



BONUS!
Full-size
Patterns

- Our Cape Cod dollhouse is easy to make and folds up in minutes
- Great new shop project: A cabinet for all your sanding supplies
- Plus: Full size patterns for a sturdy coat rack and a hand mirror

TODAY'S
WOODWORKER

PROJECTS, TIPS AND TECHNIQUES

Issue 31 \$4.95

3 1
0 33175 79715 4

TODAY'S WOODWORKER®

PROJECTS, TIPS AND TECHNIQUES



13 A Sturdy Coat Rack

By Chris Inman

This arts and crafts inspired coat rack will add a touch of class to any foyer.



8 The Sanding Caddy

By Rick White

Build the ultimate storage cabinet for all your sandpaper supplies. Another project in our continuing line of shop fixtures.



18 Oval Hand Mirror

By David Larson

Here's an elegant weekend project for all you router enthusiasts.

20 One Dollhouse To Go

By Dan Jacobson

Our dollhouse folds into itself to make a convenient carrying case. There's even a handle in the attic so you can bring it along on a trip to Grandma's house!



3 On the Level

We love to see your work!

4 Tricks of the Trade

Drill bit organizer, candle turnings, a tip from the sewing corner and bungees in the shop.

5 Hardware Hints

A keyless lock for child safe cabinets or super-sleek designs.

6 Techniques

Tackle a few of the most common veneer repairs with contributing editor Tom Caspar.

7 Today's Wood

Tips for matching old veneer.

17 Finishing Thoughts

Bob Flexner clears the air on polyurethane.

Safety First

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

LARRY N. STOIAKEN
Editor in Chief

JOHN KELLIHER
Art Director

CHRISTOPHER A. INMAN
Editor

STEVE HINDERAKER
Associate Art Director

NANCY A. AMMEND
Production Manager

JEFF JACOBSON
Technical Illustrator

GORDON HANSON
Copy Editor

DAN JACOBSON
Project Designer

ANN ROCKLER JACKSON
Publisher

JIM EBNER
Director of Marketing

DEB HOLM
Circulation Coordinator

NORTON ROCKLER
RICK WHITE

STEVE KROHMER
AL WOLFORD
Editorial Advisors

TOM CASPAR
PETER KORN
RICHARD STARR
Contributing Editors

Today's Woodworker, (ISSN: 1041-8113) is published bimonthly (January, March, May, July, September, November) for \$19.95 per year by Rockler Press, 21801 Industrial Blvd., Rogers, MN 55374-0044. Second class postage paid at Rogers, MN and additional mailing offices.

POSTMASTER: Send address changes to Today's Woodworker, PO Box 420235, Palm Coast, FL 32142-0235.

One year subscription price, \$19.95 (U.S. and possessions); \$24.95 (U.S. currency — other countries). Single copy price, \$4.95; (other countries, \$6.50, U.S. currency). Send new subscriptions to Circulation Dept., Today's Woodworker, PO Box 420235, Palm Coast, FL 32142-0235. Subscribers are welcome to submit project proposals, tips and techniques to the editor, Today's Woodworker, Box 44, Rogers, MN 55374. For purposes of clarity, illustrations and photos are sometimes shown without proper guards in place. Today's Woodworker recommends following ALL safety precautions while in the shop.

Today's Woodworker is a trademark of Rockler Press. All rights reserved. Reproduction without written permission of the publisher is strictly prohibited.

Copyright© 1994, by Rockler Press.

Give Us Your Best Shots

One of the greatest joys here at *Today's Woodworker* is receiving pictures of our projects from readers. Even when we're right in the middle of a frantic deadline, nothing brings our shop and office to a standstill quite as quickly as a picture from one of you, showing off a recently completed TW project.

So I want to say thanks to Sal and Bill for making our day! Nice work guys. And remember, even if you don't have a picture, we want to hear from you. Tell us what you like (or what you'd like changed). Or, just ask for further clarification, like Jim has done below. We'll always do our best to respond.

Larry N. Stoiaken



Here's a picture of the **English Garden Bench** I built from your issue #28. It was a very nice project and I have received many compliments on it. I did deviate from the published project, however, by using cedar decking (which I milled down to the appropriate dimensions) and went with straight arm rests. All crosspins were done from behind so as to be out of sight and I used exposed brass screws on the seat.

The bench is lighter than oak but the spar varnish gives it a fairly tough coating. All in all, it was an enjoyable project to work on.

Sal Cretella
Bristol, CT

In **The Low Down on Oil Finishes** (see issue 29), Bob Flexner seemed to imply that an oil finish will not provide protection from moisture. I recently bought a wooden English garden bench (I know, I should have built my own from issue #28!), and the information on its care said to treat it with a coat of diluted boiled linseed oil annually. Mr. Flexner's article says linseed oil is easily penetrated by moisture and humidity. If that is true, what is the benefit of oiling wood?

Jim Holland
Indianola, Iowa

Box Flexner responds: Linseed oil makes the wood look nicer and causes water to bead up and run off for awhile. Of all finishes it protects the least against moisture (including humidity). Linseed oil has a good reputation as a protective finish because people who don't know better keep recommending it.

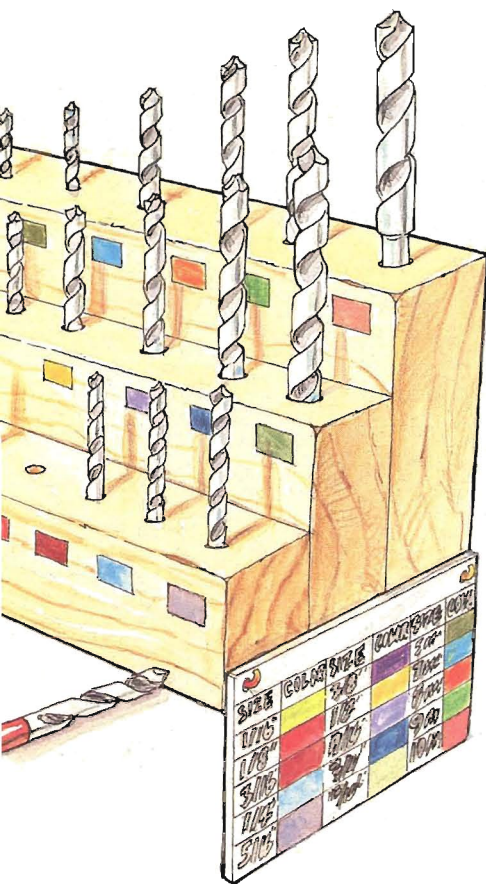
If you want to stick with an easy-to-apply, non-peeling, penetrating finish, and you don't mind paying more, you will do better with a mixture of one-third pure tung oil, one-third spar varnish, and one-third paint thinner. Tung oil is more water resistant than linseed oil, but doesn't look as nice. Spar varnish improves the appearance of the mixture, and it resists moisture penetration better than linseed oil. Paint thinner makes the mixture easier to apply. Reapply this finish whenever the wood begins to look raw and wipe off all the excess.

But don't expect miracles. A penetrating finish is just too thin to provide much protection for long. Paint is the best protective finish. Boat varnish that contains UV absorbers is next.



I'm sending you a picture of the **Futon Sofa Bed** I made from Today's Woodworker, issue #26. It was fun. I used pine with an Early American stain and followed that with three coats of tung oil. So far it's holding up just fine.

Bill Blood
Houston, TX



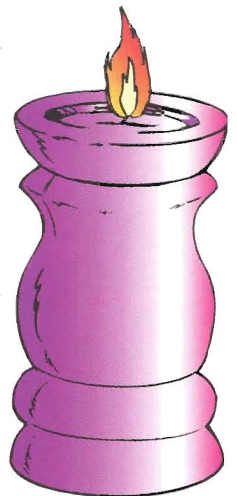
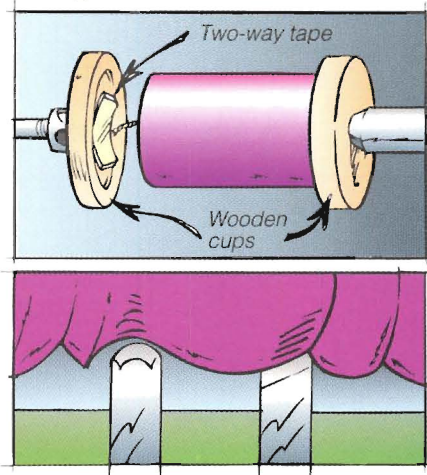
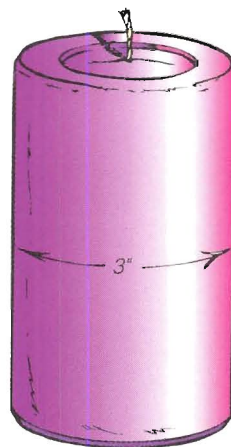
Color Code Your Drill Bits

Drill bit manufacturers usually stamp the diameter of the bit on the upper part of the shank, but after a while the drill chuck wears the numbers off. This makes it hard for me to choose the bit sizes I need at a glance.

To remedy this problem I dip the shank end of the bits into oil base paint, using a different color paint for each bit. Then I put a dot of paint under each hole of my drill bit holder to correspond with the colors on the bits. When I ran out of ready mixed paints, I started mixing my own colors. With the help of a master chart that hangs on my bit holder I now can quickly pick the right bit for every job. And even after the paint wears off the side of the shank, a dot of color will remain on the bit's end.

*Garland Draper
Millington, Michigan*

Shop Scavengers



Candles with Flair

The large candles my wife and I buy for holiday decorations are usually plain round cylinders, about 3" in diameter and up to 12" tall. They're nice candles, but I wanted something a bit more unique, so I tried turning them on my lathe.

Obviously, candles aren't designed for turning. A spur drive will crack the wax and friction from a cup center will melt it. My solution is to turn wooden cups to protect the candle's ends. The cups must be sized properly, have a flat bottomed, shallow recess and a narrow rim. Adding double-faced tape between the candle and the headstock cup prevents slippage during the turning operation.

I run my lathe at its slowest speed and use the turning tools in a scraping fashion. Once the shape is formed I polish the candle with a piece of silk or nylon while it's still on the lathe. The key to success is a simple design.

*Dick Dorn
Oelwein, Iowa*

Bungees in the Shop

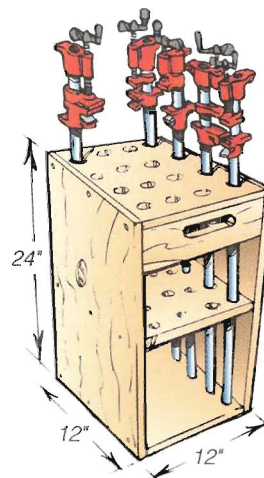
I prefer to glue and screw my cabinets together while all the pieces are held in position with a length of bungee cord. The cord allows enough movement for readjusting the pieces and for squeezing glue into the joints. I tie knots to tighten the cord wherever they're needed.

*Jay Hendon
Lake Oswego, Oregon*

A Trick from the Sewing Basket

Fabric stores sell quilter's templates, which are lightweight sheets of plastic used to make sewing patterns. They come in different sizes, can be cut easily with a scissors, and are thick enough to guide a pencil. They're perfect for woodworking patterns too. I've found that the 14" x 20" size is the most useful for my needs, and the cost is under \$2.00 per sheet.

*John E. Rynbrandt
Leeland,
Michigan*

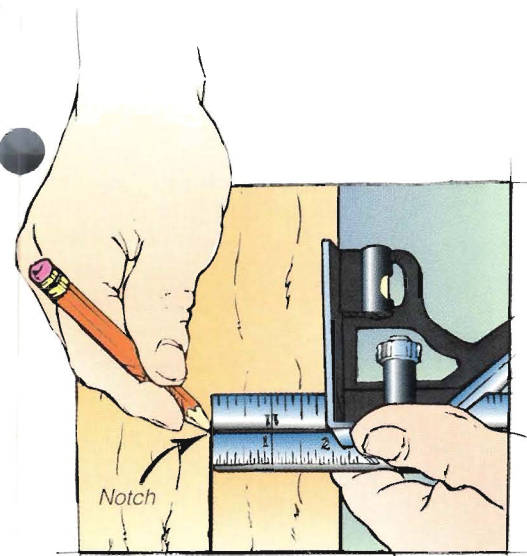


Pipe Clamp Storage

Storing pipe clamps is always a pain in the neck. To put an end to this problem I built a storage box out of plywood and pine. The box is 12" square and the 1 1/4" diameter holes in the

top and middle shelves are drilled in exactly the same arrangement. The middle shelf is installed 6" below the top to support the upright pipes, and the oblong holes in the sides provide good hand holds when moving the box around the shop.

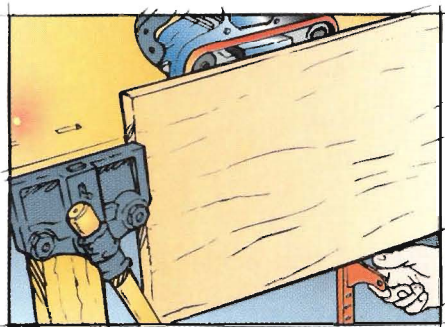
*Ted Finneseth
Northfield, Minnesota*



The Layout Square

I use my combination square as a marking gauge to lay out joints and cuts on a workpiece. I filed a 1/16" deep notch in one end of the blade to hold a pencil point. Now, after adjusting the length of the blade, I run the square along the edge of the board to layout my line.

*Howard E. Moody
Upper Jay, New York*



Holding Up Your End

A channel style shelf standard mounted on the front of our workbench helps hold up long stock for routing or planing. We can adjust the bracket position on the standard to accommodate material from 1" to 30" wide, and when the bracket isn't needed, it's easily removed and hung on a nearby hook.

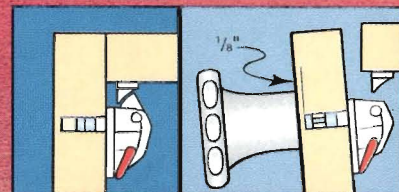
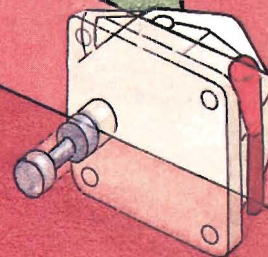
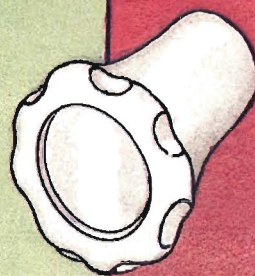
*Alice & Robert Tupper
Canton, South Dakota*

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

HARDWARE HINTS

Magnetic Safety Catches

By Al Wolford



When the metal pin is located within 1/8" of the cabinet face, a magnetic key easily disengages the plunger from the strike plate.

In the last issue I talked about kitchen hardware that can make an appliance disappear. This time I'd like to cover a new invisible lock. If this trend keeps up I'll soon be known as the Hardware Houdini.

Just about every week I get a few woodworkers calling to find out what's new on the market when it comes to childproof hardware. Most suppliers carry gang locks, deadbolts or chest locks, all of which require some machining to install and, in general, change the appearance of the piece they're being installed on. Hardware stores usually carry a line of plastic baby locks (they're kind of ugly).

With the introduction of Rev-a-Lock®, the magnetic lock and key system shown above, I've finally got a product I can recommend without reservation. It's easy to install, completely invisible and, most importantly, it works great. It's also ideal if you're looking for hardware to complete a secret door or hidden panel.

The key to this invisible lock is a magnet. When held to a door or drawer front across from the catch, the magnet pulls on a metal pin, which in turn disengages the plunger from the strike plate. If you choose

not to use the lock for a time, the latest version of this hardware includes a small red lever on the housing that holds the plunger in its open position.

The catch can be installed anywhere along the edge of a door or drawer front, as long as the cabinet frame is nearby for mounting the strike plate. Since all the parts are surface mounted, this lock is a good choice for retrofitting. Aside from pilot holes for the mounting screws, the only drilling required is a 1/4" diameter hole for the metal pin. Varying the depth of the pin hole allows the lock to be used on wood thicknesses ranging from 5/8" to 1 1/2". A single, well hidden magnetic key will open all the catches you ever install.

While this lock won't stand up to a crowbar, it certainly does manage to frustrate overly curious children.

Al is the technical service manager at The Woodworkers' Store. Send your hardware questions or comments to Al c/o Today's Woodworker, Dept. HH, Rogers, MN 55374-0044.

How to Repair Damaged Veneer

By Tom Caspar

Studying the techniques of the masters and working on hundreds of antiques has taught me a lot about repairing veneer. Some of these lessons I've learned the hard way —by making mistakes. Here's a few hard earned tips that will make your work go a little easier.

If you've found a piece you think can be restored, get started by temporarily taping back any loose veneer. Regular tape is too sticky and might pull off some finish if left too long, so I use wallpaper hanger's tape. Next, search for hidden loose spots by tapping the veneer with your fingernail. A dull sound indicates the veneer is well attached to its ground (the wood that veneer covers), whereas a hollow ticking sound means the veneer is loose. Pay special attention to edges, where airborne moisture could easily have entered and loosened the bond of the hide glue.

Once the spots needing repair have been identified and marked with tape, remove the glue from the veneer and ground with an old chisel. I always sharpen the chisel for this task by pointing it right into a fine grinding wheel to get a thick sturdy edge. Before scraping the glue off, be sure



Even though an old piece of furniture may seem beyond hope, veneer blisters, chipping and peeling are surprisingly easy to repair.

to soften it with hot tap water (I've found that even hundred year old glue will become runny and sticky again).

Once the old glue is removed, start the regluing process by working on the hollow sounding pieces you discovered earlier. The trick here is to slip glue between the ground and the veneer. Usually you can work glue in from an edge if you have a long thin flexible blade, such as those in a set of automotive feeler gauges.

As far as the right type of glue, my first choice is liquid hide glue, although I've used white and yellow

glue and it works fine. Be sure to put paper between the veneer and some softwood blocks to absorb any glue squeeze out (paper backed tape is ideal), then clamp the pieces overnight. The next day, remember to wet the paper before removing it so the dried glue won't pull off any of the finish or veneer.

Blisters can be glued down in the same way, although you need to cut a slit with a razor blade to work in the glue. Before you do this, however, check that the blister will lay flat without cracking or overlapping by slowly pressing it down with a

piece of plexiglass (so you can see how it goes). If the bubble is stiff from age and won't lay down properly, scrape off the finish and wet the veneer with hot water, then put layers of paper under a softwood block and apply clamping pressure. After a few days the veneer will dry and you can slip in the glue.

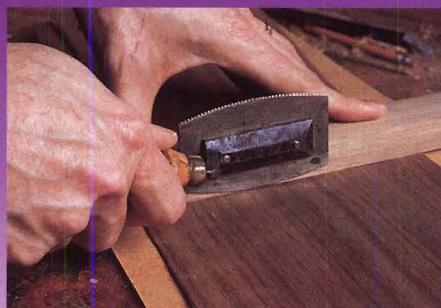
Adding New Veneer

Making an invisible repair with new veneer isn't difficult once you've learned a few tricks. The hardest part is matching the old veneer with new

Five basic steps for a tight fitting veneer patch



Step 1: Begin cleaning up the hole where the piece is missing from the rail by straightening one of its edges with a sharp chisel.



Step 2: Cut the matching patch from your veneer with a veneer saw. The saw's curved edge allows you to start your cut anywhere in the veneer.



Step 3: While holding your block plane in a vise, pass the veneer patch over the blade to straighten one edge for matching the edge of the hole.

Veneer Matching Tips

By Tom Caspar

stock (see box at right). Matching the color isn't that difficult since there are lots of ways to stain or dye veneer. The greater concern is getting a good grain match. Concentrate your efforts on choosing a patch with a grain pattern that resembles the area around the missing veneer.

If you're using new veneer to make your patch, it will probably have to be shimmed to the thickness of the old veneer. Try not to make your veneer too thick, however, or you might scrape off the finish and lose the patina in the old veneer when leveling off the patch with the surrounding area. In fact, I sometimes use slightly thinner veneer and build it up with plenty of glue for this application.

Fitting in a Patch

Fitting a veneer patch requires some finesse. Always use sharp tools and make wedge shaped patches—they are far easier to snug into a hole than other shapes. The example below demonstrates the steps in the patching process. It's common to be missing small pieces of veneer on dresser rails, especially if the grain is running vertically. To replace a missing piece, I start by straightening one edge of the hole (**Step 1**). Next, I cut an oversized patch with a veneer saw (**Step 2**) and joint one edge of the patch with a block plane (**Step 3**). Be sure to adjust the throat to a very narrow setting and watch your fingers. Now

snug the patch into the hole (against its straight edge) and mark a cutting line on the other side of the patch (**Step 4**). Be sure the patch covers the hole generously and layout this line at a slight angle to get the wedge shape. Once the line is laid out, use a chisel to chop the veneer (or a plane iron in the case of a longer patch).

Next, I lay the tapered piece on the hole with its ends overhanging an equal amount and scribe a line on the rail with a knife, following the taper of the patch. This line is then chopped with the chisel (take several cuts to remove more than 1/16" of veneer).

I wrap up by test fitting the patch, refining its edges on the plane as needed. Most of the excess length can be removed with a chisel prior to gluing the patch in place. After it dries, file the ends flush to the rail.

Fitting a three sided patch is a little bit trickier, but the process is essentially the same. The most helpful tip I can suggest is to cover the end of the hole with a piece of white tape after the hole edges have been straightened. The tape will help show you exactly where to cut the wedge shaped patch, as shown in **Step 5**.

Now I recommend that you find an old dresser and give these techniques a go. Experience is still the best teacher.

Tom Caspar is a contributing editor with Today's Woodworker magazine and a professional woodworker.

The veneers most commonly found on old furniture include curly and bird's-eye maple, walnut, rosewood and mahogany. Many of these woods are still harvested and used to make veneer today,

but the exact species are difficult to find and the quality isn't what it was a century ago. There are, for instance, a number of mahogany species available, but Cuban mahogany, a favorite of 18th century cabinetmakers, is nowhere to be found. This makes it more difficult to match new veneer to an old piece of furniture, but don't lose heart. Here's three ideas to help you get the look you're after.

First, remember that modern veneers are sliced very thin and uniform, whereas old veneer was cut thick and unevenly, due to the tools of the day. Try shimming new veneer to match the old by using a second piece of veneer, a thick plane shaving or colored paper. Just be sure to glue the shim to the veneer before fitting the patch.

Second, try pulling off a piece of veneer from one part of a dresser to use for patching elsewhere. A large solid area of new veneer with a slightly different grain pattern, especially if it's somewhat isolated, works better than using many small patches that don't match.

And third ...yet another reason to hit auctions and estate sales on the weekends. These are just great places to scout out old veneered pieces that are beyond repair. If they're cheap, it pays to remove the veneer and save it as patch material for more worthwhile projects.



Step 4: After chopping the second edge of the patch at a small angle, push the patch in the hole and transfer this angle to the rail with a knife.



Step 5: For a three sided repair, press white tape over the end of the hole, draw the cutting angle and mark the angle on the patch.

The Ultimate Sanding Cabinet

Put an end to the frustration of curled sandpaper and organize your sanding supplies in one convenient location.

By Rick White

Woodworkers accumulate lots of supplies. Tools and the accessories needed to support them fill most of my cabinets, and my shelves tend to overflow with cans of screws and hardware. One item that always seems to get shortchanged in this process is sandpaper. It piles up in corners somewhere, or gets buried under other things, eventually curling with the humidity changes in my shop.

Not long ago I spent a weekend working on a solution to this nagging headache. Designing a cabinet for holding all my sanding supplies was easy enough, but putting an end to curling sandpaper was a little more challenging. After a few prototypes failed the convenience test, I finally settled on a set of trays with cam action presses. The trays slide in and out for easy access, and come completely out if I want them at my work-



Our white oak and walnut sanding cabinet matches the other *Today's Woodworker* shop projects, including the rolling tool center (issue #1), the router table (issue #13), the tool box (issue #19) and the drill caddy (issue #23).

bench. The cams press down on a plywood plate to keep the paper flat and, as I use up my sandpaper, the cams can be adjusted to compensate for the loss of material. In addition to storing standard sandpaper the cabinet holds hook and loop disks, sanding belts and rolls of stick-it paper.

Building the Carcase

Most of this project is made of 1/2" thick white oak. Begin by gluing up stock for the cabinet sides, top, bottom and center divider (pieces 1 through 5). When the glue dries, cut these pieces to size, along with the bin dividers (pieces 6), the drawer runners (pieces 8) and the plywood back (piece 9). Next, use straight bits in your router table to rout the 1/8" deep rabbets and dadoes in these pieces, following the **cabinet details** at right. You'll find that the same simple rabbet joint is used throughout the project on all the cabinet and door corners. Wrap up this step by squaring the end of each stopped dado with a chisel and removing the corner sections from the top and bottom panels with a saber saw.

Now the cabinet carcass is ready for a test assembly. Fit all the pieces together and clamp them securely, then drill



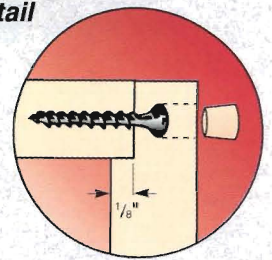
Planning Ahead: The Sanding Cabinet Project

The primary tools you'll need for building this project are a table saw, a router and a drill press. This sanding cabinet will take about 35 hours to complete, including the finishing, where an oil/varnish blend is the recommended coating.

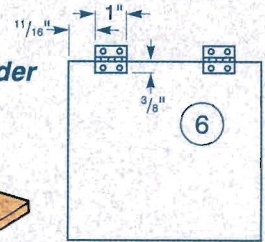
- 18 square feet of 1/2" white oak
- 1 board feet of 3/4" white oak
- 2 square feet of 1/8" walnut
- A half sheet of 1/2" white oak plywood
- A half sheet of 1/2" baltic birch plywood
- A quarter sheet of 3/4" baltic birch ply

Rabbet Joint Detail

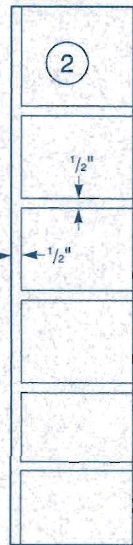
All of the rabbets and dadoes in the carcass are 1/8" deep.



Bin Divider Hinge

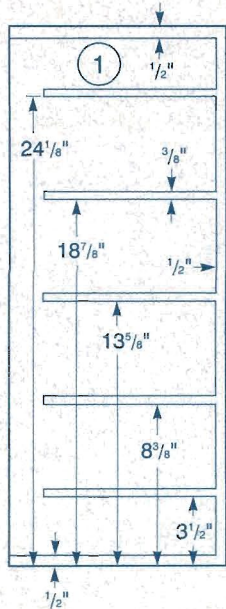


Right Side Details

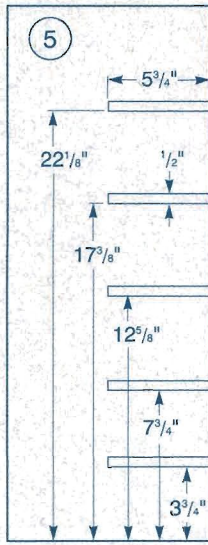


Note: The right side dado layout is the same as the layout in the bin dado locations at left.

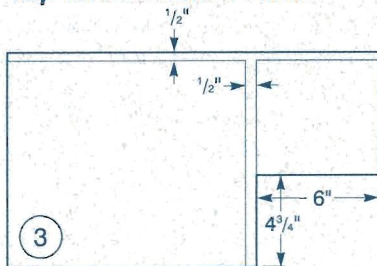
Drawer and Tray Dado Locations



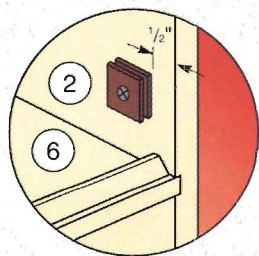
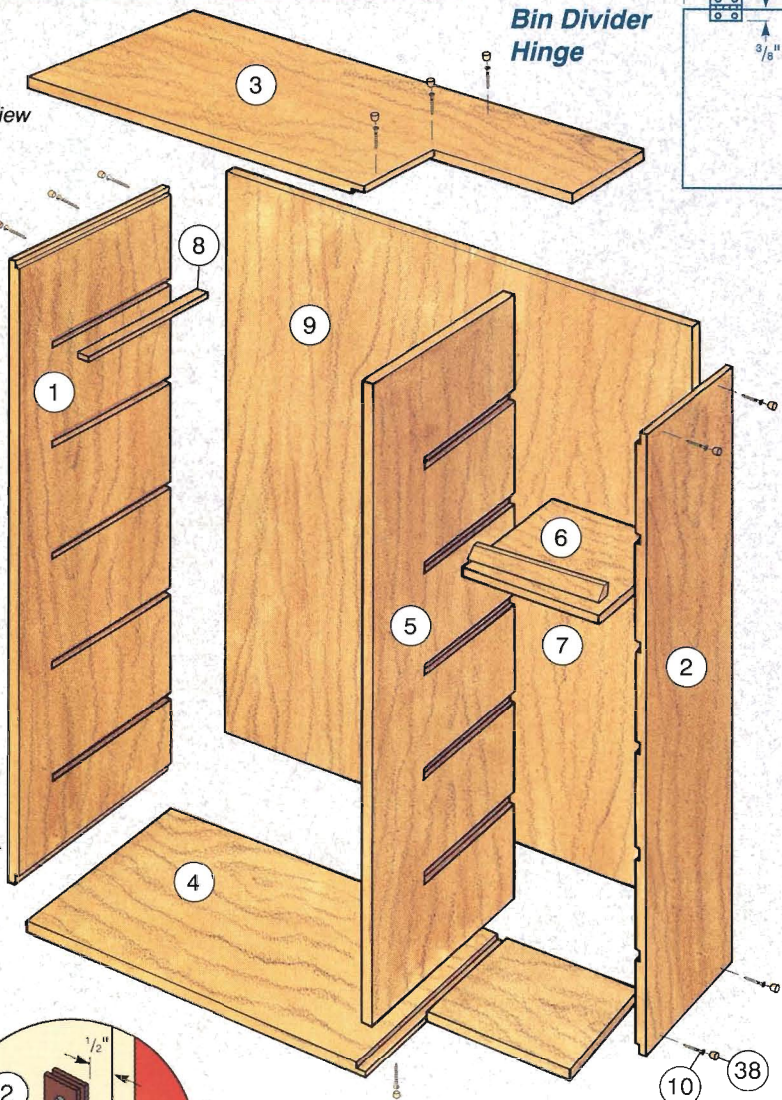
Bin Dado Locations



Top and Bottom Details



Carcass Exploded View



Magnet Detail

MATERIAL LIST

	T x W x L
1 Left Side (1)	1/2" x 11" x 27 3/4"
2 Right Side (1)	1/2" x 6 1/4" x 27 3/4"
3 Top (1)	1/2" x 11" x 19"
4 Bottom (1)	1/2" x 11" x 19"
5 Center Divider (1)	1/2" x 10 1/2" x 27"
6 Bin Dividers (5)	1/2" x 5 3/4" x 6 1/8"

	T x W x L
7 Bin Strips (6)	1/2" x 1/2" x 5 5/8"
8 Drawer Runners (10)	3/8" x 3/8" x 9"
9 Back (1)	1/2" x 19" x 27"
10 Screws (22)	#8-1 1/2"
11 Bin Door Magnets (6)	Low profile
12 Butt Hinges (6 pr.)	1" x 1"

counterbored pilot holes in the rabbet joints and the center divider dadoes for #8-1½" screws (pieces 10). Next, take the cabinet apart again to complete a few things before it's permanently assembled. For starters, drill the pilot holes for the bin door magnets (pieces 11) in the right side wall, as shown in the **magnet detail** on page 9, then position your butt hinges (pieces 12) on the bin dividers, as shown in the **bin divider hinge detail** on page 9, and drill these pilot holes. Now glue and screw the cabinet together, including the drawer runners.

Making the Trays and Drawer

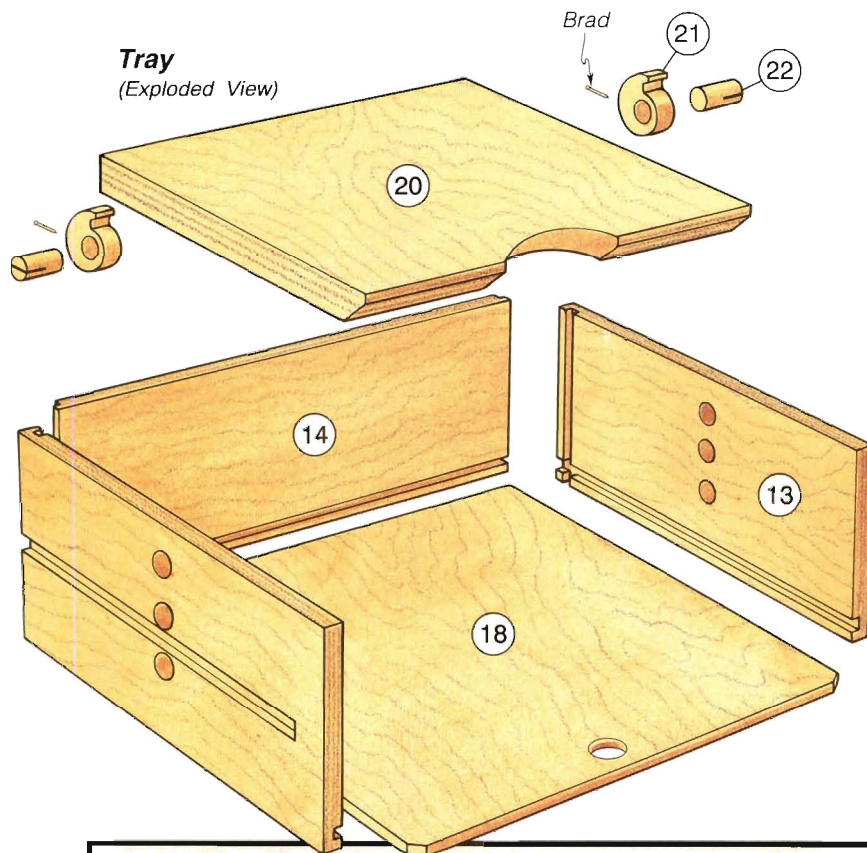
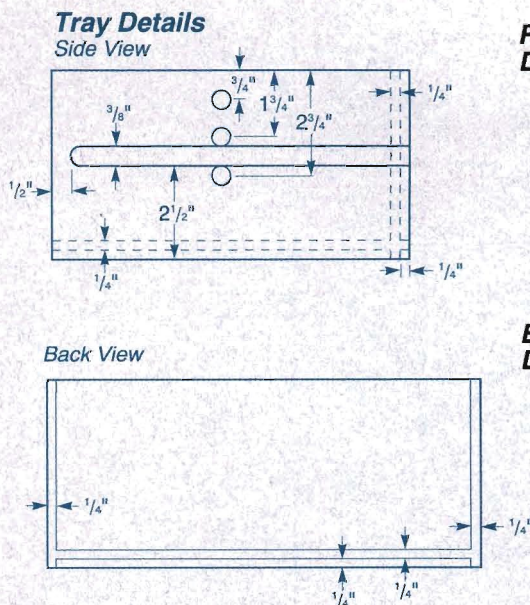
If you take one idea from this project to use in your shop, it should be the sandpaper trays. Curled paper is difficult to store and a pain to work with, and these trays solve both problems. If the full cabinet is too large for your shop, just make one or two trays to keep your sandpaper flat.

The trays are simple plywood structures with extra tall walls to accommodate the cams. Since the drawer construction is so similar to the trays you can make them all at the same time. Cut 1/2" baltic birch plywood for the tray sides and backs (pieces 13 and 14), and the drawer sides, back and front (pieces 15, 16 and 17), then rout all the appropriate dadoes, rabbets and grooves, as shown in the **tray and drawer details** at top. (NOTE: The grooves in the drawer sides for the bottom panel are stopped 1/4" from the front edge, but in the tray sides they go through.) Drill the three 1/2" holes in each tray side for the cam adjustments, then cut 1/4" plywood for the bottoms (pieces 18 and 19) and drill the 1" finger holes in the tray bottoms and the drawer front.

Test fit the parts for each tray and drawer and then glue the assemblies together. Once the glue dries, plough the stopped grooves for the drawer runners and square the end of each groove with a chisel. Try them in the cabinet and, if any sticking occurs, sand the runners to get an easy glide.

Cut the tray plates (pieces 20) to size and chamfer their front edges to make them easier to handle when they're in the trays. Next, bandsaw the 1½" radius half moon at the center of the front edge on each plate, as shown in the **exploded view** at right.

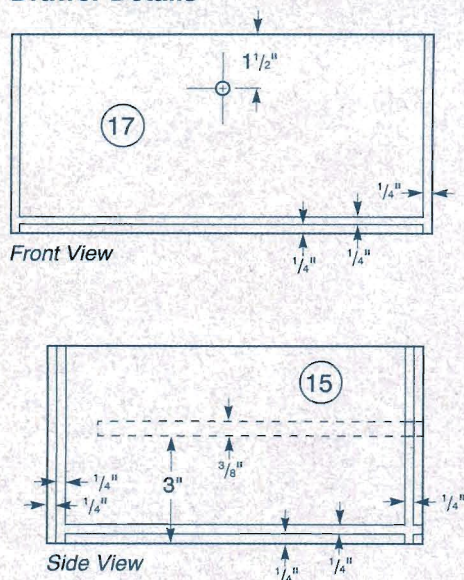
Now cut out the **full size pattern** of the cam (pieces 21) and trace it eight times onto some 1/2" birch plywood



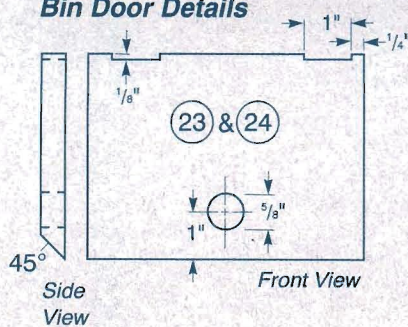
MATERIAL LIST

	T x W x L
13 Tray Sides (8)	1/2" x 5" x 9 1/2"
14 Tray Backs (4)	1/2" x 5" x 11 3/4"
15 Drawer Sides (2)	1/2" x 5 1/2" x 10 3/8"
16 Drawer Back (1)	1/2" x 5 1/2" x 11 3/4"
17 Drawer Front (1)	1/2" x 5 1/2" x 11 3/4"
18 Tray Bottoms (4)	1/4" x 11 3/4" x 10 1/2"

Drawer Details

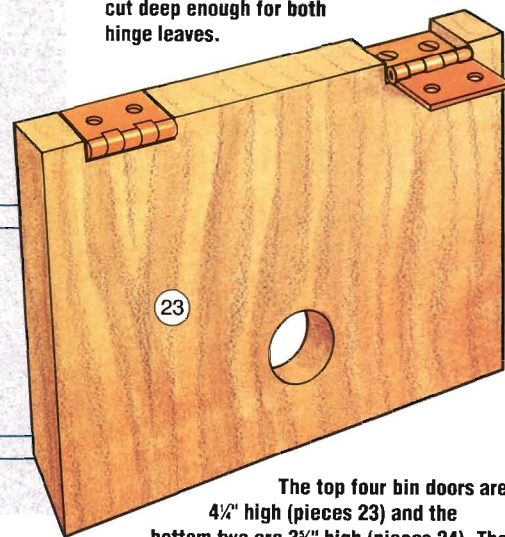


Bin Door Details



Bin Doors

The hinges are not mortised into the bin dividers, so the door mortises must be cut deep enough for both hinge leaves.



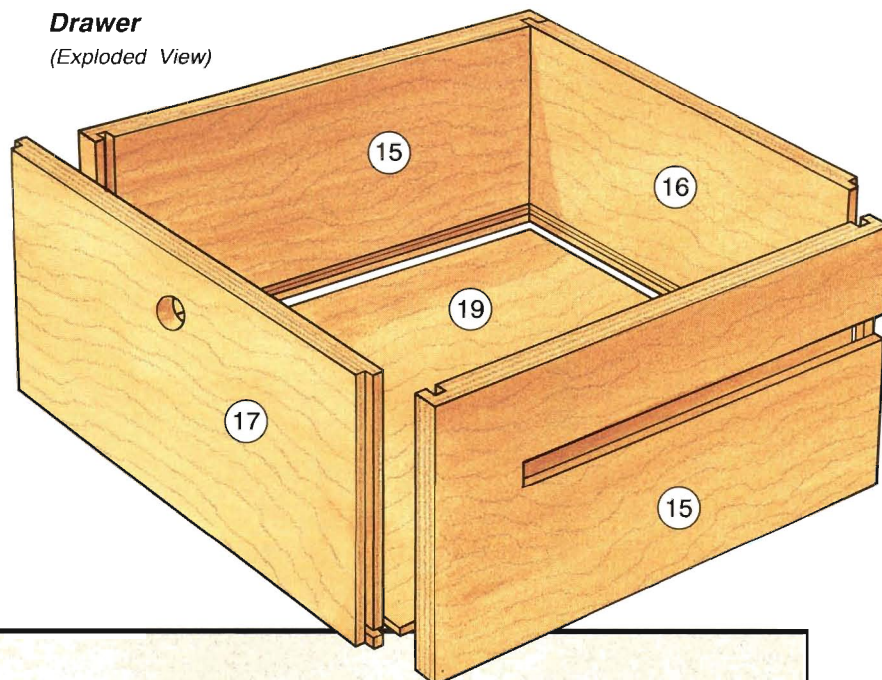
The top four bin doors are 4 1/4 inch high (pieces 23) and the bottom two are 3 3/4 inch high (pieces 24). The bottom edge of each door is beveled at 45° to serve as a cutter for tearing the rolls of sandpaper.

—be sure to mark the pivot hole location on each one. Drill a 1/2 inch hole for the pivot dowels through the center of each layout, then bandsaw the cams to shape. After sanding the cams, cut the pivots (pieces 22) from a dowel rod and glue them in the cam holes. As an extra precaution I pinned the

pivots to the cams with a small brad to prevent the joints from twisting loose. Complete the cams by cutting a kerf in each pivot (see **exploded view** at left), which makes them easier to slip into the tray holes and increases their gripping power.

Drawer

(Exploded View)



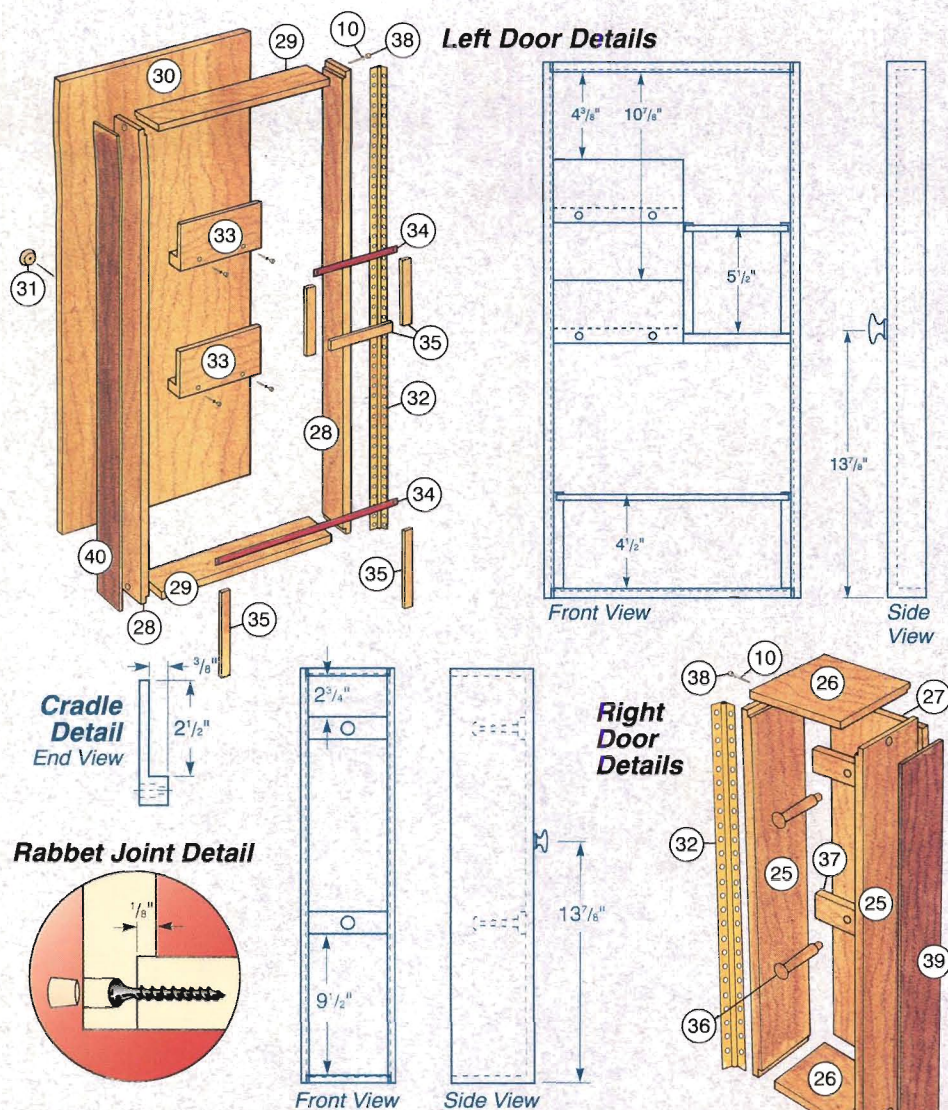
The Bin Doors

Cut the bin doors (pieces 23 and 24) to fit snugly in the bins, then cut the mortises for the butt hinges in two passes with a 1/2 inch dado blade (see **bin door detail** above). Since the bin dividers have no mortises, be sure to cut the door mortises deep enough to house both leaves of each hinge. Next, install a standard blade in your table saw and tilt it 45° to bevel the bottom edge of the doors. Finish up by drilling the 3/4 inch finger pull hole in the middle of each door.

Hold the butt hinges in the door mortises and drill the pilot holes, then screw the hinges down. Secure the strike plates for the door magnets as well. Now hold the doors in position while you secure the other leaf of each hinge to the bin dividers, driving the screws into the pilot holes you drilled earlier. A short screwdriver is handy for this operation.

Now that the doors are installed make the bin strips (pieces 7) and glue them to the bin dividers, as shown in the **bin detail** above. I recommend beveling a wider piece of stock first, then ripping it to width for the strips. Once installed the beveled door edges will mate with the bin strips to form cutters for tearing off your rolled sandpaper.

	T x W x L
19 Drawer Bottom (1)	1/4" x 11 3/4" x 9 7/8"
20 Tray Plates (4)	1/4" x 11 1/8" x 9 1/2"
21 Cams (8)	1/2" x 1 1/2" x 2"
22 Pivots (8)	1/2" x 1" dowel
23 Bin Doors (4)	1/2" x 5 3/4" x 4 1/4"
24 Bin Doors (2)	1/2" x 5 3/4" x 3 3/8"



MATERIAL LIST

25 R. Door Sides (2)	1/2" x 6 3/4" x 27 3/4"
26 R. Door Top and Bottom (2)	1/2" x 6 3/4" x 5 1/2"
27 R. Door Front (1)	1/2" x 5 1/2" x 27"
28 L. Door Sides (2)	1/2" x 2" x 27 3/4"
29 L. Door Top and Bottom (2)	1/2" x 2" x 12 5/8"
30 L. Door Front (1)	1/2" x 12 5/8" x 27"
31 Knobs (2)	1 1/2" Diameter
32 Piano Hinges (2)	1 1/8" x 27 3/4"
33 Cradles (2)	3/4" x 3 3/4" x 6 1/2"
34 Hacksaw Blades (2)	Metal cutting
35 Cutting Jig Shims (1)	1/8" x 1/2" x 30"
36 Pegs (2)	3 1/2" Shaker style
37 Peg Mounting Bars (1)	1/2" x 1 1/2" x 5 1/4"
38 Walnut Plugs (24)	3/8" Diameter
39 Walnut R. Door Strip (1)	1/8" x 4 3/4" x 27 3/4"
40 Walnut L. Door Strip (1)	1/8" x 2" x 27 3/4"

Sanding Cabinet Hardware Kit

A hardware kit is available for this project that includes the butt hinges, magnetic catches, screws and walnut plugs, knobs, piano hinges, and shaker pegs.

Item # 97487 (use order form)\$34.95

Building the Doors

The doors on this project are made for unique purposes. The right door is deep and narrow for storing sanding belts. The left door is large and shallow for the 1/2 sheet and 1/4 sheet sandpaper cutting jigs. The left door also has two cradles for hook and loop disks. As I mentioned earlier, these doors are made with the same screwed rabbet joints used on the carcass.

Start by cutting solid stock for the door sides, tops and bottoms, and cut 1/2" oak plywood for the fronts (pieces 25 through 30). Use a 1/2" dado blade to cut the 1/8" deep rabbets for the door joinery, as shown in the rabbet joint details above. Mock up the door assemblies and drill counterbored pilot holes for screwing the corners together, and countersunk pilot holes for installing the knobs

(pieces 31). Take the doors apart to spread glue in the joints, then reassemble them with screws. After the glue dries, install a 1/2" dado blade in your table saw and trim one edge of each door in preparation for the piano hinge (pieces 32) installation, as shown in the at left. As with the mortises in the bin doors, these cuts need to be deep enough for both leaves (about 1/4"), since the hinges are surface mounted on the carcass. Mount the doors and hinges and make any adjustments before moving on to the next step.

The best way I found to store hook and loop discs was in cradles (pieces 33). To make the cradles rabbet one face of a 3/4" x 3/4" x 14" piece of oak, as shown in the cradle detail at left, then cut it in half. Install the two halves in the left door with glue and 3/4" long screws.

The only materials needed for the sandpaper cutting jigs are two hacksaw blades and some 1/8" thick oak shims (pieces 34 and 35) to lift the blades away from the panel. Glue the shims to the panel as shown at left, and secure the blades to them with small screws. Position the lower blade for cutting a sheet of sandpaper in half, and set the upper blade for cutting these 1/2 sheets in half again for palm sanders.

I used shaker style pegs (pieces 36) for hanging my sanding belts in the right door. First I cut a mounting bar (pieces 37) for each peg, then I drilled a 1/2" diameter hole in each one and glued the pegs in place. Next, I glued the mounting bars into the door.

Finishing Up

Fill all the counterbores with walnut plugs (pieces 38) and sand them flush with the surrounding surfaces. To keep the cabinet as dust free as possible, I glued walnut strips (pieces 39 and 40) to the mating door edges to form a seal, as shown in the exploded view at left. And since I couldn't find walnut knobs for the doors I colored birch knobs with walnut stain.

Take apart the cabinet to do the final sanding, then coat everything with an oil/varnish mix to bring out the warmth of the wood. When the finish dries, remount all the hardware and wax the drawer runners. Hang the cabinet with at least four screws, making sure to hit the studs in your wall for adequate support.

A Sturdy Hall Tree That's Built For The Ages

With a generous tip of our hat to famed furniture maker Gustav Stickley, we present a coat rack that will actually stand up to the simple task it was designed for.

By Chris Inman

Fans of the Arts and Crafts furniture movement in this country will recognize this hall tree's roots right away. The exposed mortise and tenon joinery and the tapered tops, both typical of Arts and Crafts originals from the turn of the century, are dead giveaways. I did take the liberty of working with cherry instead of the traditional wood of choice for this style, quartersawn white oak, and branched out a bit from the original designs by adding an umbrella hanger and a tapered storage box for mittens and gloves.

Selecting this style as the basis for the hall tree was no accident, especially when you consider that the most important feature of a good hall tree is sturdiness. We've all seen our share of lightweight stands that can't seem to handle a windbreaker without an argument. The Arts and Crafts style lends itself nicely to the heavy-weight, double post approach and the oversized feet provide excellent balance and stability. Unlike bentwood hall trees that tend to become wobbly after a short period of use, the wedged mortise and tenon joinery in this project guarantees a lifetime of useful service.

If you think cutting the mortises for the coat rack is going to require hours of drilling and chiseling, take a closer look at the **elevation details** on the next page. All the through mortises are located in the posts or feet, which are two piece laminations. By cutting dados in each half of these pieces, you set the stage for instant mortises when you complete the glue-up process (See **Figure 1**). This technique saves a lot of time and elbow grease, and you may not even need your chisels for clean up duty.

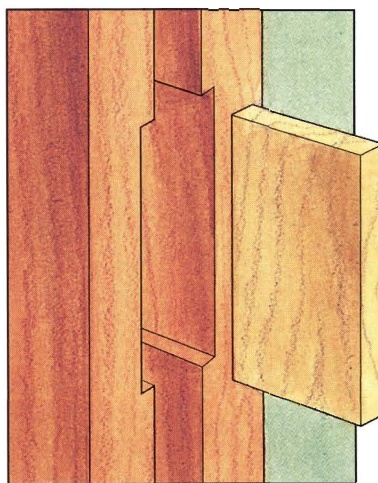


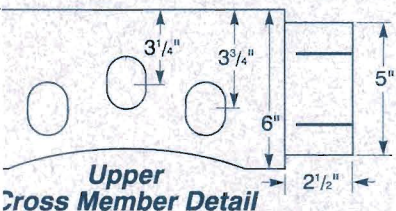
Figure 1: Use temporary tenons to align the post and feet laminations during the glue-ups. Remember to wax the tenons or they'll become a permanent part of the assembly.



The Coat Rack Hardware Kit

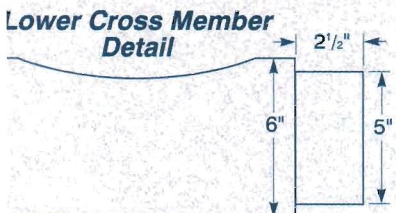
A hardware kit is available for this project that includes six solid brass garment hooks and their mounting screws.

Item # 97495 (use order form)\$42.95

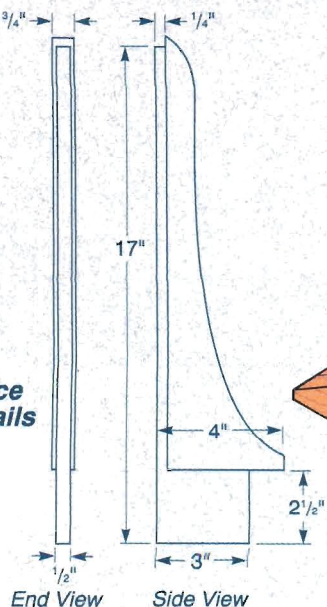


MATERIAL LIST

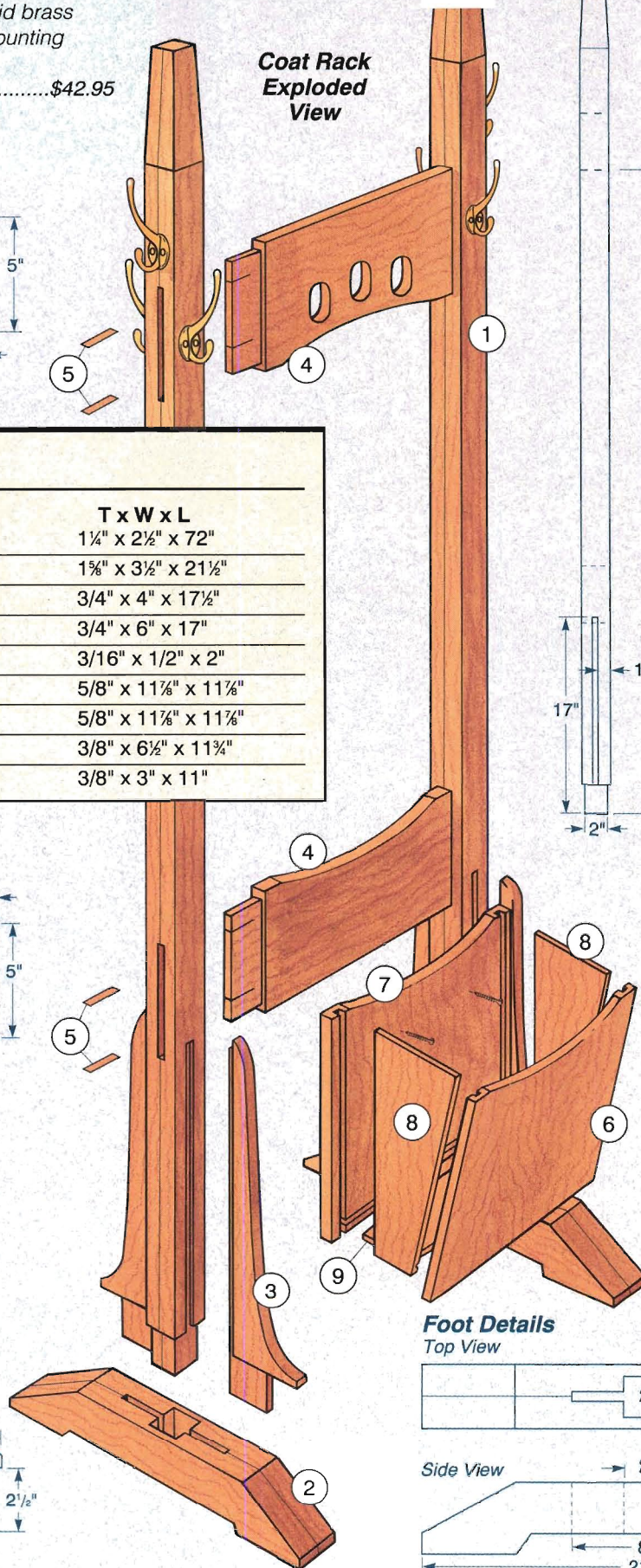
	T x W x L
1 Post Laminations (2)	1 1/4" x 2 1/2" x 72"
2 Feet Laminations (2)	1 5/8" x 3 1/2" x 21 1/2"
3 Braces (4)	3/4" x 4" x 17 1/2"
4 Cross Members (2)	3/4" x 6" x 17"
5 Wedges (8)	3/16" x 1/2" x 2"
6 Bin Front Panel (1)	5/8" x 11 5/8" x 11 5/8"
7 Bin Back Panel (1)	5/8" x 11 5/8" x 11 5/8"
8 Bin Side Panels (2)	3/8" x 6 1/2" x 11 3/4"
9 Bin Bottom Panel (1)	3/8" x 3" x 11"



Brace Details

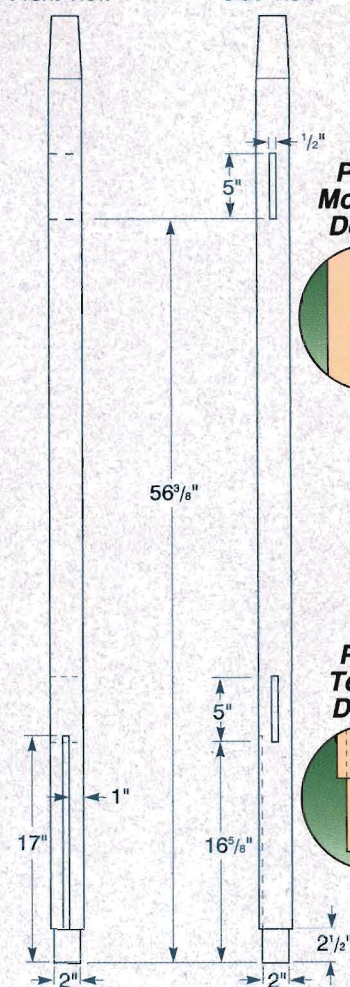


Coat Rack Exploded View

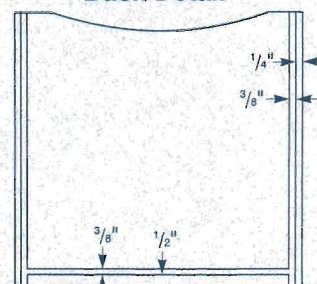


Post Details

Front View Side View



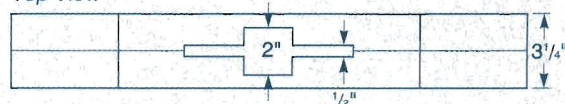
Bin Front and Back Detail



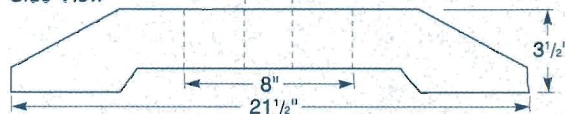
Note: See page 16 for more bin construction details

Foot Details

Top View



Side View



Planning Ahead: The Coat Rack Project

Plan on setting aside a full weekend to build the coat rack, and a few evenings to do the finishing. While a radial arm saw is the ideal tool for cutting the joints in this project, they can be cut on a table saw, but with more effort. A table saw will still come in handy though, as will a drill press and a band saw. To

bring out the warmth of the cherry in the completed coat rack, Nordic oil is the recommended finish.

- 18 board feet of 1 1/4" cherry
- 5 board feet of 3/4" cherry
- 3 square feet of 5/8" cherry
- 2 square feet of 3/8" cherry

Milling the Stock

The first order of business when beginning the hall tree project is selecting straight stock for the post laminations (pieces 1). Avoid twisted, cupped or warped material, as these defects will lead to a crooked post. Rip, plane and crosscut the four pieces to size, then layout the dadoes and bottom tenons as shown in the **post details** at left.

As mentioned, cutting a dado in each piece will result in a complete mortise when the posts are laminated. The ideal tool for cutting the dadoes is a radial arm saw, since the saw moves and the long, unwieldy stock remains stationary. A table saw will work, but it takes more effort. Whichever saw you use, install a 1/2" dado blade and adjust the blade to cut 1/4" deep dadoes in the stock. Put a new fence in the radial arm saw table, then use the cut in the fence for aligning the mortise layouts with the blade, as shown in **Figure 2** below.

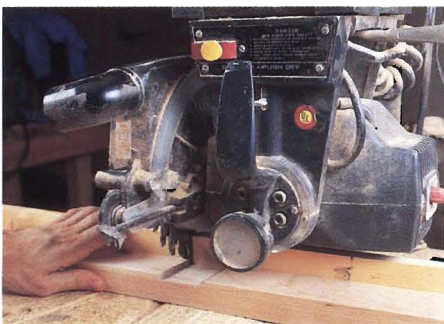


Figure 2: A radial arm saw is ideal for cutting the two halves of each mortise. Use the cut in your fence to align the mortise layouts with the blade.

To align the rather large post laminations during the glue-up process you'll find that temporary tenons, cut to fit your soon to be created mortises, are absolutely critical. Cut four pieces of 1/2" thick by 5" wide stock and test the fit of these tenons in the mortises (See **Figure 3**). When you're satis-

fied with the fit, coat the tenons with paste wax to keep the glue from bonding to them. Now spread glue on the laminations and leave them clamped overnight. Take great care to see that the laminations align perfectly.

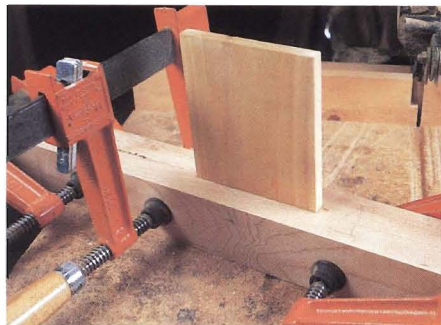


Figure 3: The temporary tenons should fit your mortises perfectly. Make sure they're well waxed so they can be knocked out after the glue dries.

The process for making the feet (pieces 2) is similar to the one just used for the posts. First mill the stock for the laminations and then cut the dadoes, as shown in the **foot details** at left. The dadoes are stepped to form mortises for both the post tenons and the brace tenons. To avoid shifting, plan on cutting more temporary tenons to fit the mortises you'll create when you glue up the pieces for the feet.

Cutting the Tenons

Unclamp your post laminations and set up your radial arm saw with a 1/2" dado blade again to cut the tenons at the bottom ends. You'll need to use a stand to support the posts as they overhang the saw table. Now clamp a stop to the saw's fence to align the blade with the shoulder line you laid out earlier. Adjust the saw to the correct height and form the four cheeks of each tenon (See **Figure 4**).

Once the tenons are formed, turn the saw to plough a stopped groove in each side of both posts (see post

details) for joining the braces (pieces 3). Use your 1/2" chisel to square up the ends of these mortises.

This is a good time to taper the tops of the posts. Following the **full size pattern**, layout the lines and cut a little wide with a circular saw, then shave the tapers smooth with a hand plane.

Now cut the remaining stock to overall size for the braces and cross members (pieces 3 and 4), then use the table saw and a dado blade to form tenon cheeks on these pieces, as shown in the **brace detail** and **cross member detail** at left. Cut the edge shoulders by hand, then complete these tenons by cutting thin wedge kerfs by hand or with a band saw.

Bandsawing the Pieces to Shape

Cut out the **full size pattern** of the foot from the insert between pages 12 and 13 and trace this shape onto your laminated stock. Be sure you center the mortise layout lines on the pattern with the actual mortises on your pieces of stock. Once the pattern is traced, bandsaw the feet to shape and plane them smooth. Finish up by sanding the feet thoroughly.

Next, cut out the **full size patterns** of the brace and the cross

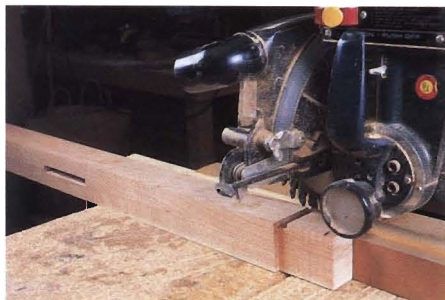


Figure 4: The cheek depth on the post tenon is the same on all four sides. Clamp a stop block to the fence to align the shoulder lines with the blade.

member and trace them onto your material. Be sure that you include the umbrella holes on the upper cross member layout. To form the umbrella holes, chuck a 1 1/2" Forstner or spade bit in your drill press and remove most of the waste in each opening by drilling two overlapping holes. Refine the openings with a file and sandpaper, then rout the rim of the holes on both sides with a 1/4" roundover bit. Once the holes are completed, bandsaw the cross members and braces to shape.

Assembling the Hall Tree

Putting the hall tree together is done in stages, beginning with gluing two braces to each post. While the glue is drying, cut your wedges (pieces 5) to size. For safety, use a couple of 2" long by 4" wide pieces of 1/2" stock, cutting just four wedges from each piece. This will ensure that your fingers never get too close to the blade. Tilt your table saw miter gauge 2 1/2° to get the correct slope on the wedge sides, as shown in **Figure 5**.

Once the post assemblies have dried for a few hours, add the feet. Use a small brush to spread glue in the mortises and a little on the tenons, then insert a post into each foot. Use a rubber mallet to knock the feet completely onto the tenons, then clamp the assemblies. Be sure to protect the braces from the clamps with softwood blocks.

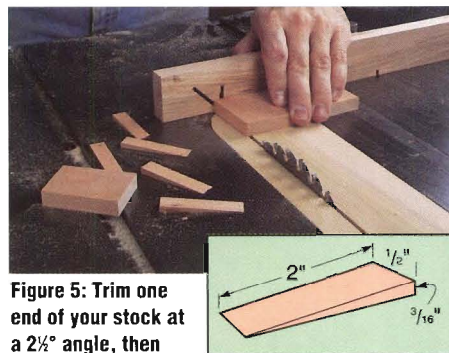


Figure 5: Trim one end of your stock at a 2 1/2° angle, then

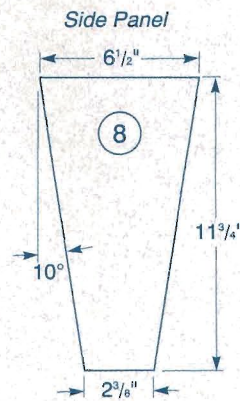
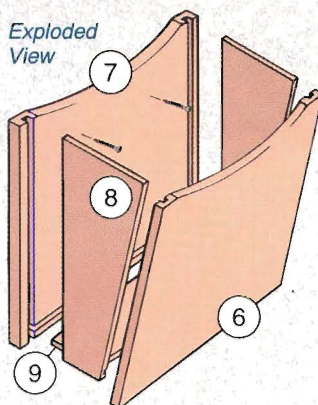
turn it over and slice off the first wedge. Make sure its fat end is about 3/16" thick. Continue turning the stock to cut the rest of the wedges.

The final phase of the hall tree assembly is connecting the post assemblies with the cross members. Brush glue in the post mortises and insert the tenons, then snug the posts to the shoulders and drive in the wedges. Allow the glue to dry, then sand the wedges and tenons flush with the surrounding surfaces.

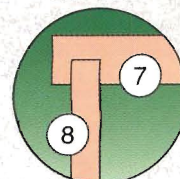
Building the Bin

The accessory bin has proven to be a helpful addition to this hall tree. It holds mittens and hats that could otherwise be lost, and the daily paper usually finds its way to this storage spot. To build the bin, glue up panels for the front, back and sides (pieces 6 through 8), and cut them to the sizes in the material list. Next, install a 3/8" dado blade in the table saw and plough 1/4" deep grooves for the sides in the front and back panels, as shown in the **front and back detail** on page 14.

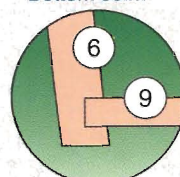
Bin Details



Side Joint



Bottom Joint



While you've got the 3/8" dado blade installed, cut the 3/16" deep dadoes in the front, back and sides for holding the bottom (piece 9). First cut a through dado in each side piece and then tilt the blade 10° to drop cut dadoes in the front and back panels. Be sure to draw starting and stopping lines on your table saw for making these drop cuts, which are very safe since the blade just barely sticks above the saw surface. Clean up the dadoes with a chisel.

Until this point the sides have remained square to make the machining easier. Now you can cut the sides into triangles following the **side panel** bin detail above. Align the top of the pattern with the top edge of each side panel, then bandsaw them to shape.

Rip and crosscut a piece of 3/8" stock to size for the bottom. Before going any further, put the bin through a trial assembly to see that it all fits together properly. Hopefully the joints all fit well, but don't be surprised if the bottom needs a little trimming before the front and back snug up to the sides.

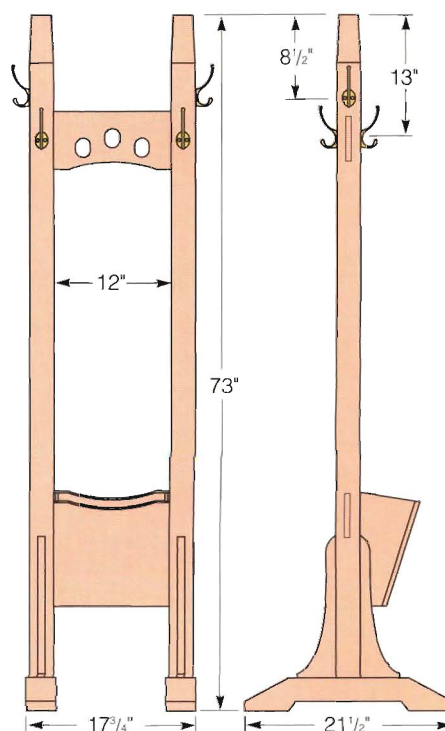
Once you're satisfied with the fit, take the bin apart and use the cross member pattern to trace the curves on the top edge of the bin front and back. Bandsaw the curves and sand them thoroughly, then drill two countersunk pilot holes in the back panel for mounting the bin to the hall tree, as shown in the **bin details** above. Drilling them now is much easier than after assembly. Sand the inside surfaces of the bin parts and glue the pieces together. Later, after the glue dries, tilt your table saw blade 10° and trim the bottom edges of the bin in one pass to make all the parts even.

Tying It All Together

Sand the hall tree and the bin to 220 grit and apply several coats of an oil/varnish blend like Nordic Oil. After the finish dries for a day or two, mount the coat hangers on the posts as shown in the **final assembly detail** below. Complete the assembly by securing the bin to the lower cross member with two #8-1" screws. A stubby handled screwdriver comes in very handy for this step.

Within days your hall tree will be buried in down and wool, and you probably won't be able to see anything but its feet. But soon the patina of the cherry will be well developed and you'll have a nice hat and umbrella rack to admire over the summer.

Final Assembly Details



Finishing With Polyurethane

By Bob Flexner

Looking for the most durable finish you can apply with a brush? You can't beat polyurethane. It's very resistant to scratches, heat, water, solvents, and alkalis. Its main drawback, however, is the same as with all varnishes. It cures so slowly that dust has time to settle in the finish.

Polyurethane is an alkyd-resin varnish with polyurethane resin added. The polyurethane resin increases the toughness and durability of the varnish. You may hear polyurethane called urethane, leaving you to wonder if there are two different finishes. Actually, both names apply to the same finish, with polyurethane being the more accurate description.

Polyurethane is available in gloss, semi-gloss and satin sheens. Stirring is essential for all but gloss polyurethane to keep the flattening agent mixed in the liquid. The effect of the flattening agent is cumulative, so that each additional coat dulls the surface more. To control the glossiness of your finish you may want to mix sheens, either between cans or coats.

Polyurethane Myths

Contrary to popular belief, polyurethane doesn't last forever, although it's more durable than most finishes. On floors, polyurethane is vulnerable to wear as dirt carried on the soles of shoes acts like sandpaper. To increase the life of the finish, wax your floors to reduce friction. Around sinks polyurethane holds up well unless water finds a way through a crack and under the finish. The water then causes the finish to peel. You can extend the life of the finish by coating the ends of boards (especially under the sink), and then adding more coats to the top whenever cracks begin to appear. When you add coats of polyurethane be sure the surface is clean and sanded lightly with 280 grit or finer sandpaper to get a good bond.

If treated correctly, polyurethane will resist cracking for decades.

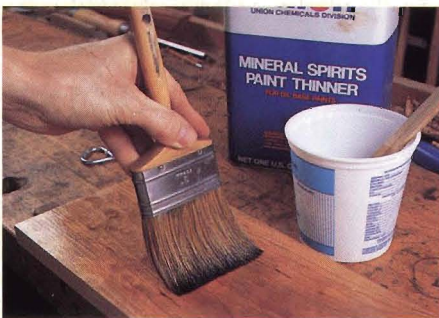
More than anything else this means keeping your finished piece out of direct sunlight. Strong light causes finishes to deteriorate faster than any other element, and polyurethane is especially vulnerable on projects left outdoors and exposed to sunlight.

There's no advantage to using a sanding sealer under polyurethane, because polyurethane sands fairly easily. In fact, sanding sealers may weaken the bond since they contain stearate, a soap-like substance that has poor adhesion to polyurethane.

A common complaint about polyurethane is that it looks more plastic than other finishes. In fact, it is a plastic, as are all film finishes except for shellac (which is a natural material). Another misleading generalization I've heard is that you should never shake the can or you'll get bubbles in the finish. Bubbles are really caused by the air introduced while brushing on the finish. You can prevent bubbles from curing in the film by adding about 10% paint thinner, which slows the curing enough to allow the bubbles to pop out and the film to level.

Applying Polyurethane

For your first coat, pour some polyurethane into a clean container, such as a wide-mouthed jar or coffee can, and stir in 50% paint thinner. Apply the mixture with a good quality bristle or foam brush, going with the grain. Allow the finish to cure overnight, then sand the surface smooth using 280 grit



Pour your polyurethane into a clean container and add paint thinner if needed. After a coat is applied, tip off the excess with the brush held at about 45°.

Follow these tips to help solve the dust problem before applying a finish.

- Never sand the wood and apply the finish in the same room without allowing time for the dust to settle first.

- Wet mop the shop floor before finishing and avoid wearing dusty clothes.

- Always strain the finish if it's dirty or has formed a skin.

- Hit your brush against your hand to shake out any loose bristles.

- Wipe the wood with a tackcloth just before you begin brushing.

or finer sandpaper. Remove the dust with a vacuum or tackcloth.

For the next two or three coats, again working from a clean container, brush the polyurethane (full strength or reduced 10%) in any direction, then tip off going with the grain by holding your brush at a 45° angle and dragging it lightly over the surface. This technique removes excess finish and straightens the brush lines.

Applying polyurethane to a vertical surface should be done as thinly as possible so it won't sag or run. It helps to wipe your brush over the edge of a clean jar after each tipping-off stroke to squeeze out any excess finish. Continue to tip off until the finish ceases to sag.

Allow each coat to cure overnight. If the weather is cold or damp, it may take longer. Test the finish by pushing your fingernail into an inconspicuous place—if it gives you need to wait a while longer. To cut off dust nibs in the finish, lightly sand with 280 grit or finer sandpaper. When more than a week goes by before you apply the next coat, it's wise to abrade the entire surface with 0000 steel wool or a 3M Scotch-Brite pad. The fine scratches you make will give the next coat a better surface to hold onto.

Bob Flexner makes and repairs furniture in Norman, Oklahoma, and is the author of *Understanding Wood Finishing* (Rodale Press (800)848-4735).

A Cherry Hand Mirror Frame

Two router tricks get you off to a great start on this weekend project. Our full size pattern takes you the rest of the way home.

By David Larson

If I had to choose just two power tools to do all of my woodworking, I think I'd go with a router and a table saw. The saw can be used to size stock, and a router is useful for truing an edge, cutting joints, forming decorative profiles and shapes, and generally performing the widest array of woodworking operations of any shop tool.

They might be the wonder tools of the shop, but success with a router often depends on a good shop jig and a well thought out plan. Building this hand mirror provided me with a good example of this. Even though I mapped out the step by step process for cutting and routing the mirror, I still ran into an unforeseen problem

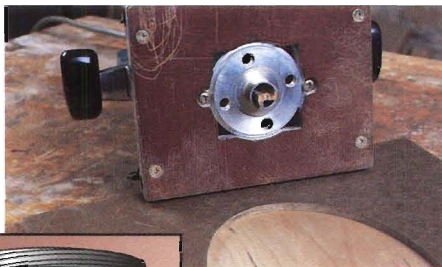


Figure 1: The key to making an accurate template for this project, is accounting for the offset between the rub collar and your bit.

—chamfering the inside rim of the mirror opening. It may not seem like a difficult operation at first, but think about it. How do you get a chamfering bit with a pilot bearing assembly to rout in an area that's only 3/16" deep? Well, it took a little head scratching, but I came up with a great solution.

Making the Template

Before you even think about cutting any wood for this project, order the mirror and have it on hand. Each mirror is slightly different, so the templates you'll make need to be traced from your mirror's unique shape. A good source for an oval mirror is Cherry Tree Toys (800-848-4363). Tell them you want mirror #2970-C for this project and they'll ship you one for \$11.95 (includes shipping and handling).

Once the mirror arrives, make a template for routing the recess in the frame. Center your glass on a piece of 1/4" x 10" x 10" hardboard. The template opening must be a little larger than the mirror to account for the offset between a 3/4" rub collar and a 5/8" straight

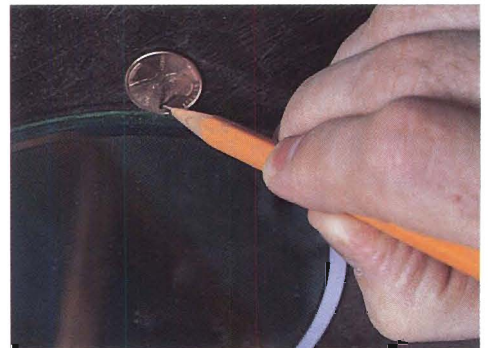
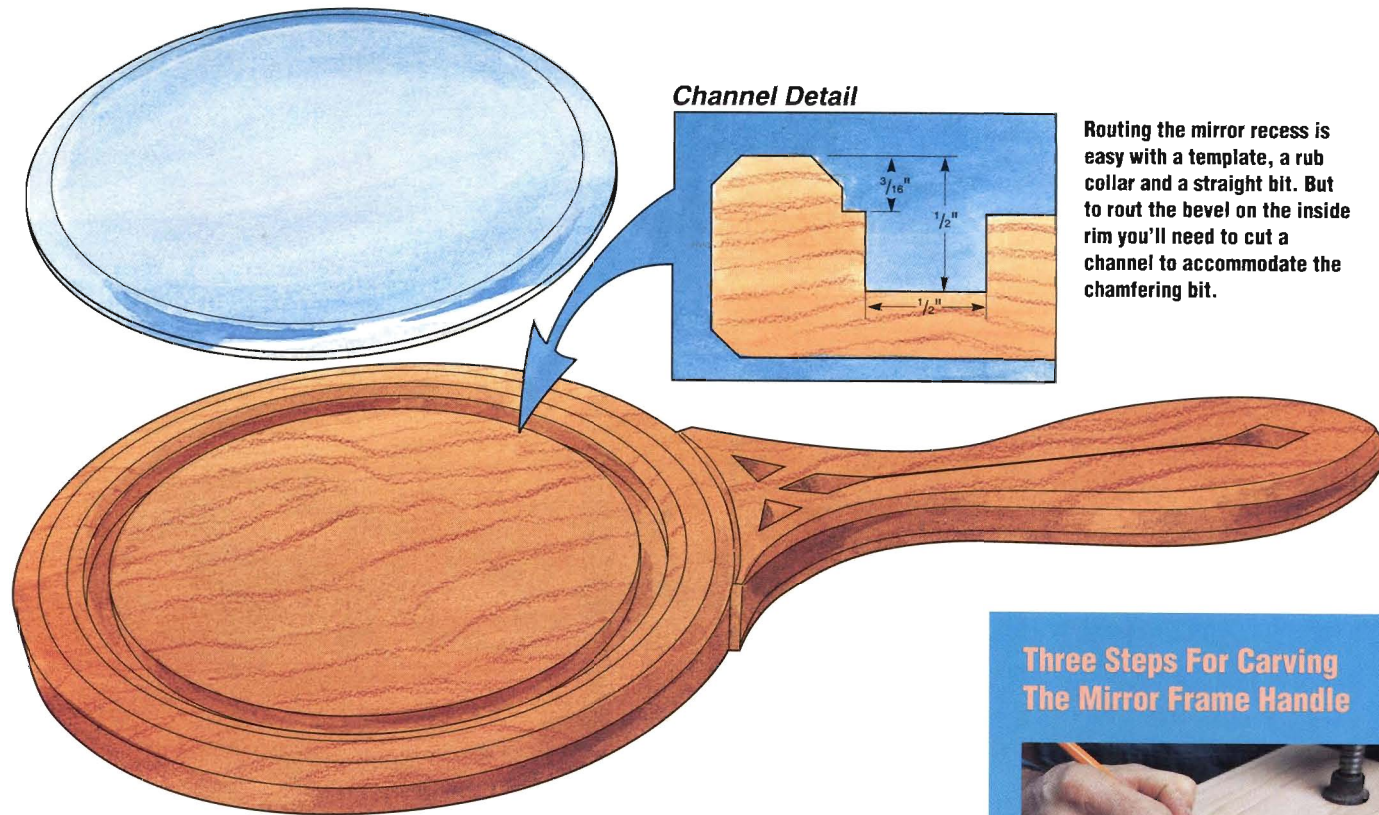


Figure 2: Drill a 1/16" hole in a penny that's set back from the edge the same amount as the bit offset, then use it to trace around the mirror.

bit (See **Figure 1**). To draw the opening to its correct size, drill a 1/16" hole in a penny 1/16" from its edge, then insert a pencil in the hole and trace around the glass, as shown in **Figure 2** above. Now drill a 1/2" access hole within the oval tracing and cut out the opening with a saber saw (keep 1/16" inside the line). Finish up by carefully sanding right up to the line with a drum sander.



Routing the mirror recess is easy with a template, a rub collar and a straight bit. But to rout the bevel on the inside rim you'll need to cut a channel to accommodate the chamfering bit.

Routing the Recess

Cut out the **full size pattern** of the mirror frame from the insert between pages 12 and 13 and, after selecting a nice looking piece of 3/4" x 8" x 15" cherry, trace the pattern onto the wood so the handle is parallel with the grain. Align the mirror template with the tracing and screw it down, making sure the screws fall outside of the frame pattern. Now install the 3/4" rub collar and 5/8" straight bit in your router and rout the 3/16" deep recess.

With the recess completed you're ready to chamfer the rim. Only problem is, as I pointed out earlier, there's no room for the pilot bearing. My solution was to rout a simple channel to accommodate the pilot bearing. Keep the rub collar in the router and switch to a 1/2" straight bit. Adjust the cutter to rout 1/2" deep, then run the router around the template (see **channel detail** above). The narrow ledge that remains outside the channel will support the outside edge of the mirror, which is fairly weak. Now remove the template and install a piloted chamfering bit in your router to form the bevel.

Cutting to Shape and Carving

Now that the interior machining is completed, bandsaw the frame to shape and give it a good sanding. Now you'll need a second template

for routing the dividing line between the handle and the frame. Cut out the **full size pattern** of this template and make your form. Clamp the template to your frame and use a 3/4" rub collar and a V-groove bit to rout the 1/8" deep detail line. Once the line on the front is routed, set up the template to rout a similar detail line on the back of the frame. Bevel the rest of the frame edges with a chamfering bit, being careful to set your depth to match the depth of the V-groove cut.

The bevels on the handle are best shaped with a cabinetmaker's file, then scraped and sanded smooth. Follow the full size pattern of the frame for tapering these bevels.

The carving on the handle is an extra touch that really sets this mirror apart. Using a parting tool and skew chisel, follow the steps at right, then give the frame a good going over with 220 grit sandpaper to clean the surfaces. Apply two coats of an oil finish, then mount the mirror with a special adhesive that won't affect the silvering on the back of the glass (available from glass suppliers). To allow for a little wood movement in the frame, keep the adhesive within a 1" wide line down the center of the recess (go with the grain), and wrap up by gently pressing the mirror into place.

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

Three Steps For Carving The Mirror Frame Handle



Step 1: With a pencil, draw the carving outlines on the frame handle following the example shown on the full size pattern.



Step 2: To carve the center line, first use a straight edge and razor knife to set the line, then follow with a V-shaped parting tool.



Step 3: A skew chisel works great for cutting in the triangles, and a 1/4" bevel edged chisel is just right for cleaning up the carving.

The Fabulous Folding Dollhouse

By Dan Jacobson

FOR SALE: Charming Cape Cod colonial. Hardwood floors, lots of windows and new paint throughout. Folds up in minutes when you're ready to move.

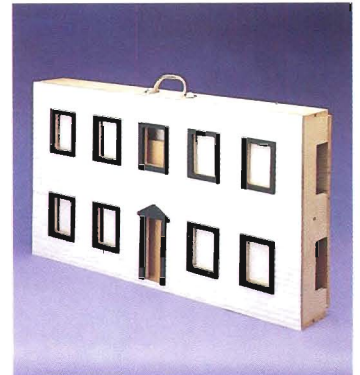
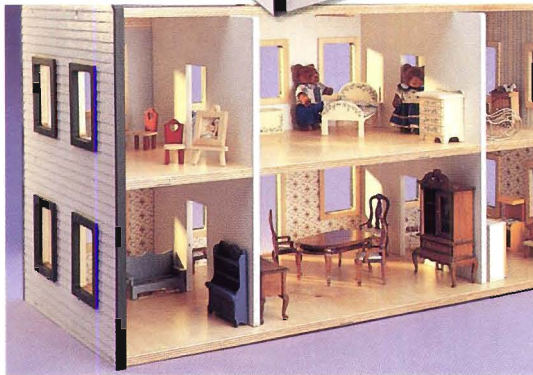
Before I actually started to design a dollhouse for this issue of *Today's Woodworker* I went looking for ideas and suggestions. I checked dimensions on a few commercially available dollhouses and reviewed pictures of some handmade ones. I wanted to make sure that we incorporated all the best features in our version. Curiously, the one feature that seemed most important to me just wasn't available.

To my mind, a dollhouse that could be knocked down and folded into itself to form a case would make an ideal toy. You'd get all the benefits of a standard dollhouse, plus portability. When it's time for a summer visit to Grandma's, the dollhouse folds up and comes along for the ride! After building this project I realized there's one more important bonus with our design—this dollhouse can easily be stored under a bed or in a closet when the kids turn their attention to other toys.

Portability is certainly appealing to adults, but how do kids like this project. We asked Rick White's daughter, Mary Rose (shown above), and got a solid "thumbs up". Her little bear family moved right in and made themselves at home. Perhaps they liked the easy to make clapboard siding and cedar shake shingles, specially designed by Mary Rose's dad.

Start with the Siding

The primary material used for the dollhouse is 3/8" and 1/2" baltic birch plywood. You could get by with less expensive plywood, but I think you'll be disappointed if you try. Baltic birch



Believe it or not, all the pieces (the sides, roof, middle floor and inside walls) easily fit into the carrying case formed by the front and the two folding floors. Sorry, you'll have to hire a mover for the furniture.

is solid throughout, so you won't expose voids or gaps when you cut the pieces to size or form the siding.

Since so much of the dollhouse is plywood, the best way to start is by cutting your sheet stock into the pieces listed in the material list. Cut the sides, front, roof, frame, attic floor, second floor, first floor and walls (pieces 1 through 9) to size with a newly sharpened blade in your table saw (a dull blade will chip the fragile plywood and leave rough edges).

Now form the clapboard siding, which is cut right into the dollhouse sides and front with a 1/2" dado blade. Tilt the blade 5° and raise it to just barely stick above the table surface. Clamp a wood face to your fence and position it right next to the blade. Make a first pass across each panel, then move the fence 1/2" away from the blade and make a second pass. Move the fence another 1/2" for a third pass, and so on, until you reach the top of the panel (See Figure 1).

Planning Ahead: The Dollhouse Project

Completing the dollhouse will take about 25 hours, depending on how involved you get with the finishing. The paint of choice is oil enamel. For dollhouse scale wallpaper, search out your local hobby and craft shops, which will also have a selection of furniture and accessories to choose from.

- One 3' x 5' piece of 1/2" Baltic birch plywood
- One 3' x 5' piece of 3/8" Baltic birch plywood
- 9 square feet of 1/2" birch

For routing out most of the windows you'll need a template. Cut out the **full size pattern** of the template from the insert between pages 12 and 13, and transfer the pattern onto a piece of 1/4" thick plywood or hardboard. Drill access holes into each window layout and cut the openings with a saber saw. Now set up your router with a 3/8" rub collar and a 1/4" straight bit. Clamp the template to one of the side panels and rout out the windows (See **Figure 2**), then do the same thing to the other side piece. For the front panel, first clamp the template to the right half and rout four windows and then move to the left half to rout the other four. Layout the center window and front door and cut them with a saber saw. Square the corners of all the windows with a keyhole saw.

The peaks on the side panels can be cut now, with the table saw's miter gauge set at 45°. Once the peaks are cut, cover the edges of the side panels with 1/4" solid wood banding (pieces 10), as shown in the **exploded view** on page 22.

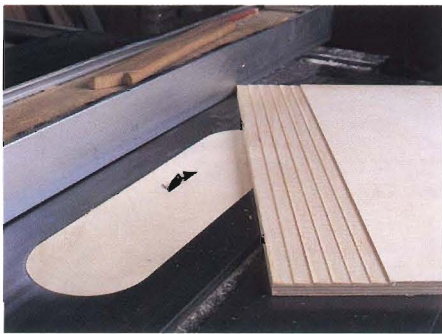


Figure 1: The siding is formed right on the plywood using a 1/2" dado blade tilted 5°. Just move the fence in 1/2" increments before making each pass.

Adding the Walls and Floors

Follow the **frame detail** at lower right when notching the frame sides, then join the four frame pieces together by drilling counterbored pilot holes and driving your screws (pieces 11). Fill the counterbores with birch plugs (pieces 12) and sand them flush.

Now glue the front panel to the frame. After the glue dries, hinge (pieces 25) the attic floor to the top of the frame and the first floor to the bottom frame (see exploded view, page 22). Next, use a router table to cut the slots in the walls and second floor, following the **wall and floor details** at right, then layout and cut the doorways in the walls with a saber saw. Now slip the walls and second floor together (file the notches if the fit is too tight) and slide them into the dollhouse.

Joining the Structure

I used threaded inserts (pieces 13) and machine screws (pieces 14 and 15) to hold the sides to the floors. Before drilling pilot holes for the screws, however, a strip (pieces 16) of plywood should be added to each side panel to fill the gap created by the frame at the second floor (see **side detail** on page 22). Cut the filler strips to size and glue them to the inside of the side panels, then set the side panels in place against the frame. Now layout the pilot hole locations on the sides, as shown in the **side detail**, and drill the 5/32" counter-sunk holes. Take care to center the pilot holes in the edge of each floor.

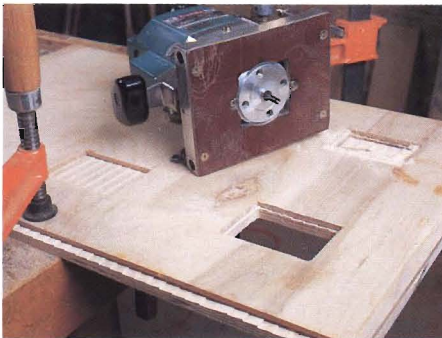
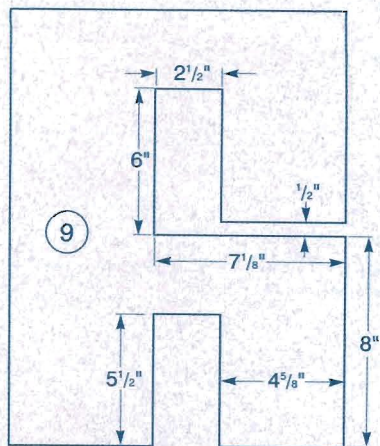
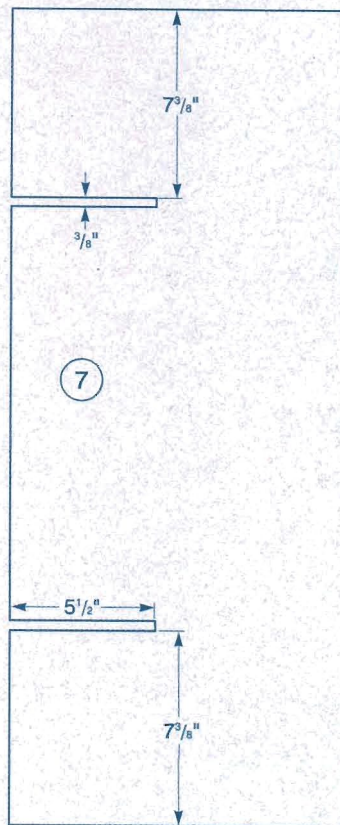


Figure 2: After making the window template, clamp it to each panel and rout the openings with a 3/8" rub collar and a 1/4" straight bit.

Wall Detail

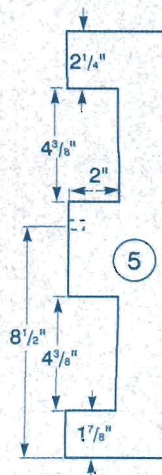


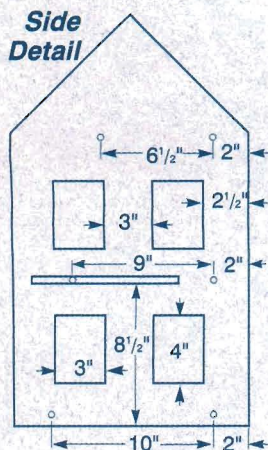
Second Floor Detail



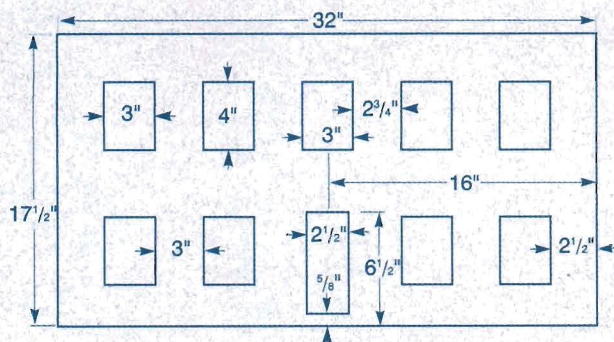
Frame Side Detail

Cut the notches in the frame sides as shown at right. After the first floor is installed, swing it up against the frame sides and drill pilot holes for the machine screws and threaded inserts 8 1/2" from the bottom of the frame sides.

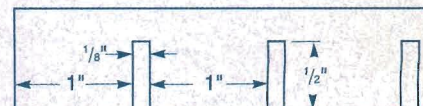




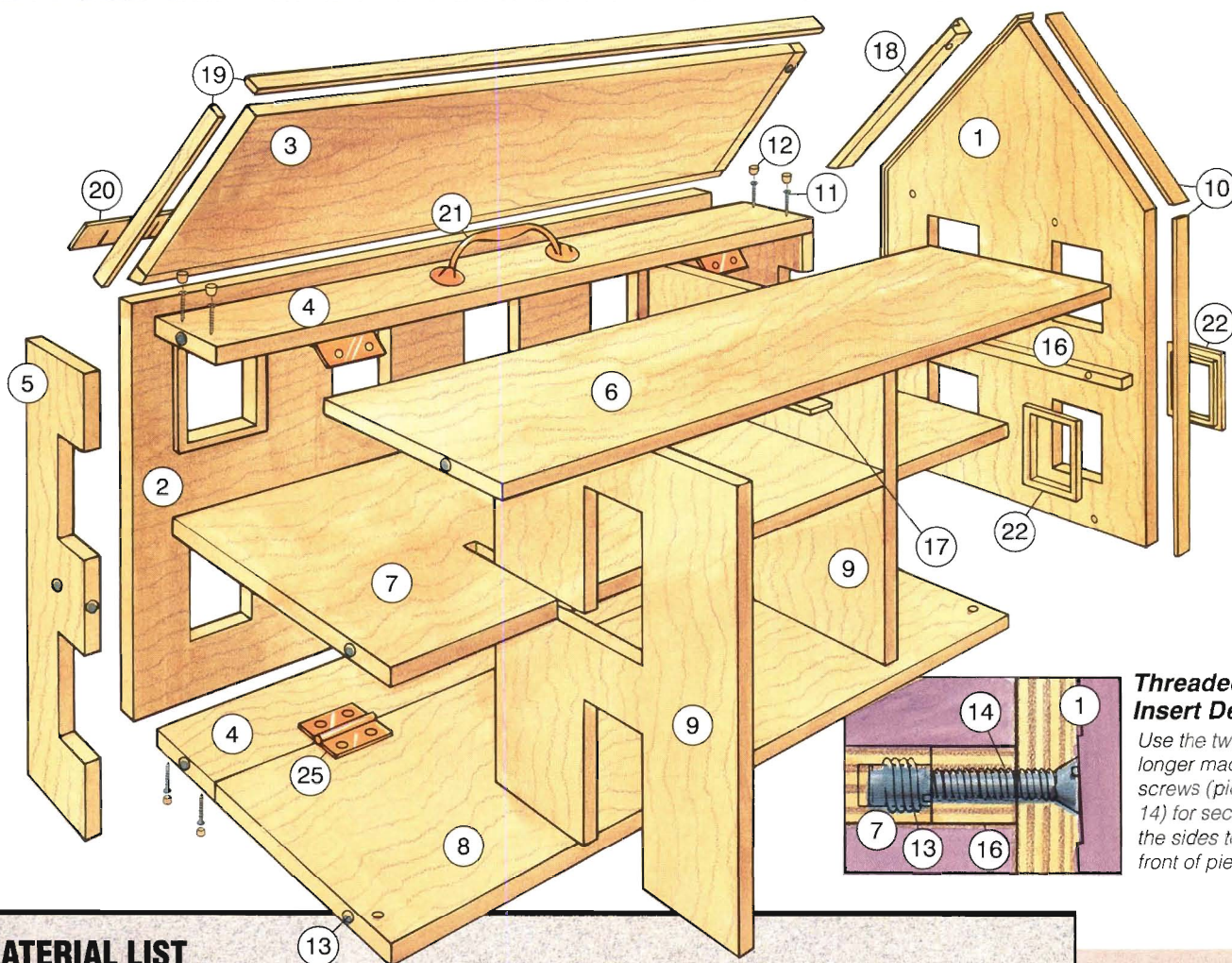
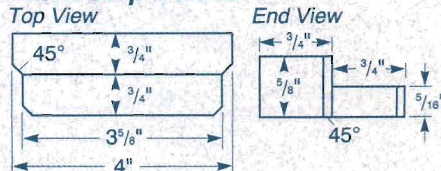
Front Detail



Shingle Strip Detail



Front Step Details



Threaded Insert Detail

Use the two longer machine screws (pieces 14) for securing the sides to the front of piece 7.

MATERIAL LIST

	T x W x L
1 Sides (2)	3/8" x 14" x 24 1/2"
2 Front (1)	3/8" x 17 1/2" x 32"
3 Roof (1)	1/2" x 9 3/4" x 30"
4 Frame Top and Bottom (2)	1/2" x 3 3/4" x 32"
5 Frame Sides (2)	1/2" x 3 3/4" x 16 1/2"
6 Attic Floor (1)	1/2" x 6 5/8" x 32"
7 Second Floor (1)	1/2" x 12 5/8" x 31"
8 First Floor (1)	1/2" x 9 3/4" x 32"
9 Walls (2)	3/8" x 12 5/8" x 16 5/8"
10 Side Bandings (1)	3/16" x 1 1/2" x 120"
11 Wood Screws (8)	#6-1 1/2"
12 Plugs (8)	3/8" Diameter
13 Threaded Inserts (16)	#8-32

	T x W x L
14 Machine Screws (2)	#8-32 x 1 1/4"
15 Machine Screws (14)	#8-32 x 3/4"
16 Side Panel Strips (2)	1/2" x 1 1/2" x 8 5/8"
17 Attic Floor Tongue (1)	1/4" x 1 1/2" x 3"
18 Roof Supports (2)	1" x 1" x 10 1/4"
19 Roof Banding (1)	1/2" x 1 1/2" x 85"
20 Shingle Strips (1)	1/32" x 13/16" x 58"
21 Carrying Handle (1)	Brass
22 Window Frames (34)	3/8" x 3 1/2" x 4 3/8"
23 Door Frames (2)	3/8" x 2 7/8" x 7 1/4"
24 Front Step (1)	5/8" x 1 1/2" x 4"
25 Butt Hinges (4)	2" x 1 3/8"

The Dollhouse Hardware Kit

A hardware kit is available for this project that includes 2 pairs of butt hinges, threaded inserts, pressure sensitive edgmate, birch plugs and a chest handle.

#97502\$42.95
(use order form)



Figure 3: Stiffen the shingle veneer strips by sandwiching them between scrap wood, then use tape as a marker for the repetitive kerfing cuts.

After the pilot holes are drilled remove the sides and enlarge the holes in the floors with a 1/4" bit, then wax the outside threads of the inserts and drive them into the holes.

Remove the walls and second floor from the house and swing the bottom floor up against the frame. Now drill countersunk pilot holes through the floor and into the frame sides, as shown in the **frame detail** on page 21. Next, enlarge the holes in the frame and drive in the inserts.

Several details should be completed before moving on to the roof construction. The first is gluing a tongue (piece 17) to the attic floor (see exploded view). The second is installing the carrying handle (piece 21) to the top of the frame. And the third is making the roof supports (pieces 18), by following the **roof support detail**, as shown above right. Rabbet two strips of stock, then cut one end of each piece at a 45° angle to meet the attic floor. Drill the pilot holes for the machine screw connections with the roof, then glue the supports to the peaks of the sides.

Roofing the House

Earlier you cut plywood to size for the roof, but since this piece may be banged around a bit, I recommend banding the edges with solid stock (pieces 19) before applying the shingle strips (pieces 20).

While the glue on the banding dries, go ahead and make the shingles. I used 58 feet of 13/16" wide pressure sensitive edgmate veneer to make all the rows of shingles. Cut the rolls into 35" lengths, then gang these strips into groups of about ten and sandwich them between two pieces of scrap wood to stiffen the veneer while you make the shingle cuts (See **Figure 3**). With the blade raised 1/2", make the first pass through the sandwich about an inch from the end, then slide

the sandwich exactly 1" over. Place a strip of tape on the table saw that lines up with first cut. Now make a second pass over the blade, slide the sandwich over to align the new kerf with the tape and make a third pass. Continue cutting like this until you've kerfed all the strips.

Rip the bottom edge of the roof panel at a 45° angle (to meet the attic floor) and set it onto the dollhouse. Extend the pilot holes in the roof supports into the roof panel. Now remove the roof to enlarge the pilot holes and install the threaded inserts. Replace the roof on the house and secure it with the machine screws.

Apply the shingle strips one course at a time, starting with the front edge of the roof. Peel off the backing and press the strips to the plywood panel. Allow the excess veneer to overhang the sides and be sure to offset the courses to imitate real shingles. After reaching the top, trim off the excess on each shingle strip with a razor blade and slice through the strips at the split where the sides meet the roof.

The Frames and Front Step

Trimming out the windows and doors gives the dollhouse a realistic appearance and covers the sharp edges where youngsters might snag their fingers on a splinter. I made window and door frames for both the inside and outside of the house. Once again, a router and jig are the best means for making accurate, repetitive frames.

Plane or resaw birch for the window and door frames (pieces 22 and 23) to a thickness of 3/8", and make a little extra for use on the jig. Now rip and crosscut the window frame stock to 4" x 5", and the door stock to 4" x 9". They're a little oversized to provide strength during the routing operation. Make jigs for the window and door

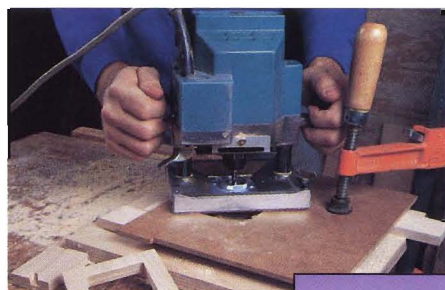
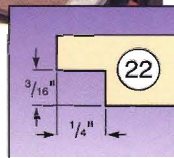
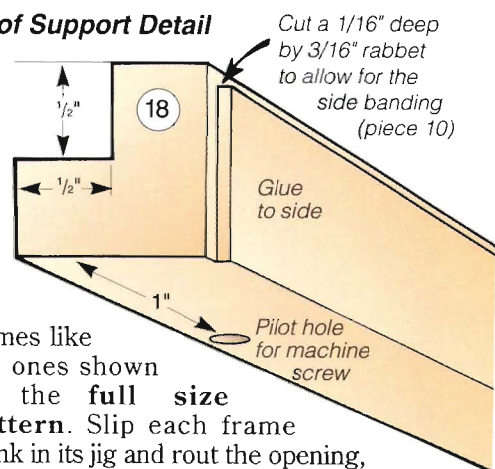


Figure 4: To rout the frame openings, sandwich the blanks between the template and some plywood scrap. Then rabbet the edges as shown at right.



Roof Support Detail



frames like the ones shown on the **full size pattern**. Slip each frame blank in its jig and rout the opening, using a 3/8" rub collar and a 1/4" straight bit (See **Figure 4**). When all the openings are completed cut the pieces down to size, then cut the 3/16" deep by 1/4" wide rabbets on the frame edges. Finish up the outside door frame by bandsawing the peak to shape. Hold off installing the frames until the finishing is completed.

Shape the front step (piece 24), following the **step detail** at left, using a dado blade and an extra long piece of birch, then cut the piece to length. Add the chamfer details with a chisel.

Finishing

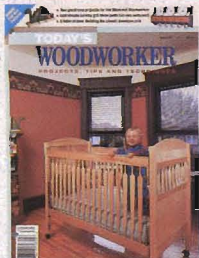
The sky is the limit when it comes to finishing your dollhouse, but let me tell you what we did to get you started. The classic New England color scheme is white with green trim, so we followed this tradition using Windsor Green paint from The Woodworkers' Store. On the inside of the house we wallpapered the outer walls and coated the floors and inner walls with varnish and paint. Miniature scale wallpaper is available at craft stores and dollhouse specialty stores.

I varnished the inner frames to keep them light, but you could easily stain them if you prefer. To install the frames, an instant setting adhesive called Hot Shot (also available from The Woodworkers' Store) is a great help. Just squeeze a little adhesive on the mating edges of the interior and exterior frames, then hold them together in place for a few seconds while the glue sets. Clean up any squeeze out with a sharp chisel.

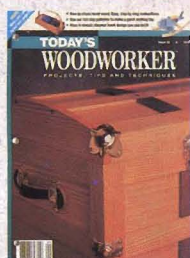
When the dollhouse is finished you might not know which configuration you enjoy looking at it more. Opened and all set up for play is charming, but when it's folded and tucked into a tight little package you may feel your greatest sense of accomplishment.

FREE binder when you order six back issues or more!

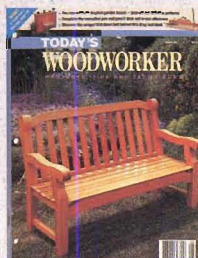
30 29 28 27 26 25



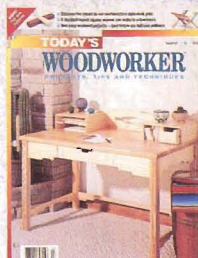
Solid maple crib, early American plate rack, rush covered stool and barnyard animals.
Item 89012\$3.95



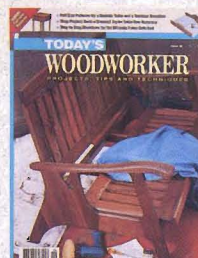
A steamer trunk, a toddler's rocking fish, a bentwood carryall and a marking gauge.
Item 89004\$3.95



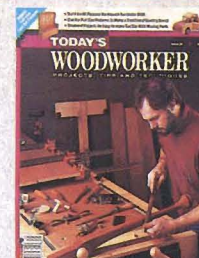
An English garden bench, a fold down bed, a whirligig and a desk top accessory set.
Item 88999\$3.95



A southwestern desk, a folding magazine rack, a dovetail layout tool and two more projects.
Item 88981\$3.95

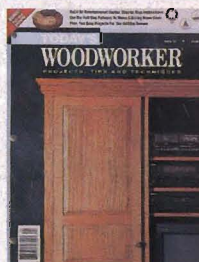


The ultimate futon sofa bed, a crosscut jig, a cherry side table and a tambour breadbox.
Item 88973\$3.95

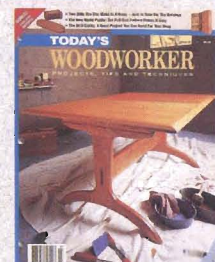


The budget workbench, a toy car, the flammable storage cabinet and a traditional country settle.
Item 88965\$3.95

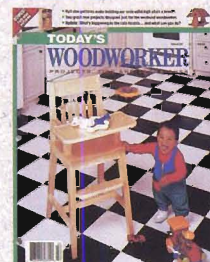
24 23 22 21 20 19



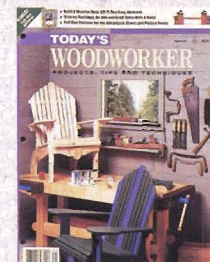
Entertainment center, dining chair (for table in issue 23), serving tray and tree ornaments.
Item 79707\$3.95



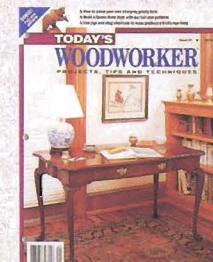
Contemporary dining room table, drill bit cabinet and three weekend gift projects.
Item 79699\$3.95



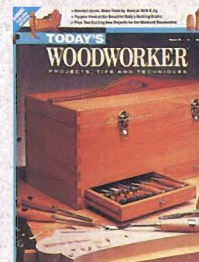
Classic tavern mirror, a high chair for the ages, display case and a weekend bird feeder.
Item 79681\$3.95



Adirondack Chair, easy to make deck set, scroll saw project and a sofa table.
Item 79673\$3.95

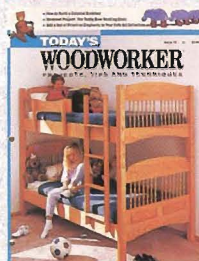


A Queen Anne desk with cabriole legs, carved grizzly bear and a table lamp.
Item 79665\$3.95

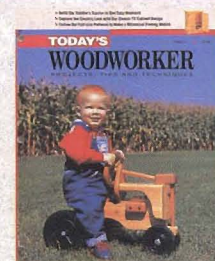


Craftsman's toolbox, a swinging cradle, turned salt and pepper shakers and a simple bookcase.
Item 79582\$3.95

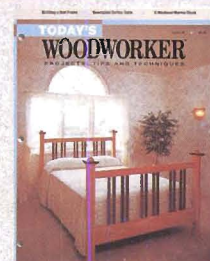
18 17 16 15 14 13



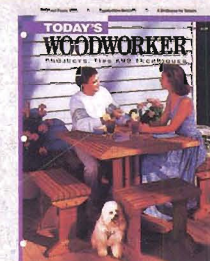
A sturdy bunk bed, crafting folk elephants, a Teddy Bear chair and a Shaker table.
Item 72199\$3.95



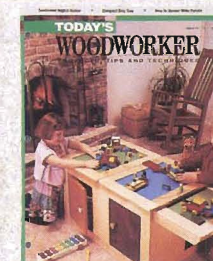
Country TV cabinet, an elegant bureau caddy, the angler's mobile and a toddler's tractor.
Item 72161\$3.95



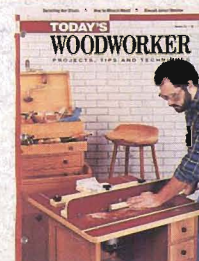
Crafting a maple bed frame, a contemporary mantel clock and a dovetailed coffee table.
Item 71639\$3.95



Picnic table for four, a birdhouse for turners, a simple dulcimer and a joiner's mallet.
Item 66878\$3.95

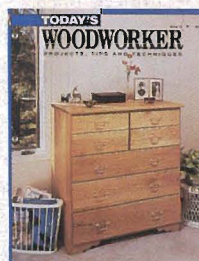


A craftsman style rocking chair, brightly colored toybox and a compact disc holder.
Item 66860\$3.95

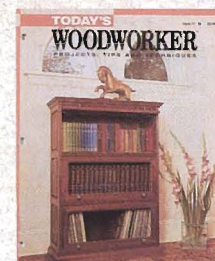


Precision router table, a swiveling bar stool and tips on buying a new biscuit joiner.
Item 68700\$3.95

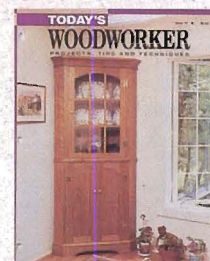
12 11 10 9 8 7



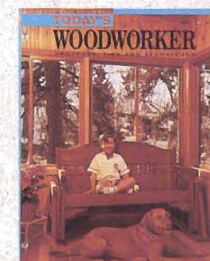
Butternut bureau, a Shaker swivel mirror and deep-reach hand screw clamps.
Item 38521\$3.95



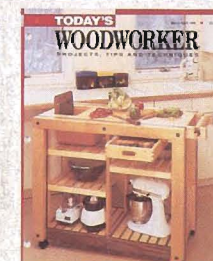
Barrister's bookcase, spinning string tops, a kid's step stool and an easy to make desk tray.
Item 38513\$3.95



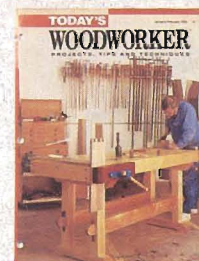
Classic corner cabinet, bent lamination fishing net and a white oak trivet scroll saw project.
Item 38505\$3.95



A porch glider for two, continuous grain box, Chippendale mirror and spoon carving tips.
Item 38497\$3.95



Kitchen work station, Shaker candlestand table, baker's rolling pin and a step stool.
Item 38489\$3.95



European workbench, turned stamp holders, bandsawn heart box and a breakfast tray.
38471\$3.95

Binders

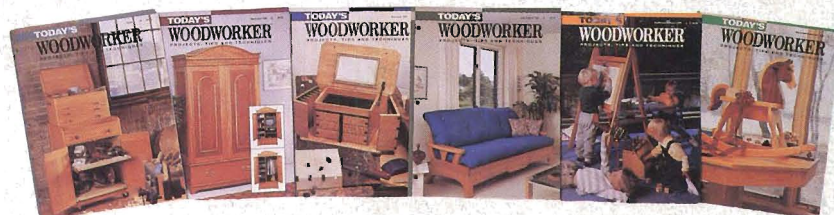
60962\$7.95
(2+ - \$6.95 each)

Stoneware Mugs
88329\$5.95



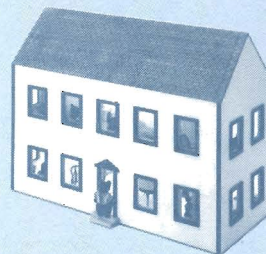
To order Back Issues, Binders, Hardware Kits or Craftplans, please use the order form on page 12.

Issues 1-6 described on order form.



Full-Size Patterns

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

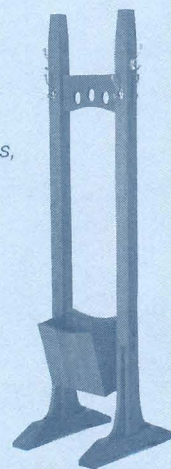


Dollhouse

Patterns for routing the window openings and for making the door and window frame jigs.

Craftsman Coat Rack

Includes patterns for the cross members, the braces, the feet and the tapers on the top of each post.



Mirror Frame

A complete pattern of the frame with all the handle carving details.

*Bandsaw thin
kerfs for wedges.*

TODAY'S
WOODWORKER™

Today's Woodworker, Box 44, Rogers MN 55374.
© 1994, Today's Woodworker Magazine.
All rights reserved.

Step 1: Build a jig for routing the window frames following this pattern.

Step 2: Place a window frame blank in the jig.

Step 3: Screw jig and blank onto some scrap wood.

Step 4: Rout window frame opening with a $\frac{3}{8}$ " rub collar and a $\frac{1}{4}$ " straight bit.

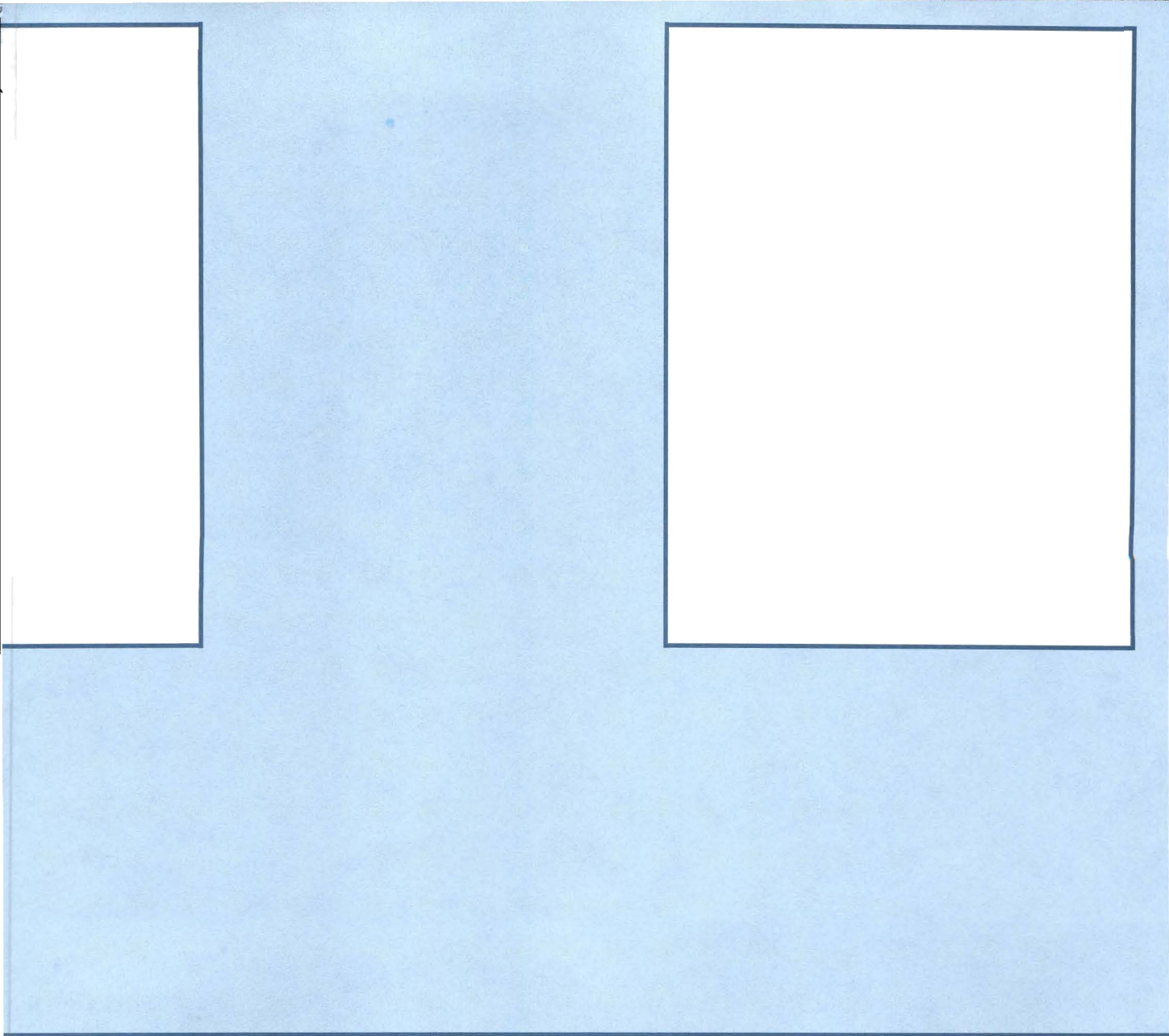
Step 5: Cut frames to size and rabbet the edges.

$\frac{3}{8}$ " scrap wood



Screw jig to scrap wood here.

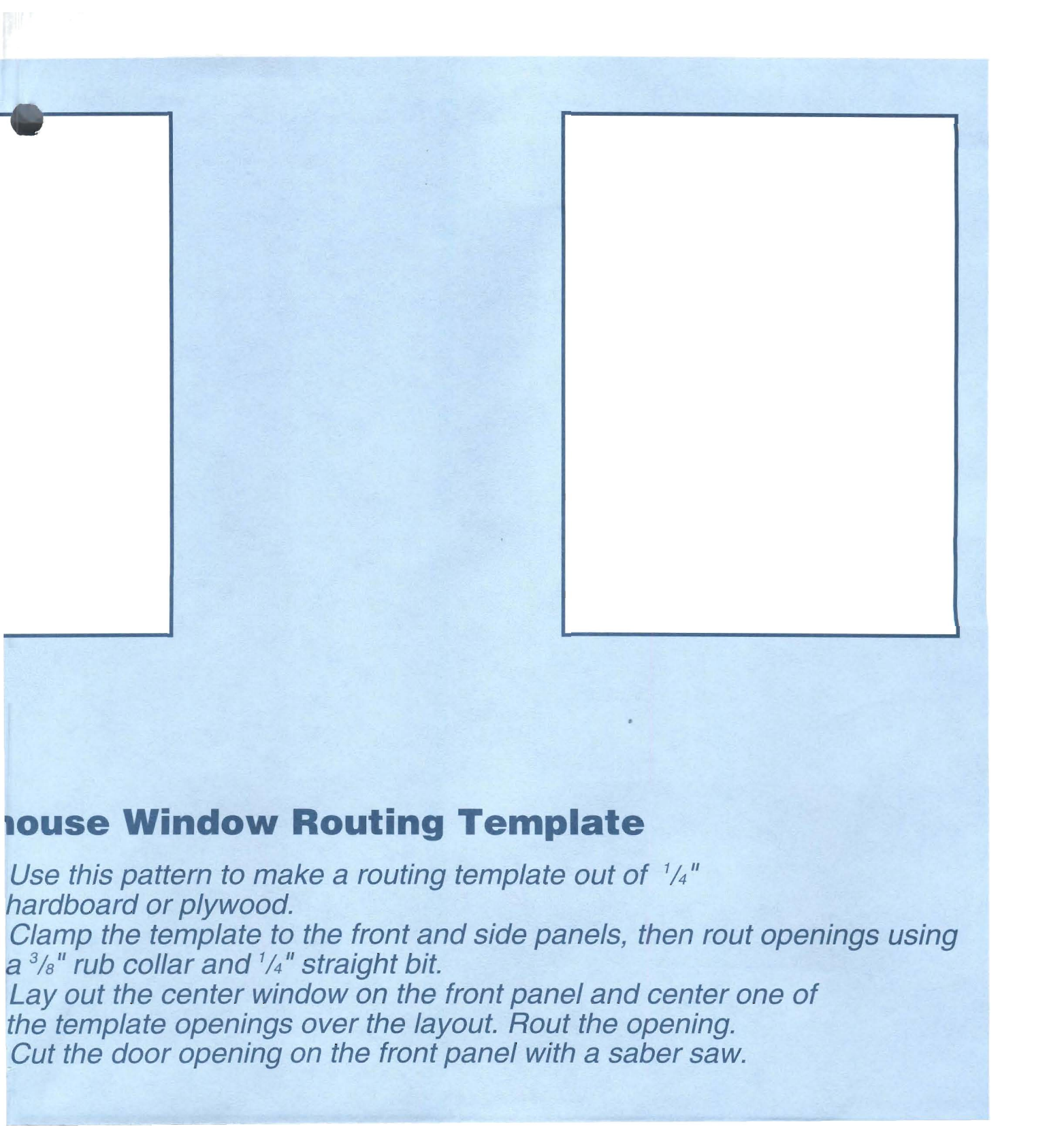
*a jig for routing the door
like the one shown above for
window frames. After routing the
edges, rabbet the edges and
pieces to shape*



1/4" hardboard



Window Frame Jig
(Bottom View)



House Window Routing Template

Use this pattern to make a routing template out of $\frac{1}{4}$ " hardboard or plywood.

Clamp the template to the front and side panels, then rout openings using a $\frac{3}{8}$ " rub collar and $\frac{1}{4}$ " straight bit.

Lay out the center window on the front panel and center one of the template openings over the layout. Rout the opening.

Cut the door opening on the front panel with a saber saw.

2

Coat Rack Feet

Brace Mortise

Doll

Step 1:

Step 2:

Step 3:

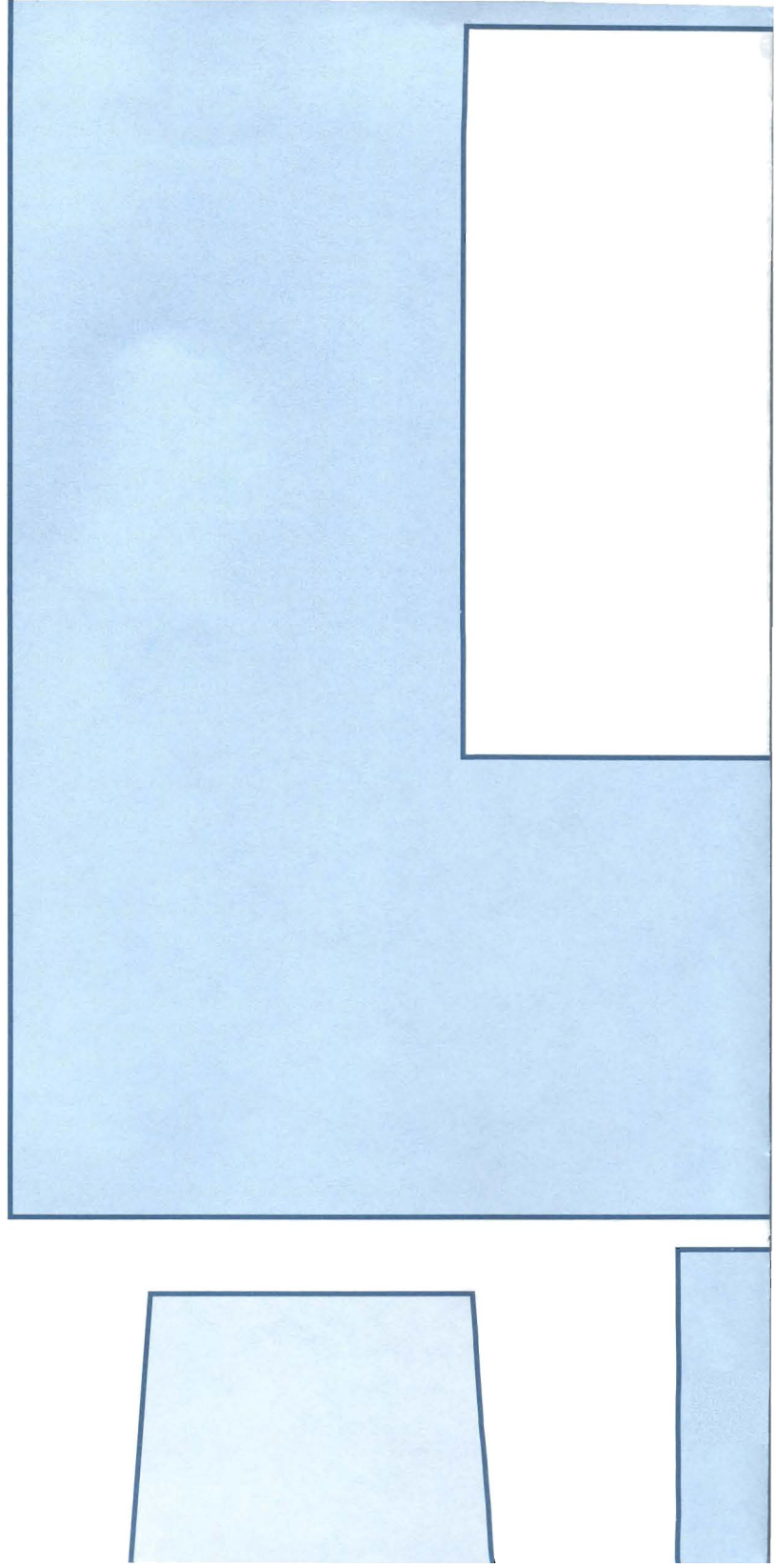
Step 4:

Location

*Post Mortise
Location*

*Brace Mortise
Location*

*To guarantee that
your foot pattern is
centered on your
stock, be sure to align
the mortise layout shown
here with your actual*



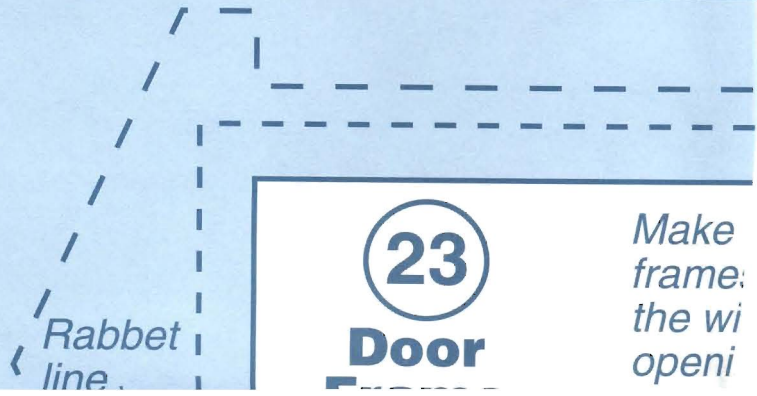
root mortises.

*Use this pattern to
lay out the tapers
on the top of each
coat tree post.*

1

**Coat
Rack Post**

e Template

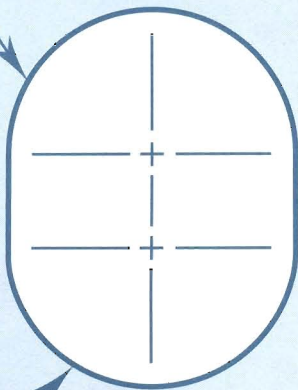


*Make
frame:
the wi
openi*

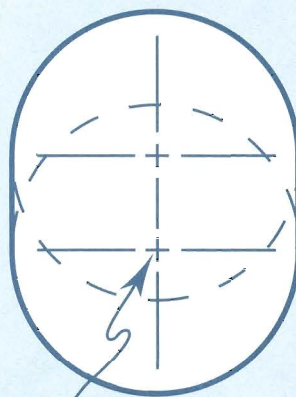
make a template
or hardboard.
to your mirror frame
where the handle

Use this same curve on
the bin front and
back (pieces 6 and 7).

on umbrella hanger
rings in upper
member only.



at all the edges
a $\frac{1}{4}$ " roundover bit.



Drill two $1\frac{1}{2}$ " diameter holes to
remove most of the waste, then
complete the umbrella hanger
openings with a file.



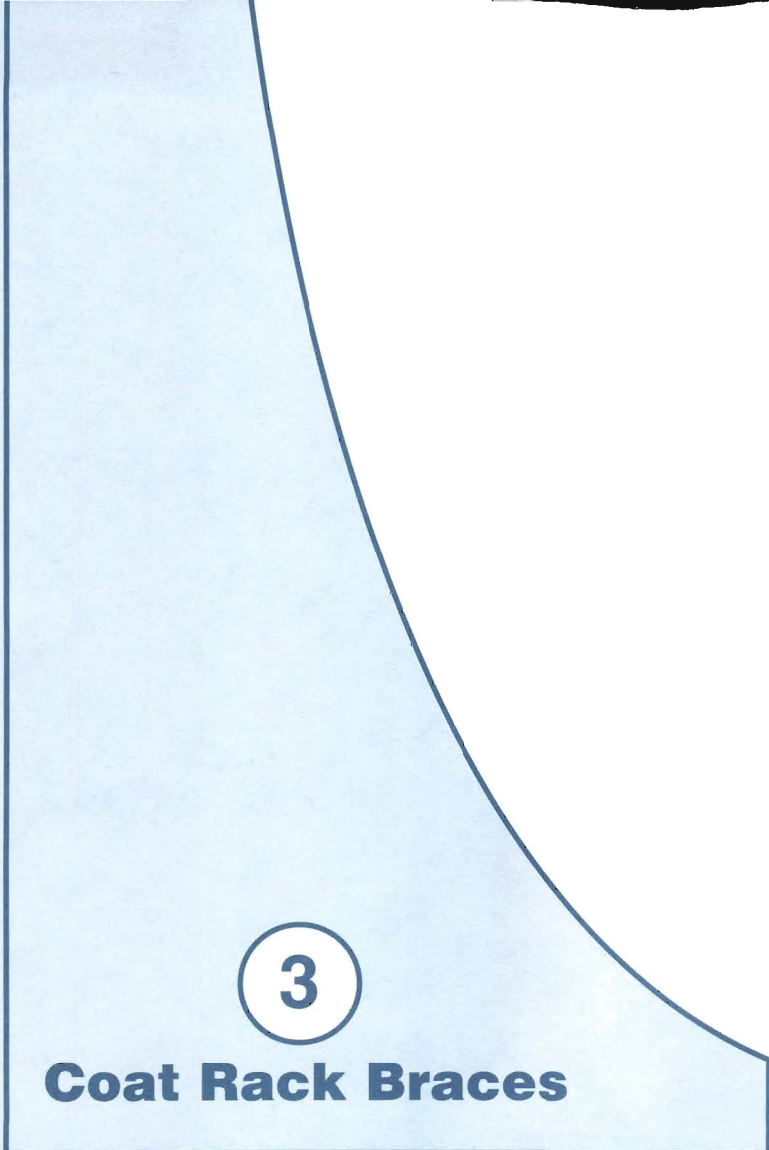
Outside rim of frame

Mirror Frame Template

*Use your actual mirror
to make a routing template
for recessing the frame.*

Frame Handle (Side View)

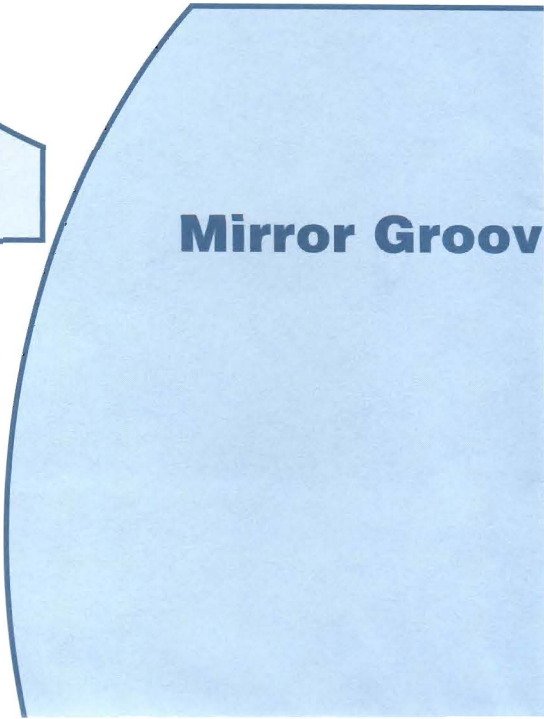
Form tapered chamfer by hand with a spokeshave and cabinetmakers' file.



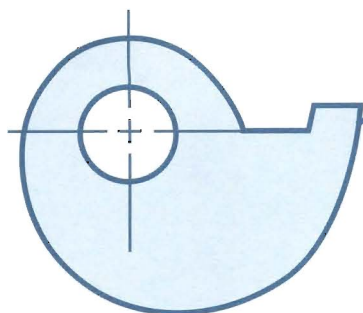
3

Coat Rack Braces

*Form tenons before
cutting braces to shape.*



Mirror Groov



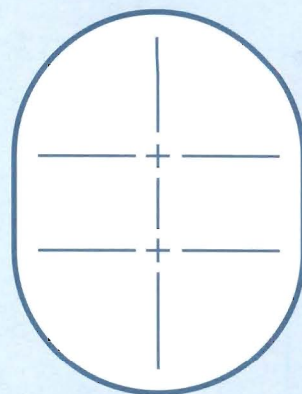
21

Sanding Cabinet Cam

*Make eight cams for
the cabinet trays*

*Use this pattern to
cut out of 1/4" plywood.
Clamp the template
to rout the V-groove
where the cam
meets the frame.*

*Bandsaw thin
kerfs for wedges.*



*Form
open
cross*

4

Coat Rack Cross Members

*Rou
with*