{8}$ " peg, and make another cut. Follow the same procedures to saw $\frac{1}{8}$ "-wide dados along the length of the strip.

5 Set up your tablesaw as shown in the Cutting the Dentic Rabbet drawing at *right*. Cut the rabbet.

6 To make the spool bars (K), first rough-cut eight pieces of $\frac{3}{4}$ "-thick stock to $2 \times 16\frac{1}{4}$ ". Crosscut them to fit within your frame rails. (Ours measured 16" long.) Lay the bars side by side, and locate the dowel-hole cen-

terpoints on one as dimensioned on the Spool Bar drawing *opposite*. Next, using a square, scribe the centerlines across all bars at the same time. Drill the holes. (We clamped a fence to our drill-press table to position the bars when drilling.)



Project design: Bob Colpetzer, Clinton, Tenn. Illustrations: Kim Downing; Carson Ode Project builder: Chuck Hedlund

DENTIL CUTTING JIG

STEP 1

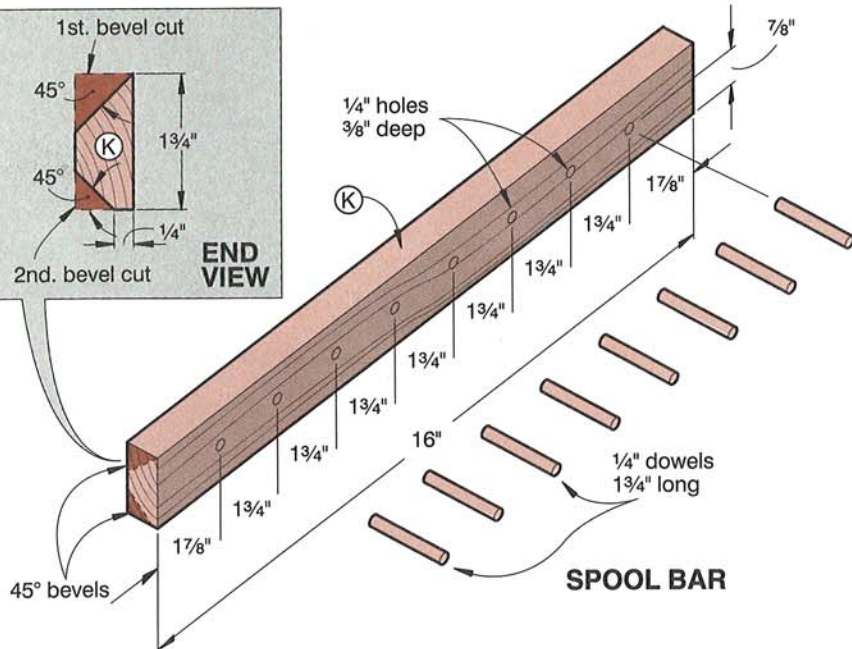
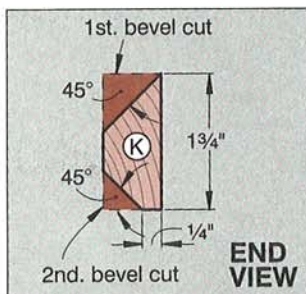
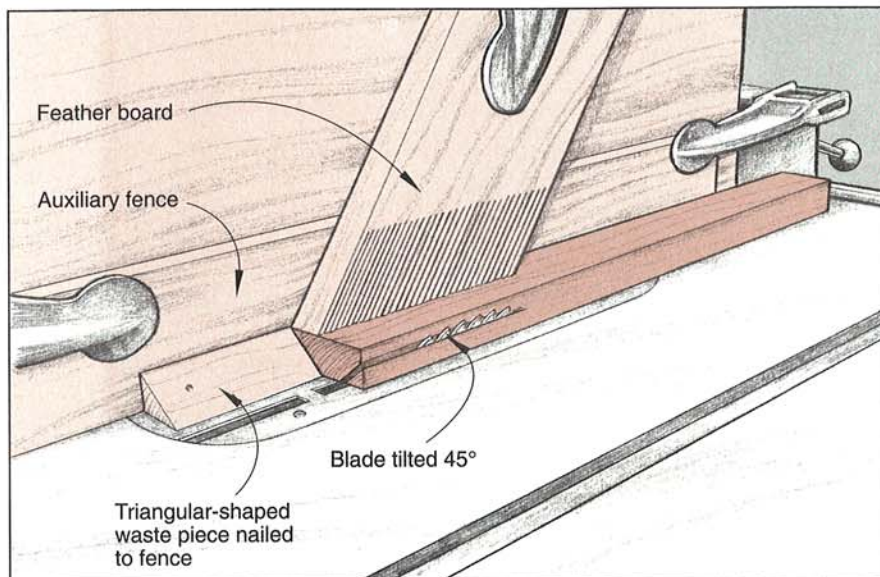
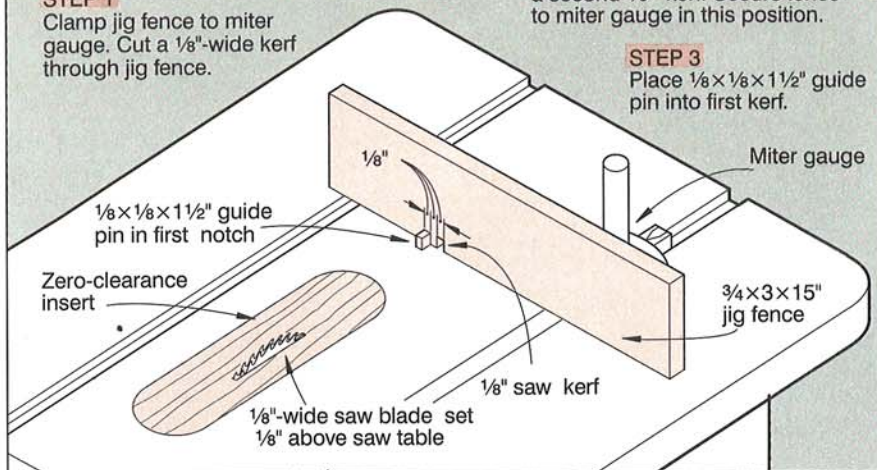
Clamp jig fence to miter gauge. Cut a $\frac{1}{8}$ "-wide kerf through jig fence.

STEP 2

Move jig fence $\frac{1}{8}$ " to right and cut a second $\frac{1}{8}$ " kerf. Secure fence to miter gauge in this position.

STEP 3

Place $\frac{1}{8} \times \frac{1}{8} \times 1\frac{1}{2}$ " guide pin into first kerf.



7 Set the rip fence 1" from the blade, tilt the saw blade to 45° from perpendicular, and make the first bevel-rip on each piece. Nail a beveled waste piece to a 24"-long piece of scrap, and clamp it to your rip fence. Set the fence so you can bevel-rip the second edge of each bar as shown on the End View and at left. Rip all eight bars. Finish-sand.

8 Crosscut 64— $1\frac{3}{4}$ " lengths of $\frac{1}{4}$ " oak dowel. Sand a slight taper on one end of each for easy insertion into the spool-bar holes. Next, glue the dowels in the bar. (We cut a $1\frac{3}{8}$ "-long block and used it as a height gauge when driving the dowels into the bar.)

You're on the home stretch: Add the refinements

1 Center, glue, and clamp the top plate (H) and bottom plate (E) to the frame. Next, miter-cut a 3" length from each end of the top molding (F), and then cut the long piece to fit the frame under the top plate where shown on the Side View drawing. Miter-cut the end pieces of the top molding (G) to fit on the frame ends. Glue and clamp the trim pieces to the frame. Wipe off glue squeeze-out.

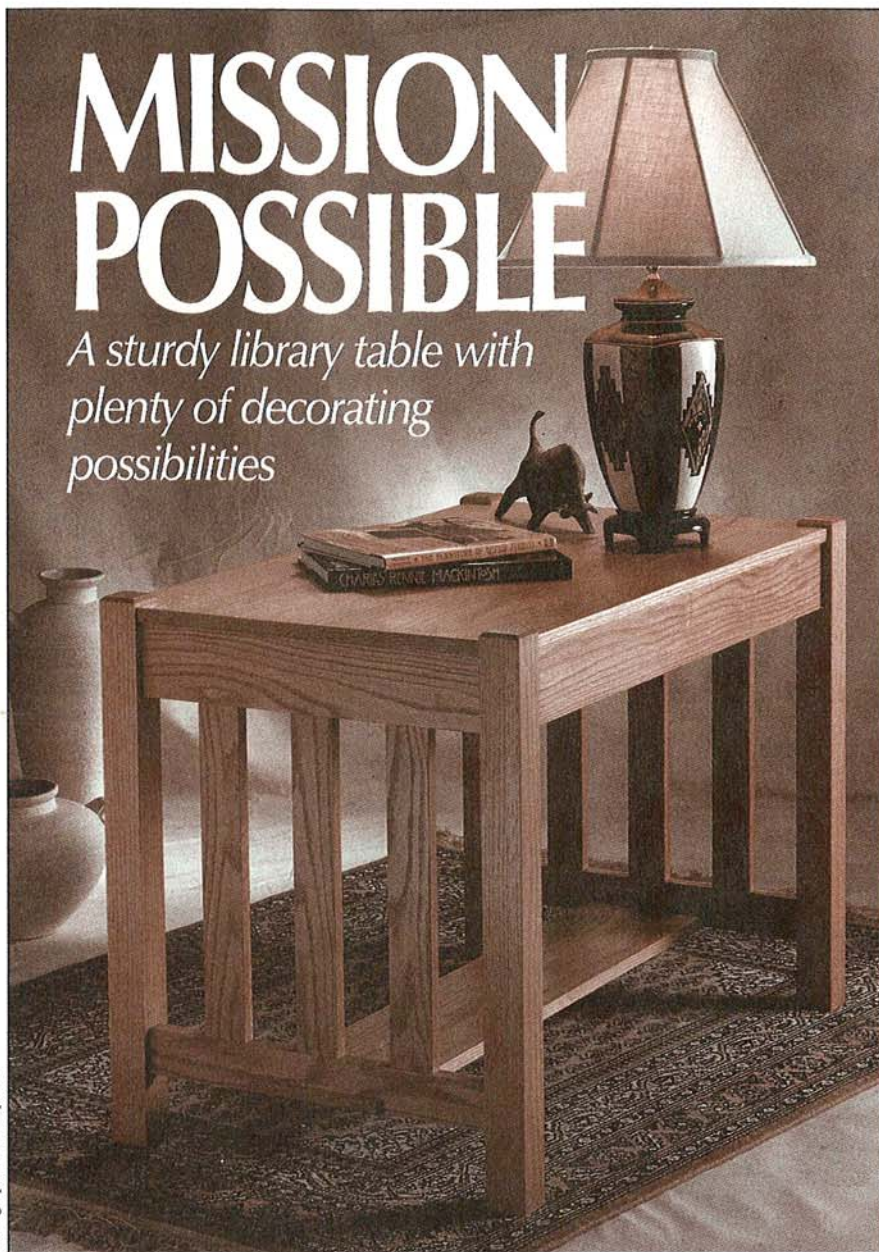
2 Following the same procedures, miter-cut the dentil trim (I, J) to fit under the top molding. Glue and clamp these pieces in place. Screw the spool bars to the back as shown on the Side View drawing.

3 Apply the finish of your choice. (We brushed on a light-oak oil stain, let it set for 10 minutes, and then wiped off the excess with a cloth. After allowing the stain to dry 24 hours, we brushed on a coat of sanding sealer. Once the sealer had dried, we sanded with 320-grit sandpaper, and followed with two coats of lacquer, again sanding between coats.)

4 To hang your spool rack, attach a mirror hanger to the back of each frame stile. Drive two hooks into your wall the same distance apart as the hanger loops, and hang the rack. ■

MISSION POSSIBLE

A sturdy library table with plenty of decorating possibilities



Photograph: Wm. Hopkins

Editor Chuck Sommers looked no further than his daughter's living room to find a perfect addition to our line of mission-styled furniture pieces. This table, patterned after an authentic mission piece, seems just the right size for today's families.

Note: In previous issues, we've featured a mission-styled bookcase (Issue 7), telephone table (Issue 19), coffee table (Issue 22), and wall clock (Issue 27). You may buy back issues for \$4.95 each. Write to: Weekend Woodworking Projects, P.O. Box 9266, Des Moines, IA 50306-9266.

Make a rock-hard tabletop

1 Select the best pieces of your $\frac{3}{4}$ " stock (we used oak) for the top (A). See the Cutting diagram on page 13 for how we laid out and cut our stock. Rip and crosscut five pieces to 5×43 ". Now, lay out the boards, select the top surfaces, and label.

2 Using a $\frac{1}{4}$ " slot-cutting bit in your router, cut a $\frac{1}{2}$ "-deep slot along the center of all mating edges of the top boards. Start and stop the slots 2" from the ends. For more information, see the Spline Slot detail *opposite*.

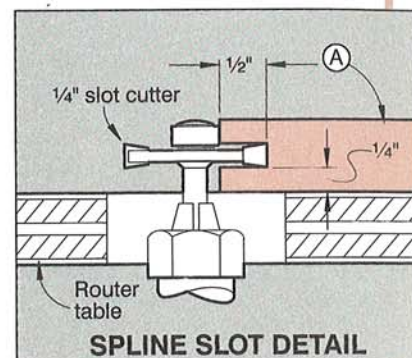
3 From $\frac{1}{4}$ "-thick plywood, rip and crosscut four $\frac{7}{8} \times 38$ " splines. Sand the spline ends to match the slots' end curvature. Now, dry-assemble the top with the splines inserted in the slots and check all parts for fit.

4 Brush glue into the slots, insert the splines, and assemble the top. Align top along one end. Place bar clamps over and under the panel.

5 Remove the clamps and scrape off excess glue. Next, cut the top to the dimensions listed on the Bill of Materials on page 13. (To cut our tabletop, we made the Panel Cutting jig shown *opposite top* to fit on our tablesaw. To use, place the cleat attached to the underside in the saw table's left slot, and the top panel on the jig with one edge against the front cleat. Next, align your trim mark with the blade, and then push both jig and top across the saw table.)

6 To form the legs (B), rip and crosscut 12 pieces of $\frac{3}{4}$ "-thick stock to $2\frac{1}{2} \times 31$ ". Group the pieces in sets of three, apply glue to the mating surfaces, lay them on edge, and clamp. (As shown at *right*, we clamped all legs at the same time.)

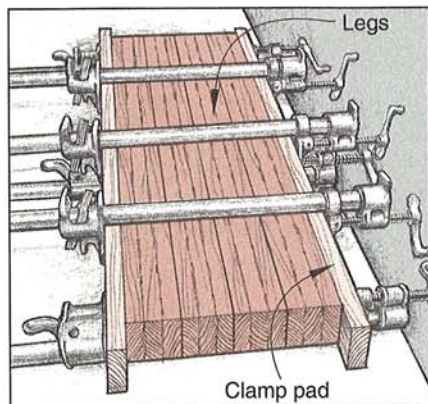
Diagram illustrating the construction of a Panel Cutting Jig. The jig is made of 1/2" plywood, 40" long and 24" wide. A 3/4" x 2" x 40" cleat is glued to the top edge. A 30"-long cleat is cut to fit a tablesaw miter gauge slot, with a 3" wide end and a 4" wide base. The diagram shows the jig being used to cut a panel.



9 Cut six vertical stiles (F) from $\frac{3}{4}$ "-thick stock. To make the stretcher (G), first glue-join two $\frac{3}{4}$ "-thick pieces measuring at least $4\frac{1}{4}$ " wide and 43" long. After the glue dries, sand the surfaces and cut it to dimension. Cut two $\frac{3}{4}\times 1\times 20$ " cleats (H), and then drill them as shown on the Cleat detail *below right*.

1 Lay out the three mortises in the top edge of the bottom rails and the bottom edge of the top rails as dimensioned on the End Panel drawing on *page 12*. Form the mortises, following the steps on the Mortise detail accompanying the drawing. (As shown on the *top* of *page 12*, we used a fence to center the rails for drilling.)

Continued



PANEL CUTTING JIG

1/2" plywood

1/4" slot 1/2" deep centered on mating edges of pieces. Stop slots 2" from ends.

42"

2"

1/4 x 7/8" spline 38" long

(A) TOP

Leg notch

Leg notch

#8 x 1 1/4" F.H. wood screw

#8 flat washer

#8 x 1 1/4" panhead screw

(H) Cleat

NOTE: Cut tenons same on C, D and E

(E) Side rail

(C) Top rail

(B) Leg

(D) Stretcher

(F) Stile

(B) Leg

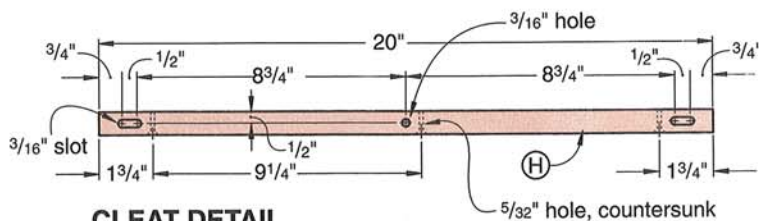
(D) Bottom rail

1/8" chamfer on both ends of G

5/32" hole countersunk on bottom side. NOTE: Mating hole is a 7/64" pilot hole 1/2" deep.

NOTE: G extends 3/8" past D

#8 x 1 1/4" F.H. wood screw



Mission-styled table

End Assembly drawing *below right*, lay out the three mortises on each leg. (We laid the legs side by side, and used a carpenter's square to mark all of the legs at the same time.)

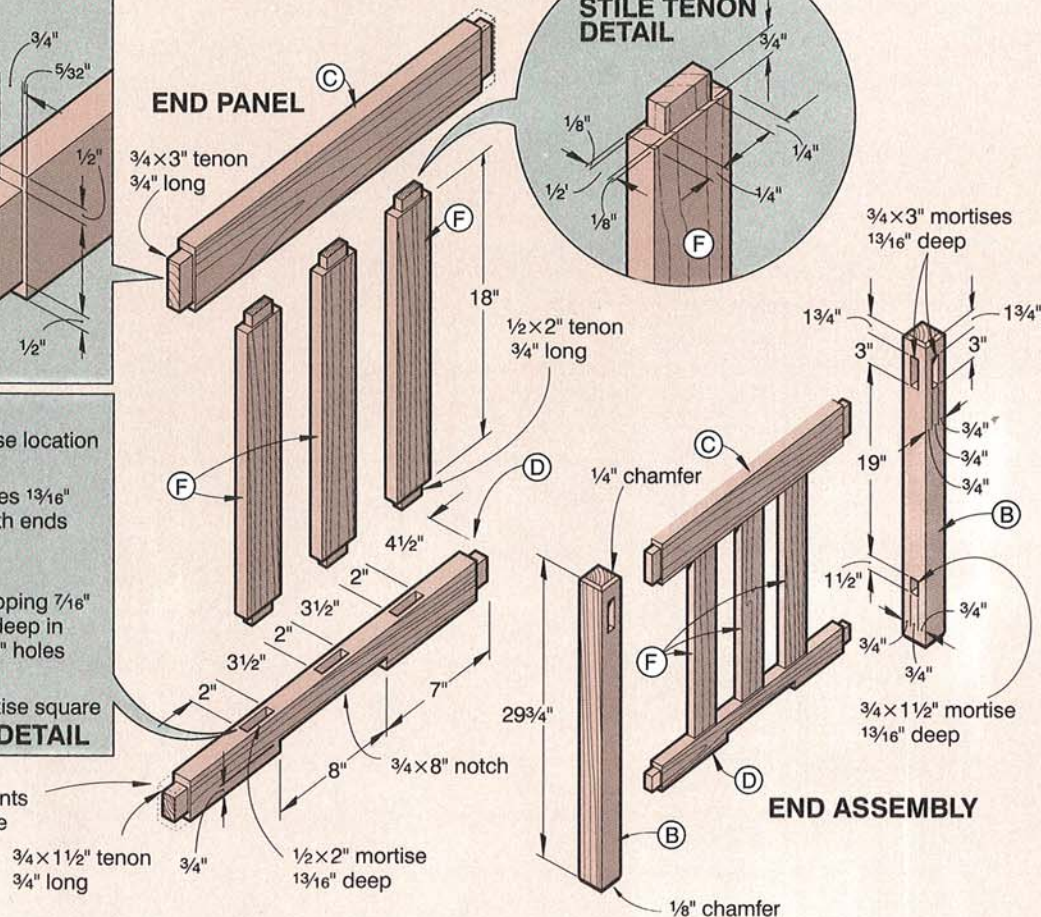
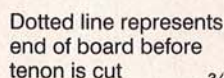
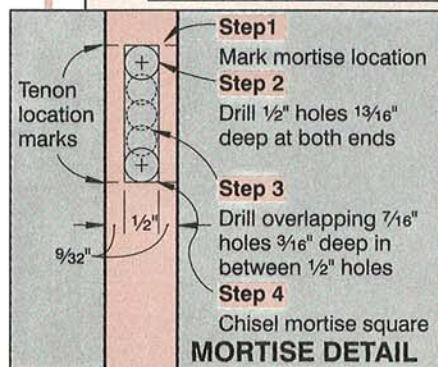
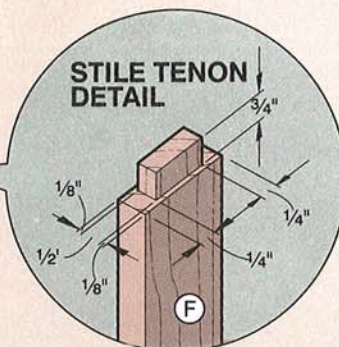
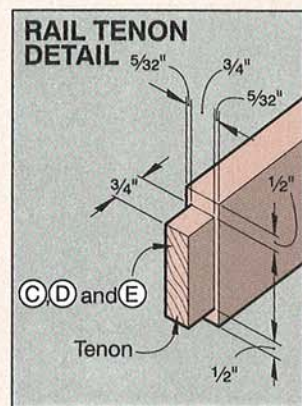
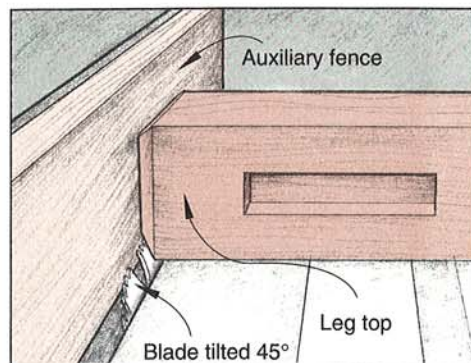
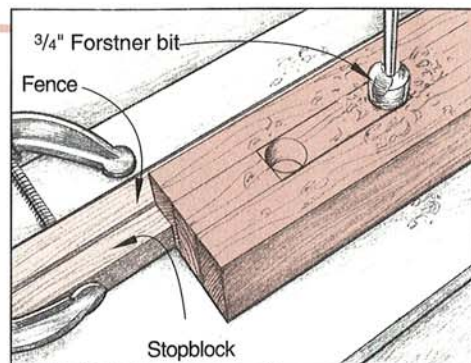
3 Form the leg mortises, following the same techniques you used to mortise the top and bottom rails in Step 1. (We bored these mortises $\frac{13}{16}$ " deep using a $\frac{3}{4}$ " Forstner bit on the ends and a $\frac{5}{8}$ " bit in the middle.)

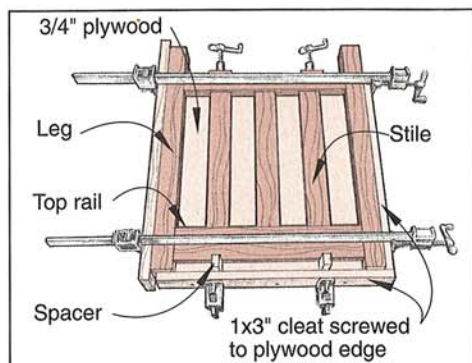
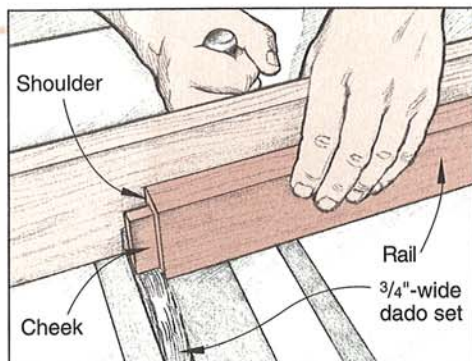
4 Attach an auxiliary wood fence to your tablesaw's rip fence. Now, as shown at *right*, tilt your saw blade to 45°, and cut a 1/4" chamfer on all edges of each leg top. Cut a 1/8" chamfer on all edges of each leg bottom.

Rip the stretcher (G) to fit the notches, and cut 1/8" chamfers on the ends.

5 Locate the $\frac{3}{4}\times 8"$ notch on the bottom edge of one bottom rail (D). Now, tape or clamp the two rails together, and saw the notches in both at the same time.

6 To cut the tenons on the $1\frac{1}{16}$ "-thick rails, mount a $\frac{3}{4}$ "-wide dado set to your tablesaw. Set it to cut $\frac{5}{32}$ " deep. (We made test cuts on a piece of our $1\frac{1}{16}$ "-thick scrap to verify the settings and tenon fit before cutting the table parts. See the Rail Tenon detail *below* for dimensions.) Make cheek cuts on the ends of top (C), bottom (D), and side rails (E).





7 Lower the dado set to cut $\frac{1}{8}$ " deep, verify the depth on your $\frac{3}{4}$ "-thick scrap, and make the cheek cuts on the six stiles as dimensioned on the Stile Tenon detail *opposite*.

8 Elevate the dado to cut $\frac{1}{2}$ " deep. Verify the cutting depth, stand the rails on edge, and as shown *above*, cut the shoulders on the ends of all top, bottom, and side rails. Lower the dado to $\frac{1}{4}$ ", verify the cutting depth on a $\frac{3}{4}$ "-thick scrap piece, stand the pieces on edge, and make the shoulder cuts on the ends of the stiles.

9 Finish-sand all parts. (We used 180- and 220-grit sandpaper.)

Now, you're ready to assemble and finish the table

1 To assemble the ends, make a gluing jig from a 25×26 " piece of $\frac{3}{4}$ " plywood. Cut one 1×3 " strip 25" long, another 26" long. Screw them to adjacent edges on the plywood. Lay two bar clamps under this jig.

2 Group the parts for the ends (one right and left leg, a top and bottom rail, and three stiles) into two sets. Brush white woodworker's glue into the mortises of one set, assemble the parts, lay them on the jig, and clamp as shown *above*. (We cut two $1\frac{1}{4}$ "-wide spacers to fit between the top rail and jig edge.) Wipe off glue

squeeze-out with a damp cloth. Check the end for square. Glue, assemble, and square the second table end the same way.

3 Join the two ends by gluing the side rails between them. Clamp and square the table frame. Place the stretcher in the notches, and drill and countersink the holes in the bottom as detailed on the Exploded View drawing. Drive the screws.

4 Lay the tabletop face down on a flat surface. Center the table frame on top of it so you have equal overhang on the sides and the ends. Carefully mark the corner notches around the legs. (We left a space equal to the thickness of a dime between the top and legs for expansion.) Now, cut out the notches. (We started these cuts on a radial-arm saw and finished them with a jigsaw.)

5 Lay the tabletop face down and place the frame on it. Position the cleats on the top and against the inside of the top rails. Poke an awl through the cleat holes to mark the screw-hole centerpoints on the rails and top. Drill $\frac{7}{64}$ " pilot holes where marked. Attach the cleats as shown on the Exploded View drawing. (After tightening the panhead screws, we backed them off one-half turn to allow for wood movement.)

BILL OF MATERIALS						
Part	Finished Size			Matl.	Qty.	
	T	W	L			
A* top	$\frac{3}{4}$ "	$24\frac{1}{2}$ "	42"	O	1	
B* leg	$2\frac{1}{4}$ "	$2\frac{1}{4}$ "	$29\frac{3}{4}$ "	O	4	
C top rail	$1\frac{1}{16}$ "	4"	22"	O	2	
D bottom rail	$1\frac{1}{16}$ "	$2\frac{1}{2}$ "	22"	O	2	
E side rail	$1\frac{1}{16}$ "	4"	$39\frac{1}{2}$ "	O	2	
F stile	$\frac{3}{4}$ "	$2\frac{1}{2}$ "	$19\frac{1}{2}$ "	O	6	
G* stretcher	$\frac{3}{4}$ "	$7\frac{5}{16}$ "	42"	O	1	
H cleat	$\frac{3}{4}$ "	1"	20"	O	2	

*Parts marked with an * are cut to final size during construction. Please read instructions before cutting.

Material key: O—oak

Supplies: #8 $\times 1\frac{1}{4}$ " flathead wood screws, #8 $\times 1\frac{1}{4}$ " panhead wood screws, #8 flat washers, $\frac{1}{4}$ " plywood, finish.

6 Apply the finish of your choice. (We wiped on an oil-based stain, let it set for a few minutes, and then wiped off the excess with a cloth. After drying for 24 hours, we applied a coat of sanding sealer, then three coats of polyurethane. We sanded each coat after drying with 320-grit sandpaper to level the finish.) ■

Squirrels agree it's the best seat in the house

A TABLE FOR ONE, PLEASE

Our neighborhood squirrels quickly learned that dining at this feeder requires table manners. After a few hours in the shop, you can sit back and enjoy watching the backyard comedians entertain you at this “corny” feeder.



Photograph: Ann Karras

If you build it, they will come

1 From $\frac{3}{4}$ "-thick stock (we used cedar, but any softwood will work), rip and crosscut the back (A), base (B), and seat (C) to dimensions listed on the Bill of Materials *opposite*. From similar stock, cut two $4 \times 7\frac{1}{2}$ " rectangular pieces and one 4" square piece. Next, scribe the radius of a 50-cent coin on the two front base corners. Saw the corners, and then sand the cut edges.

2 Make a copy of the full-sized Side pattern *opposite*. Stack the two rectangular pieces, tack them together with nails, and then trace the pattern onto the top piece. Bandsaw the sides (D) to shape. Sand the curved edges with a sanding drum before separating them.

3 Saw the pedestal (E) to dimension. (We cut ours from scrap 2×4 .) Find the center on one end, and then bore a $\frac{3}{8}$ "-diameter hole $\frac{5}{8}$ " deep into that end.

4 Mark the center on the 4"-square piece and scribe a $1\frac{3}{4}$ "-radius cir-

cle ($3\frac{1}{2}$ " diameter) on its face. Drill a $\frac{1}{16}$ " hole through this center, and then a $\frac{3}{8}$ " hole $\frac{3}{8}$ " deep. Now, bandsaw the tabletop (F) to shape. Sand the sawed edge to the line. Round over the tabletop's edge where shown on the Exploded View drawing.

5 Copy the Back pattern, position it on the back piece, and trace the top outline and heart. Saw the back's top and heart to shape, and sand the cut edges. (To form the heart, we first bored two 1"-diameter holes through the back where marked on the pattern, and then scrollsawed out the rest of the heart's interior.)

6 Drill $\frac{1}{8}$ "-mounting holes through the back where indicated, or where you'll need them to mount your feeder. Next, drill the $\frac{5}{32}$ " screw hole through the base for the pedestal where dimensioned. Drill $\frac{5}{32}$ " shank holes through the back for attaching the base. Countersink these screw holes on the backside and bottom. Now, finish-sand all pieces with 150-grit sandpaper.

Get ready for a corn feed

1 Glue, assemble, and clamp the chair sides and seat as shown on the Chair Assembly drawing *opposite*. (We used water-resistant Titebond II glue.) Glue and screw the back to the base. Next, position the assembled chair on the base and against the back. Mark the screw-hole center-points in the back and base. Drill $\frac{5}{32}$ " shank holes and countersink them. Glue and screw the chair in place.

2 Glue and screw the pedestal to the base. Drive a 16d nail up through the hole in the tabletop as shown on the Dowel detail. Next, crosscut a 1" length of $\frac{3}{8}$ " dowel. Glue one end of it in the hole in the tabletop, and the other end in the hole in the top of the pedestal.

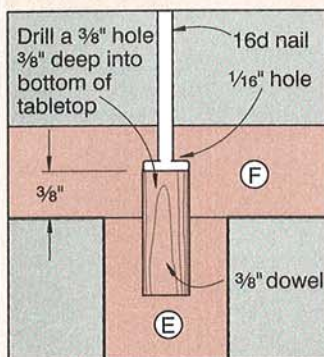
3 Apply a finish if you desire. (We left our feeder unfinished to weather naturally.) Mount your feeder with screws or wire. Place an ear of corn over the nail. Now, sit back and watch the comical squirrels gather and feast at your table. ■

BILL OF MATERIALS

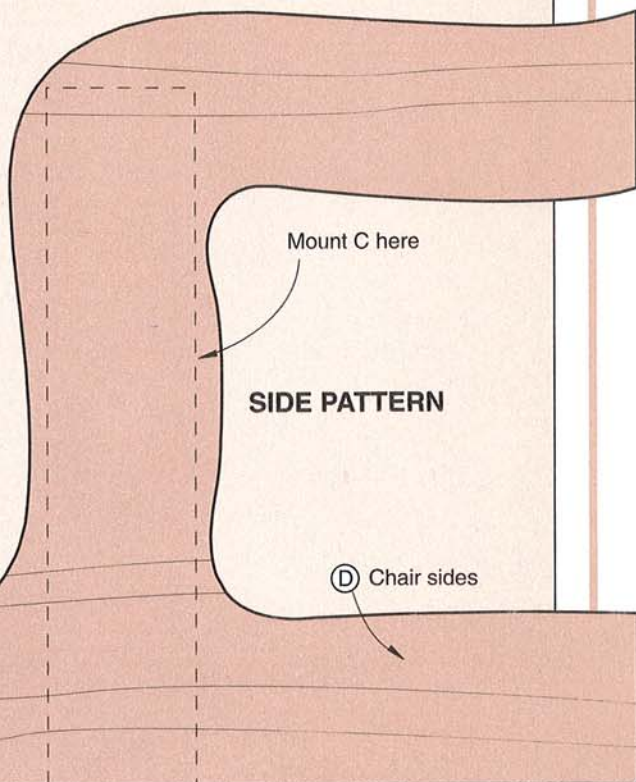
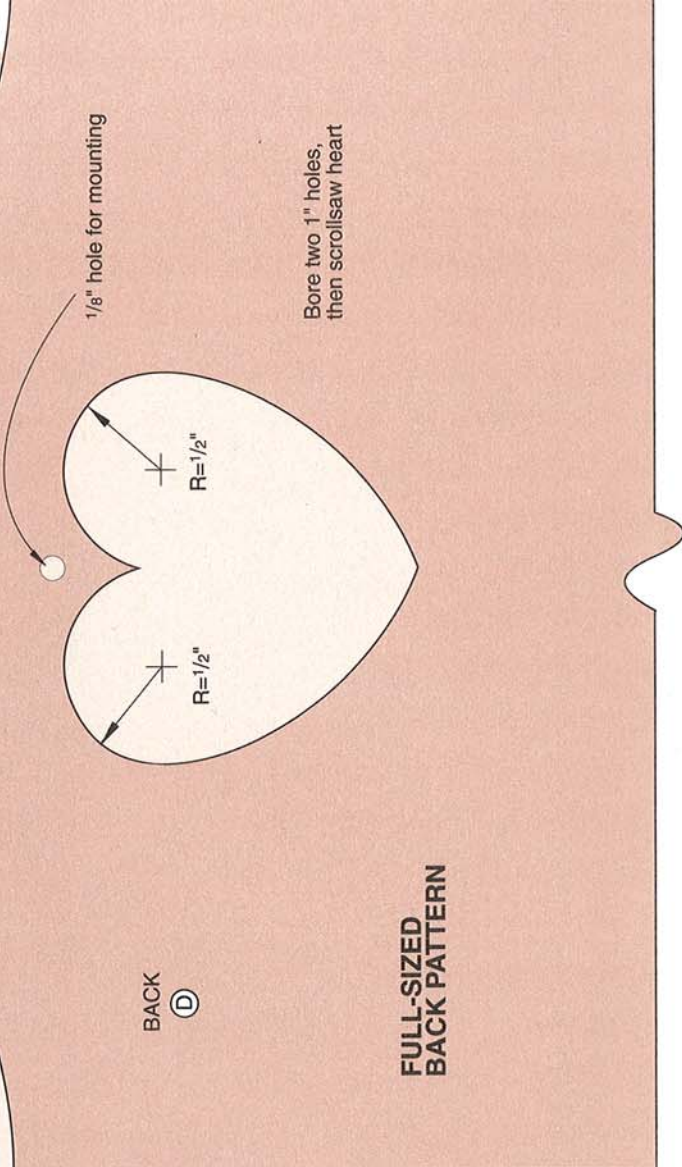
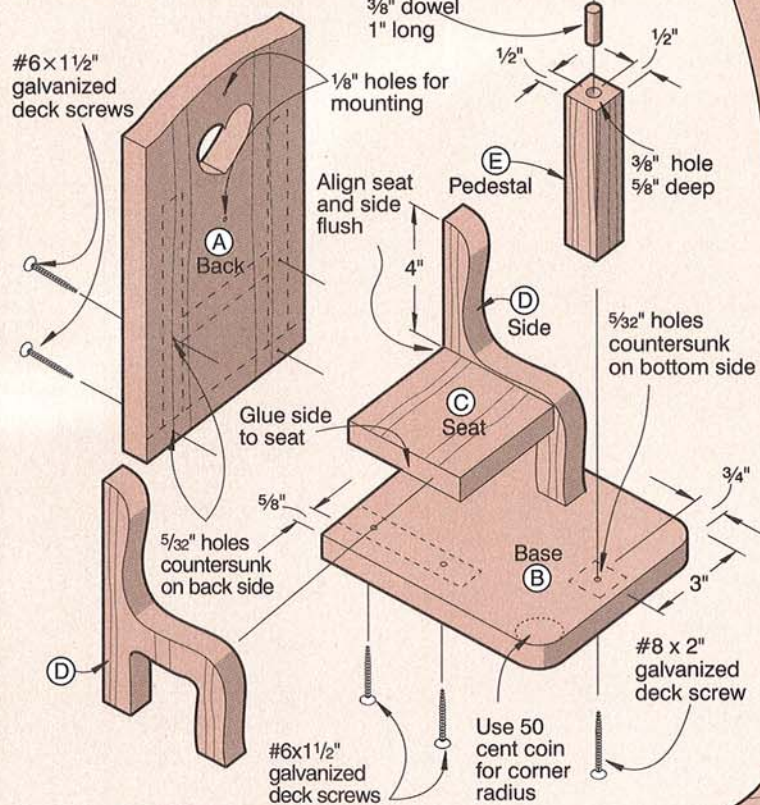
Part	Finished Size			Matl.	Qty.
	T	W	L		
A back	3/4"	6"	10 5/8"	C	1
B base	3/4"	6"	6"	C	1
C seat	3/4"	3 1/4"	3 1/2"	C	1
D side	3/4"	4"	7 1/8"	C	2
E pedestal	1"	1"	3 3/4"	F	1
F table	3/4"	3 1/2"-dia.		C	1

Material key: C—Cedar; F—Fir

Supplies: 16d nail, #6x1 1/2" and #8x2" galvanized deck screws, 3/8" dowel, water-resistant glue, finish (if desired), wire or screws to mount.



DOWEL / NAIL DETAIL



In the Victorian tradition

MIRRORED WHATNOT SHELF



Almost quicker than you can say "Victorian fretwork," you can transfer the full-sized patterns for this project. Then in a jiffy, cut out the three pieces from $\frac{1}{2}$ "-thick stock. And before you know it, you'll be ready to hang the shelf and display a favorite piece of glassware or figurine.

Start with full-sized patterns

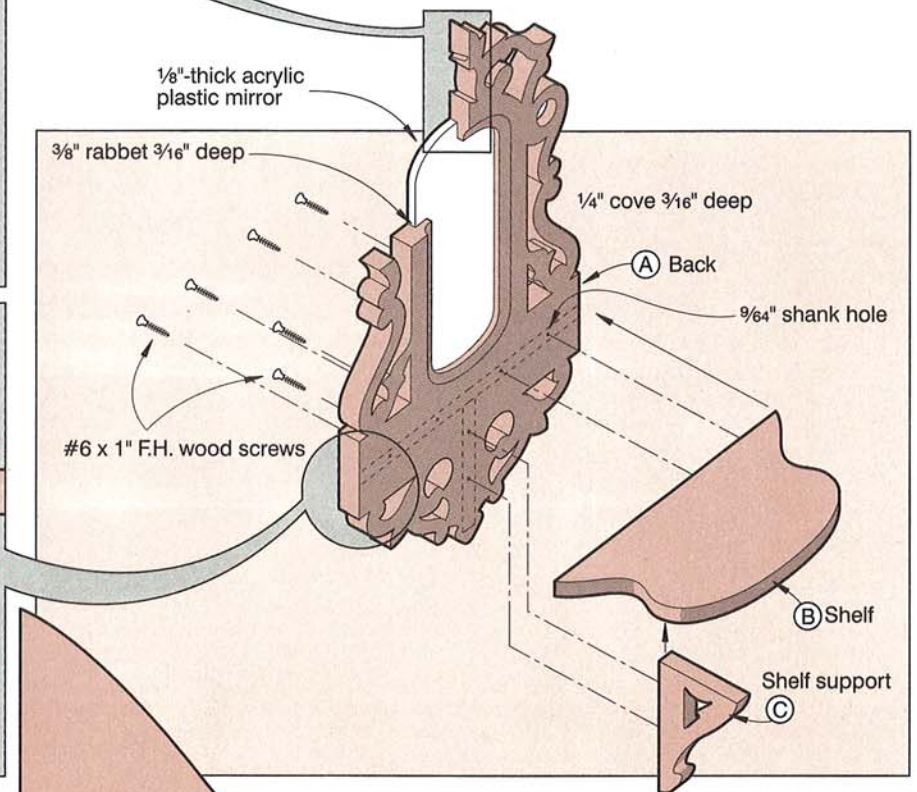
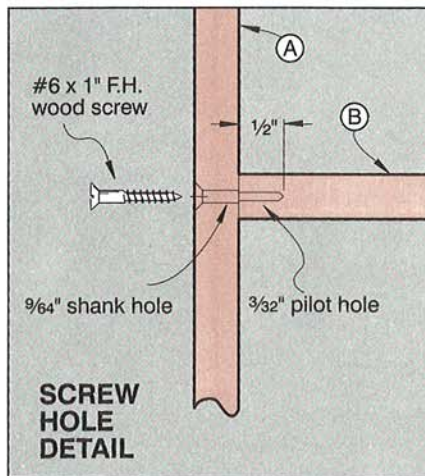
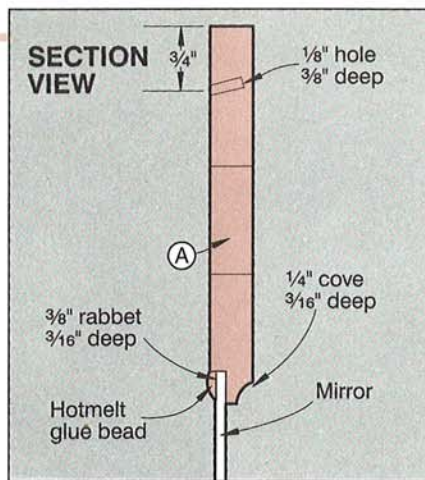
1 Copy the full-sized patterns on pages 17, 18, and 19. (We photocopied ours.) Join and tape the top portion of the Back half-pattern (A) to the bottom part (AA) where indicated on the patterns. Now, cut out all patterns, leaving a $\frac{1}{4}$ " margin along their curved outside edges.

2 From $\frac{1}{2}$ "-thick stock, rip and crosscut two $5\frac{1}{2}$ "-wide pieces 22" long for the back (A). (We chose mahogany.) If you can't buy $\frac{1}{2}$ "-thick stock, plane or resaw thicker material to size. Plane the mating edges on the two pieces, lay them side by side, and mark the faces and edges.

3 Cut a $\frac{1}{2} \times 5\frac{1}{2} \times 10\frac{3}{4}$ " piece for the shelf (B), and a $\frac{1}{2} \times 3\frac{1}{2} \times 6$ " piece for the shelf support (C).

Cut the mirror opening next

1 Stack your two back pieces front face to front face. Use double-faced tape to hold, or nail through both pieces at the outside corners. Trace the Back pattern onto the top



piece, aligning the centerline of the pattern with one edge on the back. (We used transfer paper.)

2 Scrollsaw the mirror opening. (We cut just wide of the line, then drum-sanded the edges to the line.)

3 Drill $\frac{3}{16}$ "-diameter start holes through all areas that are to be cut out. Scrollsaw these areas. (We used a #6 blade.) If the throat of your saw isn't deep enough, you'll need to make the end cuts from both sides. Do not saw around the outside yet. Separate the two backs after making all inside cuts.

4 Edge-join, glue, and clamp the backs along their mating edges. (We placed bar clamps on both top and bottom, and then clamped scrap bars across this assembly to ensure it remained flat while the glue cured.)

5 With a piloted $\frac{1}{4}$ " cove bit, rout a $\frac{3}{16}$ "-deep cove around the *front* of the mirror opening. Switch to a $\frac{3}{8}$ " rabbeting bit, and cut a $\frac{3}{16}$ "-deep rabbet around the opening on the *back*

Continued

BILL OF MATERIALS						
Part		Finished Size			Mati.	Qty.
		T	W	L		
A	back	$\frac{1}{2}$ "	$10\frac{1}{2}$ "	$20\frac{3}{8}$ "	M	1
B	shelf	$\frac{1}{2}$ "	$47\frac{8}{8}$ "	$10\frac{1}{2}$ "	M	1
C	bracket	$\frac{1}{2}$ "	3"	$5\frac{1}{8}$ "	M	1

Material key: M—mahogany

Supplies: #6×1" flathead wood screws, acrylic plastic mirror, finish.

Align this edge with board's edge

Saw along this line

Centerline

SHELF (HALF PATTERN)

Whatnot shelf

side. On your tablesaw, rip the sides to the outside pattern lines. Now, scrollsaw around the outside edge.

The shelf and bracket come next; then assemble

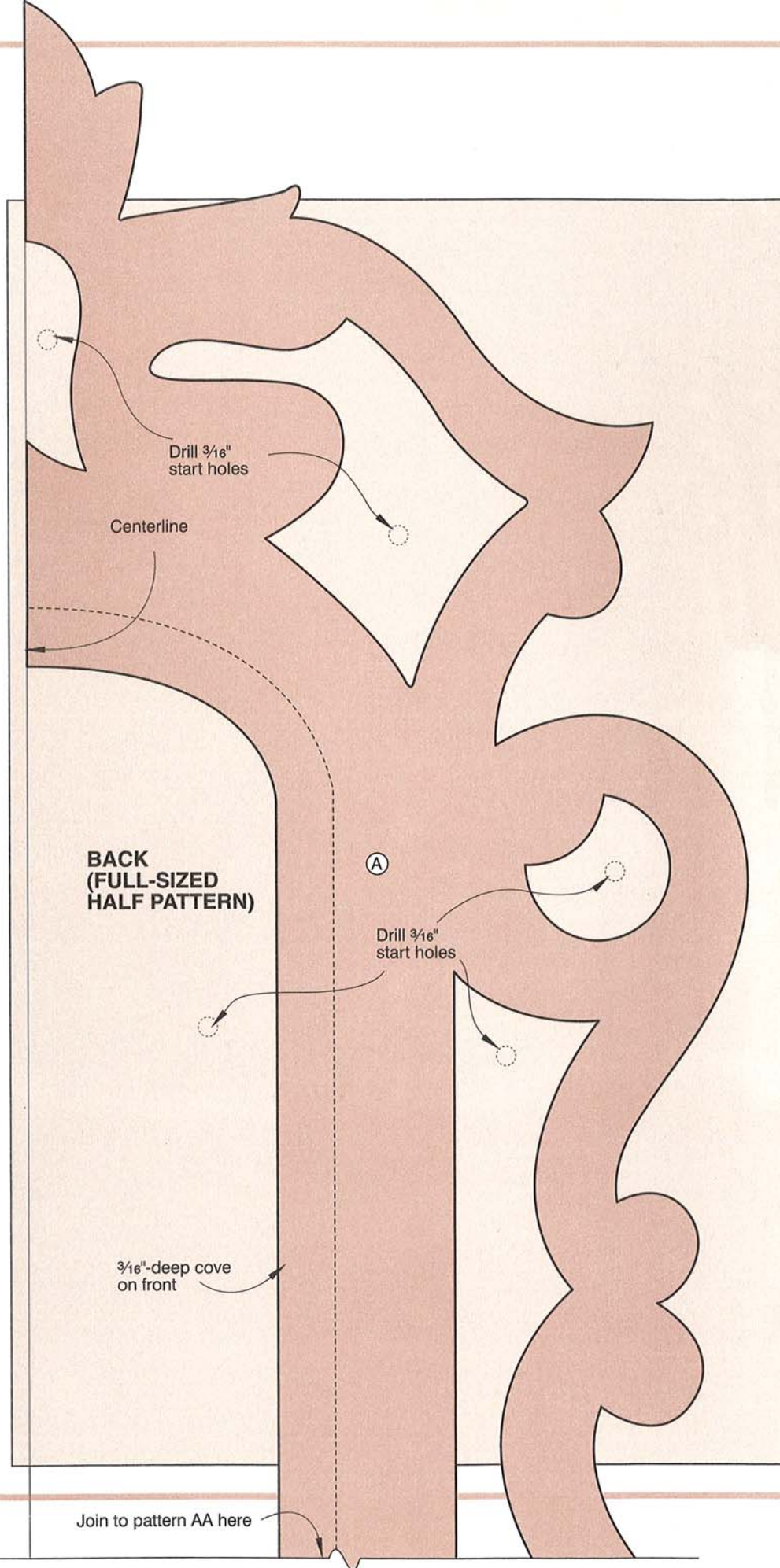
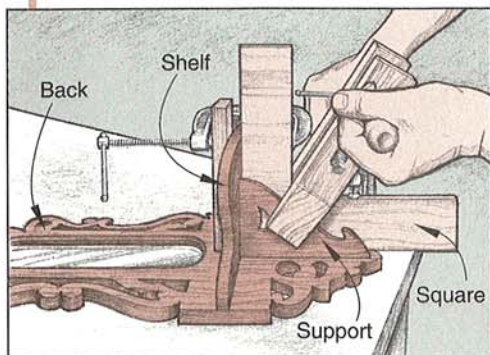
1 Trace the patterns for the shelf and support onto your two remaining $\frac{1}{2}$ "-thick pieces. Flop the Shelf half pattern to form a complete shelf. Saw around both pieces, and then sand the cut edges. Now, finish-sand all parts using 180-grit, and then 220-grit sandpaper.

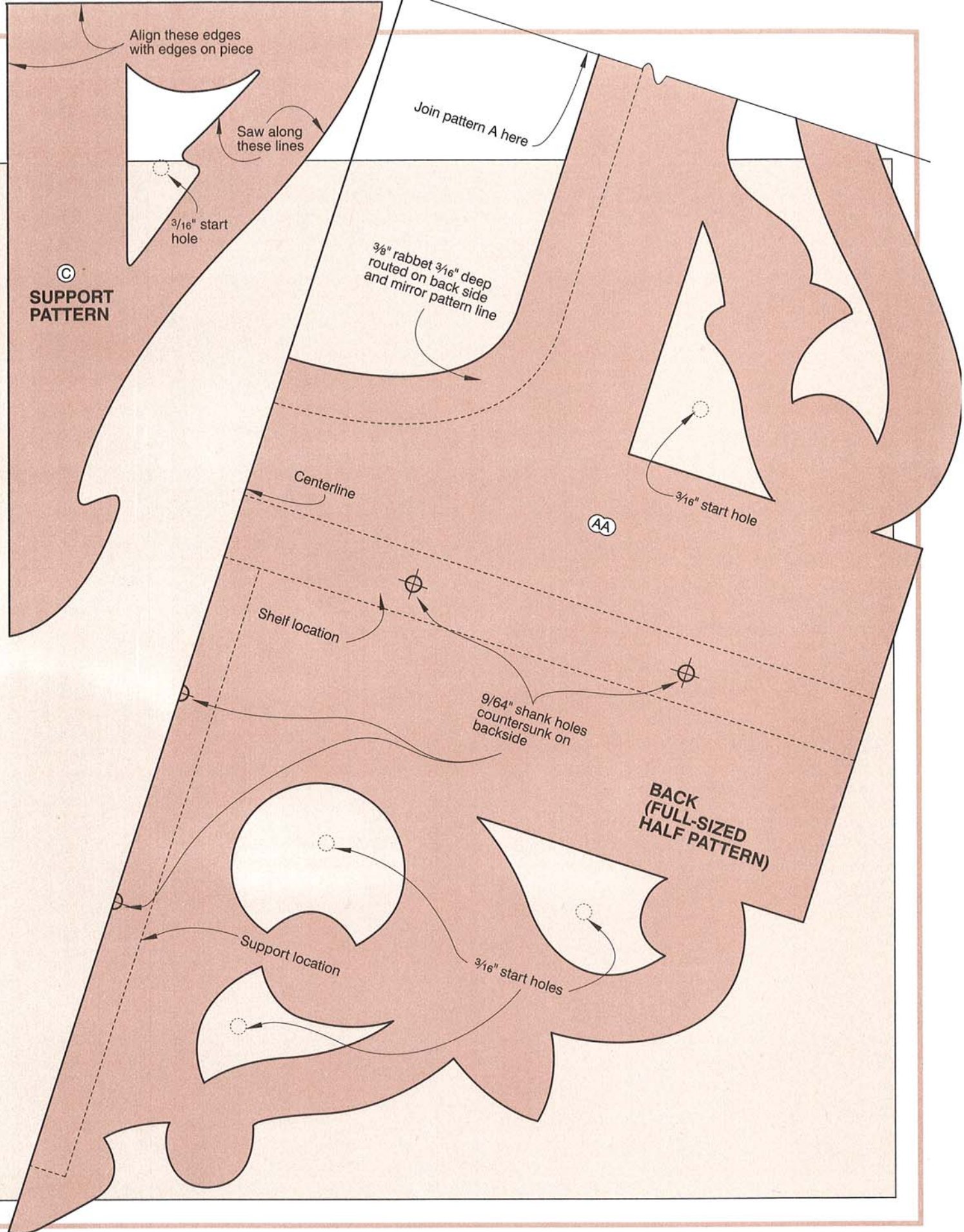
2 Assemble the shelf and support as shown on the Exploded View drawing and Screw Hole detail on page 17. (We drilled the screw holes from the front and countersunk them on the back.) Glue and screw the support to the back. Next, attach the shelf to the back and support. (As shown below, we used a square to ensure we were squaring the shelf and support to the back.)

3 Apply the finish of your choice. (We left ours unstained and applied one coat of sanding sealer and two coats of lacquer. We sanded each coat with 320-grit sandpaper.)

4 Make a mirror pattern using the dashed line on the Back pattern for size. Trace the pattern onto a piece of mirrored acrylic plastic. Now, saw your mirror to shape.

5 Place the mirror in the frame opening and apply a bead of hot-melt glue or silicone sealant to hold it in place. Drill the mounting hole into the back where shown on the Section View drawing on page 17. ■





PLANE PERPLEXING

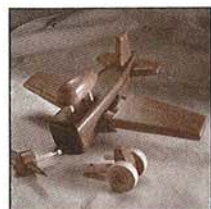
*A challenge for
puzzle buffs of all ages*

A puzzled pilot? Heaven help us. But a plane puzzle—ah, that's something everyone can enjoy. This brainteaser wings its way from **WOOD®** magazine's Build-A-Toy™ contest. You'll appreciate the hours of design work Bruce Stevenson has put into this prize-winning toy.

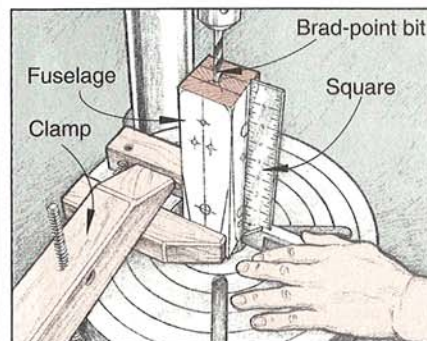
Your first assignment: Build the plane's fuselage

1 From 3/4"-thick stock (we used walnut), rip and crosscut three 3×10" pieces. Laminate the pieces face-to-face and clamp. After the glue has dried, join one edge, and then rip the laminate to 2 1/4" square. Square one end of the blank, and then trim it to 9 1/8" long. Now, scribe a centerline on each blank face and front.

2 Photocopy the full-sized airplane patterns on pages 24 and 25, and cut out the four fuselage patterns. Adhere the Top, Bottom and Left Side patterns to your blank, aligning the centerlines. (We used spray adhesive.) Turn the blank so the left side pattern faces up. Drill the 1/2"-diameter hole through the blank. Now, adhere the Right Side pattern to the blank, centering it on the 1/2" hole you just drilled, and aligning it with the centerlines on the blank.

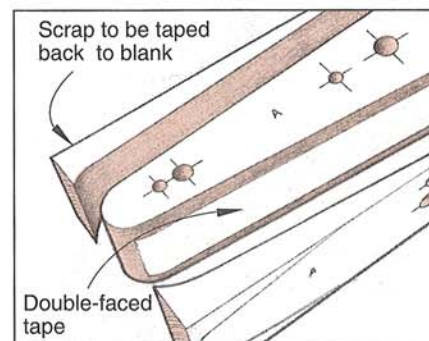


3 Mark the centerpoints of all holes shown on the fuselage patterns. Drill these holes as dimensioned on the patterns. Bore the 9/32" propeller hole 1 3/4" deep into the fuselage's front end as shown below. **Note:** For easier assembly, we used a 17/64" bit to drill the holes where the 1/4" dowels are glued. When the 1/4" dowels must slide or turn, we enlarged the holes to 9/32". To ensure accurate hole alignment, we first marked all hole centerpoints with an awl, and then drilled them with brad-point bits. When you don't have a brad-point bit in the exact size required, we suggest you first drill the hole with the closest smaller available brad-point bit. Then, redrill the holes with the proper-sized twist drill.



4 To bandsaw the fuselage (A), saw along the dashed lines on a side pattern to cut away the top and bottom as shown below. Tape both scrap pieces back onto the blank. (We used double-faced tape for this.) Now, place the fuselage bottom side down, and then saw along the dashed lines of the top pattern to cut away the fuselage's sides.

5 Remove all of the scraps and tape from the fuselage. Next, sand all cut surfaces with 100-grit sandpaper to level saw kerfs. Chuck a 1/4" pilot-ed round-over bit into your table-mounted router, and round over all edges on the plane's fuselage. Now, finish-sand the fuselage with 180- and then 220-grit sandpaper.

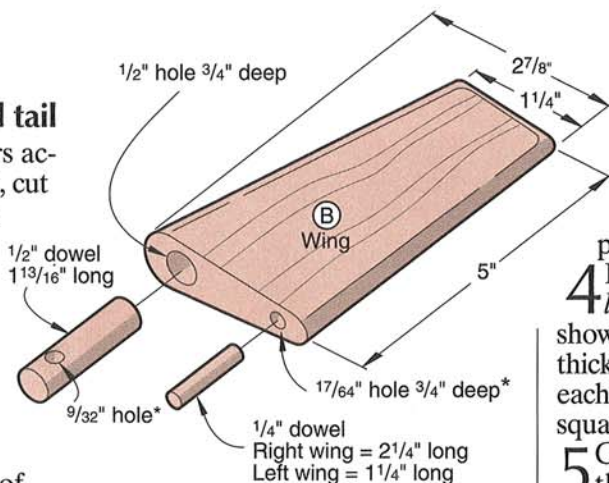


Move on to the wings and tail

1 From $\frac{3}{4}$ "-thick cherry (ours actually measured $\frac{13}{16}$ "-thick), cut a $27\frac{7}{8} \times 12$ " piece for the wings and one 2×12 " piece for the tail parts. Next, set your tablesaw's rip fence $\frac{3}{4}$ " from the blade, and then tilt your blade 5° from perpendicular. (We used our adjustable triangle to set the blade's angle accurately.) Bevel-rip one face of the wing blank. Now, tilt the saw blade to 10° . Place the beveled side of the piece against the fence and wide edge down, and bevel-rip it again. Rip the tail blank the same way, setting the saw blade at 6° and 12° for the two bevel cuts. Sand all sawed surfaces.

2 Crosscut two 5"-long wings (B) from the $27\frac{7}{8}$ "-wide piece. Center the Left Wing End pattern on the end of one piece, and the Right Wing End pattern on the end of the second. Next, mark the $\frac{1}{2}$ "-hole centerpoints on the wing ends, and drill them $\frac{3}{4}$ " deep as shown below. **Note:** To ensure the dowels in the wings, canopy, and tail parts align with their mating holes in the fuselage, use the technique described in the next step to locate the hole centerpoints. We've identified these holes with an asterisk (*) on the drawings.

3 To locate the $\frac{17}{64}$ " holes in the wings (and other parts too), first insert a 1" length of scrap $\frac{1}{2}$ " dowel in the $\frac{1}{2}$ " wing hole. Next, insert this dowel's free end into the appropriate

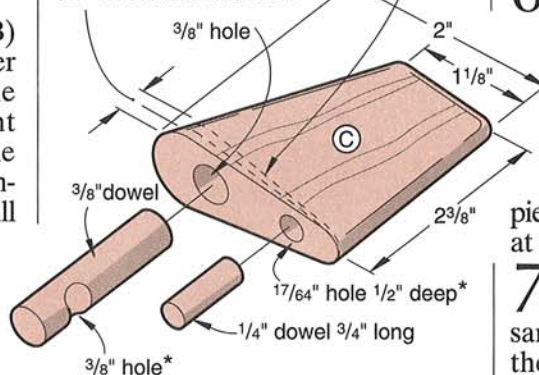


WING ASSEMBLY

*Holes located during construction

NOTE: Drill $\frac{3}{8}$ " holes, then trim end

$\frac{3}{8}$ " on horizontal stabilizers
 $\frac{3}{16}$ " on vertical stabilizers



TAIL ASSEMBLY

mating fuselage hole. At the same time, place a $\frac{1}{4}$ " dowel center in the adjacent $\frac{9}{32}$ " fuselage hole, and then align the wing. Now, squeeze this wing against the dowel center to mark the hole centerpoint on the

wing end. Mark the second wing the same way. Drill these holes $\frac{3}{4}$ " deep into the wing ends following the same procedures used in Step 2.

4 Lay out the wings as shown at left. Saw both wings to shape as shown below center. (We used a $\frac{1}{4}$ "-thick shim under the trailing edge of each wing to level it and keep the cut square to the leading edge.)

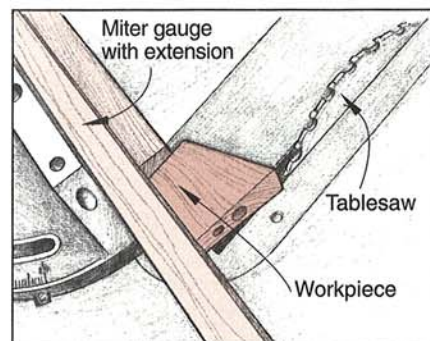
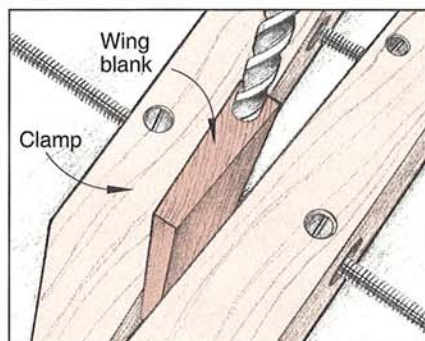
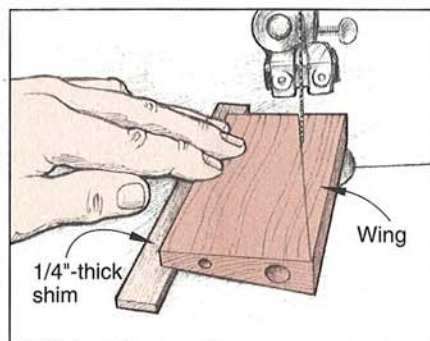
5 Crosscut the 2×12 " piece into three $23\frac{3}{8}$ " lengths. Name and mark the three tail parts. Next, adhere the Stabilizer End patterns to the end of the appropriate piece, and then mark the centerpoints for the $\frac{3}{8}$ " holes. Now, drill these holes to the depth indicated on the patterns.

6 As shown on the Tail Assembly drawing at left, scribe a mark $\frac{3}{8}$ " from the end on the leading edge of both horizontal stabilizers, and $\frac{3}{16}$ " from the end on the vertical stabilizer. As shown below, set your miter gauge to support the pieces, and miter-cut the ends of each at these marks.

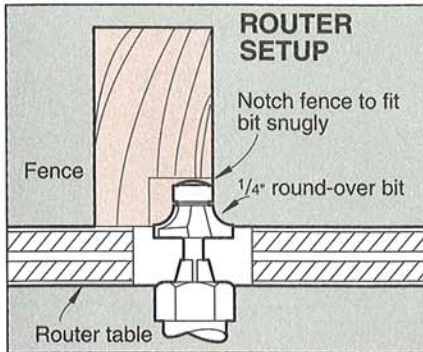
7 Mark the $\frac{17}{64}$ " holes in the ends of the stabilizers, following the same procedures you used to mark the wing ends in Step 3. Now, drill these holes to the depth indicated on your patterns.

8 Lay out the three stabilizers, using the dimensions on the Tail Assembly drawing. Saw the three parts to shape, using the same techniques you used to shape the wings.

Continued



Airplane puzzle



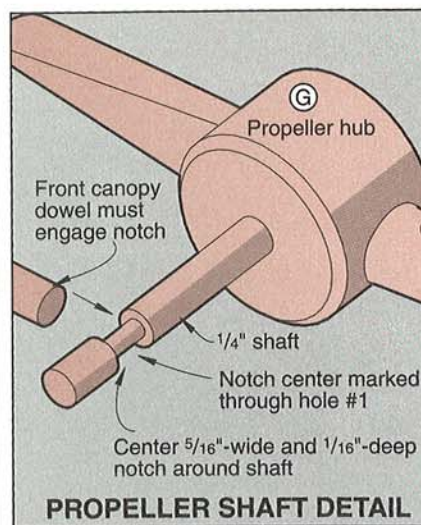
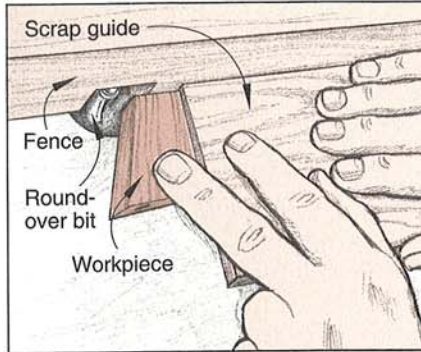
9 Set up your table-mounted router as shown on the Router Setup drawing above. Round over all edges on the wings and stabilizers except those that fit against the fuselage. (We used a piece of scrap to guide the tail parts safely past the router bit. See the drawing above center. You may sand the round-overs on these small pieces if you prefer.) Now, finish-sand the wings and tail parts, but do not reduce their thickness.

Now, prepare the canopy and landing gear

1 For the plane's canopy (D), laminate a $1\frac{1}{4} \times 1\frac{1}{2} \times 4$ " cherry blank. Scribe a centerline along the bottom face and the ends. Locate the front $\frac{17}{64}$ " hole centerpoint using the dimensions on the Canopy detail opposite. Drill the hole $\frac{3}{4}$ " deep.

2 Adhere the Top and Side Canopy patterns to the blank, aligning the pattern centerlines with the centerline and front edge on the blank. Mark the two remaining holes in the canopy blank using dowel centers. Drill these holes $\frac{5}{8}$ " deep.

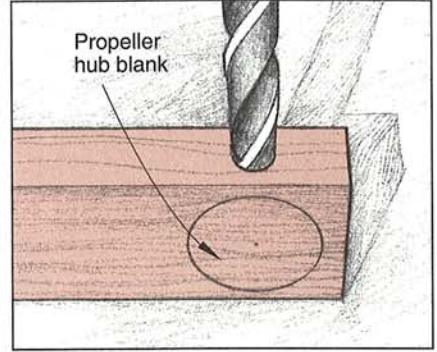
3 Saw the $\frac{5}{16}$ " wedge-shaped piece from the bottom of the canopy blank (dashed line on the side pattern). Tape the cutoff piece back onto the blank. Turn the blank on its bottom, and then saw around the top pattern outline. Remove the scrap and finish-sand the sawed surfaces. Sand the canopy to shape. (We sanded it on our stationary belt sander until we formed a shape we liked.)



4 Cut a $\frac{3}{4} \times \frac{3}{4} \times 2$ " piece of cherry, and adhere the Front Landing Gear pattern to its top. Drill the $\frac{1}{2}$ "-diameter hole $\frac{3}{16}$ " deep. Using dimensions on the Front Landing Gear detail opposite, mark the centerpoint for the $\frac{9}{32}$ " axle hole. Drill all the way through the piece. Next, mark the $\frac{17}{64}$ " dowel hole in the top and drill it $\frac{3}{16}$ " deep. Now, sand the front landing gear (E) to shape, and then remove the pattern.

5 Cut a $\frac{3}{4} \times \frac{3}{4} \times 1\frac{3}{8}$ " cherry blank for the rear landing gear (F). Drill the $\frac{1}{2}$ " hole centered in the top where shown on the Rear Landing Gear detail, opposite. Locate and drill the $\frac{17}{64}$ " hole and the $\frac{9}{32}$ " axle hole.

6 To make the propeller hub (G), scribe a $1\frac{1}{4}$ "-diameter circle on a $\frac{3}{4}$ "-thick piece of cherry scrap. Using a try square, transfer the centerline



of the circle down the side of the piece, mark the centerpoint along this line, and then drill a $\frac{1}{2}$ "-diameter hole through the blank as shown above. Drill a $\frac{17}{64}$ " hole $\frac{3}{16}$ " deep into the center of the circle. Now, cut out the $1\frac{1}{4}$ "-diameter disc on your scroll-saw, sand it round, and round over the hub's front edge.

7 Crosscut a $4\frac{1}{2}$ " length of $\frac{1}{2}$ " walnut dowel for the propeller blade. Sand it to the shape shown on the Propeller detail on page 24.

8 Insert the propeller into the hub, angle it 45° to the hub's front, and center it end to end. Redrill the existing $\frac{17}{64}$ " hole in the hub center to $\frac{1}{2}$ " deep. Crosscut a $2\frac{1}{4}$ " length of $\frac{1}{4}$ " dowel and insert it into this hole.

You're nearly ready for the maiden flight

1 Crosscut $\frac{1}{2}$ " dowels for the wings and landing gear as dimensioned. Glue the dowels into the dowel holes in these parts. Chamfer the ends on all dowels except the wheel axles.

Note: The dowels must be specific lengths to make the interlocking parts. We cut them $\frac{1}{4}$ " longer initially, and then trimmed them to correct length.

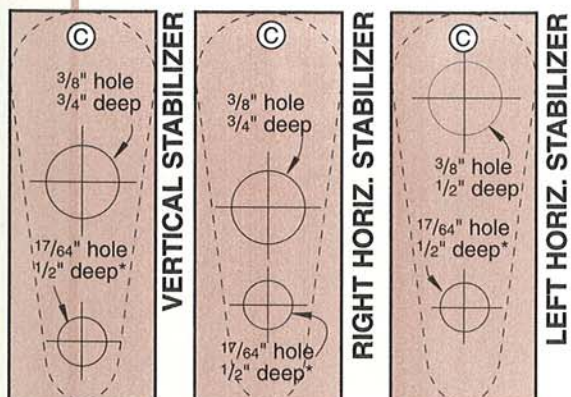
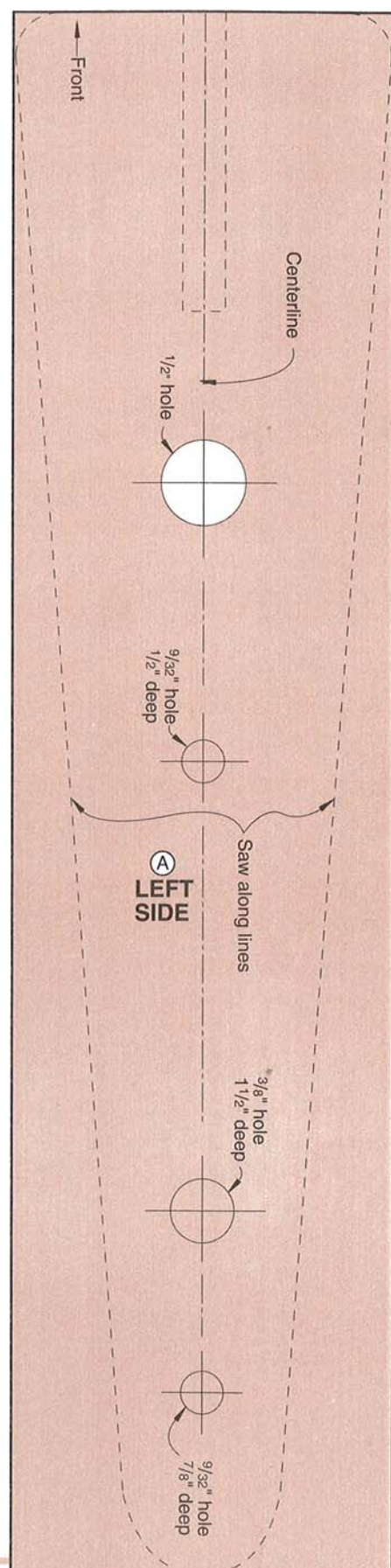
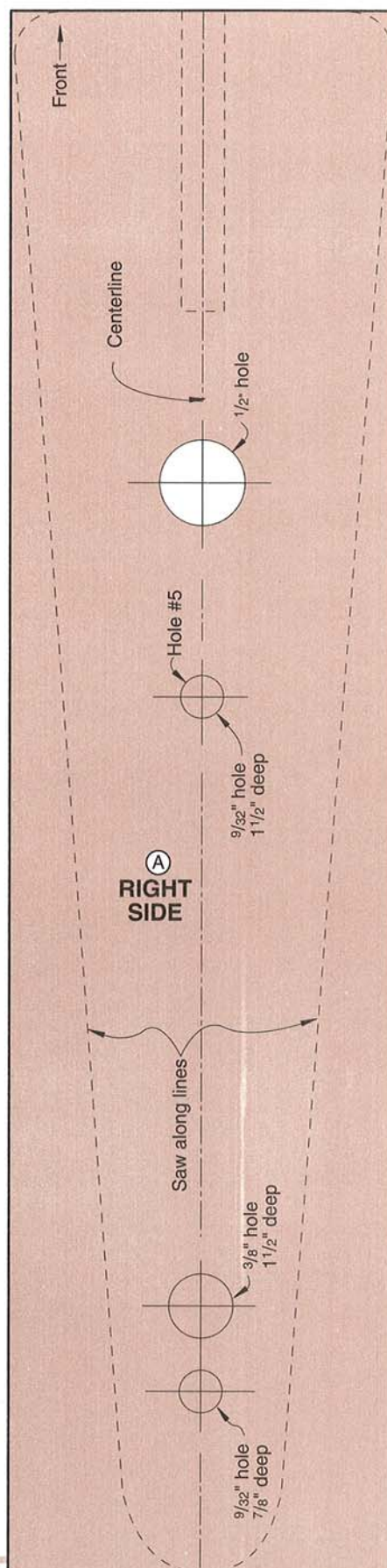
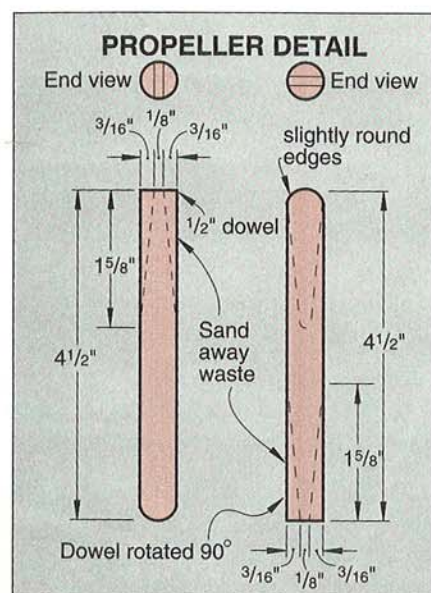
2 Crosscut $\frac{3}{8}$ "-diameter dowels for the tail parts. Glue them in the holes and trim to length. Cut $\frac{1}{4}$ " dowels for the wings, tail parts, canopy, landing gear, and wheel axles. Glue them in the holes, and trim to length.

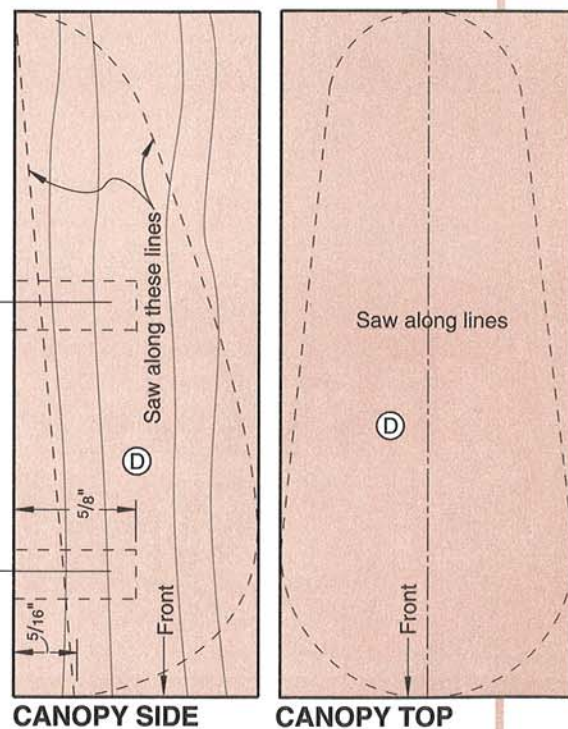
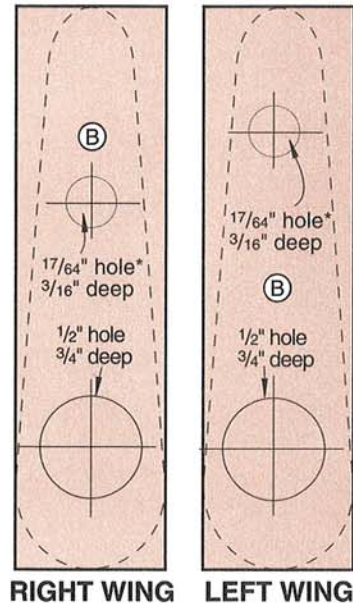
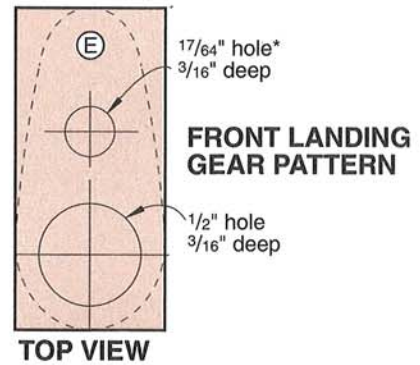
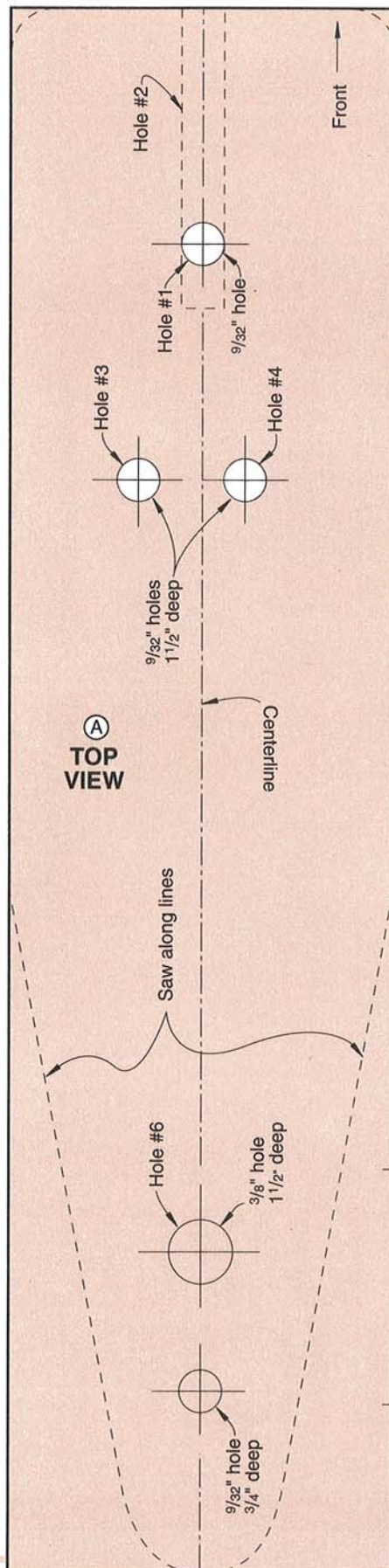
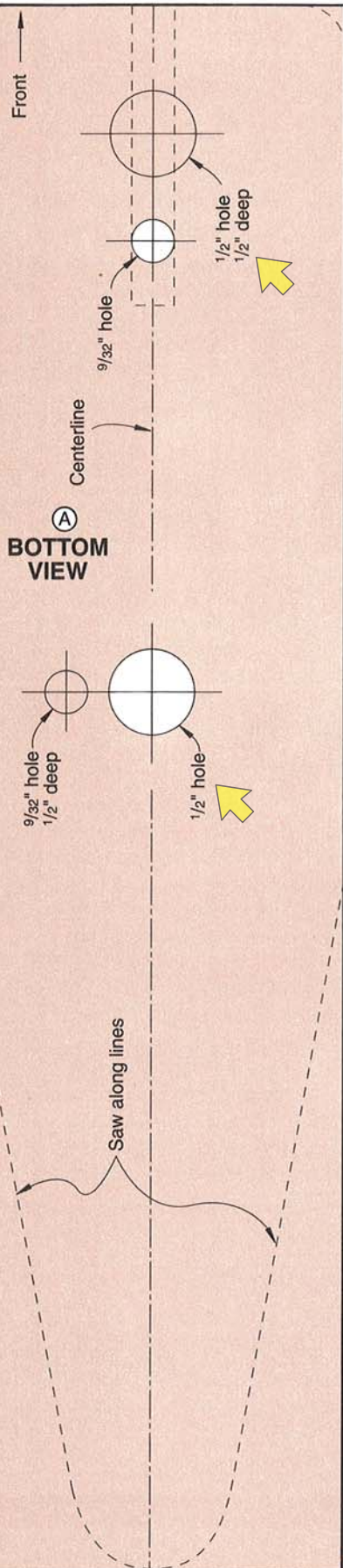
Airplane puzzle

6 Remove the wings and attach the rear landing gear to the fuselage. Drill into fuselage hole #5 (right side) and through the $\frac{1}{2}$ " dowel of that landing gear.

7 Attach the horizontal stabilizers to the fuselage. With a $\frac{3}{8}$ " bit, carefully drill into hole #6 and through the $\frac{3}{8}$ " dowels of both horizontal stabilizers.

8 Finish-sand any parts needing touch up. Apply the finish of your choice. (We applied one coat of sanding sealer and two coats of polyurethane, sanding each coat after it dried with 320-grit sandpaper.) Glue and assemble the wheels and landing gear. Finally, assemble the airplane to complete the puzzle. ■







Kelly Mehler adapted this two-stepper from a 19th-century Shaker original found in the New Lebanon, New York, community. Angled sides shift the top step's center of gravity forward, contributing to the stool's well-known stability.

Step right up: Cut the side panels first

1 From $\frac{3}{4} \times 5\frac{1}{2}$ " stock (we used poplar), crosscut six pieces to 22" long. See the Cutting diagram on page 28 for how we laid out our stock.

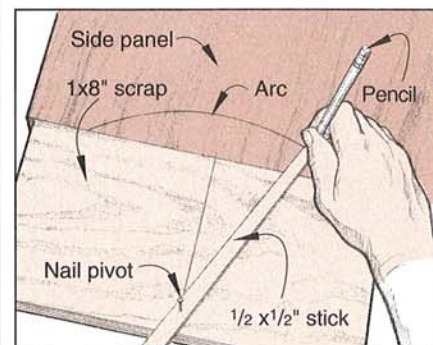
Group these pieces into two sets of three, and then lay them out side by side. Mark the outside face and mating edges of each piece.

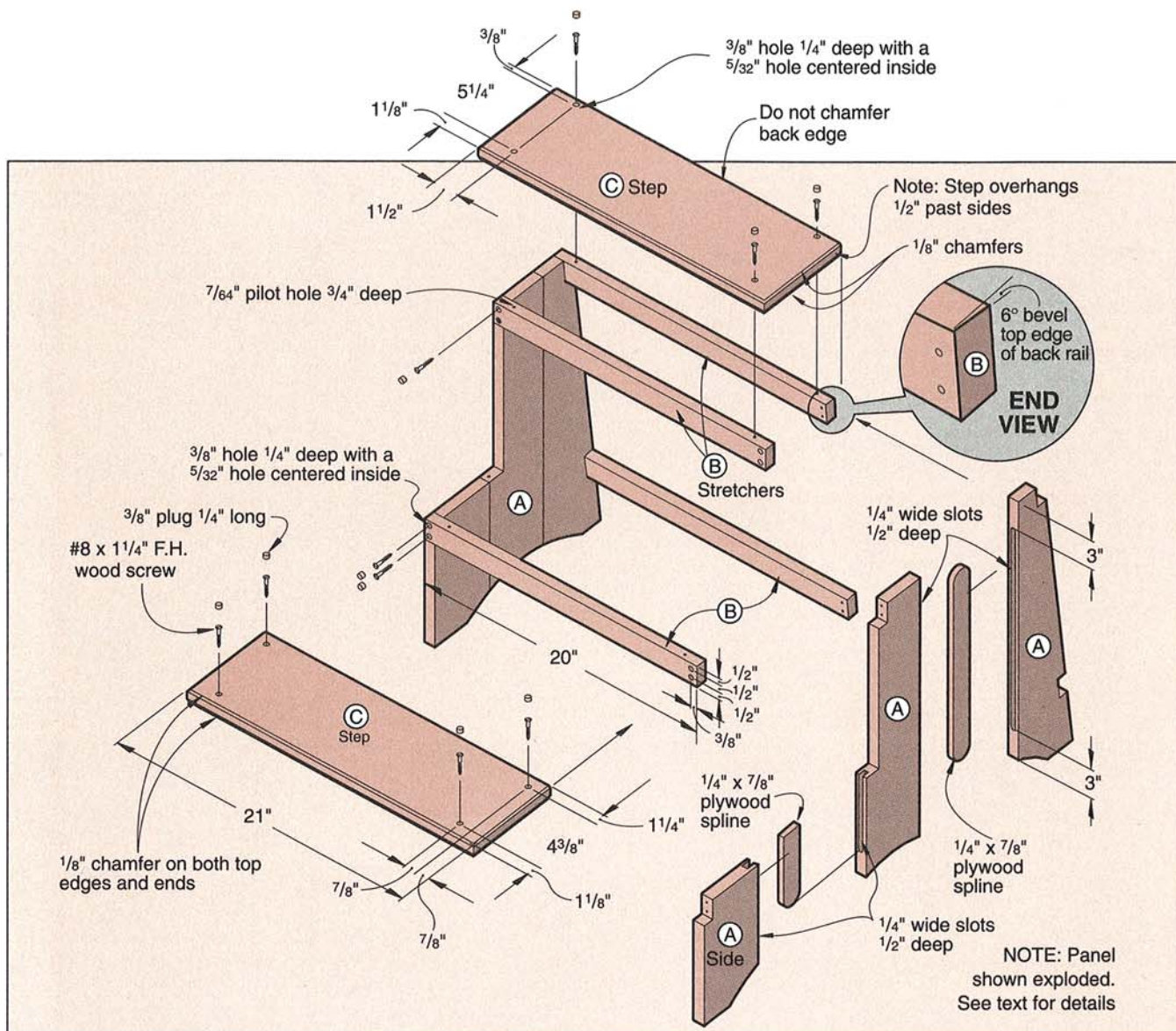
Rout a $\frac{1}{4}$ "-wide slot $\frac{1}{2}$ " deep centered along the mating edges of each piece. Start and stop the slots 3" from each end.

2 From $\frac{1}{4}$ "-thick plywood, rip and crosscut four $\frac{7}{8} \times 16$ " splines. Round the spline ends to match the slots. Glue the splines in the slots of the two outside pieces of each set. Assemble both panels, as shown on the Exploded View drawing *opposite*, aligning the boards at one end. Clamp the panels using bar or pipe

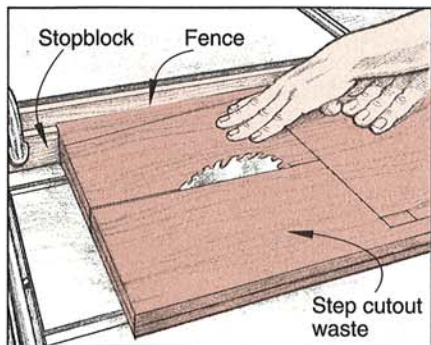
A step stool in the Shaker tradition

TWO-STEPPER SIMPLICITY

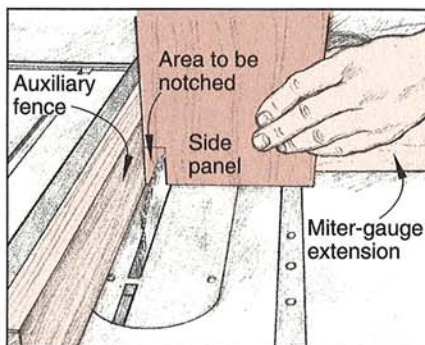




clamps. (We placed clamps on both sides for uniform pressure and to minimize warp.) After the glue cures, remove the clamps, scrape off glue squeeze-out, and sand with 150-grit sandpaper. Now, crosscut both side panels (A) to 21" long.



3 Lay out the bottom arc, back angle, step, and notches on one panel using dimensions from the Side Panel drawing on page 28. (As shown opposite, we placed a scrap 1x8 at the bottom, plotted the 7 1/4"-radius centerpoint, and then drew the arc.)

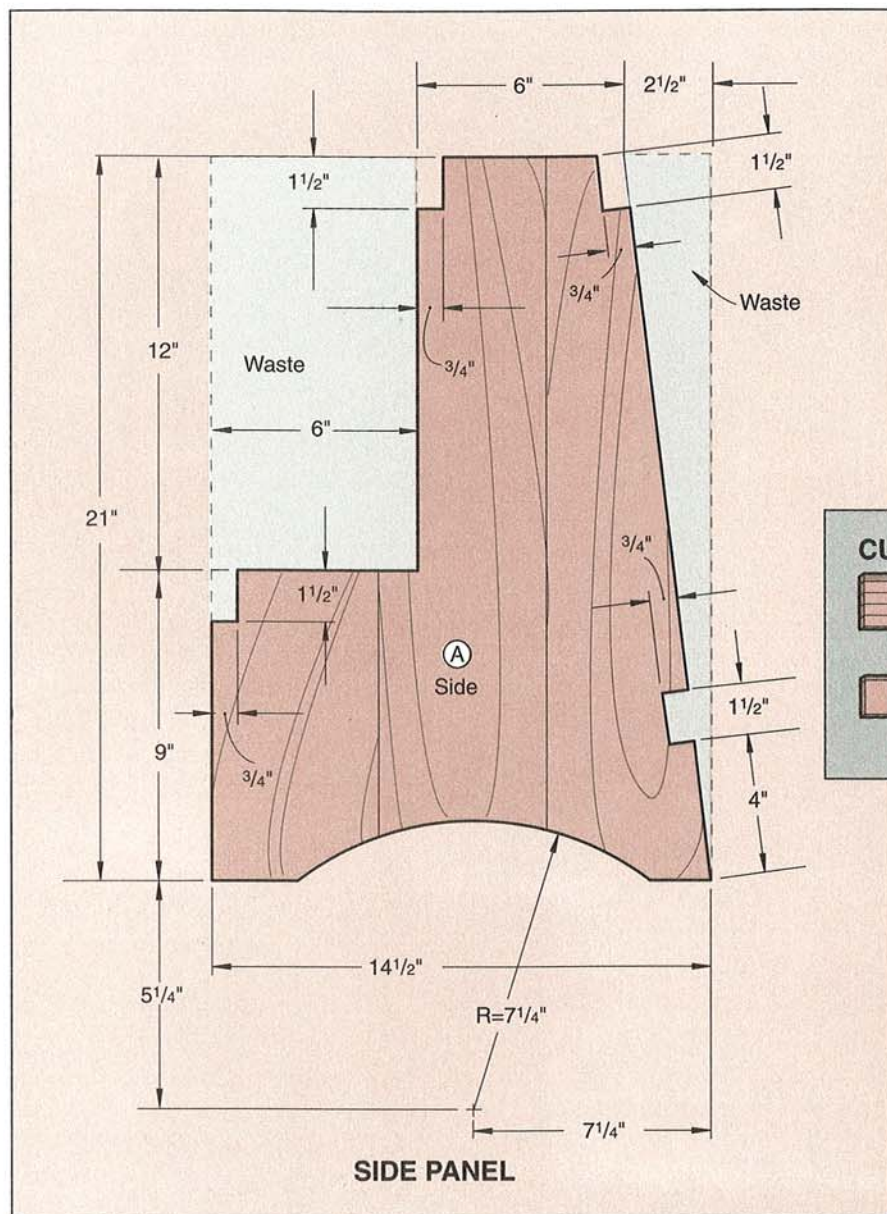


4 Using double-faced tape, stack the two panels together face-to-face with the marked panel on top. On your tablesaw, rip the stair cutout as shown below left. Clamp a straight-edge parallel to the back angle, and saw off the back edge of the panels. Cut the bottom arc with your band-saw, scrollsaw, or jigsaw.

5 Crosscut the stair notch. (We started this cut on our radial-arm saw, and finished it with a jigsaw.) To cut the inside top notch, set your saw's blade to cut 1 1/2" deep. Place the fence to cut a 3/4"-wide notch. Now, place the top edge of the sides down as shown at left, and make several passes to cut out the notch.

Continued

Shaker stool



6 To cut the remaining three stretcher notches into the sides, mount a $\frac{3}{4}$ "-wide dado set on your tablesaw. Elevate it to cut $\frac{3}{4}$ " deep. Use your miter gauge and fence to support the panels as you cut the notches. Now, smooth the notches with a chisel or file.

7 From $\frac{3}{4}$ "-thick stock, rip and crosscut three stretchers (B) to $1\frac{1}{2} \times 20$ ". Cut the fourth stretcher for the top back to the same dimensions,

but rip the top edge at 6° from perpendicular. See the End View detail on the Exploded View drawing for additional information.

8 From $7\frac{1}{4}$ "-wide stock, rip and crosscut two steps (C) to dimension. Cut chamfers along the front edges and ends on both steps as detailed on the Exploded View drawing. Do not chamfer the back edges. Now, sand the stretchers and steps with 150-grit sandpaper.

BILL OF MATERIALS

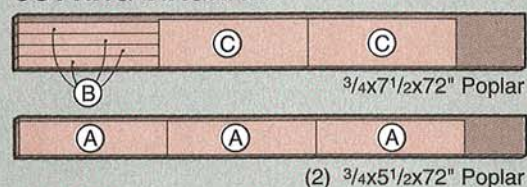
Part	Finished Size*			Matl.	Qty.
	T	W	L		
A* side	$\frac{3}{4}$ "	$14\frac{1}{2}$ "	21"	P	2
B stretcher	$\frac{3}{4}$ "	$1\frac{1}{2}$ "	20"	P	4
C step	$\frac{3}{4}$ "	$6\frac{3}{4}$ "	21"	P	2

*Parts marked with an * were assembled and cut to final size during construction. Please read all instructions before cutting.

Material key: P—poplar

Supplies: #8 $\times 1\frac{1}{4}$ " flathead wood screws, finish.

CUTTING DIAGRAM



The final steps: Assemble and finish your stool

1 Drill and counterbore two $\frac{5}{32}$ " shank holes on the ends of each stretcher where dimensioned. Dry-assemble the sides and stretchers, square the assembly, and clamp temporarily. Drill through the existing stretcher holes to form the $\frac{7}{64}$ " pilot holes $\frac{3}{4}$ " deep in the sides. Glue and screw the stretchers to the sides.

2 Center the steps on the assembled sides. Lay out, drill, and counterbore the step holes. Now, screw the steps to the sides.

3 Using a $\frac{3}{8}$ " plug cutter, cut $24\frac{1}{4}$ "-long plugs from scrap. Glue the plugs into the screw holes, and then sand them flush with the surface. Sand the back edge of the top step to match the stretcher angle.

4 Apply the finish of your choice. (We left the wood unstained, and applied one coat of clear sanding sealer and two coats of polyurethane, sanding after each coat dried.) ■

Antarctic antics PENGUINS ON PARADE

Photographer: Wm. Hopkins



Brighten your day with a trio of laughable, easy-to-scrollsaw characters

1 Copy the pattern below. (We set our enlarging photocopier for a 150-percent enlargement. That made our penguins 5" tall and 10" wide.)

2 Rip and crosscut a piece of 1/2"-thick Baltic birch plywood to a size slightly larger than your pattern. Using spray adhesive or rubber cement, adhere the pattern to the plywood.

3 Scrollsaw around the outside of the pattern and remove the waste. (We used a #5R [reverse tooth] blade.) Next, saw out the individual penguin parts. Drill the 1/16" eye holes. Remove the pattern from the pieces.

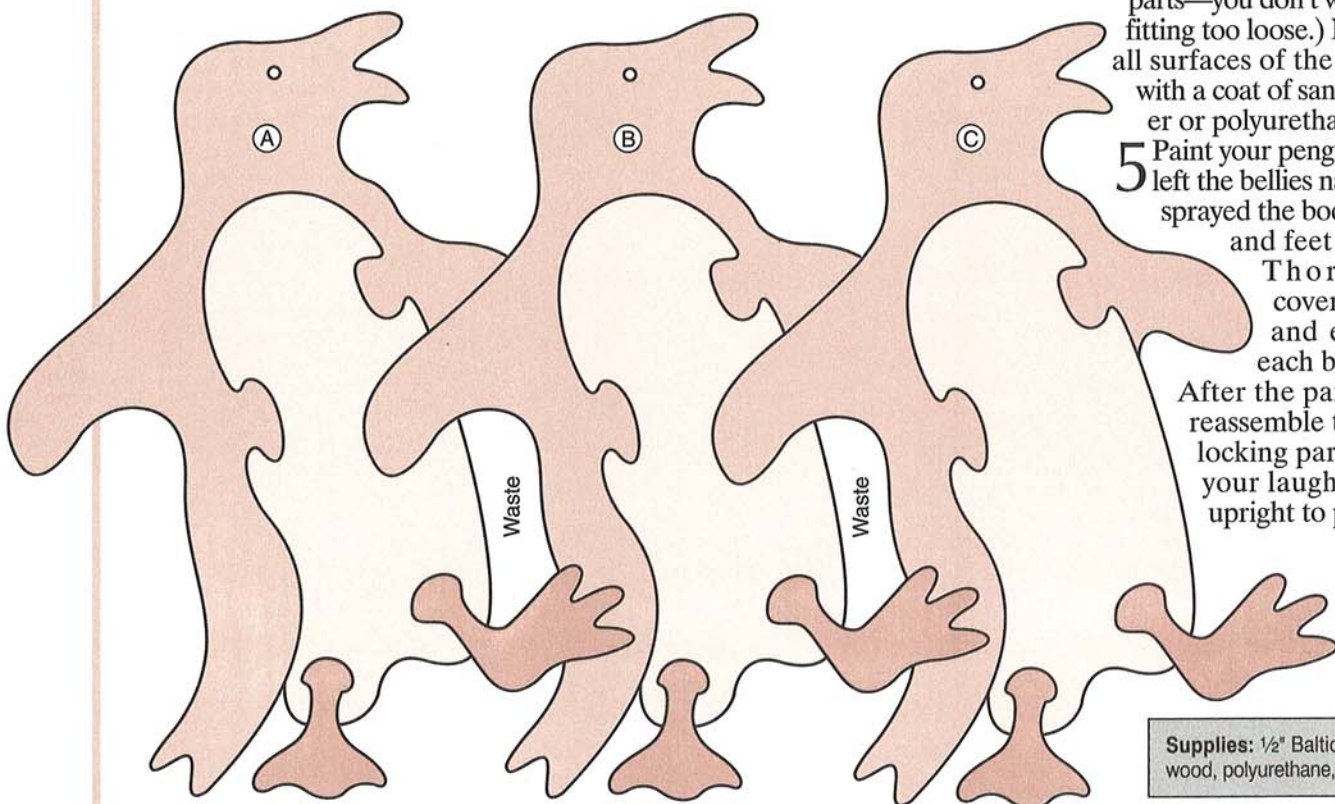
4 Finish-sand all surfaces and edges. (We used a 1/2"-diameter sanding drum to smooth the curved surfaces. Do not over-sand the interlocking

parts—you don't want them fitting too loose.) Next, seal all surfaces of the plywood with a coat of sanding sealer or polyurethane.

5 Paint your penguins. (We left the bellies natural but sprayed the bodies black and feet orange.)

Thoroughly cover all sides and edges on each body part. After the paint dries, reassemble the interlocking parts. Stand your laughable trio upright to parade. ■

Supplies: 1/2" Baltic birch plywood, polyurethane, paint.



Project design: Don Zacharias, Vancouver, B. C. Illustration: Kim Downing Project builder: Rick Hutcheson

Build Any of These Great Projects in a Weekend

You Can Do It with These Project Plans

PORCH SWING

Simple to construct, this swing's curvy design creates comfortable gliding for two adults or three children and hangs securely from a pair of chains.



ADIRONDACK CHAIR

You'll delight in this comfortable Adirondack Chair which hugs the human form and offers its wide arms to park a cold lemonade or snack.



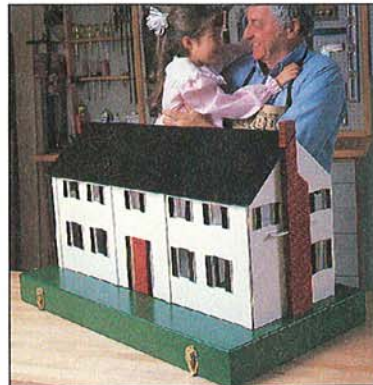
REINDEER

Crafting a herd of these 3'x 4' reindeer for your yard or gifts is easy. Simply transfer the pattern, cut, sand, paint, and snap together. They fold flat for storage, too.



PACK-AWAY DOLLHOUSE

The perfect solution to the space squeeze, this colonial mini-home (complete with six generous rooms, a staircase and a chimney), folds flat in its own case.



Here are four easy-to-build projects you won't want to miss. There's still time to enjoy summer with this Adirondack chair or porch swing. Get a jump on the holidays by starting your projects early with these sprightly reindeer or this enchanting and practical dollhouse.

The Weekend Woodworking Projects editors thought these four projects were such terrific designs that they joined with the editors of Better Homes and Gardens WOOD magazine to offer you the plans.

Each plan steps you through the project with clearly written instructions that reveal those special tricks of the trade that save time and money—and help you create a professional result. There's also a complete list of materials to get you started, full-size cutting patterns, and detailed diagrams that reveal the secrets of a professional fit. Special tips and hints from our woodworking experts make the project even easier.

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