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JANUARY 1997 ISSUE NO. 94

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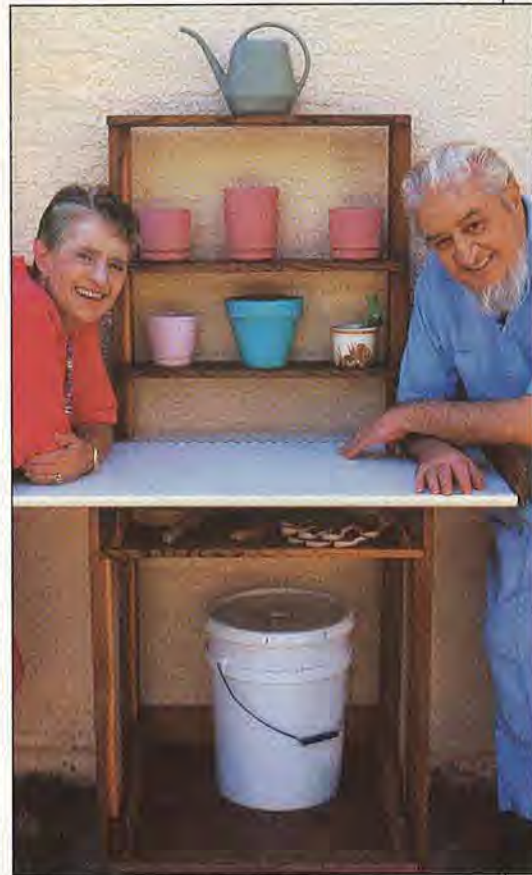
If at first you don't succeed...

As you might well imagine, we can publish only a small fraction of the woodworking projects that come our way each year. By the time we attend numerous crafts shows looking for projects we think you might like, design some projects ourselves in-house, and sort through the many quality submissions from our readers, the selection process becomes difficult to say the least.

So what do we do with those reader ideas we can't use right away? We keep some on file for later use, and for others we write a "thanks, but we're sorry we can't use it" letter to the submitter.

Sometimes, though, the recipient of one of these letters writes back and pleads his/her project-design case. That's exactly what Leroy Wagner, of Glendale, Arizona, did, and his efforts paid off. We're now in the process of building a prototype of his potting-table project, and hope to have it ready for you to enjoy in one of our spring issues.

In his first letter to us, Leroy said, "My wife has a VERY BIG green thumb. And several times a month I notice that I have a problem—I find a big mess on my workbench. First, I considered buying a big lock for my shop, but then I remembered who it was who helps me rip long boards. That's when the potting-table idea hit me." Leroy concluded by saying that the project turned out great, she loves it, and best of all she loves him.



The happy couple, Sue and Leroy Wagner, showing off Sue's redwood potting table. Leroy, you've got all the right moves, guy!

Then disaster struck! We told Leroy that we weren't going to be able to use the design. Undaunted, this longtime reader of **WOOD**® magazine sent us a second letter. In it Leroy said, "I believe this is EXACTLY the type of article you should be looking for. It is easy to build, inexpensive, requires no special tools, and is a product that will fill a need for many of your readers." We give, Leroy! We'll do it, hopefully yet this spring!

So what's the moral of this story? It's that we're not always going to be able to publish every worthwhile design submission we receive. But that doesn't mean you can't coax us a little to publish yours. Sometimes it works; just ask Leroy. 🌱

Larry Clayton

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THE WORLD'S LEADING WOODWORKING MAGAZINE

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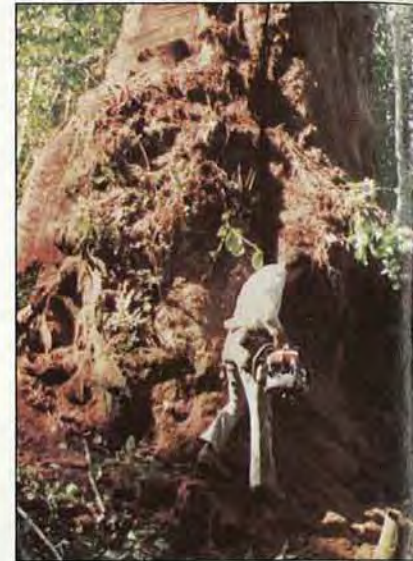
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This issue's cover wood grain: cottonwood

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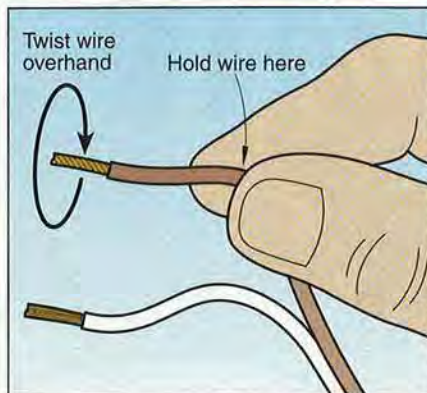
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TALKING BACK

Why not?

I have a couple of additional tips for the article "What Woodworkers Need to Know: Worry-Free Wiring" in the June 1996 issue. First, I've found that when twisting the wire after removing the insulation, it's best to hold the wire in your right hand, and twist the wire overhand with your left (see drawing below). This will cause the wire to pull under the screw when it's tightened, rather than mash out.

Second, use an underwriter's knot on the power cord to secure it inside the socket, rather than the knot shown in the middle photo on



How to reach us

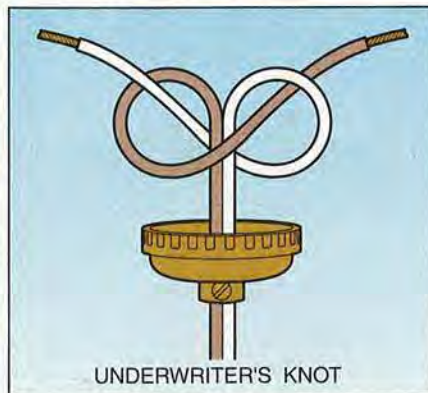
We welcome comments, criticisms, suggestions, and even compliments. And you're sure to hear back from us, perhaps on this page! You can "talk back" by one of several ways:

• **Via mail.** Send your letter to Talking Back, *WOOD*® magazine, 1912 Grand Ave., Des Moines, IA 50309-3379.

• **Via computer.** Send your e-mail to one of these addresses:
CompuServe: 74404,3516
Internet:
74404.3516@compuserve.com

page 16 of the article. For how to tie this knot, see the drawing below.

—Gary Hagins, Service Manager,
Hagins Appliance Service Center, Savannah, Ga.



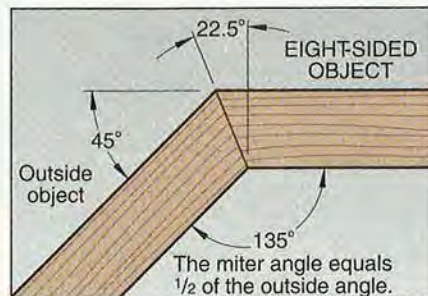
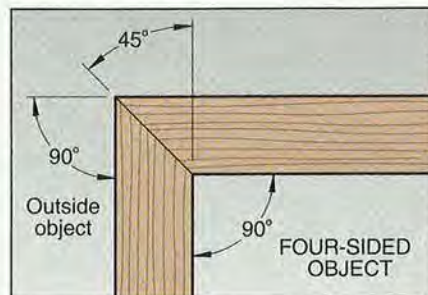
Where did that angle come from?

Maybe I missed something in the Talking Back letter "How to calculate the side length of a polygon" in the January 1996 issue. I was taught that a rectangular object with four sides has a 90° angle on each corner. Can you help a novice woodworker by explaining where the 45° angle for a four-sided object comes from?

—James A. Musil, Willow Springs, Ill.

We sure can, Jim. You're right when you say that the angle of a corner of a four-sided rectangular object will be 90°. However, to assemble a box or case so that the grain appears to flow around the corners, we need to miter-cut the ends of the sides at an angle. And the angle that will give us the best-looking mitered joint equals 1/2 of the total outside angle of the cor-

ner (see drawing below), or 45° in the case of a rectangle.



Continued on page 6

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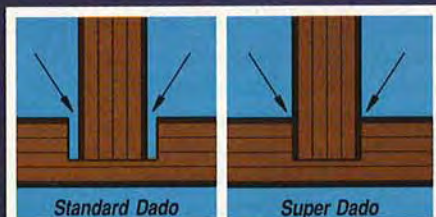
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Continued from page 4

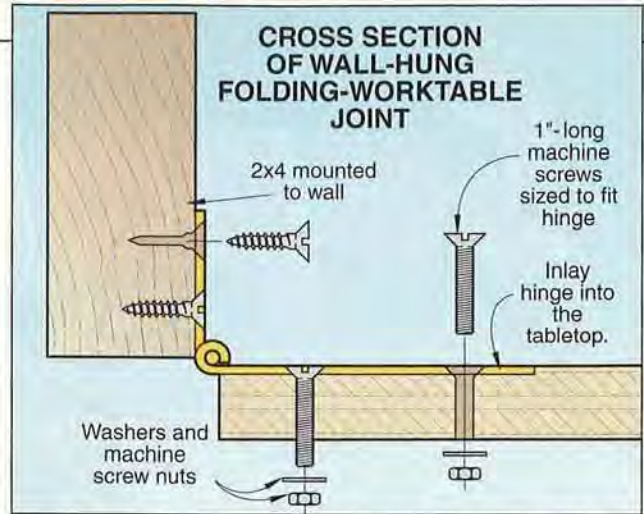
Adjustments to a table hinge

As I was looking over the plans for making the folding worktable shown in the June 1995 "Tips from your shop (and ours)," I came up with the following questions:

- 1 How do you remove the crossbar when the top folds down? The hinged joint at the tabletop-to-wall mount shown in the drawing appears to prevent the top from being raised to remove the crossbar.
- 2 What do you do with the crossbar after it has been removed? In my shop it would probably wander off and get lost. How about drilling a hole in the crossbar so it could be mounted on the wall alongside the table?

—Carl Puleo, Melrose, Mass.

Good points, Carl! Our solution for the hinge problem is to use some heavy-duty hinges fastened to the wall-mounted 2x4 and the top rear edge of the worktable. Mount these so the hinge-pin area extends below the 2x4 and behind the tabletop.



Inlay the hinges into the tabletop to prevent marring your work on them. Use flathead machine screws, washers, and nuts to firmly secure the hinges to the tabletop (see drawing above).

Your suggestion about drilling a hole in one end of the crossbar and hanging it on the wall makes good sense. We'd drill a 3/8" hole near one end, and mount the crossbar on a 16d nail driven into a wall stud near the worktable.

When can I buy Delta's new planer?

This letter is in response to your article on portable planers in the November 1996 issue. Being in the market for one of these planers, I enjoyed the information you gave on the different types that are available in the marketplace.

The Delta 22-560 seemed to be a good unit, but when I called several Delta distributors, none of them knew of the model 22-560.

What is going on?

—Relmon Cartee, Douglasville, Ga.



Thanks for writing, Relmon. Several other readers have written to us expressing similar frustration. Here's what happened.

We knew that the Delta 22-560 might not be available when the article came out, but we included our test results of an early production model because of its good performance. We felt that leaving it out would deny our readers valuable information that might affect their buying decision.

Also, after the conclusion of our tests, Delta made some slight modifications to the 22-560 that delayed its introduction. Company officials now tell us that they expect the planer to be in stores sometime in January.

In hindsight, we wish we had noted in the article that the machine might not be available immediately. We apologize for any inconvenience.

Hegner scrollsaw update

In our scrollsaw review that appeared in the October 1996 issue of *WOOD*® magazine, we omitted information about Hegner scrollsaws that may prove important to a potential buyer. To begin with, the Multimax 14E has a 1.9-amp. induction motor. The Multimax 18V and 22V models feature front and rear blade tensioning, a thickness capacity of 2 5/8", and dual stroke settings of 3/8" and 3/4". In addition, all three models that appeared in the article accept both pin-end and plain-end blades. Finally, the stands for all reviewed Hegner models were redesigned this year to provide smoother, quieter operation, according to the manufacturer.

Lots of wood stabilizers out there

In the Talking Back column of our August 1996 issue, we requested help from readers in locating companies that offer wood stabilization using acrylic resins. Here are the addresses of the companies readers wrote and told us about. 🌲

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What
woodworkers
need to know

Harvesting the best grain

When it comes to displaying your finest craftsmanship under a clear finish, the wood's grain can make or break a project's appearance. Here's how our resident expert Chuck Hedlund selects grain to complement his workmanship.

Do you consider the grain of the wood when you're cutting out parts for a project? A lot of woodworkers don't, and all too often it really shows.

Take a look at the buffet *below* for example. Haphazard grain patterns on the drawer fronts chop up the face. The poorly matched fronts grab attention, overpowering the fine workmanship and the beauty of the design.

With another set of drawer fronts the buffet looks completely different, *page 10 top*. Now, grain lines run straight across, parallel to each other. These uncluttered fronts emphasize the buffet's horizontal lines.



Plan for appearance

The second buffet didn't end up looking beautiful by accident. Chuck Hedlund, *WOOD*® magazine's project builder, selected the grain to give it that look. Here's how he reaps the best grain when building a project.

Before Chuck cuts any wood for a project, he takes a close look at the plans. "The first thing I do," he says, "is consider which parts will be most prominent—where the wood will show the most." (The day we looked in, he was starting to build a wall-hung shelf. Its two endpieces would be most visible, he decided.)

At the same time, he considers how much grain display is appropriate. "Don't get carried away with grain," Chuck warns. Wildly figured stock may look spectacular by itself. But when made into furniture with complex moldings and other details, the overall effect can be confusing and distracting. As a general rule, ornate designs look best built from plain-er wood. Save the highly figured

boards for accents or simpler pieces. "Don't make the grain fight the design," Chuck says.

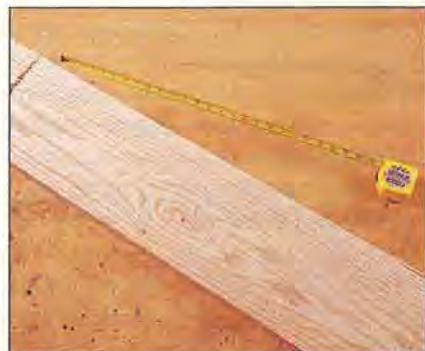
A hodgepodge of grain on the drawer fronts breaks up the face of this buffet. Straight grain on the drawers (*page 10 top*) creates a smoother look.

Lay out the parts

Chuck divides the stock into sections roughly sized to accommodate the parts, starting with the largest, most prominent ones. "I disregard the order of the parts on the Bill of Materials," he says, "and completely ignore cutting diagrams." He cuts nothing until he's laid out the major, visible parts. To do that, Chuck grabs a tape measure.

Thinking about the two ends of the shelf, for instance, he studies a 10'-long oak board. "This might look good centered on an end," he says, pointing to an elliptical grain pattern.

Then, Chuck locates the figure's visual focus. Centering on that, he measures and marks a section a little longer than the part, shown *below*. He also marks out a similar section for the other end, and identifies both with the letter for the part.



The red dot marks the visual middle of a grain figure. Measure from the spot to center the grain on the project part.

"If you have trouble visualizing how the grain will look, cut a window the size and shape of the part in a piece of light cardboard," Chuck suggests. "This works great for determining grain orientation. Often, if you just cut

Continued on page 10



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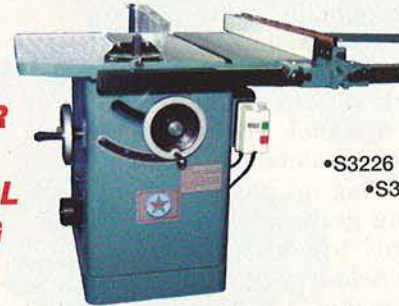
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Harvesting grain

Continued on page 8

a part straight out of a board, the grain makes the part look warped—it's an optical illusion. The window can help you spot that before you cut the wood. Then, by turning the window slightly or moving it a little one way or another, you can perhaps avoid the problem." (See photos *center right*.) This trick also helps you lay out parts that need to match or be opposites.

As he lays out parts, Chuck watches for knots and flaws he'll need to avoid. Usually, he can move a piece slightly to avoid a bad spot, especially as he gets down to the smaller ones.

When gluing up stock for wider parts, Chuck selects the mating pieces and rips their edges with an eye toward maintaining grain harmony. Gluing up pieces with mismatching grain at the joint unnecessarily breaks up a surface, shown *below right*.

Finishing makes a difference, too. "On wood with a strong grain, such as ash or oak, avoid dark stain or other finishing treatments that accentuate the grain," Chuck advises.

What's it going to cost?

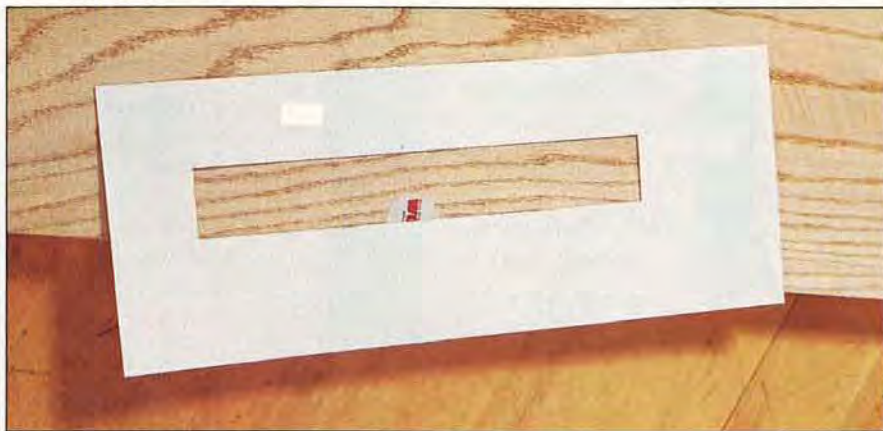
Laying out parts to provide optimum grain appearance may create some waste and require more wood. But you can still cut out hidden or interior parts with little or no regard for appearance, so the penalty may not be unreasonable in many cases.

Considering that you might buy several hundred dollars' worth of lumber and invest 40 or 50 or more hours in building a piece of furniture worth perhaps a thousand dollars, the cost of enough extra lumber to do a first-class job seems a small price to pay. ♣

Carefully selected grain enhances this buffet's beauty. Subtle grain doesn't overpower the graceful design.



The grain would appear to run off the edge of a door stile ripped from the edge of this board *above*. Rotating the part slightly, shown by the window *below*, would result in straighter grain.

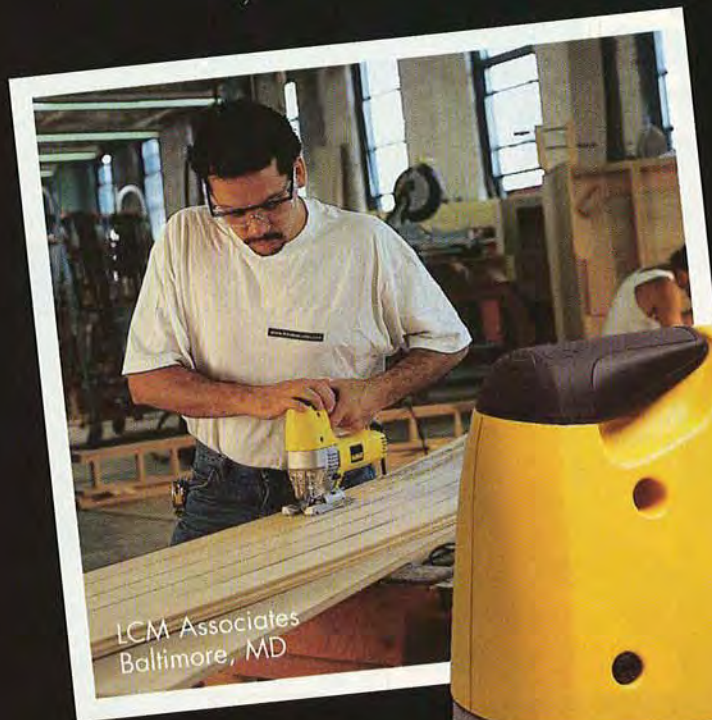


Poorly matched grain accentuates the joint *above*. Simply flipping one piece around results in a better match *right*.

Photographs: John Hetherington Written by Larry Johnston

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Meet Top Shop Tip winner and *WOOD*® magazine reader Gary Webster.

Beginning this issue, you'll be seeing a new face here as we recognize the winner of our Top Shop Tip contest. It's a way to meet a fellow woodworker and *WOOD* magazine reader.

Gary Webster of Indianola, Iowa, has built a number of *WOOD* projects since he started woodworking 16 years ago. The oak wagons he's proudly displaying are part of a production run of 12 that he plans to sell at a local crafts fair.

Congratulations to Gary for submitting the top tip. His winning idea proves that a tip doesn't have to be complicated to be clever and useful.

Your solution to a particular woodworking problem may be worth \$40. If it's selected as the Top Shop Tip, you'll win a tool prize valued at \$250 or more and be featured in this column. To submit a tip, send a letter, including your daytime phone number, with a photo or drawing of your idea, to:

**Tips from Your Shop
(And Ours)**

**WOOD Magazine
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Des Moines, IA 50309-3379

We try to publish original shop tips, so please send your idea only to *WOOD* magazine. Also note that we cannot return submissions. Thanks!

Kerry Gibson

GENERAL-INTEREST EDITOR

Dowel centers hold the key to keyhole hangers

I always had trouble hanging projects with keyhole slots.

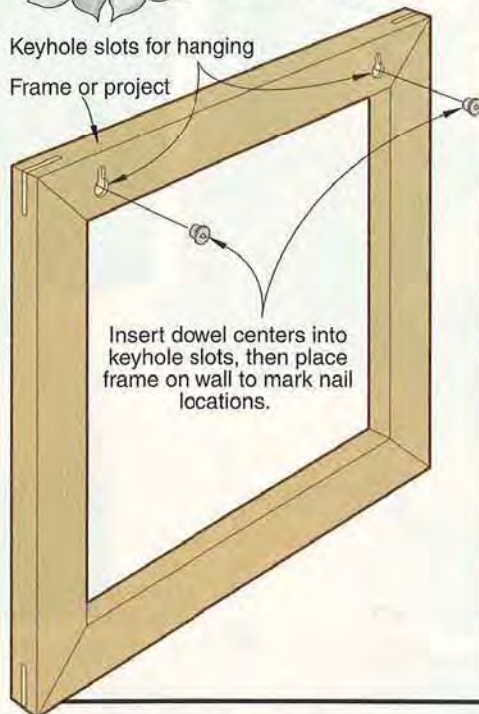


Even with an assistant, it was hard to get the nails in the wall to line up with

the slots. Then I found a simple solution that precisely marks the location of the hanging fasteners.

When I hang a project, I insert $\frac{3}{8}$ " dowel centers into the keyhole slots cut into the back of the frame as shown *at left*. I position the project on the wall, then simply press it tightly against the wall to mark the exact location for the hanging nails.

—Gary O. Webster, Indianola, Iowa



For submitting the Top Shop Tip for this issue, Gary Webster receives \$250 worth of Bessey products from American Clamping Corporation.

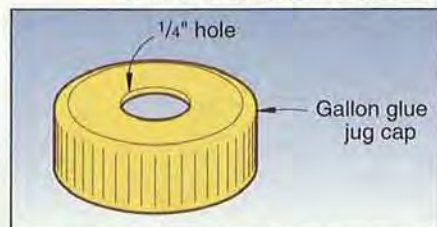
Smaller hole makes glue refills spill-free

Every time I tried to refill my small glue bottle from a gallon jug, I wound up spilling glue. The glue ran so slowly that I'd

impatiently give the big bottle a squeeze to speed things up. The resulting surge would overflow the opening in the smaller bottle.

I solved this problem by drilling a $\frac{1}{4}$ " hole in the cap of the gallon jug. This allows squeezing a smaller, more controlled stream into the smaller bottle. To reseal the larger bottle, I place a piece of plastic wrap over the top before screwing on the cap. When my current jug is empty, I'll save the pouring cap to use on the next jug of glue.

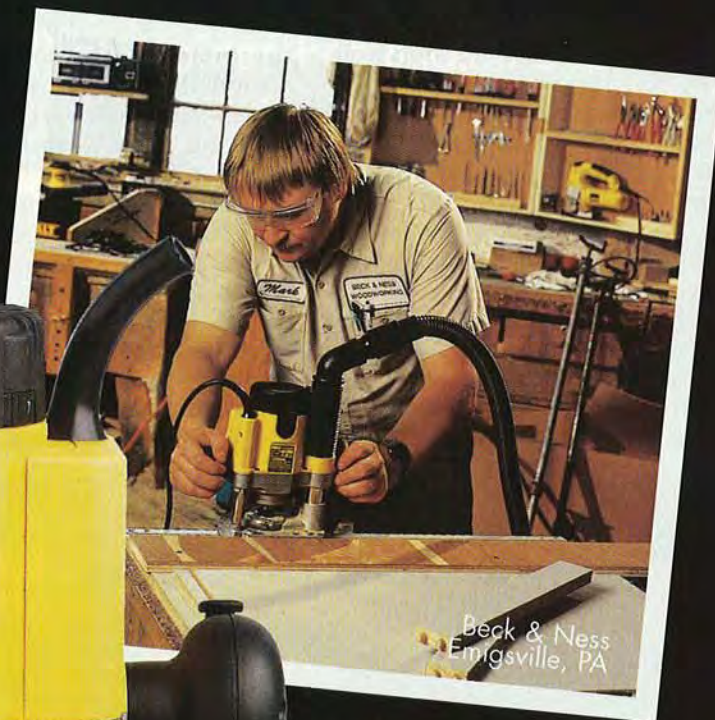
—Linda S. Lee, Lake Orion, Mich.



Continued on page 14

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system allows dust
extraction through the
router's plunge column.



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designed round handles with a plunge lock on one side and an on-off trigger on the other for optimum user control. All in all, it's the perfect tool for those who fill their woodshops with talent, sweat and a lot of sawdust. For the distributor nearest you, call 1-800-4-DEWALT.



Dedicated To Perfection.

Continued from page 12

Fold-down benchtop solves space problem

In my small shop there wasn't enough space for a large, sturdy workbench where I could spread out my tools and work on big projects. So I came up with a bench that offers lots of work surface, yet folds flat against my shop wall.

The benchtop consists of a solid-core exterior door. You can find these in home centers and lumber stores in widths up to 36" and lengths of 80-96".

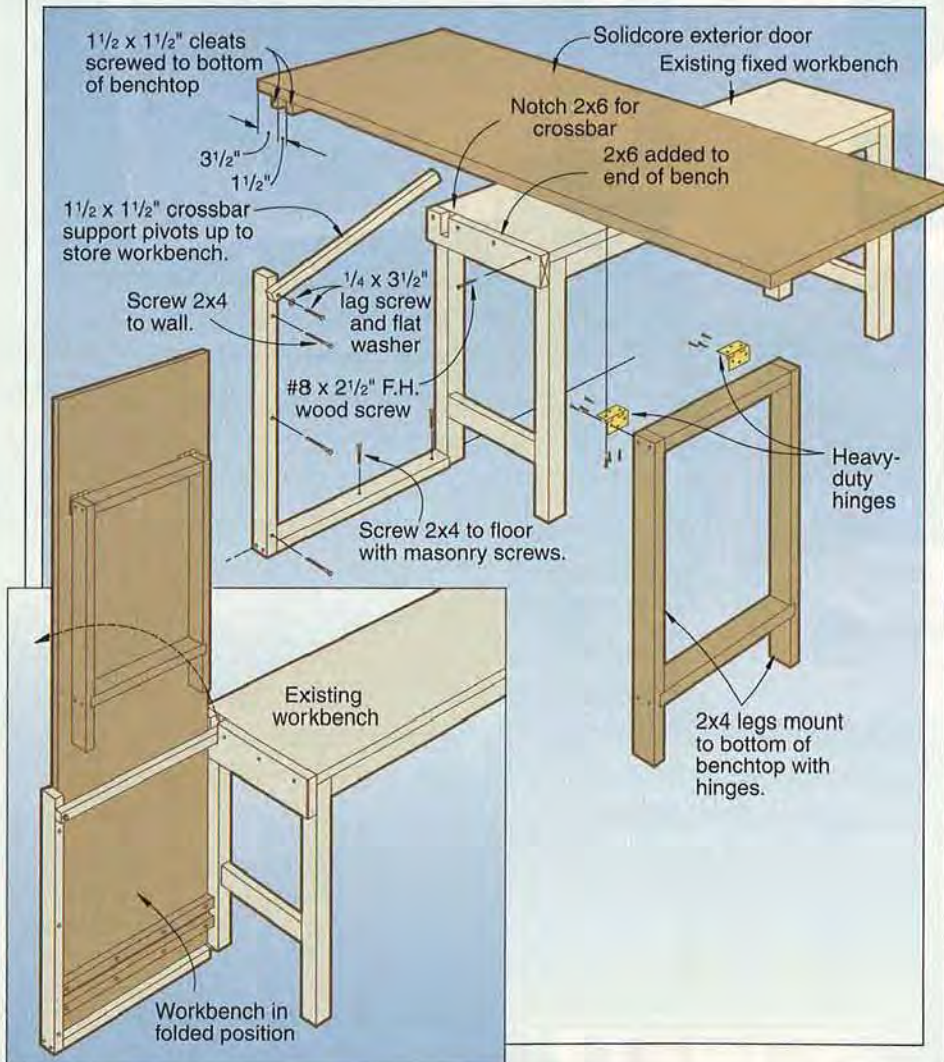
To convert the door to a bench, first build a wall frame and attach it to the wall and floor as shown below. Make sure the screws that attach the frame to the wall penetrate at least 1½" into a wall stud or other solid support. Size the inside dimension of the frame to

match the width of the door plus ⅛" for clearance.

Next, build the swinging legs to a length that puts the benchtop at a comfortable working height. Attach these to the underside of the bench with hinges. Finally, attach the cleats to the bench, screw the notched 2×6 to the existing bench, and install the crossbar as shown.

To set up the bench, raise the crossbar and lower the end of the bench with the legs. When the legs touch the floor, return the crossbar to its original position, and lift the lower end of the bench onto the crossbar. You've just doubled your bench space!

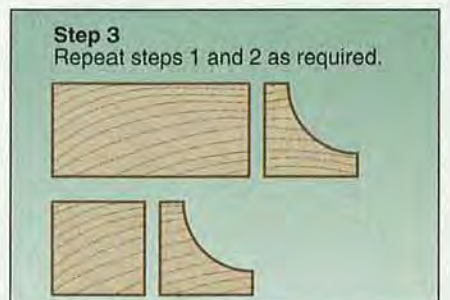
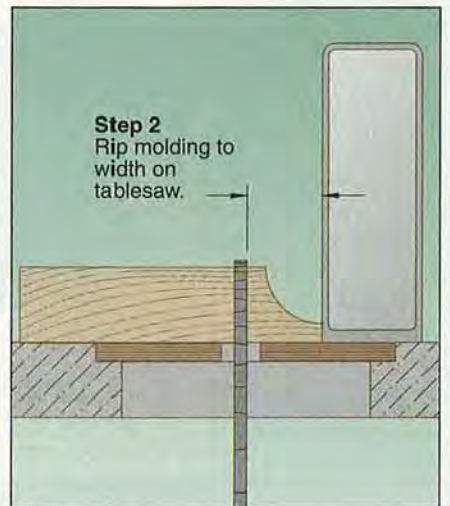
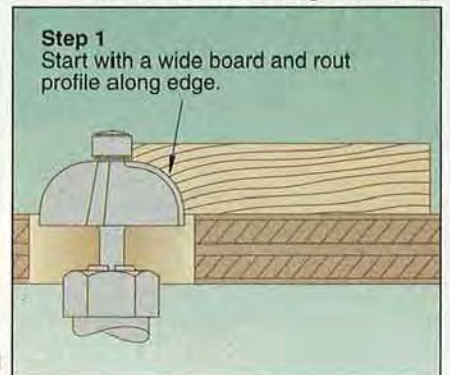
—Mark Curry, Rancho Murieta, Calif.



Try this tip to safely rout narrow moldings

Routing narrow moldings can be a tricky, and sometimes dangerous, undertaking. I've found a safer way to cut moldings that's quick and simple. Starting with a wide board, I rout the desired profile along one edge. Then I rip the molding piece to width on my tablesaw. I rout and rip subsequent pieces from the same board until it becomes too narrow to handle safely.

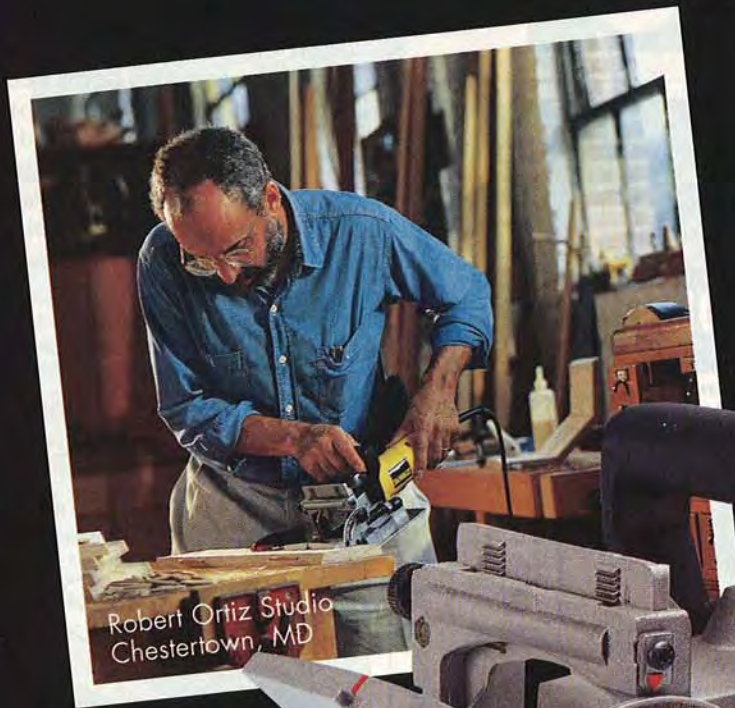
—From the WOOD magazine shop



Continued on page 16

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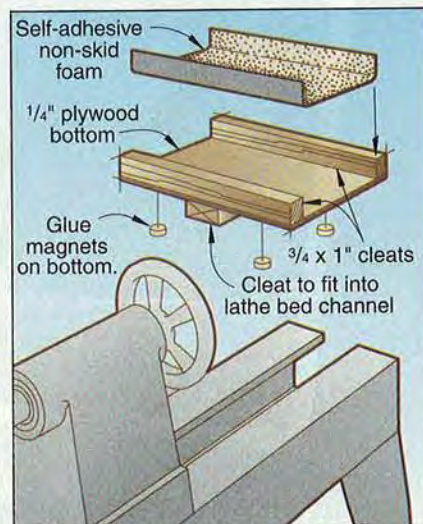
TIPS FROM YOUR SHOP (AND OURS)

Continued from page 14

Safe lathe tool storage

To keep my lathe chisels safe from edge-dulling bumps against the ways and other metal parts of my lathe, I built this padded tray. I cut the cleat on the bottom to fit into the lathe bed channel, then attached magnets to help hold the tray in place. I lined the tray with thin, nonskid foam, commonly used as shelf-liner material in recreational vehicles. Double-faced tape holds the foam in place. The tray also helps keep my lathe tools from being buried under an avalanche of wood chips that fall beneath the turning.

—Robert H. Fubman,
Sterling Heights, Mich.



A FEW MORE TIPS FROM OUR WOODWORKING PROS

- To form consistent, perfectly shaped hinge mortises on your projects, follow the process we used on the sewing machine cabinet, *page 74*.
- Peter Chapman shares his secrets for creating bandsawn, three-dimensional animal puzzles, *page 33*.
- Wondering how to form wide bevels or chamfers? Check out the method we used to chamfer the sides of our doormat on *page 44*. 🌲



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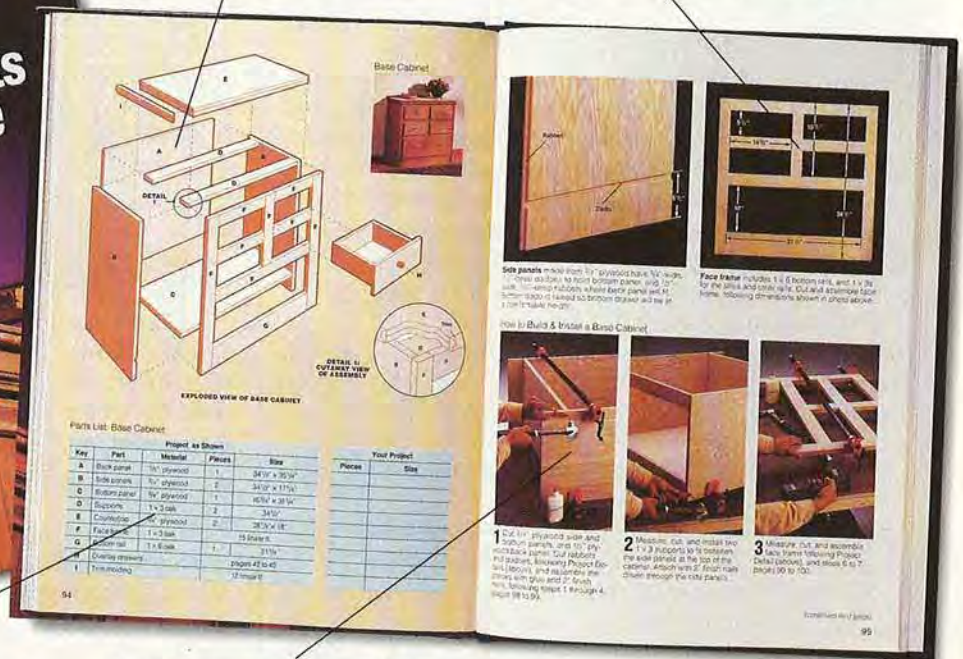
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B	Side panels	1/2" plywood	2	34 1/2" x 17 1/2"	
C	Bottom panel	1/2" plywood	1	34 1/2" x 30 1/2"	
D	Supports	1 x 2 oak	2	34 1/2" x 28 1/2"	
E	Countertop	1/2" plywood	2	38 1/2" x 18"	
F	Front panel	1/2" oak	1	31 1/2" x 30 1/2"	
G	Drawer	1 x 2 oak	1	12" x 12"	
H	Drawer insert	1/2" plywood	1	11 1/2" x 11 1/2"	
I	Trim/molding	1/2" oak	12	12" x 1/2"	

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Cleaner cutting with router

I have been trying to do pattern cutting on 3/4" red oak blanks, using a table-mounted router and a 1" flush trim bit. A hardboard pattern fastened to the oak with double-faced tape works as the router guide, and the blank has been cut to within 1/16" to 1/8" of the pattern line. While routing, I feed the wood into the rotation of the bit.

A problem occurs when I start to trim the end grain, and most particularly when cutting into a concave area. When making this cut, the flush trim bit occasionally catches in the end grain. This results in a lot of kickback, enough so that I have wrecked two bits because of bent shafts.

And a second problem occurs when I try to cut the edge grain with this bit. There have been instances in which pieces of wood up to 2" long and 1/8" deep have splintered off. How can I correct these problems?

—Darrell Beauchamp, Wales, Wis.

We have some suggestions that should help, Darrell. First, we'd recommend that you use a bit with a 1/2" shank for this template-pattern work on 3/4" oak. The thicker shaft makes the bit more stable and lessens the chance of the bit catching in the grain and kicking back.

Then, use a spiral-fluted bit rather than a straight cutter. The spiral flutes produce more of a shearing action while cutting, reducing the chance for a tearout or chipping of the grain. You can order these spiral-fluted flush trim bits from:



Use a spiral-fluted router bit for cleaner template routing.

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We also recommend that you keep the amount of material to be removed to 1/16" or less. The less wood that's available for the bit to grab, the less the chance for it to kick back.

Have a question for our woodworking experts? Here's how to reach us.

No matter how simple or perplexing a woodworking problem you're faced with, we would love to hear from you. We'll do our level best to solve your mystery, and you might even find your question and our reply on this page. You can reach us by one of several ways:

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• **Via Computer.** Send your e-mail to these addresses:

CompuServe: 74404,3516

Internet: 74404.3516@compuserve.com

Too many cedars

I've been looking at cedar for use in building some outdoor furniture. Can you tell me what the difference is between red and white cedars, and between white cedars and the Alaskan yellow cedar?

—Keith Quisenberry, Mars, Pa.

Keith, with the exception of Eastern red cedar (also known as aromatic cedar), these species are all excellent woods for outdoor furniture. And here's more information on these trees native to the United States.

Northern white cedar and Western red cedar fall within the genus *Thuja*. Being the most geographically widespread of the "cedars," lumber from one of these species should be readily available in your area. And because of their decay and insect resistance, you'll find them used in many outdoor projects. The most common applications include shingles, siding, house trim, posts, fences, and many uses in the boatbuilding industry.

Both woods are soft in texture, brittle, and coarse-grained. You'll find they work easily with power and hand tools, and are stable under most conditions. The most noticeable dissimilarity is in color: off-white to a pale yellow-tan for Northern white cedar and a dull red-brown for Western red.

The genus *Chamaecyparis* includes Atlantic white cedar, Port Orford white cedar, and Alaska yellow cedar. These trees produce fine-grained and even-textured woods that rank high in decay resistance. However, because of their more limited growing range, you will find lumber from these trees more difficult to come by outside of their native areas.

Atlantic white cedar produces a light brown heartwood with a pink tinge, while the wood of Port Orford cedar appears light yellow in color. Alaska yellow cedar has a bright yellow heartwood and is heavier and stronger than the white cedars. The woods in this second group find many uses in furniture making, interior finishing, small boat hulls, and cabinet making, as well as siding and shingles. ♣

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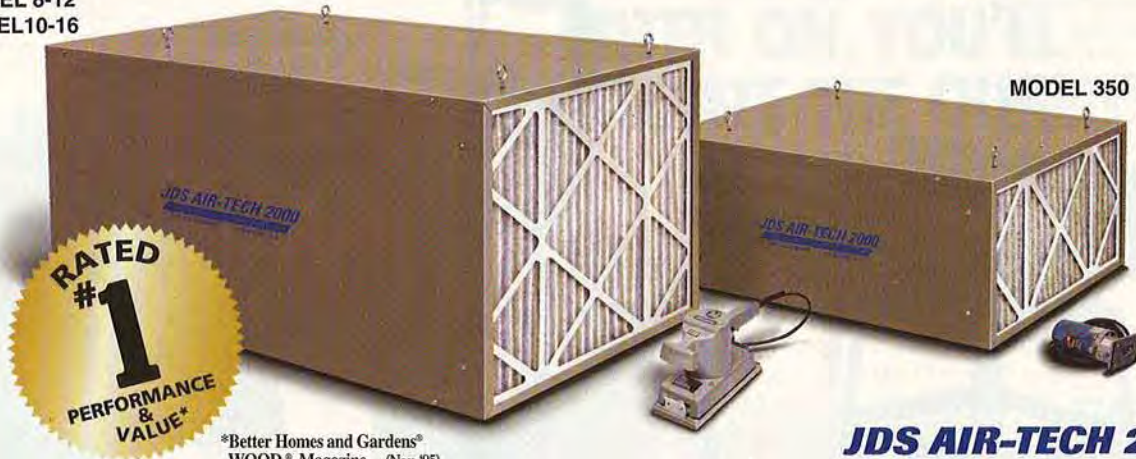


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*Better Homes and Gardens®
WOOD® Magazine (Nov. '95)

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THE STANLEY 57 CORE-BOX PLANE

A tool that gets right to the point

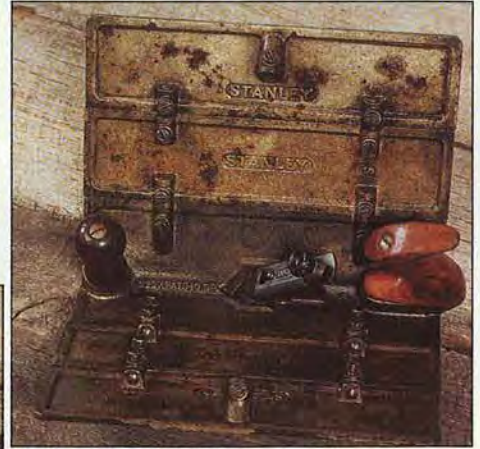
The odd-looking plane *far right* is a woodworking tool you wouldn't find in the average woodworking shop. It came instead from an iron foundry, where it belonged to the craft of patternmaking.

Woodworking in a foundry

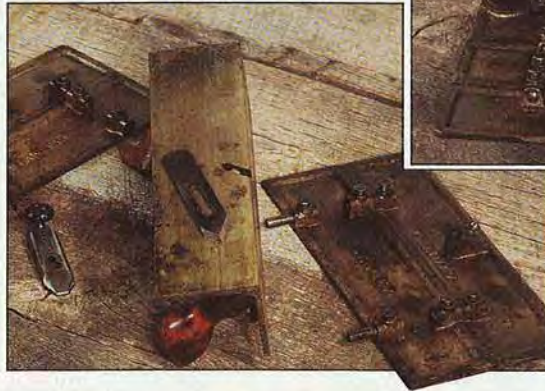
Metal casting begins with a pattern—a replica of the item to be cast. The pattern, oversized to allow for shrinkage that occurs as molten metal cools, is used to make a mold. Once, foundry patterns were made largely, if not entirely, of wood. Patternmakers were all-around woodworkers, skilled at joinery, carving, and turning. (Many still are.)

The Stanley 57 core-box plane *far right* served one patternmak-

ing task—hewing a half-round channel for the top or bottom half of a core box. A core box is a form for making a core, a cylindrical element placed in a mold to create a hole in the casting. Cores form the cylinder bores in an engine block, for example.



With two extensions installed, the Stanley 57 core-box plane (*above*) handles work up to 7½" in diameter. A rod (removed for clarity) spans the sides at the top to stabilize them. The iron features a pointed end (*left*).



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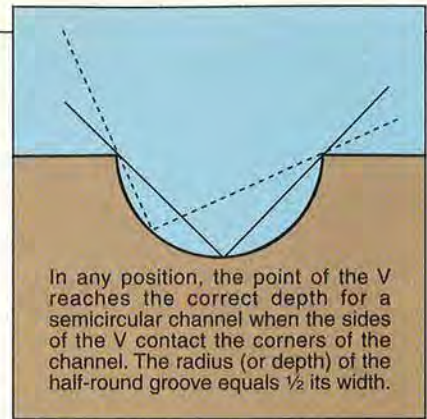
A plane with a round-nosed iron and semicylindrical sole would carve core-box channels of a fixed size easily. But since a foundry mold might call for cores of any diameter, practicality demanded a tool that could hew out channels of different sizes. A plane with a pointed iron and a V-shaped sole provided the solution.

The beauty of the V-shape is that the plane automatically maintains the radius for a half-round groove of any diameter. (The groove's width equals the diameter of the core to be made in the form.) With the plane's wings riding along the edges of the groove, the iron, which extends through the point, always forms a perfect radius, as shown above *right*.

The $\frac{7}{8}$ "-wide, pointed blade (lying on the bottom of the plane, *opposite page*) doesn't cut away the wood very quickly, however. So, the core-box grooves ordinarily would be roughed out with gouges or other tools first, then completed with the plane.

The basic Stanley 57 with one wing extension installed on each side could handle work 1-5" in diameter. With two extensions in place, as shown *opposite page*, it could go to 7½", and with a full set of three, 10".

The 57's heyday came with American industrial growth, around the turn of the century. (The plane was marketed from 1896 until 1943.) From about 1909 until 1923, Stanley catalogued a smaller core-box plane,



too. This one, the 56, covered a range from $\frac{9}{16}$ -2". A 57 in good condition with a full set of three extensions might bring upwards of \$400 from a collector today. A 56 could fetch even more.

And while you might not find a plane like this in what we think of as a woodworking shop today, you will likely find its descendant—the core-box router bit. ♣

Tool from the collection of Philip W. Baker, Venice, Florida.
Photographs: John Hetherington
Written by Larry Johnston

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HOW TO DECIDE WHAT TO SELL

Craftsmanship alone isn't enough

Ray Murray had no intention of becoming a professional woodworker. He had a good nest egg to retire on after leaving a job in security management. But when a friend who owned a furniture rental store asked him to make a bunk bed, he gave it a try. That was the start of a business near Cincinnati that today grosses nearly \$500,000 annually.

Murray's experience points to one successful approach any woodworker can take in deciding what to sell: Just ask a retailer. Furniture stores, craft stores, galleries, boutiques, anybody who sells the types of things you make, or might want to make, can be an invaluable source. Shop owners and managers are experts at determining consumer demand because they're face-to-face with customers every day. What's more, they usually know who's already making what—and where you can fill a gap in the market.

Listen and look for product ideas

The idea for Archiblocks, which are sets of wooden blocks in classical architectural styles, sprang from an offhand comment by a museum-store buyer that Vermont woodturner Ron Bower heard thirdhand. Archiblocks became a successful national product for him, with more than \$1 million in annual sales.

Most small-store owners will be happy to talk with you, provided you show them the courtesy of scheduling a visit beforehand. And you don't want to distract them from customers when you drop by to talk about your work. They might even invite you to make one of the products that you discuss. These informational

visits happen to be great no-pressure sales calls that put you in contact with potential customers without having to close a deal.

Craft shows and fairs are another big potential outlet for your work—and another great tool for discovering what sells. Go to several shows and see what appeals to you. But, more important, watch for what appeals to other consumers. Whose booth is drawing a crowd? What are people actually carrying home versus just looking at admiringly? Even after you start selling your own work at shows, try to take time to

walk around and look at other craftsmen's booths. Your research should never end because products and consumer trends are always changing.

Find what you like to make

Retailers and consumers provide only half the answer to the question of what to make. They can show you what consumers want, but they can't tell you what you're good at making. Nor will they invent truly original products for you to make. Even if consumers love wooden pen and pencil sets, if you can't make them at a competitive price, put your own touches on them, and enjoy making them, you won't be successful selling them.

Generally, it's best to start with things you can make easily and cost-effectively with the tools that



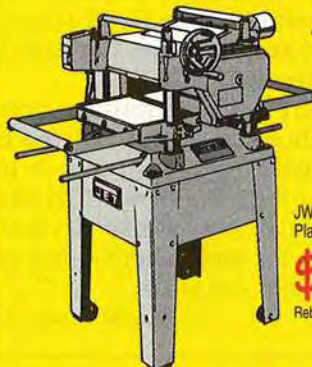
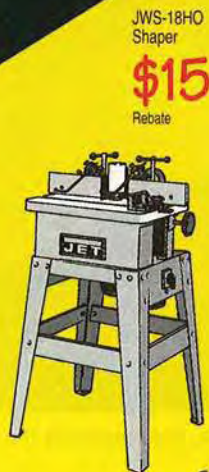
you already have. It's also important to build things based on your own talents and interests. Such was the case with Tim Detweiler, a Germantown, Ohio, building contractor who loved to toy around in his basement making decorative hardwood padlocks that actually work. After some friends commented on how much they liked them, he turned the eye-catching locks into a big hit on the local craft-show circuit.

Detweiler found out for himself that if a product springs from your innate interests, it's more likely to be novel. And, people are more willing to pay a higher price for it. You'll also enjoy yourself a lot more by expressing your creativity with what you make. ♣

Written by Jack Neff, a Batavia, Ohio, business writer and author of the book *Make Your Woodworking Pay for Itself*.

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SPOTLIGHT ON LATHE SAFETY

Woodturning appeals to many because with just a few tools you can complete a project in practically no time at all. Yet, sharp gouges, spinning stock, and moving belts can spell trouble for the unprepared.

Lathe chucks spin between 400 and 3,000 rpm. That's why you can reduce a chunk of raw wood to a nicely shaped bowl or spindle in record time. Yet, that speed, combined with sharp turning tools, also means that accidents happen in a flash. But, if you heed the following tips compiled from the *WOOD*® magazine shop, industry sources, and the National Safety Council, your woodturning should always be an accident-free experience.

Get ready for turning

As when you're operating most machines in your wood shop, you should always wear safety goggles, safety glasses with side shields, or a face shield when working at a lathe. Add a dust mask when sanding, and hearing protection when turning for extended periods. Don't wear gloves, jewelry, loose clothing, or dangling objects (a tie or long hair) that can catch on rotating stock or machine parts. Also pay attention to the following advice:

- Choose the correct tool for the type of lathe work you'll be doing. For instance, a skew chisel cuts and you use it for spindle turning. For faceplate work, such as a bowl, you might select a



For safe turning, keep the tool rest about $\frac{1}{8}$ " from the stock. This prevents the tool from catching and being thrown.

round-nose scraper. So become familiar with turning tools before you start.

- Make sure that your stock has no checks, loose knots, or insufficiently glued joints that could come loose and send wood flying from the lathe.
- Task lighting on the lathe should be shadow-free.
- Make certain that the lathe's belt-guard cover is in place and that all locks and clamping devices are tight.
- Adjust the tool rest so that the tool's cutting edge contacts the work at or slightly above the stock's center line and as close as possible to it (about $\frac{1}{8}$ "). Check clearance between the stock and

tool rest by revolving the stock by hand. Never adjust the tool rest while the machine is on and the stock is revolving.

- Imbed centers securely by tapping the stock with a mallet. And tightly clamp the tail stock to avoid slippage.
- Use a ball-bearing (live) tail center whenever possible, or add paraffin to a fixed (dead) tail center so that the stock turns freely.
- When faceplate turning, firmly anchor the stock to the faceplate with screws, or glue it to a wasteblock screwed to the faceplate. Never use drywall screws for attachment—they're brittle and can snap.

Continued on page 26

OK, Hold It.



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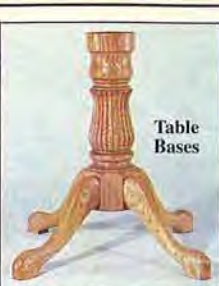
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LATHE SAFETY

Continued from page 24

Balance the stock for safe operation

If you want your turning to go smoothly, heed these tips:

- Rough-cut square stock for spindle turning to an octagonal shape with hand or power tools before mounting it on the lathe. The closer it is to round, the less likely it is to grab a tool, or make the lathe vibrate due to imbalance. You also must saw your turning blocks to a round shape for faceplate work.

- Perform all roughing work between centers at a slow speed of 400-600 rpm until the stock becomes cylindrical. Large-diameter faceplate work should also be done at slow speed. Remember, the larger the stock you want to turn, the slower the speed. You can increase rpm for finish work.

- Before remounting a turned piece, make pencil marks on the faceplate and the stock so that it exactly lines up with the original mounting. If you don't, the piece will turn off-balance.

Watch your tools

It's easy to get overconfident with a lathe. So keep the following points in mind:

- If not properly handled, a roughing gouge near the stock's end will easily grab and tear out of your hand as well as damage the wood. To avoid this, begin work a few inches inside the end and move out toward it.

- Watch where you lay your tools. A dropped gouge or chisel can injure your foot or be tossed by the lathe.

- To prevent injury, always remove the tool rest before sanding or applying finish to the turned stock.

- Never reach across stock that's turning on the lathe. Your hand or arm may catch on the wood and be pulled into the lathe bed.

- Sweep or vacuum loose shavings and chips from the lathe and floor. Excess waste on the floor can cause you to slip.

Written by Peter J. Stephano
Photographs: Bob Calmer



Out-of-balance stock will make the lathe vibrate excessively, so round-down rough stock for faceplate or between-centers turning before mounting it.

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DW100	3/8" 4 AMP, VAR. SP, DRILL	66
DW321K	TOP HANDLE JIG SAW KIT	162
DW356K	7 1/4" CIRCULAR SAW W/CASE	129
DW411K	1/4 SHEET SANDER WITH CASE	54
DW420	5" RANDOM ORBIT SANDER, PSA	68
DW421	5" DSTLS RNDM ORB SANDER, VELCRO	74
DW422	5" ROS 2 AMP SANDER W/DUST COLLECT	79
DW423	5" VS DUSTLS RANDOM ORBIT SANDER	93
DW430	3" X 21" DUSTLESS BELT SANDER	163
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DW610	1 1/2 HP ROUTER, 9 AMP	147
DW615	1 1/4 HP PLUNGE ROUTER, VAR SP	163
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DW625	3 HP HVY DTY PLUNGE RTR, VAR SP	274
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DW991K	DW991K WITH TWO BATTERIES	224
DW991KS2	14.4V CDSL DRILL & CIRC SAW KIT	348
DW995K	18V 1 1/2" DRILL W/BATT, CHRGR & CS	238

Panasonic

FREE 12V LANTERN!

EY610EQW	12V PREDATOR CORDLESS KIT W/KEYLESS CHUCK, 2 IRONMAN BATTERIES, 15 MIN. CHARGER & CASE, VSR	194
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5" HOOK & LOOP PAPER FOR PORTER CABLE	12.95
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RYOBI

AP12	12" PORTABLE PLANER	388
DC500K	DETAIL CARVER KIT	62
DS2000K	2 SP DETAIL SANDR W/CS & ACCYS	62
HL20VSK	MULTI ROTARY TOOL W/CS & ACCYS	55
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FT2000E	3 hp PLUNGE ROUTER W/30 REBATE	174
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F410	10" X 40T QUIET BLADE	48
F810	10" X 80T QUIET BLADE	78
LM72M010	10" X 24T FLAT TOP RIP BLADE	34
LM82M010	10" X 60T CROSSCUT/RIP BLADE	46
LU84M010	10" X 50T ATB COMBO BLADE	36
LU85M010	10" X 80T ATB FOR MIRROR FINISH	50
LU87M010	10" X 24T RIP BLADE THIN KERF	42
LU88M010	10" X 60T CROSSCUT THIN KERF	39
LU89M010	10" X 72T THIN FERRONFER METAL	57
LU92M010	10" X 80T TCH - BEST FOR LAMINIS	57
LU98M010	10" X 80T TCH LAMINATES OR WOOD	67
SD508	8" SAFETY DADO WITH CASE	116
SD508	NEW 8" SUPER DADO SET	167

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CENTRAL MACHINERY

16" SCROLL SAW

- Precision milled 14-1/2" x 8" table tilts 0° to 45°
- Uses pin end blades, 5-1/2" long
- Heavy duty cast iron frame and base reduces vibration • 7/8" blade stroke
- 5-1/2" blade length
- 1/8 HP, 110V, .83 amps
- 1750 SPM blade speed

ITEM 34618-0SWA **\$59⁹⁹**

FOOT SWITCH WITH GUARD

Ready to use. Steel housing and 8 ft. cord.

ITEM 00495-6SWA **\$9⁹⁹**



CENTRAL MACHINERY

10", 2 HP, BENCH TABLE SAW

Die cast aluminum table 25-3/4" x 16", has adjustable 17-7/8" x 2" rip fence and inch/metric scale for precise cutting.

- Maximum depth of cut at 90°: 3-1/8"; at 45°: 2-1/2"
- Blade capacity: 10" with 5/8" arbor
- Miter gauge adjusts 0° - 60° left and right
- Motor: 2 HP, 115V, 60 Hz, 10 amp, 4500 RPM
- Blade sold separately, below
- Shipping weight: 36 lbs.

ITEM 35715-2SWA **\$79⁹⁹**

10" 40 TOOTH CARBIDE TIP SAW BLADE

• 5/8" arbor
 ITEM 00529-4SWA **\$9⁹⁹**



CENTRAL MACHINERY

12" PLANER

Put a professional finish to low cost raw lumber quickly. Powerful smooth drive system gives cool even planing and constant blade speed.

- Motor: 2 HP, 115V, 60 Hz
- Single wheel depth adjustment: 0" to 6"
- Maximum width: 12"
- Maximum planing capacity: 3/32"
- Shipping weight: 66 lbs.

ITEM 06469-7SWA **\$299⁹⁹**



SAVE \$50 FROM OUR SUMMER '96 CATALOG



1/2 OFF

BENCH BRUSH

Perfect for workshop, home, or car. Extra long 2-3/4" bristles trap dust and clear saw dust, wood chips and metal shavings from work bench or tools. 14" beavertail style, natural lacquered hardwood handle with hang-up hole. • 7" brush head

ITEM 01072-4SWA **\$1⁹⁹**



HITACHI 7-1/4" CIRCULAR SAW

- 115V, 10 amps, 60 Hz, single phase
- 5500 RPM
- Tool weight: 8-3/4 lbs.
- Maximum cutting depth: 2-1/4"

Hitachi C75C **\$79⁹⁹**



ITEM 35120-3SWA

8-1/2" SLIDE COMPOUND MITER SAW

Hitachi C 8FB **\$429⁹⁹**

ITEM 31876-8SWA

3/8" 9.6V DRIVER DRILL WITH KEYLESS CHUCK

Hitachi D 10DF2 **\$104⁹⁹**

ITEM 34641-5SWA

4" DISC GRINDER

Hitachi G 10SD1S **\$59⁹⁹**

ITEM 34644-5SWA

3/8" 9.6V CORDLESS DRILL WITH KEYLESS CHUCK

Hitachi FDS10DVA **\$99⁹⁹**

ITEM 34998-6SWA

4-1/2" ANGLE GRINDER

Hitachi G12SA **\$59⁹⁹**

ITEM 35015-1SWA

9.6 VOLT CORDLESS 1/4" IMPACT DRIVER

Hitachi WH8DC2 **\$139⁹⁹**

ITEM 35254-2SWA

SAVE 35% FROM OUR SUMMER '96 CATALOG



12-1/2" ROLLER AND BRACKET SET

Double your table saw capacity! Attach to sawhorse or other surface and make your own roller table. Avoid the high cost of roller stand by making your own. Features: chrome polished roller, steel bracket, two holes for mounting. Roller is 1-1/4" diameter and 12-1/2" long.

ITEM 30026-6SWA **\$44⁹⁹**

CENTRAL MACHINERY

SAVE OVER 30% FROM OUR FALL '96 CATALOG

6" INDUSTRIAL RABBETING JOINTER

- Infeed table size: 22-1/2"
- Outfeed table size: 19-1/2"
- Motor: 1 HP, 110V, 4 amp, 4900 to 5900 RPM cutterhead speed
- Maximum depth of cut: 3/8"

ITEM 30289-5SWA **\$199⁹⁹**

REPLACEMENT BLADE SET

ITEM 33271-2SWA **\$15⁹⁹**



INCLUDES STAND



SLASHED 57% FROM OUR FALL '96 CATALOG

2 PC. 3/4" HEAVY DUTY PIPE CLAMP SET

Constructed from heat-treated cast iron, these durable clamps keep your work rock steady. Just screw the handle side onto a 3/4" threaded pipe and slide the spring loaded end on. You're ready to go! Pipe not included.

- Handle screw operating range: 2-1/8"
- 1-1/2" throat depth
- Weight: 2-7/16 lbs.

ITEM 31255-4SWA **\$2⁹⁹**

ODOR-FREE

SAVE 37%



PORTABLE 34,000 BTU FORCED AIR PROPANE HEATER

Circulate clean heated air fast. Heavy duty fan and high BTU output combine for efficient heating in the coldest conditions. Features solenoid valve, pressure regulator, and gas hose fit standard refillable propane tanks, not included. Long lasting stainless steel combustion chamber.

- 13 lbs. shipping weight
- Uses 1-1/2 lbs. of propane per hour
- 15-1/4"L x 7-1/2"W x 9-1/2"H

ITEM 32217-8SWA **\$99⁹⁹**

RYOBI

Ryobi OSS450

LIMITED QUANTITIES

OSCILLATING SPINDLE SANDER

Nothing beats this machine for contour and curve sanding. 1/2" to 3" drum size range (includes 1/2" and 1" drum) gives you the options. Removes stock fast using the whole drum and prevents sanding burn marks.

- Dust collection port
- Factory reconditioned, factory perfect
- 120V, 3.5 amps; 45 oscillations per minute; 1680 RPM; 29 lbs. tool weight

ITEM 33625-0SWA **\$99⁹⁹**



CHICAGO Electric Power Tools

SAVE 20% FROM OUR FALL '96 CATALOG

TRIM ROUTER

Now you can tackle those jobs that were too fine or exacting for a standard router. This compact router weighs only 4 lbs. for easy operation. Includes a straight and adjusting conductor to assist in trimming and engraving in both straight and circular patterns.

- 1/4" collet
- 30,000 RPM no load speed
- 110V, 3-1/4 maximum amp draw
- 8-1/2" overall length
- 4 lbs. tool weight

ITEM 33833-3SWA **\$39⁹⁹**



DELTA 10" BENCH SAW

Delta 36-510

Big saw capacity in a portable unit. Easy and safe to use with up-front controls and removable on/off switch. Front and rear locking rip fence and miter gauge maintain full sized accuracy.

- Motor: 13 amps, 115V, 4700 RPM
- 5/8" arbor
- Table: 16" x 26"
- Capacity: 3" max. depth, 2-1/2" max. depth at 45°
- Dimensions: 15" x 26" x 19"
- 40 lbs. tool weight

ITEM 35734-2SWA **\$119⁹⁹**



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CHICAGO
Electric Power Tools

SAVE 30% FROM OUR FALL '96 CATALOG

8-1/4" COMPOUND MITER SAW

- Powerful 1-3/4 HP motor, 120V, 9 amp, 4900 RPM no load speed
- Cutting capacity 2-1/8" x 5-1/8" miter, bevel, and compound cut
- Miter positive stops at 0°, 15°, 22.5°, 30°, and 45° left and right • 5/8" arbor
- Bevel positive stops at 0° to 45° left
- 20 lbs. shipping weight
- Includes free 8-1/4" multipurpose blade

ITEM 01078-2SWA

\$99⁹⁹

8" CIRCULAR SAW BLADE

- 20 tooth carbide-tipped

ITEM 00702-1SWA

\$3⁹⁹



SAVE 46%



11 PC. HOLE SAW SET

Cut smooth, clean, accurate holes 7/8" to 2-1/2" through wood, drywall, or even plaster up to 1" thick! Ideal for plumbers and electricians, the set includes 8 tool steel cups sized 3/4", 7/8", 1", 1-1/4", 1-1/2", 1-3/4", 2", and 2-1/2", plus 1/4" and 3/8" mandrels, a 1/4" bit, a hex wrench, and a blow mold case to keep everything organized.

ITEM 01263-1SWA

\$7⁹⁹

SAVE UP TO 33%

CONTROLLED PRESSURE, NON-MARRING HARDWOOD CLAMPS

These hand screws will clamp without scratching or marring your workpiece. Hardwood jaws distribute pressure evenly, and can easily be adjusted for non-parallel surfaces and odd shapes.

JAW LENGTH	JAW CAPACITY	ITEM	REGULAR PRICE	\$5.99 PRICE
8"	4-3/4"	04852-3SWA	\$3 ⁹⁹	
10"	6"	04853-4SWA	\$4 ⁹⁹	
12"	8-1/2"	04854-7SWA	\$5 ⁹⁹	



CENTRAL MACHINERY

1/3 HP

5 SPEED BENCH DRILL PRESS

- 620 to 3100 RPM
- 8-1/4" maximum distance spindle to table • 1/2" chuck
- 2" stroke, 8-1/4" swing
- 1/3 HP motor
- 22-1/2" high, 49 lbs. shipping weight

ITEM 05901-6SWA

\$49⁹⁹

DRILL PRESS WITH KEYLESS CHUCK

ITEM 34231-0SWA

\$69⁹⁹



CENTRAL MACHINERY

SAVE \$20 FROM OUR FALL '96 CATALOG



12" x 37" WOOD TURNING LATHE

Index pin contains 36 - 10° spacings for accurate fluting and marking on workpieces. 4" face plate, center assembly tail stock, spur assembly head stock and 6" and 12" tool rests. (Stand sold separately).

Distance between centers: 37"; Swing over bed: 12"; Spindle speeds: 575, 980, 1560, 2520 and 3580 RPM; Motor: 1/2 HP, 1725 RPM, 115V, 60 Hz AC, swing mounted to headstock; Drive spindle: No. 1 Morse taper plus 3/4-16 threaded; Tailstock: No. 1 Morse taper, 2-3/8" ram travel; Ship. wt.: 80 lbs.

ITEM 06841-0SWA

\$139⁹⁹

CENTRAL MACHINERY

FREE ACCESSORIES: Stand, 6" belt, 9" disc, open-end wrench, and hex key wrench



COMBINATION 6" BELT AND 9" DISC SANDER

1 HP, 110V, 8 amps, 3450 RPM, all ball bearing motor. Overall height: 40"; Table tilt 0° to 50"; Table surface: 6-1/2" x 12-3/4"; Two position work table for disc or belt use; Disc speed: 1720 RPM; Belt: 6" W x 48" L; Belt speed: 1280 FPM; Weight: 121 lbs.

ITEM 06852-6SWA

\$169⁹⁵

DRILL MASTER

TiN COATED FORSTNER BIT SETS

Titanium nitride runs cooler, cuts easier, and lasts longer than standard steel! Includes 3/8" shanks and individually organized wooden case. Rockwell hardness range from 55-65 HRC.

20 PC. SET

- 20 sizes from 1/4" to 3/4" by 16ths, 7/8", 15/16", 1" to 2" by 8ths.

ITEM 31130-7SWA

\$34⁹⁹

16 PC. SET

- 16 sizes from 1/4" to 2-1/8" by 8ths

ITEM 32404-8SWA

\$29⁹⁹



CHICAGO Electric Power Tools

3-1/4" PLANER

- Front base has a V-groove to help guide in chamfering • 2 blade cutter
- Depth adjustment knob
- Includes rabbeting guide plate/fence, sharpening holder, blade setting jig, replacement brushes, replacement belt
- D-handle with lock-on button
- 1/10" maximum depth of cut; 3-1/4" planing width
- 110V, 5 amps, 17,000 RPM
- 34,000 cuts per minute
- Tool wt.: 6-1/4 lbs.

ITEM 32222-3SWA

\$52⁹⁹

2 PC. REPLACEMENT BLADES

ITEM 33262-2SWA

\$7⁹⁵



CENTRAL MACHINERY

SAVE \$70 FROM OUR FALL '96 CATALOG



10" PLANER

- 2 HP, 110V, 1 phase, 11 amp, 8000 RPM
- 5-1/8" working distance
- 10-1/8" x 9-1/8" feed table
- 19" x 16-5/8" x 16" overall dimensions
- 10-1/8" blade size
- 2-blade cutter head
- 61 lbs. ship. wt. • Stand sold separately

ITEM 32377-3SWA

\$199⁹⁹

CHICAGO Electric Power Tools

14.4 VOLT 3/8" CORDLESS DRILL KIT W/KEYLESS CHUCK

- Variable speed, reversible; 0 to 600 RPM
- 6 torque settings
- Includes 6 pc. drill bit set, 6 pc. screwdriver bit set, magnetic extension bit, charger, battery, Jacobs® keyless chuck, and carrying case

ITEM 34793-4SWA

\$59⁹⁹

ITEM 34794-2SWA

\$27⁹⁹

29 PC. BRAD POINT WOOD DRILL BIT SET

ITEM 35837-1SWA

\$7⁹⁹



CENTRAL MACHINERY

1" BELT/5" DISC SANDER

Remove the belt back plate and sand all types of curves and odd shapes. With the back plate in place, you can apply pressure for faster stock removal.

- Motor: 1/3 HP, 2.4 amp, 60 Hz, 110V, 3450 RPM • Dust collection
- Table: 5" x 5", tilts to 45°
- Belt length: 30", 3350 FPM belt speed
- Shipping weight: 19 lbs.

ITEM 34951-1SWA

\$59⁹⁹ \$49⁹⁹



CENTRAL PNEUMATIC CONTRACTOR SERIES

1/4" CROWN AIR STAPLER/18 GAUGE BRAD NAILER KIT

Use 18 gauge staples with 1/4" crowns for a variety of jobs. Change to 18 gauge brads for molding, trim, and more! Features non-slip rubber grip.

- Includes: (2000) 18 gauge brads, (2000) 18 gauge staples
- Brad length: 5/8" to 1-1/8"
- Staple length: 1/2" to 1-1/8"
- 100 brad capacity, 110 staple capacity
- 100 PSI maximum pressure
- 1/4" NPT • 3 lbs. tool weight

ITEM 35673-1SWA

\$109⁹⁹



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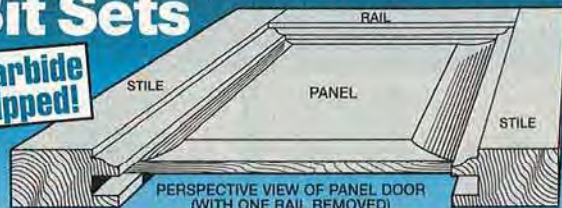
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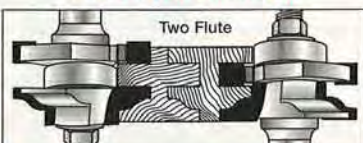


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*Reversible Combination Rail & Stile Bit
Works with stock from 11/16" to 7/8".

Includes instructions & professional tips!

Carbide Tipped RAISED PANEL DOOR SETS

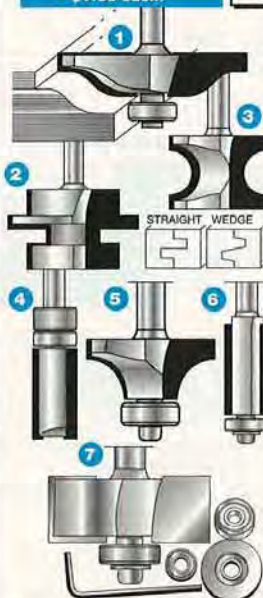
SET#	BIT STYLE	RAISED PANEL LRG. DIA.	SET PRICE
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#1302	1/2" Shank Router	* 3-1/2"	\$79.95
#1303	1/2" & 3/4" Shaper	4-5/8"	\$99.95

*Ball bearing included

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When ordering 3 or more router bits deduct \$1.00 each!

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#1331 3/4" Dia. of Circle\$21.00
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#1340 1/2" Dia., 1" Cutting length.\$15.00
#1341 3/4" Dia., 1" Cutting length\$17.00
- ROUND OVER**
#1314 (1/8" Radius)\$11.00
#1315 (3/16" Radius)\$11.00
#1394 (1/4" Radius)\$13.00
#1316 (5/16" Radius)\$14.00
#1369 (3/8" Radius)\$15.00
#1370 (1/2" Radius)\$17.00
- FLUSH TRIM**
#1337 3/8" Dia., 1" Cutting length.\$8.50
#1338 1/2" Dia., 1" Cutting length.\$9.50
- RABBETING KIT**
Change ball bearing guides and select 4 depth of cuts: 3/8", 7/16", 5/16", 1/4". Set. 1/4" shank rabbeting bit, 4 bearings (3/8", 1/2", 5/8", 3/4") and hex key.
#1425 1-1/2" Large Diameter\$25.00

MLCS Woodworking Accessories ON SALE!



25pc Brad Point Drill Bit Set

Drill accurate holes in wood, plastics & composites.

Bit sizes from 1/8" to 1/2" by 1/64" increments. Bits are deep fluted to clear chips quickly.

METAL CASE & BIT HOLDER INCLUDED!

ITEM #1413
REG. \$34.95 **SALE \$18.95**



Biscuit Joining Set

5/32" Slot Cutter-1/4" Shank and 250 #20 Biscuits

"Biscuit Joining with your Router", Instructional sheet included.

FAST & EASY

ITEM #1385
REG. \$35.00 **SALE \$29.95**



MERLE The ADJUSTABLE CORNER CLAMP®

- Adjustable, uniform clamping pressure on all corners
- Great for wide cabinet frames (for center or edges)
- Forces a frame into perfect square
- Almost NO capacity limitation, ships with 23 FEET steel banding
- Aluminum & Steel construction

ITEM #1420

REG. \$39.95 **SALE \$24.95**



Router Speed Control

Gets the best results with the wood and bit you are using!

- Works with all routers 3-1/4" HP or LESS - 120V 15 Amp
- Full horsepower and torque at all speeds
- Gives your router a feature only available on routers costing hundreds of dollars!

Includes Dust Cover

ITEM #1304
REG. \$49.95 **SALE \$34.95**



NEW!

Brass Piloted Router Bits

Carbide Tipped!

New bit saves hours of hand sanding!

Rout into those tight spaces and sharp corners! These professional grade router bits have smooth running Brass Pilots, measuring only 5/32" (approx.) in diameter, instead of the usual 1/2" ball bearing. Save hours of hand sanding or filing and get a more consistent edge.

Unique Brass Pilot:
Approximately 5/32" in diameter! It's 11/32" smaller than typical ball bearing.

Set #	Description	Shank Size	Price
#1428	1/8" R Round Over	1/4"	\$16.00
#1429	1/4" R Round Over	1/4"	\$17.00
#1430	3/8" R Round Over	1/4"	\$19.00
#1431	5/32" R Roman Ogee	1/4"	\$20.00

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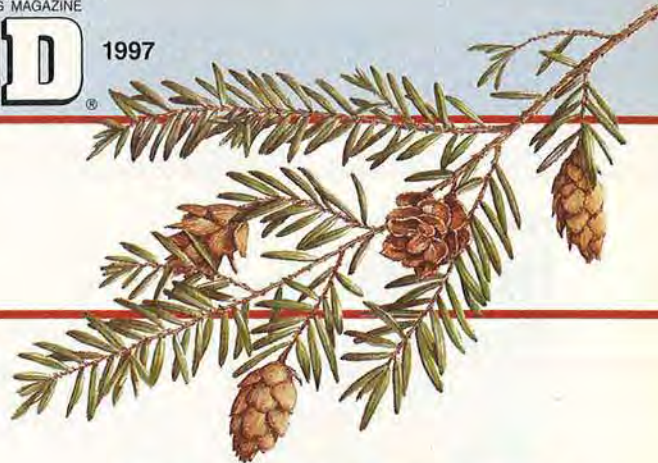
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Western HEMLOCK



The softwood that's not just for framing anymore

Thriving in the deep, damp forests of the Pacific Northwest, western hemlock rivals Douglas fir as preferred construction lumber. Yet in its beauty, this tree ranks ahead of all other conifers.

Western hemlock is a dignified tree. It grandly stands with pendulous branches and fronds of flat needles that provide it with a deep-green, lace-like coat.

Although known in the past primarily as a construction species, western hemlock has developed new admirers. Called a "white" wood in the industry, it resembles pine. But planing and sanding bring out an enhancing luster. That's why it now draws more notice as paneling, doors, flooring, even cabinets and furniture.



rowed, russet-brown bark, western hemlock stands out. Its flat, dark green, and glossy needles dotted by short cones make it easy to identify.

Western hemlock's wood ranges from creamy white to yellowish brown. It weighs about 29 pounds per cubic foot air-dry. The wood also is hard, strong, straight-grained, fine-textured, and nonresinous.

Uses in woodworking

Except for the heaviest construction, western hemlock always has been a mainstay for framing lumber because it firmly holds nails and screws. The wood has a reputation for termite resistance, too. If used outdoors untreated or unfinished, it will decay.



Natural range

Western hemlock's attractiveness, good machining and finishing qualities, plus wear-resistance, make it ideal for staircase components, doors, windows, and other millwork. The availability of clear, straight boards has brought it into the shops of cabinetmakers.

Availability

Wood-products producers market western hemlock with White fir, Grand fir, Noble fir, and other firs that have identical working, appearance, and performance characteristics and call the lumber HEM-FIR. If you live in the West, your chances of buying pure hemlock substantially increase. You'll want the clearest wood for furniture and cabinets: B & BTR SEL, C SEL, D SEL (Western Wood Products Assoc., USA finish grades) or Canadian grades No. 2 CLR & BTR, No. 3 CLR, and No. 4 CLR. For the lowest moisture content, demand boards dried to 15 percent ("MC 15" in the trade). Your cost should be about \$1 or less per board foot.

Continued

Wood identification

Western hemlock (*Tsuga heterophylla*) has three American relatives. Of them, only eastern hemlock has commercial importance.

In North America, the greatest quantity of western hemlock grows in the coastal rain forests of Alaska and British Columbia, followed by Washington and Oregon. But you'll find it nearly to San Francisco on the south and east into Idaho and Montana.

Where it grows heaviest, trees may reach 200' heights with diameters of 8'. Mammoths such as these may be nearly 500 years old.

With a narrow, pyramid-shaped crown and an almost taperless trunk covered by deeply fur-

PERFORMANCE PROFILE

western hemlock

(*Tsuga heterophylla*)

Western hemlock

Photograph courtesy of Western Wood Products Assn.

You won't find western hemlock finish- or appearance-grade boards kiln-dried to anything less than about 12 percent. That's typical for western softwoods. That doesn't mean that the wood can't be used for cabinets and furniture, though. But you'll have to acclimate the wood in your home for a week or so to stabilize it. Then, keep the following advice in mind when working your chosen wood.

Machining methods

Western hemlock is considerably harder than its eastern relative, yet you won't have difficulty working it with hand tools.

- Beware cutting any wood that includes knots, however. They tend to be brittle and break easily. Your best bet: Lay out the work to avoid them, or keep them toward the inside of your cuts.

- Sometimes, you can't avoid machining stock with knots, so you treat them tenderly. In thickening, for instance, use sharp knives and reduce the cut to 1/32" or less. On the jointer, also minimize the cut, and drastically reduce the feed rate at knots.

- Western hemlock, unlike Douglas fir, won't easily splinter or tear out when crosscut or otherwise machined across the grain. Still, for the cleanest cuts, keep a backing board in place.

- Plan on drilling pilot holes for screws in western hemlock. And if you're going to nail near the ends of a board, predrill.

- Because this wood is for all purposes resinless, you won't have to seal knots with shellac to prevent bleed-through. You should, however, seal or condition flat-sawn wood before staining. That's because western hemlock when

flat-sawn displays a growth-ring pattern of hard-then-soft that fights even staining.

- To preserve hemlock's natural light color, think about using a water-based clear finish. It won't yellow as easily as a traditional lacquer or varnish.

Carving comments

- There's little difference in actual hardness between western hemlock's earlywood and latewood, resulting in an even texture that takes detail.

- Use stop cuts or this straight-grained stock may trick you into taking off more than you want to.

Turning tips

On the lathe, western hemlock becomes a turner's dream. It has no resin, no odor, and doesn't impart taste. Use it for anything from chair legs to egg cups!

SHOP-TESTED TECHNIQUES THAT ALWAYS WORK

Any exceptions pertaining to this issue's featured wood species appear under bold-faced headings elsewhere on this page.

- For stability in use, always work wood with a maximum moisture content of 8 percent.

- Feed straight-grained wood into planer knives at a 90° angle. To avoid tearing, feed figured or twisted grain at a slight angle (about 15°), and take shallow cuts of about 1/32".

- For clean cuts, rip with a rip-profile blade having 24-32 teeth.

Smooth cross-cutting requires at least a 40-tooth blade.

- Avoid using standard twist-drill bits. They tend to wander in the wood and cause breakout. Use brad-point bits and a backing board under the workpiece.

- Drill pilot holes for screws.

- Always rout with sharp, preferably carbide-tipped, bits and take shallow passes to avoid burning.

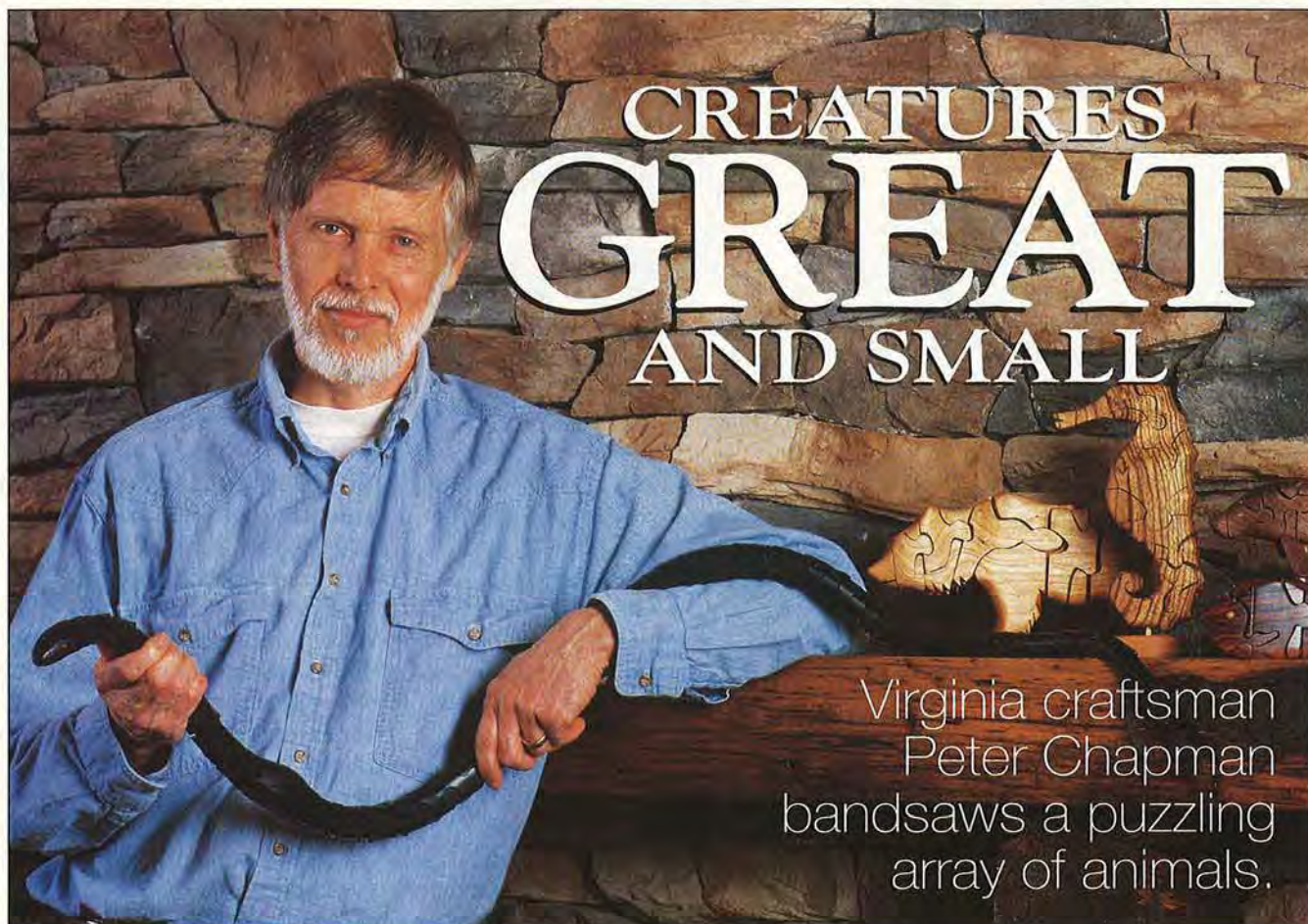
- Carving softwoods generally means fairly steep gouge bevels—20° or more—and usually deeper cuts. ♣

WESTERN HEMLOCK AT A GLANCE

Cost	\$ \$ \$ \$ \$
Weight	Ⓜ Ⓜ Ⓜ Ⓜ Ⓜ
Hardness	T T T T T
Stability	▲ ▲ ▲ ▲ ▲
Durability	⌚ ⌚ ⌚ ⌚ ⌚
Strength	🦵 🦵 🦵 🦵 🦵
Toxicity	☠ ☠ ☠ ☠ ☠
Workability	🪚 🪚

Look-alike: Ponderosa pine

CREATURES GREAT AND SMALL



Virginia craftsman Peter Chapman bandsaws a puzzling array of animals.

Bent Mountain. From its name, you'd never imagine that this hamlet in Virginia's Blue Ridge mountains boasts quite a zoo. But by following a winding road that meanders through hollows and down hillsides you'll eventually arrive at an aged, sagging apple barn at the edge of an orchard. In it, you'll discover bears, snakes, elephants, and prehistoric beasts, as well as a "seaquarium" of angelfish, bass, dolphins, whales, and other denizens of the deep. Visitors can't look forward to the entertainment of feeding time, though. These creatures—great and small—are made of wood.

A puzzling product to behold

Peter Chapman, 52, with his son Genesis, 26, creates the menagerie at Bent Mountain. That's his living—making and selling animals, fish, and reptiles of wood. Yet his, unlike the lifelike work of master carvers and bigger-than-life products of chainsaw sculptors, are actually three-dimensional puzzles crafted in walnut, cherry, and exotic stock.

"What I make is really a kind of kinetic sculpture," Peter says softly, his native Virginia reflected in his words. "I probably sell as many of them for adult toys as I do for kids' toys."

Saying that, the craftsman reaches across the workbench and picks up a blacksnake. Much as would a professional han-

dlinger, he places one hand behind the head, then lifts the writhing body with the other. The 3'-long snake clacks and clatters as its ebony parts move against each other. "Here, take it apart," he would encourage you.

The snake is again placed on the workbench, and carefully studied. How would one begin to dismember the thing? Aha! The eye! Your eager fingers push the dowel out of the wooden head. Suddenly, the first piece is freed. The next slides out at an angle. And the next. And the next. It's fun (even if you're deathly afraid of snakes).

About midway in the disassembly, a tiny piece flips out from within a larger one. Surprise! A tiny mouse hides inside. Your hands continue on to the tail. "Now, put it together—the

Continued



This angelfish of cherry represents just one inhabitant of Peter's aquarium of wooden fish and sea creatures.

Creatures Great and small

pieces can only go one way," says Peter with a smile.

In a minute or so the task is complete. Reinserting the eye locks the pieces together.

"Snakes are my best sellers," notes the woodworker. "And anytime I can put something inside a puzzle, it sells even better. Like that little mouse in the snake there. That's like a hook. Most people don't realize that they're puzzles when they first see my creatures. And having something inside gives them a whole new dimension—and gives you a reason to take it apart."

"Putting something inside isn't a whole lot of trouble, either, and it doubles the salability," Peter adds. "We even have a puzzle inside a puzzle—a big trophy bass with a puzzled bait fish inside. The possibilities are endless."

The long road to success

Three or four long miles (there are no short miles in the Blue Ridge) from the apple barn turned workshop lies what Peter calls "The house that puzzles built." It's



Inside a large bass puzzle hides a small bait fish, a feature that makes buyers eager to take them apart.

Peter and his wife Jenny's newly completed home. The glass, cedar, stone, and cement structure that he designed perches on a ridge with a view of nothing but mixed native hardwoods and moss-covered rock outcroppings. It's a dream turned reality. And it didn't come easy.

"Looking back, I've always been a woodworker," says Peter. As his eyes move across the massive stone fireplace before him, he recalls his days as an architecture major at Virginia Technical Institute. "I enjoyed the design side of architecture, but not the business side with all the rules and regulations. So after three years, I joined the Air Force."

Peter spent his hitch as a state-side photographic interpreter, and eventually learned photography. After his discharge, he put his newly acquired skill to use doing promotional work for a rock and roll band in Pennsylvania. "When the band fizzled out, I got a job working in George Nakashima's shop in Bucks County," he remembers. "What an experience that was! Of course, I knew what oak and cherry were, but in Nakashima's shop there were woods from all over the world."

In the famed woodworker's shop, Peter began on the lowest rung of the ladder, as a sander. Still, he appreciated what he saw, and learned by observation. "I just kind of absorbed what was going on. I remember seeing the other craftsmen cutting dovetails and working with huge slabs of wood with natural edges—3' wide and 12' long. Nakashima had supervised the sawing of each log, as if it were a diamond in the rough. And because I was a finisher, I got to see the wood up close.

"That was the inspiration that started my career, although I didn't know it then," Peter continues. "After three years, I left because there was no way for me to grow in his shop. It was time to get out on my own."

The self-employment road led Peter to a spell in carpentry, then

At the radial-arm saw, Peter lays out patterns to be cut from 2"-thick air-dried cherry. He harvests walnut and cherry nearby, and mills it himself.



on to Ohio as a designer/builder. "A small group of us in our mid-twenties functioned as both architects and carpenters," Peter says. "We had a woodshop where we could produce all our own millwork. Back then, we had lots of building ideas, and were able to do them because we had the woodworking know-how."

After a few years, Peter took another woodworking-related job, as a patternmaker in a foundry. After a while, though, his home state of Virginia beckoned.

In Roanoke, Peter landed employment building reproductions of antique round oak tables. For three years, he and a helper turned out 400 tables annually, and broadened his understanding of production. "I learned to do things in order," Peter remarks. "Then the market bottomed out for the tables. I was on my own again. Yet, having done that gave me the guts to look for a shop so I could start on my own."

Peter managed to locate at least the prospect for a shop in an abandoned barn tucked into the hills near Bent Mountain. After adding insulation and updating the wiring, it served him well, as it still does today.

"Soon I was making custom furniture for people down in the Roanoke Valley," Peter says. "I learned how to do whatever was necessary to get a job done. I did some oriental pieces, Danish styles, some contemporary. Looking back, what I learned from the experience was that no matter if you're designing a house or furniture, the form really does follow the function."

Inspiration at the bandsaw

In today's craft market, Peter's puzzles have made quite a mark. There's not anything like them. And he has nearly 100 retail accounts nationwide. However, if



Jenny, Peter's wife, and Genesis, his son and right-hand man, trace top views on the roughed-out forms of puzzles-to-be. The lines will guide the sanding.

it weren't for his brief stint as a patternmaker, his puzzles might never have been.

Peter recalls: "After a while, I started doing crafts fairs with my furniture, and added turned bowls to my line—I kept thinking of things that would sell better. I tried cutting boards, then bandsawn boxes, Early American quilt racks, and blanket chests. I needed something that was affordable, functional, yet one of a kind. It was slow. I was making a living, but little was going in the bank.

"Then down the line somewhere it came to me: puzzles. And the thought really went back to when I was a patternmaker. We worked with 12"-square blocks of 8/4 mahogany, and cut most of it on the bandsaw. For fun, I used to make these squiggly puzzle blocks. I puzzled them up end to end, then turned them on their side and puzzled them up again. It was really interesting."

From his furniture making, Peter had accumulated lots of scrapwood, and like all woodworkers, he hated to throw it away. Especially when much of it was

exotic wood. As he remembers it, Peter decided to incorporate the puzzling process with his scrapwood. "Then, I thought of turning the wood 90° after each cut, and it made the process all the more interesting. So my first puzzled creature came from a 1×1×24" piece of wood I had.

"After I started cutting it up on the bandsaw, it sort of looked like a snake," he continues. "With the next one, I shaped the head and found out that I could really make it look like a snake. Then, it became a matter of applying the technique to different animals, fish, and reptiles. I soon found out that at crafts fairs the puzzled creatures outsold my other stuff. That was six years ago, and I've been at it ever since."

What it takes to puzzle wood

"Puzzling is such a fascinating process. It really looks harder than it is," says Peter (turn to *page 78* to give it a try). "It takes me about 30 minutes to puzzle out on the bandsaw my biggest piece, the 5' anaconda. But at crafts fairs,

Continued

Creatures Great and small

no one believes that it takes so little time. I end up telling them that it takes an hour.”

How does Peter do it? In his shop, the process goes quickly when he gets his hands on the wood. “The piece has to be shaped and sanded first, because it would be very difficult to shape after the pieces are cut,” he notes.

Stepping up to the bandsaw, the craftsman places a 24"-long cocobolo snake on the table. He points the wooden reptile's head toward the saw's $\frac{1}{8}$ " blade (with 14 teeth per inch) and turns on the machine. Deftly, his hands direct the wood into the blade, as shown *right*. “With the snake on its stomach, I make the first squiggle cut,” says Peter. “Then, I turn it on its side to make the cut that frees the first piece. I work from head to tail all the way down, and that's the technique for all of my designs. And I don't first draw a pattern on the wood. I cut by eye, always making the next cut relate to the one before. No two cuts can ever be the same.”

After Peter has puzzled a piece, he drills through its head (or leading piece in the puzzle) to allow the insertion of a small dowel, which usually serves as the eyes. This locks the puzzle's pieces together. Then, all it takes is a light touch of 120-grit sandpaper to knock off any wood fibers raised by the bandsaw blade.

Next, the creature gets two coats of clear tung oil on its surface. He leaves the



Peter bandsaws these snakes into puzzles from head to tail, turning the workpiece 90° after each cut so that the pieces cleverly interlock.

exposed wood inside the cuts unfinished because any later movement won't interfere with the creature's loose joints. “There's nothing critical here to protect,” says Peter.

More critical than the puzzles' finishing, though, is Peter's choice of wood. The stock must be well-seasoned or kiln-dried hardwood. Other than that, he has two criteria: The wood must be strong, of course. And it has to look right.

“Part of the fun of making these puzzles is finding wood that matches and adds to their look. Open-grained wood, such as oak, looks terrible. On the large rattlesnake, for instance, the zebra-wood's close grain and figure give it a natural appearance, even if it's fanciful,” says Peter. “Whenever I find a neat wood that works, I add it to the line.”

The wood also has to fit

the production process. “It has to do with the species' cellular structure, not the density,” he explains. “Because it's not so much the cutting, but the sanding. The wood can't have a tendency to burn. Right now, the stock inventory includes walnut, cherry, bubinga, padauk, ebony, zebra-wood, cocobolo, tulipwood, and leopardwood.”

Eventually, as his son Genesis takes over more and more responsibility in their business, Peter would like to bring his creatures, or at least their concept, to a larger scale. “How about huge puzzles as abstract sculptures for display? I might even open up a log and puzzle up half of it,” he says inquiringly. “Whatever I do, I know how design works with me—something else grows from working out an aspect of what I'm presently doing. What a puzzling future it's going to be!” ♣



Made from zebra-wood, the 4' rattlesnake closely resembles the real thing. It sells for \$300. The bear is crafted from cherry and has a \$100 price tag.

See all Peter's puzzles

For a brochure describing Peter Chapman's puzzled creatures, send a business-sized SASE to: Class Menagerie, P.O. Box 45, Bent Mountain, VA 24059.

Written by Peter J. Stephano
Photographs: Steve Uzzell

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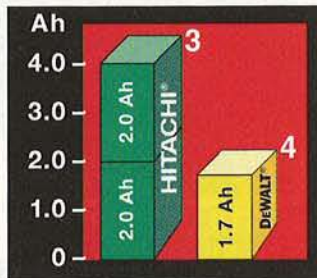
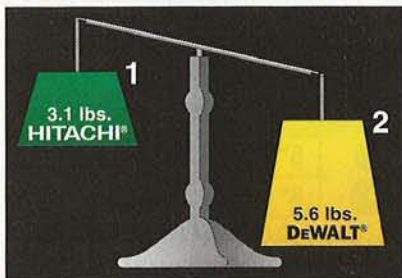
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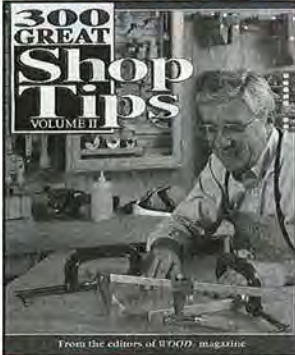
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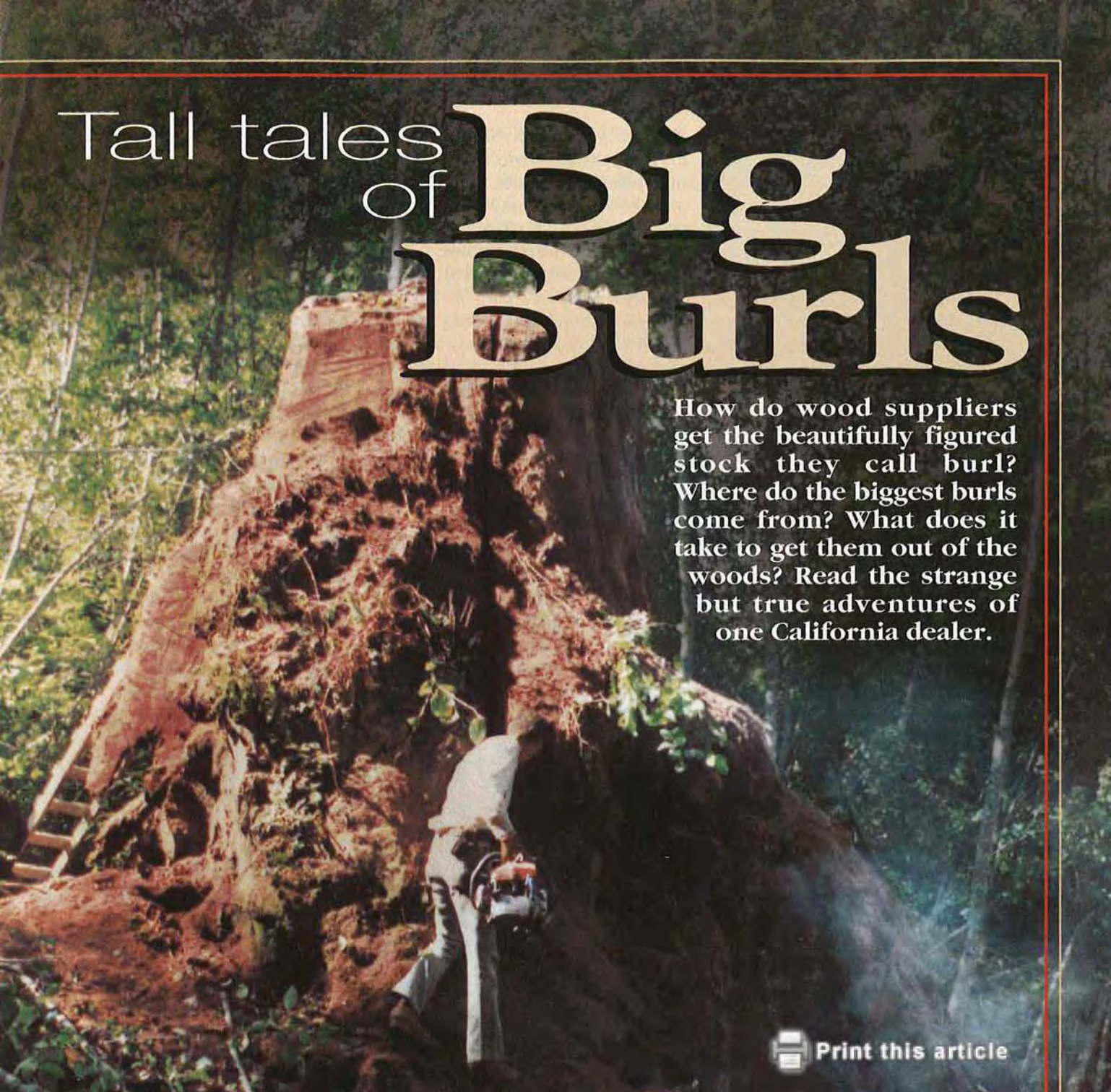
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Tall tales of **Big Burls**

How do wood suppliers get the beautifully figured stock they call burl? Where do the biggest burls come from? What does it take to get them out of the woods? Read the strange but true adventures of one California dealer.

 [Print this article](#)

A few years ago on a visit to Oregon craftsman Michael Elkan, known for his burlwood band-sawn boxes, I became intrigued by his stockpile of huge burls, some weighing 1,000 pounds. As a Midwesterner, I was only familiar with bowl-sized bumps on the trunks of some maples and oaks.

Later, on a trip to northern California, I saw roadside retail

outlets for redwood burls. Mostly slabbed, they ranged from plate-sized to tabletops that could accommodate dinner for eight.

More than ever, I wanted to find out about big burls and where they came from. What I discovered was that the burl business is akin to used car parts: You can buy about anything, but don't ask questions. The names of burl harvesters I was

given were always accompanied by disclaimers. Finally, I reached Bruce Remington, of The Burl Tree in Eureka, California. He's dealt in redwood burls (and other species) for three decades. And Bruce had some fascinating stories. Here, I'm sharing two of his best.

Peter J. Stephano

—Peter J. Stephano, Features Editor

Continued

Big Burls

No matter where burls grow on a tree—at the base, in the root system, or along the trunk—they all seem to originate in similar ways, according to Bruce Remington, 54. “Burls could be considered similar to human tumors or carbuncles and warts,” he explains. “If you look at a burl closely, it has grain similar to wart tissue—it grows in layers and patterns. [See examples, *right*.] A burl starts from an injury or disease in the tree. The tree tries to kill it by isolating or restricting its growth—like a war going on—by producing a burl around it from the first year. And the burl grows with the tree.

“I’ve found that a burl can become twice the diameter of the tree,” Bruce continues. “And they don’t necessarily bulge out. They grow in different shapes and directions, and can even put out roots.”

The largest and best burls are at or below ground level, Bruce believes. He calls them crown burls. “And they’re barely visible,” he says. “Other burls, on tree trunks, can

get fairly large in bigleaf maple or madrone, but nowhere near the size found in redwoods at ground level. In northern California, they’re hard to find because they’re so overgrown with brush that they look like part of the hillside (see photo, *preceding page*). So when you find a redwood crown burl, it’s usually because you happen to trip across it, and that’s exactly what I did one time.”

Remembering, Bruce’s eyes light up. There’s a story about to begin.

Bruce harvests the Eldorado Burl

“I’ve dealt with tens of thousands of burls, but the one I’m most proud of is the one I call the Eldorado Burl, which I found on Louisiana Pacific land near Big Lagoon, California,” says Bruce, his voice rekindling 15-year-old excitement. “I was roaming around the



Myrtle Burl

woods looking for redwood stumps pushed out by early loggers when I stumbled upon this great redwood crown burl. It was huge at the base—over 40’ in diameter—and had two trees growing out the top. I paid \$2,100 for it, and figured I bought a \$600,000 burl.”

Getting the mammoth burl off the land, though, proved more difficult than driving the bargain. Bruce describes it as if it happened only yesterday:

“We had a 20’ ladder, but it only reached two-thirds up the slippery burl. It was a gargantuan task to saw the thing up, and everything went wrong. We took in my 80,000-pound HD-20 Allis Chalmers track loader and immediately got it stuck. Then, I had a young guy to work as a climber. He went up the



Buckeye Burl



ladder, fell off the burl, and quit. So there I was, left with a 52-year-old helper and two Stihl chainsaws with 8' bars to hack it up.

"My plan was to saw from the top and split it up like a 40'-diameter pie," Bruce continues. "We started with six cuts at 5' or 6' intervals down into the burl. Next, I hooked up the loader with its winch and tried to pull the burl parts loose. But it didn't work well. Eventually, with about 250,000 pounds of force, we managed to peel off one big chunk—something like 30' long by 4' wide and 8' thick—weighing some 50,000 pounds.

"When we got that off, the rest became easier," says Bruce. "We could then get into an abandoned bear's den in a hollow of the burl and saw from there. So we sawed and ripped off more pieces. Finally, we had 10 chunks to pack out on the loader to my rig—a semi with a 28' trailer fitted with a crane. Anyway, we struggled to legally load those 30'-long chunks one, two, or three to a load and haul them to Eureka. All in all, it took us two weeks, but I estimate there was 500,000 pounds of good wood in that burl."



Madrone Burl

The burl that got away

Fishermen always have a story about "The One That Got Away." There's room in the burl business for such a story, too. And Bruce relates it with chagrin.

"The largest burl ever, in my opinion, was in a swamp area that in the early seventies became part of Redwood National Park," he recalls. "This redwood burl was unbelievable. There must have been a grandfather tree there that sent out suckers to form a ring of trees. What I saw was about six or eight trees of 6-10' diameter connected with one burl! It stood at least 25' high over a 100' dis-

tance—a wall of burl 10-15' thick! I estimate it at a million pounds.

"My bid for that burl was \$8,500, which was more money than I had, but it wasn't enough," Bruce says with a sigh. "My competitor had veneer [manufacturing] contacts, and he bid \$20,000. I've heard that he got \$100,000 for it. That same burl now would start at \$1 million, and veneer people would mark it up 10 to 50 times selling it by the square foot. It would be a \$10 to \$50 million burl."

A black market in burls

In California, burl loggers must have a limited timber operators permit. "In getting burls, there's a big insurance liability because you could do a lot of damage," notes the burl dealer. "A fire sparked by a chainsaw can burn acres of good logging timber. That's one reason there's not much burl logging anymore: Just not enough money for the liability."

There is, however, another level of the burl business. Bruce explains, "Most big timber companies don't want burl gatherers on their property. But their tree loggers like to pick up beer money or better, so they just whack off slabs from a redwood burl or madrone or whatever and sell them—in essence black-marketing. I'd be in quite a lot of trouble if I didn't have a lot left. I'm in the heart of the redwoods and believe me it is more than difficult to get this stuff at all now."

Burls to your door

For a detailed sales list of burls and other wood, write Bruce at The Burl Tree, 3527 Broadway, Eureka, CA 95503, or call 800/785-BURL. When traveling in northern California, stop by. The Burl Tree is on US 101.



In his storage yard, Bruce cuts slabs with his chainsaw from a huge redwood burl left over from the "old days."

How to spot good burl

Never cut burls from a living tree. But if you find what you think is a burl on a dead or downed tree, here's Bruce's advice for checking it out. "Establish how solid the burl appears. If you spot decay on the outside, it probably goes all the way through. And many growths on trees are not true burls at all, but have straight grain. So read the bark, looking for swirls and patterns, because what you faintly see outside exactly reflects what's inside. If it looks good, slice it off with a chainsaw."

Crown burls are less easy to spot. Bruce suggests looking at any outward flaring or protuberance of a tree's trunk or stump from a distance to evaluate possible burl structure just below ground. Then move in to inspect for defects. He notes, too, that few crown or root burls are of high enough quality to merit digging up because of all the work and expense involved. "Better to prowl land clearing sites or road building operations where root and crown burls may already be out of the ground." 🌲

Written by Peter J. Stephano
Photographs: Bruce Remington

A grand Entrance

This mat is several steps above the ordinary



As guests to your home step admiringly across this distinctive mahogany and white oak welcome mat, you'll be proud to tell them you made it yourself. But you don't have to tell them just how easy it was.

Cut the frame parts first

1 Cut the frame sides and ends (A and B) 1" longer than shown on the Bill of Materials. Mark the top face of each with tape.

2 Center a $\frac{1}{4}$ " groove $\frac{1}{4}$ " deep along the inside edge of each frame end (B). A tablesaw with a $\frac{1}{4}$ " dado blade does the job easily.

3 Miter-cut parts A and B to the finished length shown. (To cut

the joints accurately, we used a tablesaw with a sliding table.)

4 Refer to the Frame Full-Sized Pattern on *page 45*, then cut the $\frac{1}{8}$ " spline slots where shown on the ends of the frame parts. Saw the slots, or follow this procedure to do it with a slot cutter chucked in a table-mounted router:

Mark the slot's stop point on the router-table fence. Then, to make the slots, adjust the table-mounted router to position the cutterhead $\frac{3}{16}$ " above the table surface. Slot one end of each piece, keeping the marked surface facing up. Then, reset the cutter height to form the slots in the other ends. To do this, place one of the slotted pieces on the router table with the marked face down. Raise the router so the cutterhead slips

into the slot. Lock in this setting, then rout the remaining slots.

5 Cut two notches in the bottom of each frame side (A) where shown in the Notch Detail drawing *opposite page*. To form the notches, mark centers $8\frac{7}{8}$ " from the short corner of each miter and $\frac{3}{8}$ " from the inside edge of each part. At the centers, drill $\frac{3}{8}$ " deep with a $\frac{3}{4}$ " Forstner bit, using a drill press for accuracy. Drill a $\frac{7}{64}$ " pilot hole $\frac{1}{4}$ " deep into the middle of each hole. Complete the notches with a chisel.

6 Rip a piece of $\frac{1}{8}$ " stock at least 18" long to $1\frac{5}{16}$ " wide. Cut four $3\frac{1}{2}$ " lengths from it, and sand or saw one end of each to match the rounded spline slots. Place the splines in position, and dry-assemble the frame to check its fit.

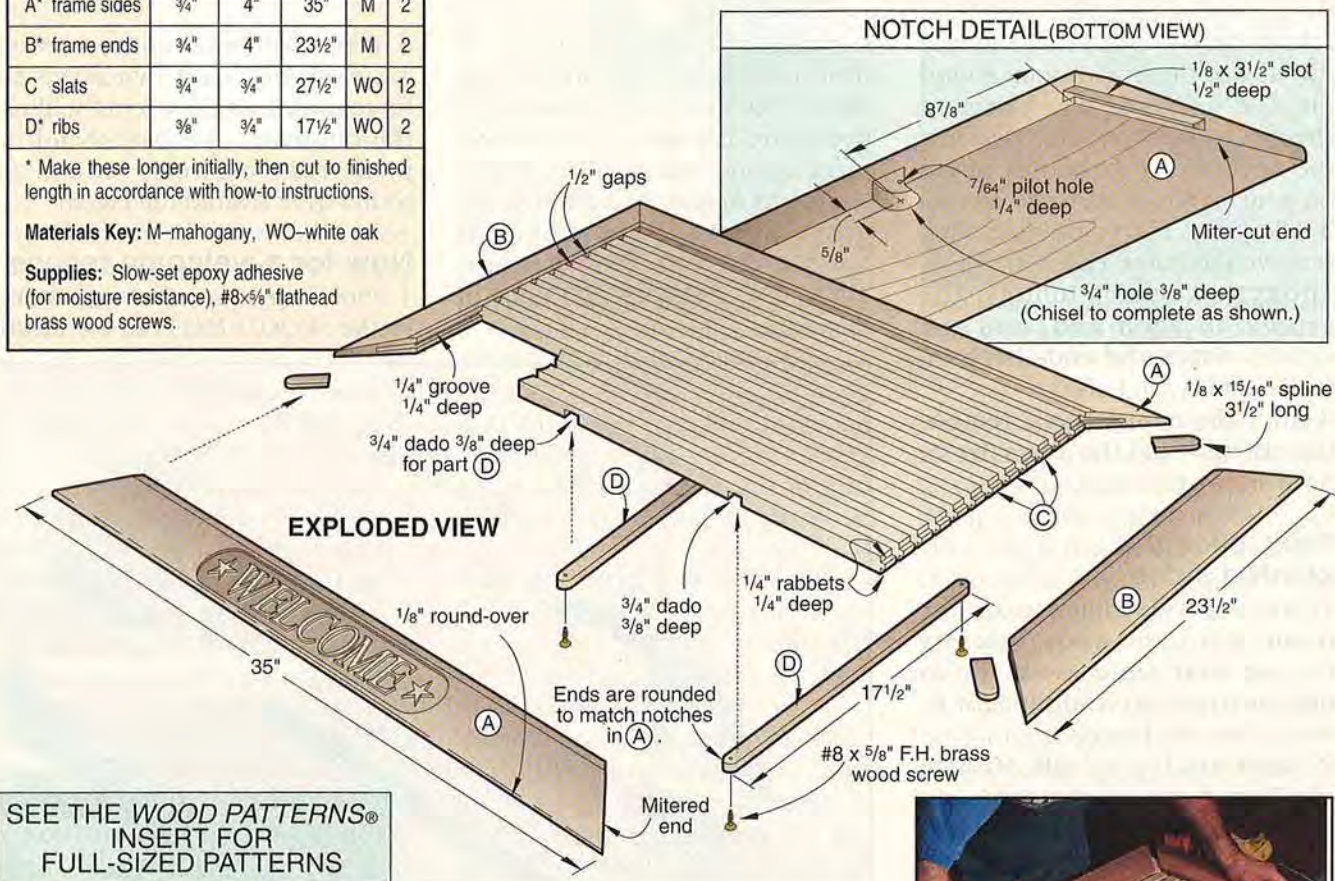
Bill of Materials

Part	Finished Size			Mati.	Qty.
	T	W	L		
A* frame sides	¾"	4"	35"	M	2
B* frame ends	¾"	4"	23½"	M	2
C slats	¾"	¾"	27½"	WO	12
D* ribs	¾"	¾"	17½"	WO	2

* Make these longer initially, then cut to finished length in accordance with how-to instructions.

Materials Key: M—mahogany, WO—white oak

Supplies: Slow-set epoxy adhesive (for moisture resistance), #8×⅝" flathead brass wood screws.



SEE THE WOOD PATTERNS®
INSERT FOR
FULL-SIZED PATTERNS

Then, saw the slats

1 Cut the slats (C) to the sizes shown. For contrast, we used white oak for the slats and ribs in our mahogany-framed doormat.

2 Form tenons on the slat ends by cutting ¼" rabbets ¼" deep in the top and bottom faces at both ends of each slat (C). Set up your miter gauge with an auxiliary fence and a stopblock to ensure uniformity. Sand slight chamfers on the tenon ends.

3 Dado the slats where shown by the Front Section View *next page*. These dados must line up with the notches in the frame sides (A) to accept the ribs (D). So, verify the locations before cutting the dados. Cut them with a ¾" dado blade, again employing an auxiliary fence and stopblock.

4 Cut two ¾×¾×18" pieces of white oak for the ribs (D). Mark a center ⅝" from each end. At each center, draw a ⅜"-radius arc for the rib ends. Drill and countersink a ⅝" shank hole at each center. Bandsaw the rib ends slightly outside the radius lines, then sand down to them with a disc sander.

Now, assemble the mat

1 Cut 26 ½×½" spacers, each about 1½" long. Insert the spacers between the slats as you dry-assemble the frame sides, ends, slats, and ribs. Refer to the Exploded View drawing as you assemble the mat. For easiest assembly, work with the mat upside down, that is, with the ribs up. Slip the splines into their



Insert spacers between the slats when you assemble the mat. Square up the assembly as you clamp it together.

slots to align the miter joints, and clamp, as shown *above*. Check the assembly for square and fit.

2 With the assembly still clamped, remove the ribs (D). Spread epoxy adhesive (for moisture resistance, we used slow-setting epoxy) into the dados in the slats (C) and the notches in the frame sides (A). Place the ribs (D) back in place, and secure with #8×⅝" flathead brass wood screws. (Don't substitute steel

Continued

Grand Entrance

screws here—later you'll run into the tips of them with your router bit. The soft brass won't damage the bit as steel would. Besides, the brass won't make rust marks on your porch or stain the wood.)

3 Allow the epoxy to cure, then remove the frame ends (B). Apply epoxy to the slat tenons, the groove in each end, and the splines. Place the ends back on the assembly, and clamp.

4 After the epoxy cures, remove the clamps. Sand the joints flat on both sides of the mat.

Next, slice the slanted sides

1 Saw the wide chamfers on the frame sides and ends. Start by raising your tablesaw blade as high as it will go, and tilting it 8° away from the fence.

2 Next, attach a 12"-tall, 36"-long auxiliary fence to the saw's rip fence. (A piece of plywood or particleboard screwed to the fence would do the trick. Ensure that the face of the auxiliary fence stands perpendicular to the

saw table.) Position the fence ¼" from the blade, measured at the table. Place a feather board to press the bottom of the workpiece against the auxiliary fence, as shown *below*. Make a test cut on scrapwood, and check it against the Full-Sized Pattern. Then, saw the sides and ends of the mat.

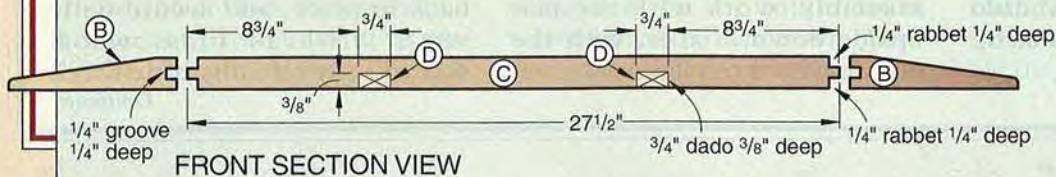
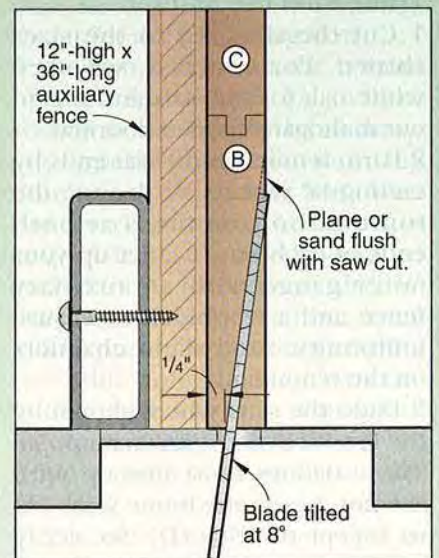
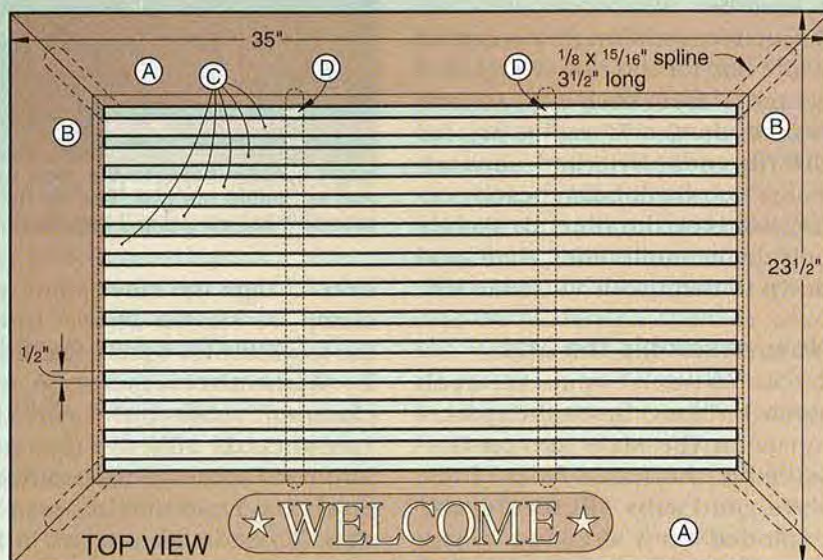
3 The blade will not cut away quite all the wood that needs to be removed, as shown in the illustration *below*. So, block-sand or plane the chamfers. Sand a ⅛" round-over around the edge.

Now for a welcome recess

1 Photocopy the lettering pattern in the *WOOD PATTERNS*® insert



The combination of a tall auxiliary rip fence and a feather board allows you to saw the wide chamfers safely. Because the blade doesn't cut quite deeply enough, you'll need to complete the chamfers by planing or sanding.

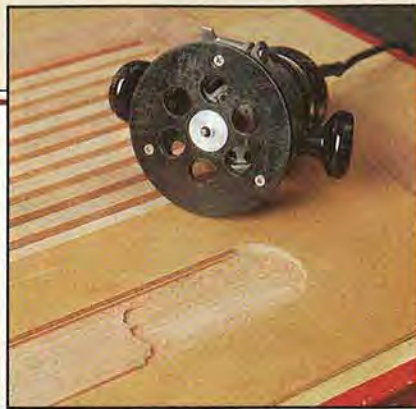


in the middle of the magazine. (Make two copies—you'll need another later.) Center the pattern on a $\frac{1}{4} \times 9 \times 24$ " piece of hardboard. Stick it in place with spray adhesive, then cut out the oval opening—this will be the template for routing the recess in the frame side. Remove the pattern.

2 Refer to the Frame Recess drawing below, and lay out the location for the routed recess on one side of the frame. Attach the hardboard template in the appropriate position with double-faced tape.

3 Fit your router's base with a $\frac{7}{16}$ " (outside diameter) guide bushing, and install a $\frac{1}{4}$ " straight bit. (Check with your tool dealer for the bushing to fit your router.) Adjust the router to a cutting depth of $\frac{3}{8}$ ". Allowing for the template's $\frac{1}{4}$ " thickness, this will allow the bit to cut $\frac{1}{8}$ " deep into the frame side.

4 Rout the recess, first cutting around the perimeter of the area then cleaning out the middle, as shown above. This is where you'll rout off the screw points.



Equip your router with a guide bushing to follow the hardboard template when you rout the $\frac{1}{8}$ "-deep frame recess.

5 Remove the template from the frame side. Lightly draw center marks on the frame at the ends of the recess, following the patterns.

Add a friendly greeting

1 Adhere another copy of the lettering pattern to a $\frac{1}{8} \times 2\frac{1}{2} \times 17$ " piece of white oak. Mark the tops of the O and the stars.

2 Scrollsaw the letters and stars. Leave the patterns attached after cutting (it helps to have them in place for later steps). Lay out the cutouts on the original pattern.

3 To make a positioning stick for the cutouts, cut a piece of scrapwood $\frac{1}{2} \times \frac{3}{4} \times 16\frac{3}{16}$ ". At each end



Double-faced tape holds the letters and stars on the stick for easy and accurate positioning in the epoxy-coated recess.

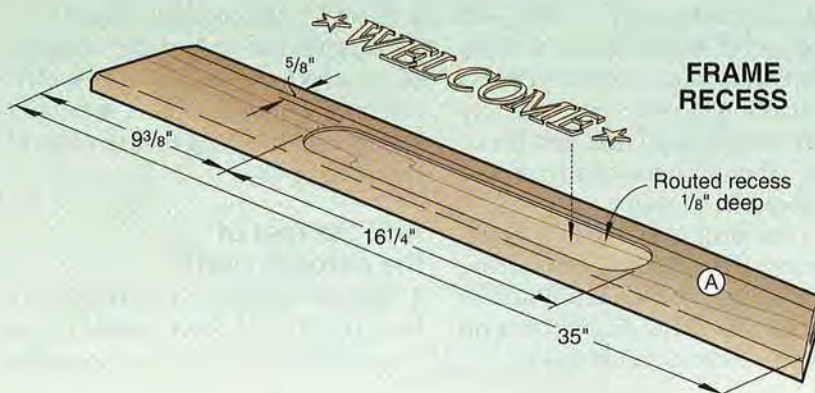
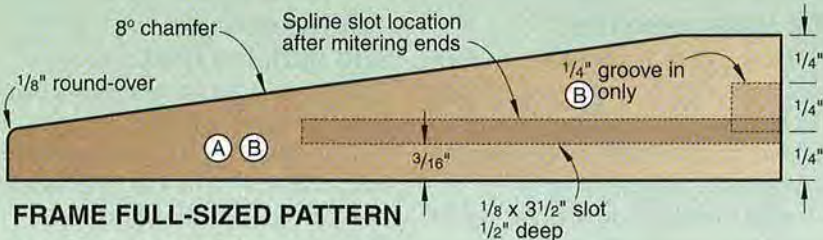
on one edge, draw a center mark. Put a strip of double-faced tape along the opposite edge.

4 Aligning the marks on the taped stick with the center marks on the pattern, press the taped edge against the letters and stars arranged on the pattern. Press firmly to ensure that all the cutouts bond to the tape on the positioning stick.

5 Mix some epoxy, and brush it into the bottom of the recess routed in the frame side. Pick up the positioning stick with the letters and stars attached, and brush epoxy onto the backs of the cutouts. Then, aligning the center marks on the stick with the ones on the frame side, press the cutouts into place, as shown above. Clamp the stick at the ends. Tilt the mat to level the bottom of the recess, and let the epoxy cure overnight.

6 Remove the clamps and the positioning stick. Here's where leaving the paper patterns on the letters pays off—as you twist and lift the positioning stick, the paper will peel off or tear, making removal much easier. Remove the remaining bits of the patterns.

7 Finish-sand the mat with 150- and 220-grit abrasive. Apply a clear finish of your choice. For outdoor use, choose an exterior varnish or exterior oil. 🌲



Project Design: David Ashe
Written by Larry Johnston
Photographs: Studio Au; John Hetherington

Craft a country classic

PUNCHED-TIN



One of the most popular country projects we've published was the punched-tin pie safe from the August 1992 issue and shown at left.



Now, we decided to follow that project with this functional and decorative wall-hung cabinet featuring punched-tin door panels.

If you're interested in building a matching pie safe, see our offer at the end of the article.

The ends come first

1 Edge-join narrower stock to form two ends (A) to measure slightly larger than those dimensioned in the Bill of Materials. Later trim the end blanks to size.

2 Using the End View drawing for reference, mark the locations of the dadoes, radii, and center-points where marked.

3 Cut the dadoes first. (We did this on our tablesaw using a miter gauge fitted with a wood extension and a stop for consistently placed dadoes from one end piece to the other.) Then, bandsaw and sand the radii to shape.

4 Fit your drill press with a counterboring bit, and drill mounting holes through the *outside* face of each end (A) to the size shown on the Screw Hole detail at right.

Cut the shelves and uprights next

1 Edge-join narrower stock slightly oversized for the shelves (B) and uprights (C). Later, remove the clamps, and cut the shelves and uprights to finished size.


2 Cut a pair of dadoes in each shelf where dimensioned on the Exploded View drawing.

3 Test-fit the pieces together. Then, glue and clamp the uprights (C) between the shelves (B). Check for square. Then, glue and clamp the ends (A) to the ends of the shelves (B).

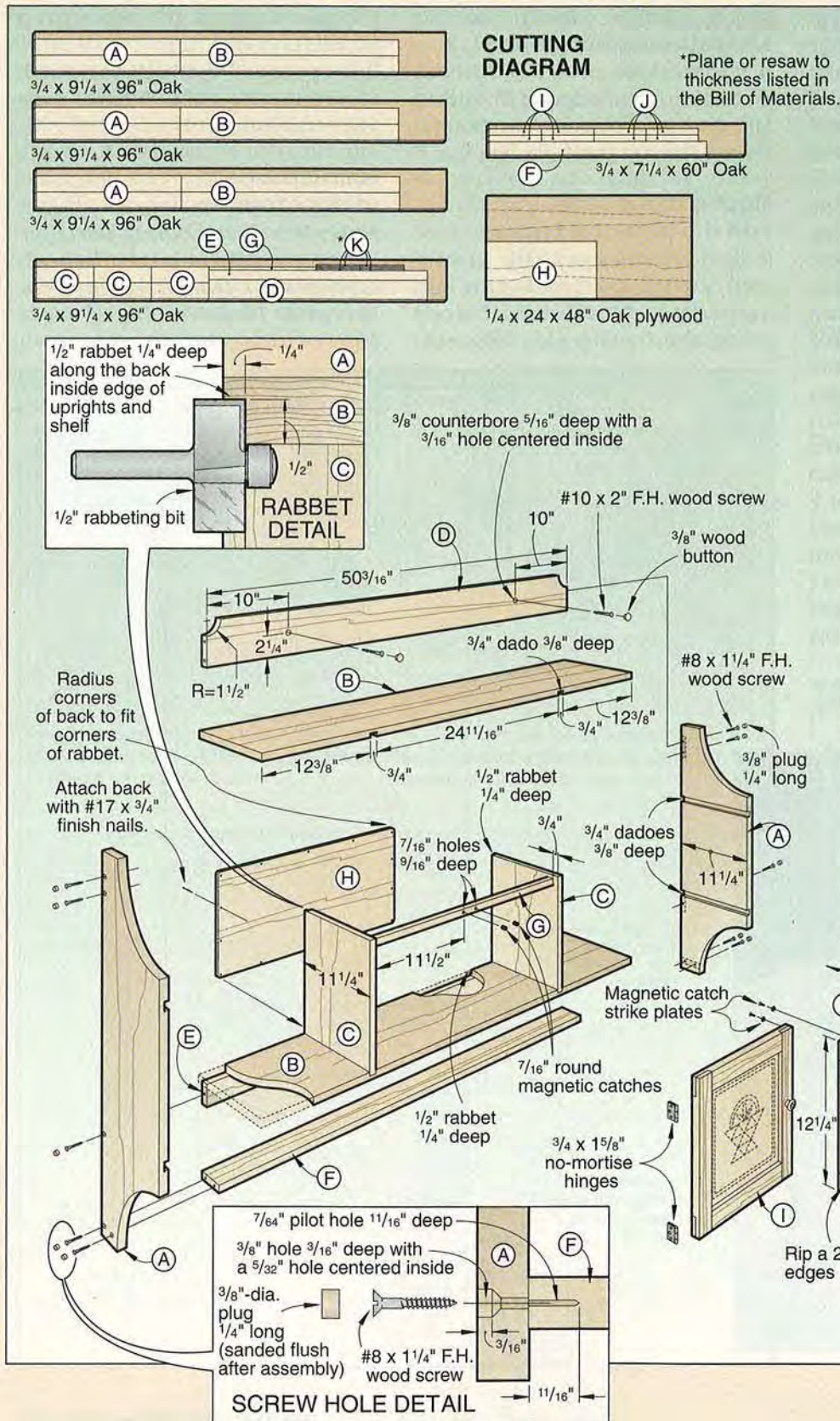
Add the rest of the carcass parts

1 Before cutting the crossmembers (D, E) and lower shelf (F) to

Continued

 [Print this article](#)

WALL CABINET



Bill of Materials					
Part	Finished Size			Matl.	Qty.
	T	W	L		
A* ends	3/4"	11 1/4"	34"	EO	2
B* shelves	3/4"	11 1/4"	50 3/16"	EO	2
C* uprights	3/4"	11 1/4"	13 3/8"	EO	2
D upper crossmember	3/4"	4 1/2"	50 3/16"	O	1
E lower crossmember	3/4"	2 1/4"	50 3/16"	O	1
F lower shelf	3/4"	3 3/8"	50 3/16"	O	1
G cleat	3/4"	3/4"	24 1/16"	O	1
H back panel	1/4"	13 3/16"	25 3/8"	OP	1
I door rails	3/4"	1 1/2"	12 1/4"	O	4
J door stiles	3/4"	1 1/2"	12 1/4"	O	4
K stops	5/16"	5/16"	9 1/16"	O	8

*Cut parts marked with an * oversized. Trim to finished size according to the how-to instructions.

Materials Key: EO—edge-joined oak, O—oak, OP—oak plywood

Supplies: #8x1 1/4" flathead wood screws, #10x2" flathead wood screws, two pair of 3/4x1 5/8" no-mortise hinges, #17x3/4" finish nails, two 3/4"-diameter porcelain knobs and screws, two round magnetic catches with strike plates, 3/8" wood buttons, stain, clear finish.

Buying Guide

Punched-tin panels. Two RP-1162 10x10" punched panels. \$29.80 ppd. Add \$5 for their catalog. Country Accents, P.O. Box 437, Montoursville, PA 17754, or call 717/478-4127 to order.

WALL CABINET

size, measure the distance between the ends (A). Using this actual measurement, cut these pieces (D, E, F) to size.

2 Mark and cut a $1\frac{1}{2}$ " radius on the top corners of the upper crossmember (D).

3 Clamp the crossmembers (D, E) and lower shelf (F) in place, and drive screws through the previously drilled holes as shown in Photo A below.

4 Cut $\frac{3}{8}$ " plugs, and glue one into each counterbored hole. Let the plugs sit overnight, and then trim them flush. If you trim them flush immediately, they'll shrink slightly as the moisture from the glue evaporates, leaving a slight depression. (For a good color match, we cut our plugs from the radiused cutouts left over when cutting the ends to shape.)

5 Measure the distance between the two uprights (C), and then cut the cleat (G) to size. Using the dimensions on the Exploded View drawing, drill a pair of holes for

Center the crossmembers and lower shelf over the previously drilled holes, and drive the screws to secure them.

the magnetic catches. (We used a barrel-type catch. To install these, we drilled a pair of $\frac{7}{16}$ " holes $\frac{9}{16}$ " deep into part G. Measure your catches before drilling; we've found them to vary in size.)

6 Position the cleat (G) $\frac{3}{4}$ " back from the front edge of B and C, and glue it in place to the bottom side of the top shelf (B).

Rout a rabbet and add the plywood back

1 To house the back (H), fit your router with a $\frac{1}{2}$ " rabbeting bit, and rout a $\frac{1}{2}$ " rabbet $\frac{1}{4}$ " deep along the back inside edges of

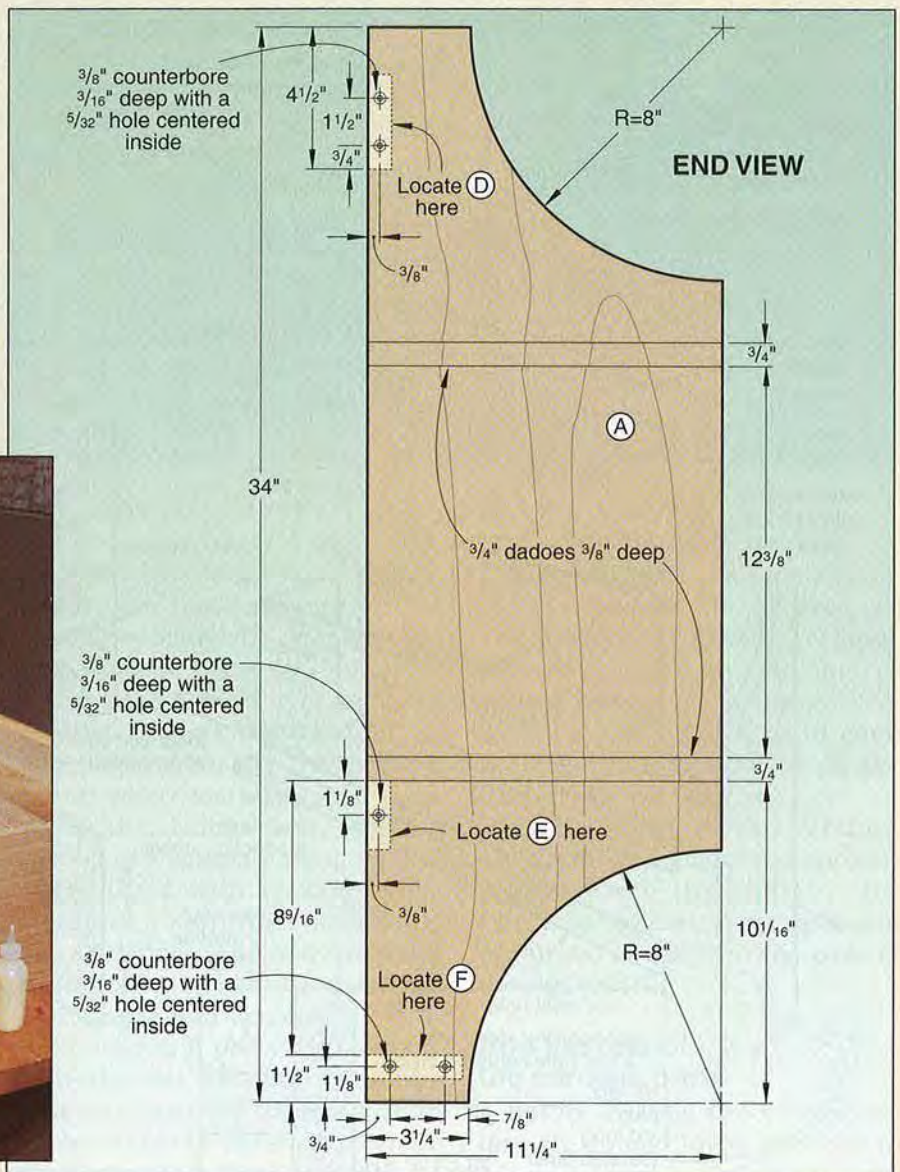
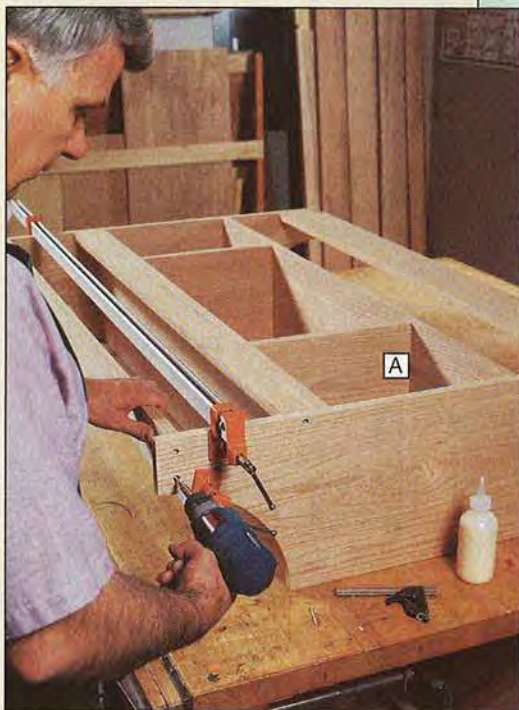
parts B and C as shown in Photo B. See the Exploded View drawing for location.

2 Measure the opening, and cut the plywood back (H) to size from $\frac{1}{4}$ " oak plywood.

3 Don't install the back yet, you'll secure it with #17 $\times\frac{3}{4}$ " finish nails after staining it.

Half-lap a pair of door frames

Note: When machining parts for a critical fit such as the half-lapped door frames, always cut two extra pieces to verify joinery before cutting the project parts.



1 Cut the door rails (I) and stiles (J) to size.

2 Using a stop for consistent half-lap lengths, cut $1\frac{1}{2}$ "-long half-laps on the ends of the four rails (I). Note that the half-laps on the rails are $1\frac{1}{2}$ " long and those on the stiles are $1\frac{1}{8}$ " long. See the Door drawing below for reference. (We cut the extra pieces to verify the blade and stop settings before cutting the needed pieces.) Move the stop, and cut $1\frac{1}{8}$ "-long half-laps on the ends of the door stiles (J).

3 Now, with the dado blade at the same height, cut a $\frac{3}{8}$ " rabbet $\frac{3}{8}$ " deep along the back inside edge

of each stile and rail where shown on the Door drawing (note that the drawing shows the view from the back side of the door).

4 Hold the door frames together and check the fit of the punched-tin panels as shown in Photo C.

5 Glue and clamp each frame together, checking for square.

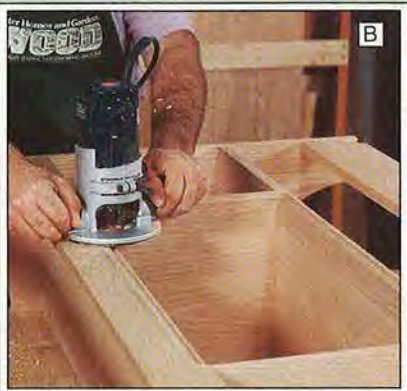
6 Rip and crosscut the $\frac{5}{16}$ "-square stops (K) to size. Drill pilot holes for the finish nails, and set the stops aside for now.

7 Place the doors in the opening and check for proper fit. You should have a $\frac{1}{16}$ " reveal on all sides. Place a piece of masking

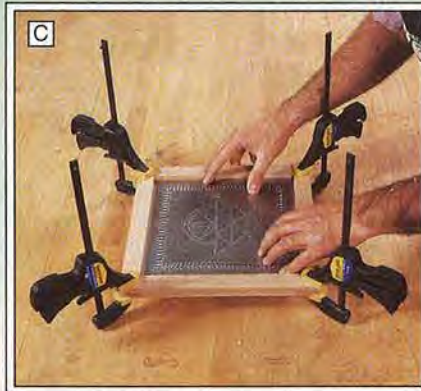
tape on the hinge edge, and mark for a right and left door. Then, mark the knob locations. Drill the holes for the hinges and knobs.

8 Tilt your tablesaw blade 2° from vertical, and bevel-rip the mating edges of the doors. This is done so the doors don't hit each other when opening and closing. Sand both door frames smooth.

9 Screw the hinges to the doors and uprights (C). Fit the back of each door with a strike plate to match with the catch previously mounted to the cleat (G). Recess the strike plates flush with the back face of each door. Measure your catches before drilling; catches vary slightly in size.



Rout a $\frac{1}{2}$ " rabbet $\frac{1}{4}$ " deep along the back inside edge of the carcass frame to house the plywood back.



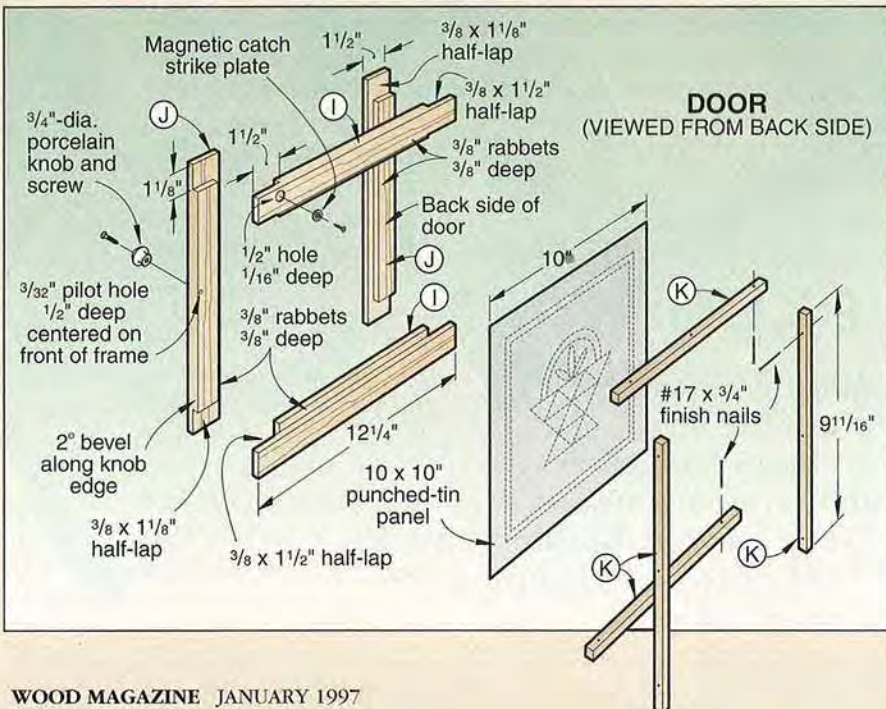
Cut the half-lap joints and rabbets, and then check the fit of the tin panels in the rabbeted opening of each door.

Remove the hardware and add the finish

1 Remove the hardware and mask the magnetic catches. Finish-sand the doors and cabinet.

2 Stain as desired (we used Penofin Applachian Oak), and apply a clear finish. Then, place the punched-tin panels in the door frames and nail the stops in place. Nail the $\frac{1}{4}$ " oak plywood back panel (H) in place.

3 Reattach the doors to the carcass. Hang the cabinet, and place a stained and finished $\frac{3}{8}$ " wood button over each screw used to hang the cabinet. ♣

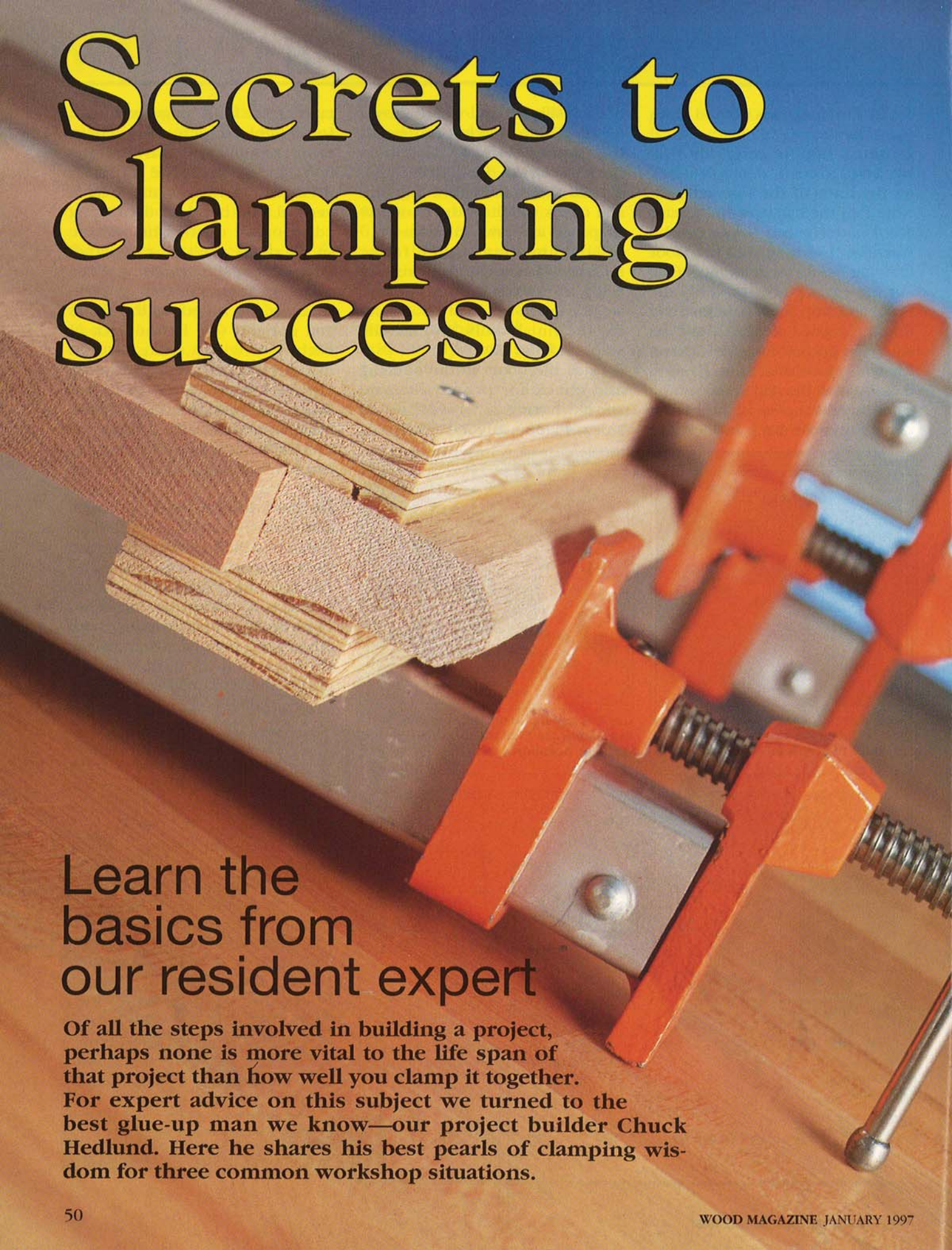


How about a matching pie safe?

Our pine pie safe from the August 1992 issue of *WOOD* magazine was such a success, we updated it and put together a *WOOD PLAN*® for you to build the project. Order Pie Safe, IFS-1012, for \$9.95 ppd. from *WOOD* Magazine Plans, P.O. Box 9255-Dept WD-88, Des Moines, IA 50306. Or call 800/572-9350 to order.

Written by Marlen Kemmet
Project Design: James Downing
Illustrations: Kim Downing; Lorna Johnson
Photographs: John Hetherington

Secrets to clamping success



Learn the
basics from
our resident expert

Of all the steps involved in building a project, perhaps none is more vital to the life span of that project than how well you clamp it together. For expert advice on this subject we turned to the best glue-up man we know—our project builder Chuck Hedlund. Here he shares his best pearls of clamping wisdom for three common workshop situations.

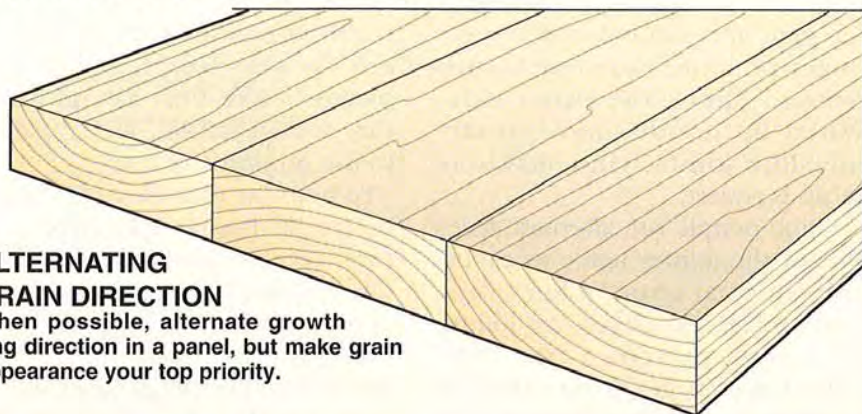
SITUATION 1: EDGE-JOIN A PANEL STEP-BY-STEP

Edge-gluing lumber into wide panels doesn't have to be a daunting task. With the help of our clever fixture and step-by-step advice, you'll be able to produce top-notch results every time.

First, keep in mind that all successful clamping operations begin with careful planning. That includes buying your lumber in advance to let it acclimate to the temperature and humidity of your workshop. "You can never be sure of how the lumber was stored before you bought it," Chuck says, "but you can bet that it wasn't in conditions that match those in your shop. I always like to give lumber at least 72 hours in my shop before I start cutting."

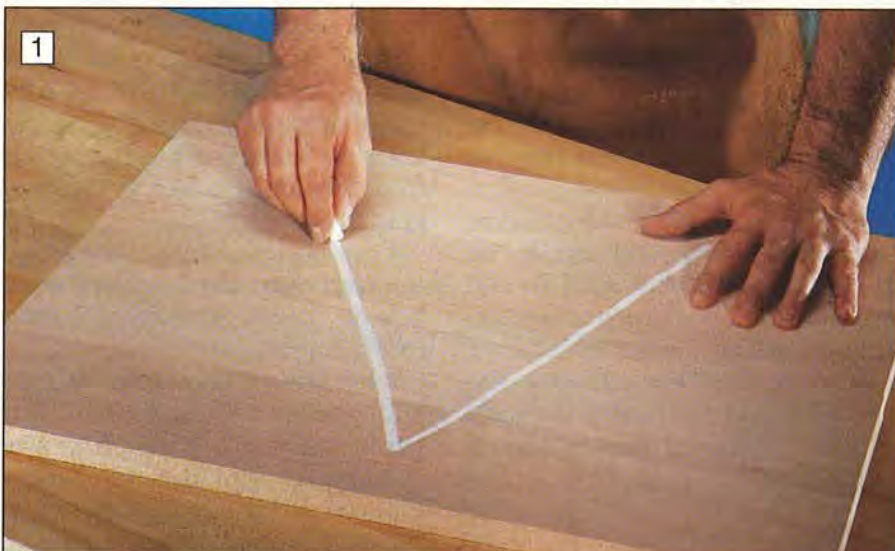
Chuck then cuts the boards for the panel to uniform length. "At this point, I size the blank so it will be at least one inch longer and wider than the finished dimensions of the panel," he says. "That makes it easy to trim to final size later."

Next, put the boards on the workbench and shuffle them until you get the best-looking arrangement of color and grain pattern. Alternating the direction of the growth rings as shown in the illustration *top* is a good general rule to help keep the glue-up from bowing with seasonal changes in humidity. But, Chuck sometimes makes exceptions. "I pay attention to the growth rings if the wood has a bland figure, but most of the time I consider appearance first," he confesses.



ALTERNATING GRAIN DIRECTION

When possible, alternate growth ring direction in a panel, but make grain appearance your top priority.



Study the grain pattern and color of the boards, then choose the most appealing arrangement. Mark a bold V for easy realignment later.

Next, mark the face of the boards with a large V in white chalk as shown in *photo 1*. This helps you easily get the boards back in the same order after you apply glue. For light-colored woods, mark with a pencil. Either way, the marks will disappear when you sand the finished panel.

Before jointing the edges of your workpieces, it pays to check the accuracy of your jointer. To do this, mark the face of two scrap-wood boards, then joint their edges (with the face marks away from the jointer's fence for each pass). Then, place the jointed edges next to each other on a known flat surface, such as your saw table as shown in *photo 2*. If



Use your saw table as a flat reference to check jointed edges. There should be no gap. Turn boards over, and repeat.

Continued

Clamping Secrets

the joint line disappears with only finger pressure, turn the boards over to check the other side. When both sides have nearly invisible joints, your machine setup is square.

"Some people run alternate faces against the jointer fence to cancel any potential error," Chuck says, "but I prefer to adjust the jointer for a perfectly square cut." Take your time to get joints that fit together well with only minimum hand pressure. "Brute clamping force is no substitute for careful workmanship," Chuck explains. Joint the edges of your workpieces, then realign them on your workbench.

If the panel will be subjected to pressures that could strain the glue joints, you may want to add mechanical reinforcement. Splines, biscuits, and dowels serve two purposes: They add glue surface and help keep the joint aligned during clamping. Just make

sure the reinforcements fit properly by dry-clamping the workpieces before final assembly. For this demonstration, we chose not to use reinforcements.

To help the clamping go smoothly, we devised an edge-gluing fixture (see the drawing *below*) that directs clamping pressure to the center of the workpieces. If the clamping pressure is not centered, it can result in "overpull" or "underpull," which cups the panel. You'll need two of these handy fixtures, one for each clamp-bearing edge. As an additional advantage, this fixture elevates the clamps off the panel surface, making it easier to clean up glue squeeze-out.

We also made some 3" lengths of the fixture to align the individual boards. You'll need two of these for each joint.

With your workpieces, clamps, and bucket of water with clean rag at the ready, it's time to start the gluing. Spread a thin film of glue on each edge as shown in *photo 3*. "Spreading the glue on both pieces minimizes the possibility of glue voids," Chuck says.

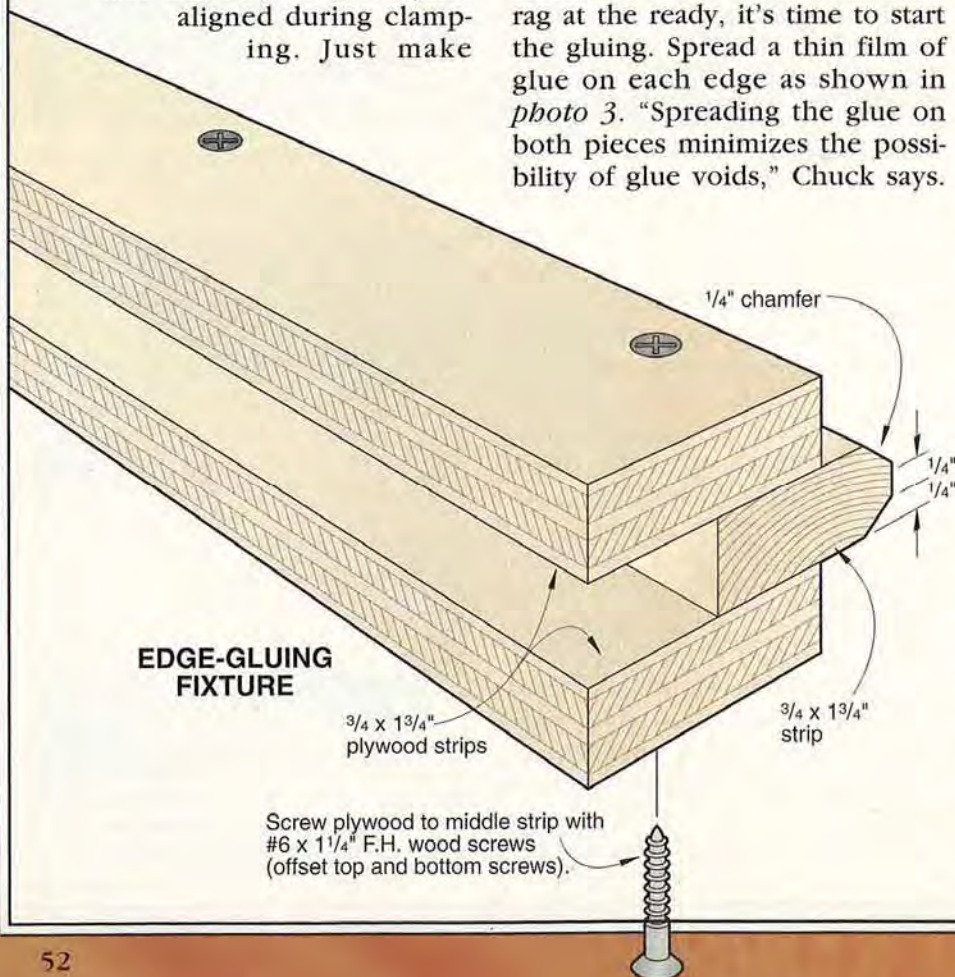


Strip the foam off a used foam brush, and you'll have a firm plastic glue spreader with a handle.

Make sure you have covered each edge with a thin film, but don't overdo it—the ideal joint line is only as thick as a few glue molecules. Excess glue will simply make a mess.

Rub the edges of the boards together as shown in *photo 4*. Then, use the 3" sections of the edge-gluing fixture to hold the boards in position while you put the assembly into the clamps. Be sure to place waxed paper in these short fixtures so they don't stick to the panel.

Put the clamps into position as shown in *photo 5*. Note that the clamps alternate on top and bottom of the assembly to equalize the pressure and help prevent bowing. Tighten the center clamp first until the boards all touch each other and you see a slight bead of glue squeeze-out at the joints. Then, tighten the clamps on each side of the center one, and continue working out to the ends of the boards. Check all the clamps in sequence again, making





4 Rubbing the glued edges together gives the glue a chance to “grab,” making assembly easier.



6 Scrape away glue squeeze-out with a putty knife. Then, use a wet rag to remove all traces of the glue.

sure that the pressure is even along the length of the glue joints.

“Most people overtighten their clamps,” Chuck says, “but you need to remember that this is not a strength contest. You only need to bring the boards in firm contact with each other. The glue will take it from there.” Overtightening the clamps can bow the panel and also lead to weak, glue-starved joints.

Next, remove the short clamping fixtures and scrape the glue



5 Draw up the clamps evenly, working outward from the center. Avoid excessive pressure; overtightening the clamps weakens the glue joint and may bow the panel.



7 Use a framing square or other straightedge to check the panel for flatness.

squeeze-out off the panel with a putty knife as shown in *photo 6*. Follow up with a damp rag. “You need to use enough water in the rag to float the glue out of the wood’s pores,” Chuck explains. “One pass of the rag won’t do it. Refold and rinse the rag often so you don’t spread the glue.”

Check the assembly for flatness with a straightedge as shown in *photo 7*. “Once you have everything tweaked into position, leave it alone for at least one hour,”

Chuck says. “If you move it, something will almost certainly move out of adjustment.” After gently removing the clamps, place the panel so there is no strain on the joints, and so air can circulate freely around it. Don’t try to rush things by putting the panel in the sun—that’s an open invitation to warping. When using yellow woodworker’s glue, wait at least three more hours before machining the panel. With white glue, allow overnight drying.

Continued

Clamping Secrets

SITUATION 2: HOW TO CUT AND CLAMP A MITERED FRAME

Another typical woodworking clamp-up is a mitered assembly such as a simple picture frame. You can apply the cutting and clamping techniques described here to other projects, such as mitered boxes. The only significant difference is that in box construction you use two or more band clamps.

Mitered frames require eight cuts, and any inaccuracy quickly multiplies into an unsightly gap. That's why accurate cutting is the key to your success. "A mitered frame looks deceptively simple, but several things can go wrong," Chuck cautions. "With a little patience, you can cut miters with deadly accuracy."

To ensure success, Chuck uses a simple homemade tablesaw miter jig to cut the miters as shown in *photo 8* (see "10 Quick-and-Easy Scrap-wood Jigs" in the December 1995 issue, page 52,



Make the first cut on each workpiece as shown. Then, clamp a stopblock to the jig to ensure that workpieces are the same length.

for jig plans). Make test cuts in scrapwood until you get the angle right. Chuck offers this advice: "If the corners of your test frame do not close up neatly, make an

adjustment to only one of the miter fences if the error is less than 1° or 2°. Then, recut just one miter on each piece: all right- or left-hand cuts. This is half the work of adjusting both cuts, and the slight difference in the length of the miter won't show."

Use only enough pressure to snug up the frame parts. Excessive tightening can damage the corners.

Dry-clamp the frame pieces, using a band clamp with metal or plastic corners as shown *left*. Gather the other items you will need: glue, rags, water bucket, and putty knife.

Spread a thin film of glue on each of the miters. Assemble the frame on a flat surface and carefully check it for flatness as you tighten the clamp. If you need to adjust the pieces, back off the pressure rather than trying to move the parts under tension. Avoid excessive pressure, which can crush the outer corners of the frame. Follow the glue-removal and drying instructions as described in the final two paragraphs of the previous section.



SITUATION 3: CLAMP A LARGE BOX WITH CONFIDENCE

To demonstrate the techniques involved in carcass clamping, Chuck assembled a typical base cabinet. (This cabinet will later get a face frame, but our demonstration will not include that step.) You can adapt many of the techniques you see here for clamping boxes of all sizes: jewelry boxes, wall cabinets, and drawers, for example.

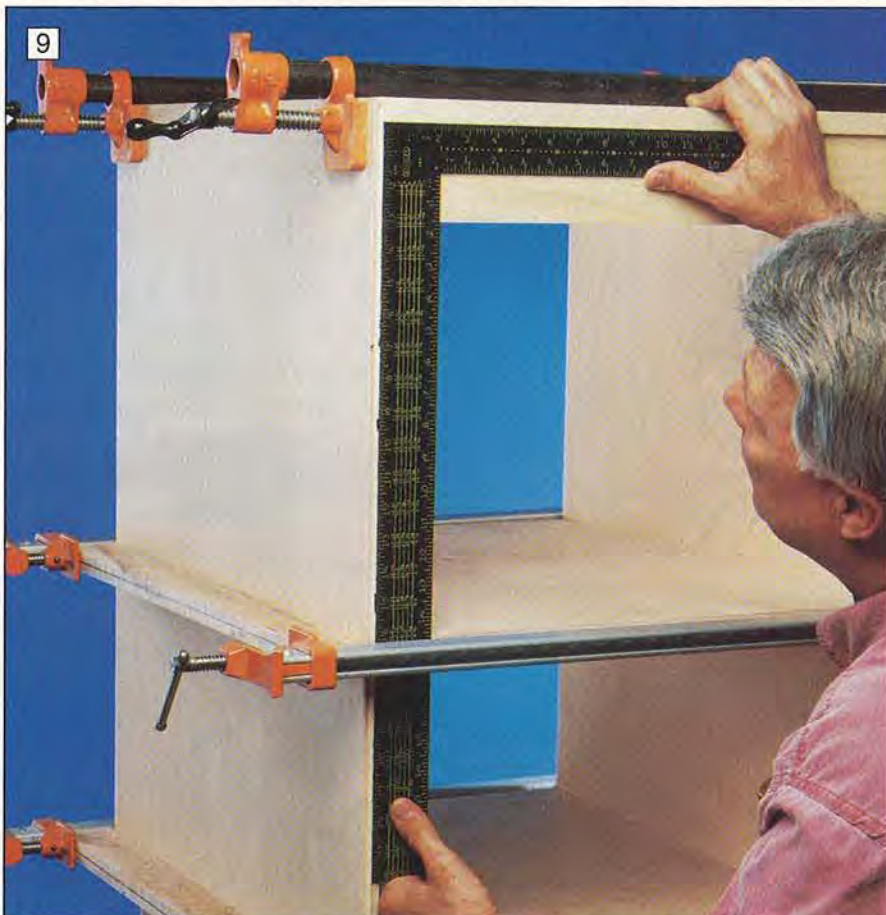
When you build a plywood cabinet, be certain to gauge the width of the rabbets and dados from the actual thickness of the stock, not its "nominal" or advertised size. Strive for dados that let you assemble the cabinet without hammering on the plywood.

Dry-clamp the assembly to check the fit of all the pieces, and to prepare your clamps. Make a pair of clamping cauls as shown in the drawing *bottom* for each fixed shelf in the cabinet. These cauls will help distribute clamping pressure evenly over the length of the dados holding these shelves.

Apply glue to mating surfaces and clamp up the assembly as shown in *photo 9*. Check for square with a framing square, and double-check by measuring diagonally in both directions across the front of the carcass. If the diagonals aren't equal, place a clamp on

the corners of the longer diagonal and apply pressure to equalize the diagonals. Leave all clamps in place for at least one hour, then unclamp. Install the back immediately to avoid straining the joints.

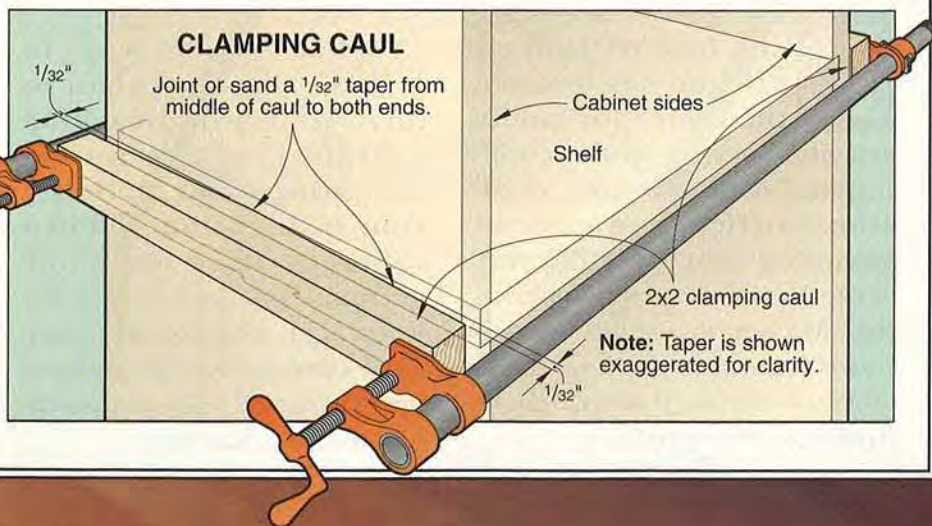
You can reinforce the joints with glue blocks positioned inconspicuously as shown in *photo 10*. These blocks are easy to make, install quickly, and add strength to the cabinet's joints. ♣



Tighten all of the clamps evenly to avoid twisting the assembly. Then, check for square with a framing square and by measuring diagonally in both directions.



Coat the edges of a glue block with glue and rub it back and forth until the glue grabs. No clamping is necessary.



DREAM-KITCHEN PLANNER



Let's face it. Today's kitchen has become the center for family activity, serving as the cooking and dining center, occasional office, and general gathering spot. To efficiently serve in these various capacities, kitchen space and its primary fixtures — the cabinets — must be well planned to optimize every inch.

What better way to achieve that goal than to turn your woodworking energies to planning, designing, and building your own custom kitchen cabinets. Here are some general planning guidelines, tips, and specific standard dimensions to guarantee winning looks and comfortable work areas.

Why build your own kitchen cabinets?

Building your own cabinets allows you to tailor the cabinet units to fit your particular space without using the filler strips sometimes necessary with stock cabinets. You can build in any options—either functional or aesthetic—you want. You also choose the materials, style, and finish to fit your home's decor and character.

Substantial cost savings also make building your own cabinets



With our guidelines, you can build in the features you've always wanted

would cost about \$700. So for the investment of your labor, you get higher quality and custom features you may not otherwise be able to afford.

The extent of your kitchen project depends on your needs, your budget, and the time you want to invest. To get the features you need, you may want to start from scratch or rework the existing space by adding your own customized cabinets.

Inconvenience also accompanies any kitchen construction project, but you can minimize the downtime by constructing all the cabinets as units in your shop ahead of the actual installation.

Plan your kitchen with family needs in mind

The overall configuration of your kitchen should be determined by your family's size and how you use the space. If you're starting from scratch with an empty room, use this rule of thumb to calculate the number of cabinets you'll need: Basic storage requires 9' of base and wall cabinets, plus 3' of cabinets for each member of the

family regularly eating at home. An average family of four requires 21 running feet of both wall and base cabinets.

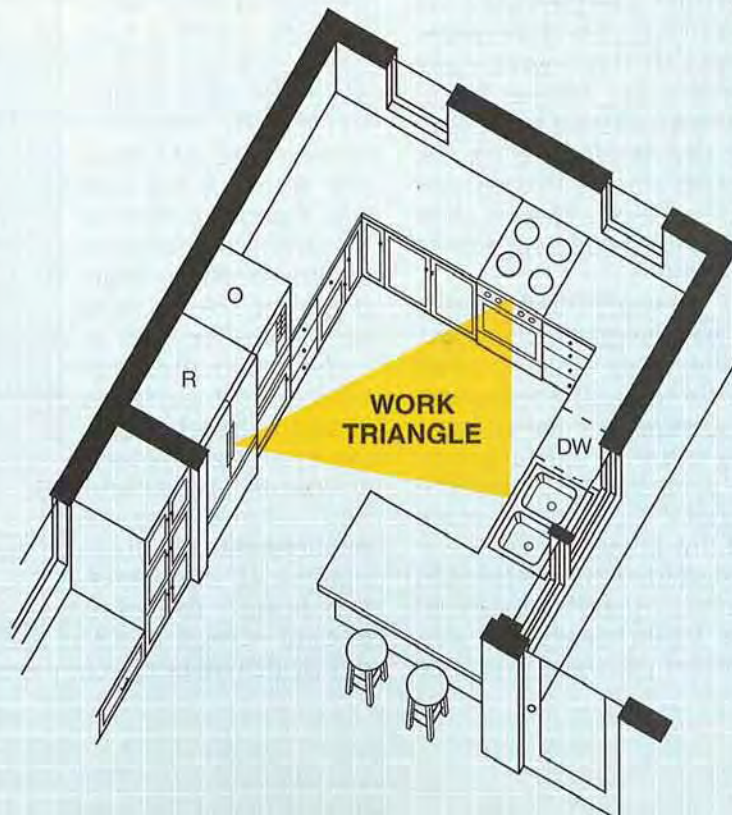
To accommodate multiple cooks, allow plenty of room to move around—at least 48" between counters—so users can share the space comfortably. Dining and office space may also be incorporated, but should be located out of the main traffic lanes to avoid congestion.

Minimize footsteps for maximum efficiency

Classic kitchen design centers on a work triangle with the sink, stove, and refrigerator located at the three points, as shown *below*. The total length of the three legs should be less than 26' for maximum efficiency.

Newer, larger kitchens incorporate work centers designed for multiple cooks and/or specific tasks. Usually incorporating an island, work center kitchens have a primary work triangle which shares its "points," such as the refrigerator and sink, with secondary work triangles. Since each

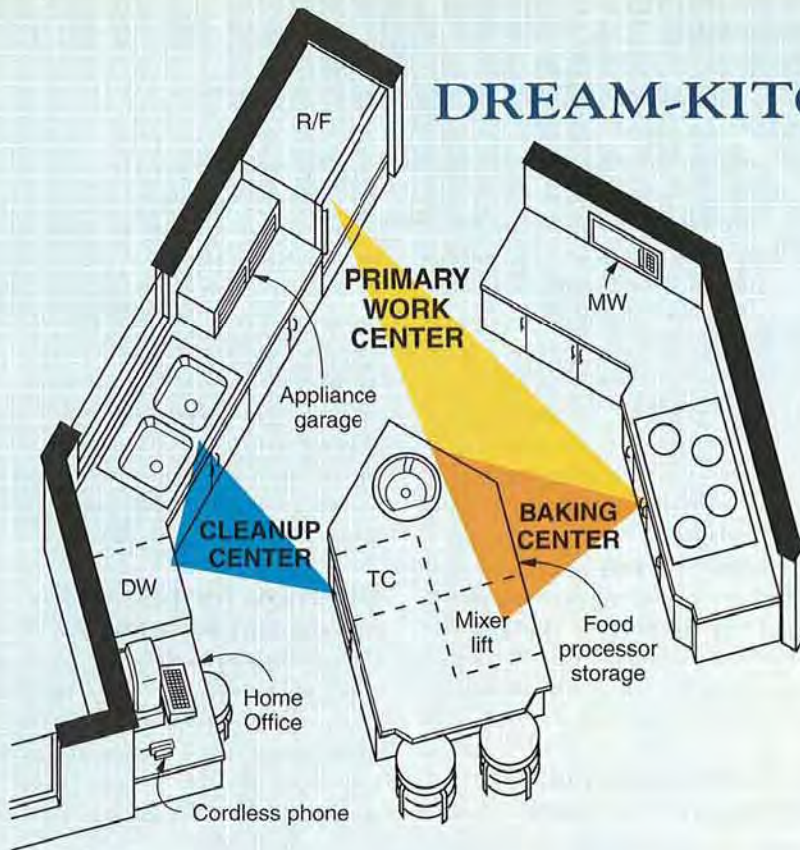
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an attractive alternative. Using 3/4" oak plywood for the cases and solid oak for the face frames, doors, and drawer members, the materials for an 8' run of base cabinets with two 30" wall cabinets would cost roughly \$600.

For the same cabinet layout, high-end stock cabinets using comparable materials and construction would cost roughly \$2,500. Even the most basic cabinets for this layout—constructed primarily of particleboard—

DREAM-KITCHEN PLANNER



for a single place setting. Two diners facing each other at a table or booth need a minimum combined width of 30".

If you include a home office, allow 3-4' of table-height counter with some drawer space underneath, adequate lighting, and a telephone. You may even want to add space for a computer.

Make room for all those appliances

Your kitchen appliances also affect the dimensions of many of your cabinets and countertop area. Luckily, appliance manufacturers heed standards, too. That's why a built-in dishwasher fits snugly under a countertop and a drop-in range lowers in with room to spare.

In the chart at *right*, you'll find a listing of appliance dimensions, as well as those for single-, double-, and triple-bowl sinks. Use these as a planning guide for counter-

area has its own flow pattern, as illustrated *above*, cross traffic seldom occurs.

Consider customized counter heights

While 36" continues to be the standard countertop height, many designers are tailoring workspaces to individual cooks based on elbow height. To determine elbow height, have your cook stand up straight, arms at his or her sides, with elbows bent, then measure the distance from the floor to the elbow. Placing the countertop 2-3" lower than elbow height provides optimum working comfort.

For the physically disabled person who must cook from a wheelchair, countertops should be only 31" from the floor. To accommodate the chair under the countertop, you must provide a free space 30" wide by 29½" high. This allows a full 24" of forward reach on top of the counter.

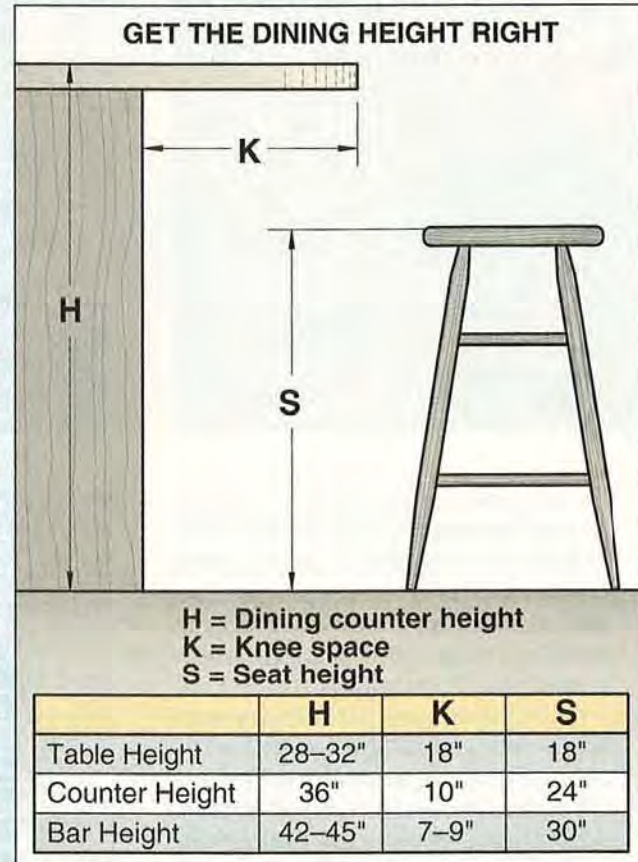
The type of food preparation can also determine counter height. If you bake fresh breads and pastries, consider placing a 3' section

of countertop 5" below elbow height (roughly 29-30" above the floor) so you can bear down when rolling out dough.

Dining dimensions, home office specifications

Dining counters range from the informal high bar to casual family seating at table height. Bar-height counters measure 42-45" from the floor. A bar can also extend from your 36"-high counterspace or drop down to table-height at 28-32" from the floor. The box, *at right*, shows the some of the most common counter heights and the appropriate corresponding seat height and knee space requirements.

Allow 21" of counter-top length for each person served. A 15" depth provides space



APPLIANCE AND SINK DIMENSIONS

Unless you buy commercial or European units, almost all appliances fall within the following range of dimensions. Refer to them when planning your cabinets, but get actual measurements before you build.

APPLIANCE	HEIGHT	WIDTH	DEPTH
Range, floor model	35 ¹ / ₈ –36"	19 ¹ / ₂ –40"	24 ¹ / ₂ –26 ¹ / ₄ "
Range, w/eye-level oven	61 ¹ / ₂ –67 ⁷ / ₁₆ "	29 ⁷ / ₈ –40"	25 ¹ / ₂ –27 ⁵ / ₈ "
Range, drop-in	23–23 ¹ / ₂ "	22 ⁷ / ₈ –23 ⁷ / ₈ "	22 ¹ / ₈ –25"
Cooktop	2–3"	12–48"	18–22"
Wall oven, single	23 ¹ / ₂ –25"	21–24"	21 ¹ / ₈ –22 ¹¹ / ₁₆ "
Wall oven, double	39 ¹ / ₄ –50 ³ / ₈ "	21–24"	21 ¹ / ₈ –22 ¹¹ / ₁₆ "
Wall oven, w/broiler	38–40 ³ / ₁₆ "	21–24"	21 ¹ / ₈ –22 ¹¹ / ₁₆ "
Range hood	5 ¹ / ₂ –7 ¹ / ₂ "	24–72"	12–27 ¹ / ₂ "
Microwave	13 ⁵ / ₈ –18"	21 ¹ / ₂ –22 ¹ / ₂ "	14 ¹ / ₂ –22"
Refrigerator	55 ¹ / ₂ –68 ⁷ / ₈ "	24–35 ¹ / ₂ "	24–32 ⁷ / ₈ "
Dishwasher	33 ¹ / ₂ –34 ¹ / ₂ "	23–24 ¹ / ₄ "	23 ¹ / ₁₆ –26 ¹ / ₄ "
Trash compactor	33 ¹ / ₂ –34 ¹ / ₂ "	11 ⁷ / ₈ –14 ⁷ / ₈ "	18–24 ³ / ₁₆ "

SINK	LENGTH	WIDTH
Single bowl	11 ¹ / ₂ –33"	13–22 ³ / ₈ "
Double bowl	28–46"	16–25"
Triple bowl	43–54"	22"

top cutouts and spacing between base cabinets, but always refer to the specific sink or appliance model you'll use for exact installation instructions.

Your appliances and sink also require a certain amount of countertop space for loading and unloading. While your space may require adjusting to these ideal situations, here are some general considerations to keep in mind:

- Ranges, including built-in or countertop microwaves, should have about 18" of work area on either side; ovens, about 15" on one side.
- To load or unload a refrigerator,

allow approximately 18" of counter on the door-opening side.

- Try to provide space on both sides of the sink for cleanup — 30" to the right and 24" to the left.

Some manufacturers now make refrigerators that are base cabinet depth (24") and that will accept front panels to match cabinetry doors, as seen in the opening photograph. This allows large appliances to blend seamlessly into the kitchen landscape.

Lots of small, laborsaving appliances, such as food processors, might require their own storage areas that you'll have to custom-dimension. A 30"-deep countertop

can help provide the necessary work and storage space.

Dimensional standards to keep in mind

While custom features and your appliance dimensions will dictate many layout decisions, you'll still want to keep in mind cabinet dimension standards. These standards, developed decades ago, were based on the physical attributes of the average woman, the primary kitchen user of that era. Countertops are most often 36" high because that was determined to be the most efficient and comfortable working height.

Ergonomic research indicated that most women have a comfortable overhead reach of 68", the height at which you'll find the highest regularly used shelf in a wall-hung cabinet. That's also why the more frequently used upper drawers in a base cabinet are about 28" from the floor so they can be opened without bending down.

Reach radius—the distance the average woman can stretch her arms straight out in front of her—determined not only the depth of a countertop, but the depths of cabinets, too. Reach radius, plus the amount of space needed for cooking, baking, and cleanup, also established the distance between wall cabinets and countertops, the clearance over ranges, and space needed around ovens, sinks, and dishwashers.

Wall cabinets: sized for versatility

Wall cabinets normally mount directly on the wall, but you can also suspend them from the ceiling over an island or peninsula with access from both sides. No matter how much you use them, your wall cabinets should be 12" deep when installed over a 25"-deep countertop, and 15" deep when installed over a wider, 30"-deep countertop.

Continued

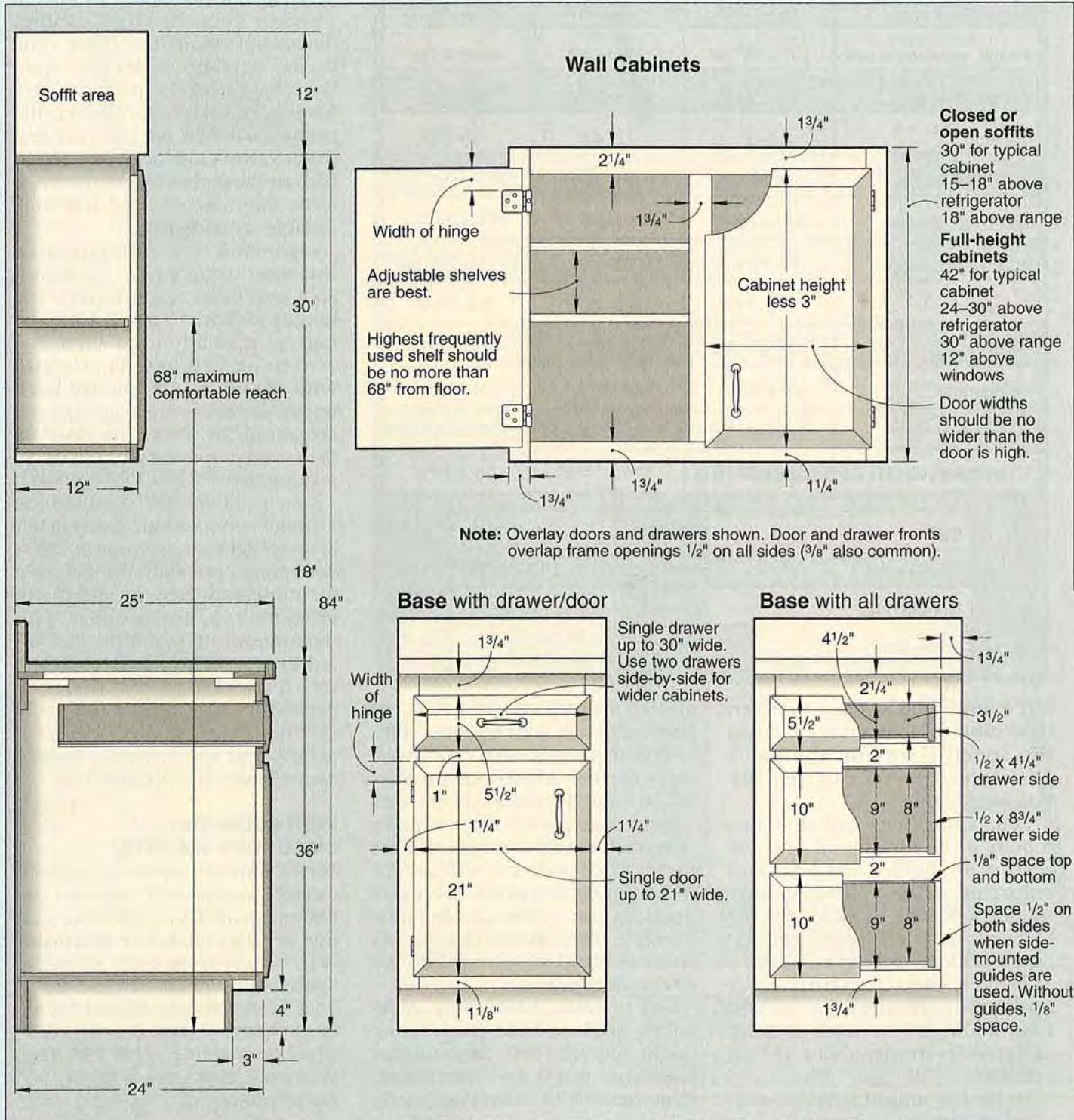
DREAM-KITCHEN PLANNER

How tall you make wall cabinets depends on how much storage you need. With a closed or open soffit, the standard wall cabinet height is 30", providing two shelves for three compartments. If you want to maximize storage,

utilize the 12" soffit space by installing 42" full-height cabinets.

The width of wall cabinets, usually 9-36", is determined by the width of the matching base cabinets below, since in most cases, the units are viewed as a pair.

Whether a wall or base cabinet has one door or two, however, depends on its width. Doors wider than their height tend to sag because of the weight on the hinges. That's why wide cabinets usually have two doors.



Base cabinets for big-time storage

You may want a special narrow cabinet 9" wide to stand cookie sheets and trays on edge next to the stove, or an under-sink cabinet 42" wide. However, base cabinets normally measure 24" deep and 34½" high (adding a 1½"-thick countertop brings them up to 36"). Extra-deep base cabinets of 29" maximize countertop area for tasks such as baking, or storage for small appliances. (You can also set standard-depth cabinets away from the wall and cover them with a 30" countertop.)

Divide up the space in a base cabinet with all shelves and a door or doors, all drawers or a combination of drawers and doors, as shown in the typical configurations *at left*. As with wall cabinets, the width of the cabinet determines whether you should use one drawer or door, or a matching pair.

Specialized cabinets, space-saving hardware

Pantry cabinets and broom closets often span from the floor to flush with the top of wall cabinets.

Their widths and the number of compartment vary according to the size and amount of storage space needed.

Corner cabinets with lazy Susan shelves, shown *below*, provide convenient access to normally wasted space. You can purchase the rotating shelves as a unit, or buy just the individual components you need.

A variety of other storage organizers and hardware available at most home centers or through mail order catalogs let you maximize storage and ease of access. Swing-down racks hung underneath wall cabinets put spices or knives within easy reach. Baskets or entire shelving units mounted on rollers or glides provide quick access to items otherwise hidden at the back of the cabinet.

Recycling bins may also be incorporated to provide handy short-term storage for cans, paper, and glass. Consider installing removable plastic bins to provide convenient carrying containers for your trips to the recycling center. Such bins make it easier for you to scrub them out periodically.

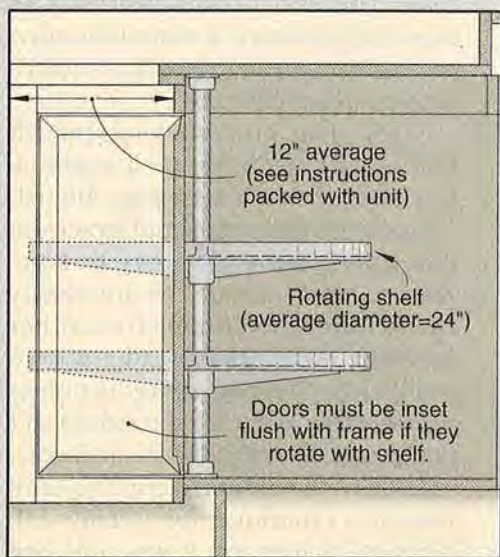
Pulling it all together

Once you've determined how you want to use the kitchen space and what custom features you'd like to include, it's time for a reality check. First, make a scale drawing of your kitchen space and make scale cutouts of various cabinets and appliances. Try arranging them in various configurations, keeping in mind the work flow.

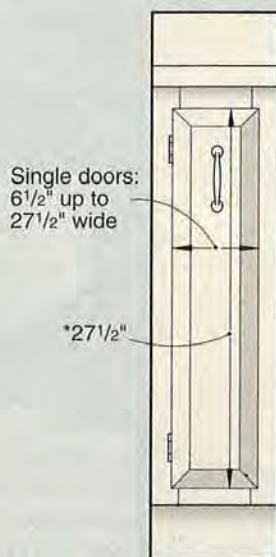
Computer drawing programs give you even more flexibility in developing these layout schemes, and a variety of kitchen planning programs are available. Some even provide elevation views and generate cost estimates.

Once you've arrived at a workable floorplan, carefully make dimensioned drawings of each cabinet unit. From these drawings, you'll determine the bill of materials necessary for the job. Detailed drawings also keep you on track when you begin constructing the many individual cabinet units.

Finally, consider the overall cost in terms of both time and money. You may want to break the job into several phases to make it more manageable. ♣



Corner Cabinet with rotating shelves



Base with door only

Need more information?

The following books provide details on kitchen planning and cabinet construction:

- *Better Homes and Gardens® Your Kitchen*, Meredith, 1983.
- *The Art of Kitchen Design* by Johnny Grey, Cassell, 1994.
- *Building Your Own Kitchen Cabinets* by Jere Cary, The Taunton Press, 1983.
- *Making Cabinets and Built-ins* by Sam Allen, Sterling Publishing Co., 1986.

You can also receive free kitchen planning information by contacting the National Kitchen and Bath Association at 800/401-6522.

Woodworkers To


To youngsters with physical challenges, your

Dear WOOD,

In a recent edition of WOOD magazine, you had an article about an opportunity to help handicapped people by building support devices. Although I am only a woodworking hobbyist, I clipped your article and sent it along to our local Easter Seal Society. There must be indeed a need. I received a call from them almost before I posted the letter.

One of the first things I was asked to do was some minor repairs to the wheelchair tray used by a young lady with cerebral palsy for eating her meals. The job was simple enough and when I stood up from doing the repairs, the young lady took my hand and kissed it. Has any woodworker ever been thanked in a more meaningful way?

Sincerely,
Melvin Shore
Sacramento, Calif.

 Print this article

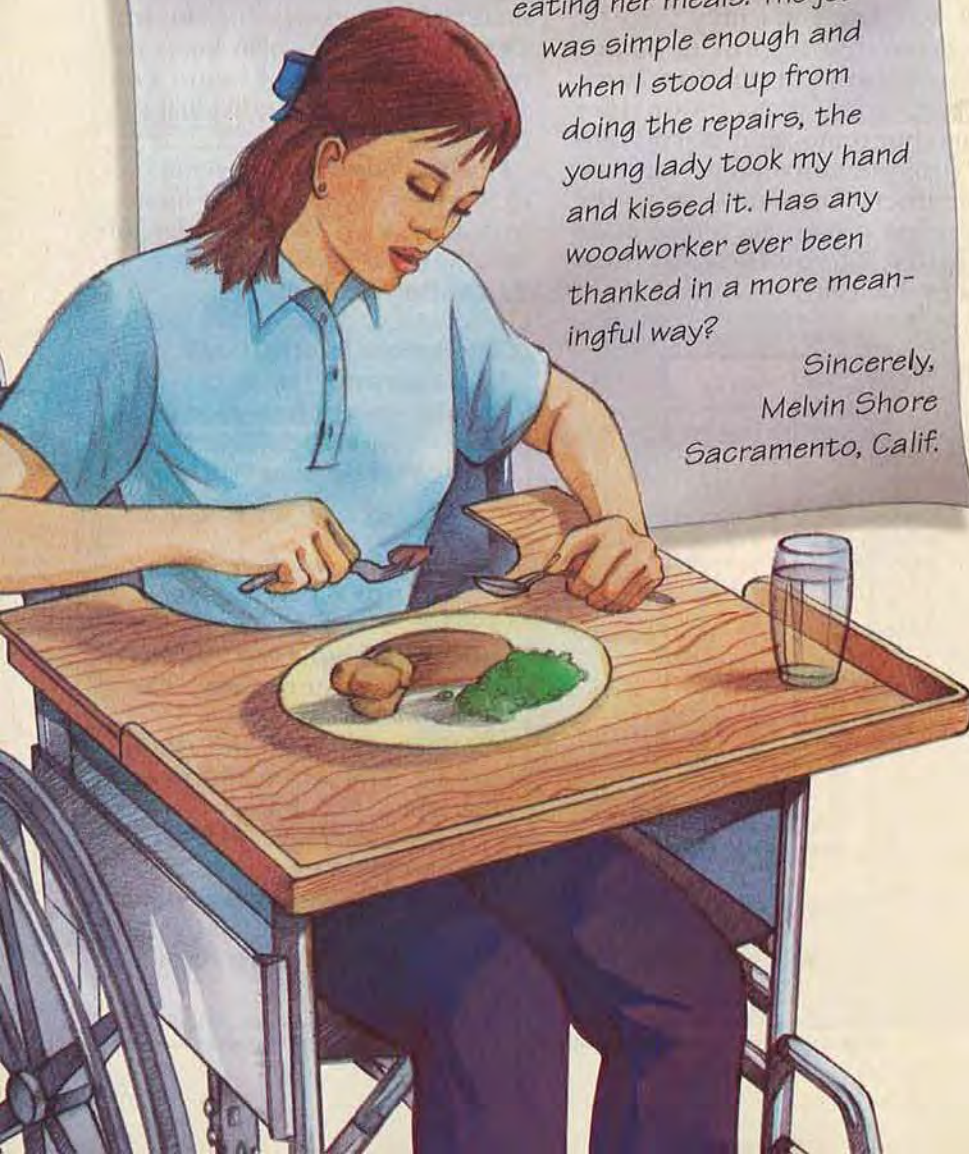
Jim Lee works as a technician at the Rehabilitative Engineering Department of the University of Iowa's Hospital School, in Iowa City, Iowa, which specializes in ongoing treatment of children with developmental disabilities. He uses his woodworking skills to craft assistive devices such as wheelchair lapboards and floor sitters, and explains how you, too, can help.

For Jim Lee, it was a typical day in the workshop. First, he completed a wheelchair laptray he had made from oak plywood. Fitted to a young girl's wheelchair, it provided a supported base on which she could work on hand dexterity.

Next, Jim figured out how to incorporate a rocker switch into the on/off control of a powered wheelchair. An eight-year-old boy used the switch to control the direction in which the chair traveled. The joy of growing confidence lighted his eyes.

Later, Jim met with a speech pathologist to decide on a positioning device for a language board. Because of the straps and braces in her wheelchair—necessary to regulate posture—a girl in her early teens found it difficult to use her language board. Jim found a way to modify the language board's holder on the laptray. Now, she can better communicate with friends and family.

And so the hours went by, each making a difference for a child with physical challenges. It was only one day, but in it Jim put his skills as a woodworker, metalworker, upholsterer, designer, and problem solver to satisfying use.



The Rescue

skills could be a really big deal.

No one works alone

Until 1991, Jim taught high school industrial arts. Suzanne Miller, Jim's coworker, came to rehabilitation engineering from a furnituremaking background.

"I believe that what we now call rehab engineering probably evolved out of a hospital's building services department," says Suzanne. "A therapist would need a special device for a patient, and a carpenter would make one up out of what was on hand."

Today, rehab engineering technicians work closely with people with disabilities and with physicians, physical therapists, speech-and-language pathologists, and professionals from other disciplines. "For example, therapists take the patient's body measurements, then give them to us to decide on the right application of the material and hardware," Jim explains. "It's a lot like building custom furniture."

And like custom furniture, assistive devices can be expensive. Bringing skills like woodworking into the picture can help to keep costs down.

Items like standing tables, floor and corner sitters, and a variety of assistive devices are available commercially. But these items may have to be customized for each patient. They also wear out or get broken. So, fitting and making, refitting or replacing, is an ongoing process. The needs of patients keep the skill of Jim, Suzanne, and other members of the rehabilitation staff in demand.

Woodworking can help

The photograph *opposite* depicts a typical shopbuilt item made by Jim and Suzanne. "When you have



Physical therapist Joy Krull and technician Jim Lee adjust Spenser Harris' wheelchair headrest for better upper body support while his mother, Toni, looks on.

a basic pattern, you can adapt and customize from that," advises Jim. "Woodworkers everywhere could do this, and help out in their communities. The key thing is to join up with a qualified therapist."

Suzanne agrees: "If we can get woodworkers teamed up with professionals in their communities, patients with disabilities

wouldn't have to travel to a facility like this for specially made devices. And there's a lot of satisfaction. When I was making furniture, I'd spend a week on a piece to please a customer. Now, I get satisfaction every day." ♣

Written by Peter J. Stephano
Photographs: University of Iowa Hospitals and Clinics/Warren Paris; Hetherington Studios
Illustration: Brian Jensen

Put your skills to work

Designing postural support systems or selecting complex assistive devices to be used by a person with disabilities requires training in the disability field. But as a woodworker, you have skills that could be applied to produce accessories such as the wheelchair laptray shown.

The first step to offer your services should be to talk to local physicians or physical and occupational therapists in your community. Also check with your local Easter Seal Society, county offices of state departments of

social services, vocational rehabilitation services, and health services. It is most important to work closely with a health-care professional, as the requirements of each disabled person differ. What is indeed a real benefit for one might be a bad choice for another.

For more information on the field of rehabilitation engineering, write:

The Rehabilitation Engineering Society of America
1700 N. Moore St., Suite 1540
Arlington, VA 22209-1903

Carve a real snowbird

Cold-Weather



Catching sight of a cardinal, all puffed up and sitting on the snow, certainly brightens a dreary winter's day. Spending some enjoyable hours carving this beauty can have the same effect.

Bandsaw the blank

Photocopy the Full-Sized top and side views (they're in the *WOOD PATTERNS*® insert in the middle of the magazine). Adhere them to the top and side faces of a $3\frac{3}{4} \times 3\frac{1}{4} \times 8$ " piece of carving stock, as shown in the Bandsawing the Blank drawing. Bring the tip of the beak right up to the end of the block on both views.

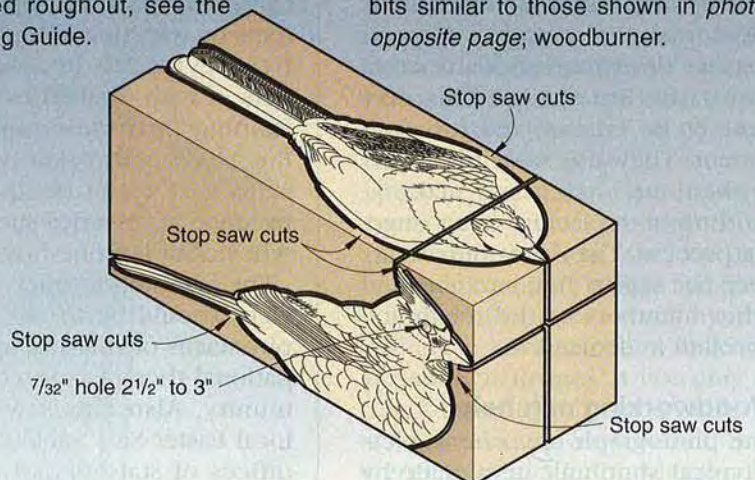
Chuck a $\frac{7}{32}$ " bit in your drill press, and drill about $2\frac{1}{2}$ " deep at the center of the eye location.

Project Prep

Stock: Carve the cardinal from a $3\frac{3}{4} \times 3\frac{1}{4} \times 8$ " block of basswood, jelutong, or other carving wood. If you prefer to start with a machine-carved roughout, see the Buying Guide.

To turn a base like the one shown, you'll need $1\frac{1}{8} \times 7\frac{1}{4} \times 7\frac{1}{4}$ " hardwood.

Tools: Power-carving rotary tool, flexible shaft or handheld; carving and detailing bits similar to those shown in *photo A*, opposite page; woodburner.



Cardinal

Center a $\frac{1}{4}$ " hole $\frac{1}{2}$ " deep on the bottom of the block where shown by the side view.

Bandsaw along the outside line of the top view. Start at the beak, and saw in to the stop point on each side, shown in the drawing. Then, saw along each side from the tail, again stopping where indicated. Randy Hansen, the Des Moines, Iowa, woodcarver who designed and carved the cardinal for us, stops the cuts this way to keep the waste attached, eliminating the separate step of taping the block back together to cut out the side view.

Bandsaw the outside line of the side view. Stop the cuts where shown to keep the block from coming apart. Remove the waste pieces by completing the cuts with a handsaw or simply breaking them off. Draw a centerline along the top of the blank.

Cut off the corners

Tilt the bandsaw table to 30° , and saw the corners off the blank. Cut the bottom corners to a line about $\frac{1}{2}$ " above the bottom edge of the blank. (To draw a guideline on each side, shown as a broken line on the pattern, we laid a pencil on a piece of $\frac{3}{8}$ "-thick scrapwood, which placed the point $\frac{1}{2}$ " above the benchtop, then traced around the blank.)

For guidelines to saw the top corners, draw a line on each side that starts where the tail joins the body, runs roughly parallel to the top edge of the blank about $\frac{7}{8}$ " below it, then arcs up across the middle of the eye hole. This line is also shown as a broken line on the side view. After sawing, your blank should look approximately like the one in front of the block in *photo B*.

Carve some curves

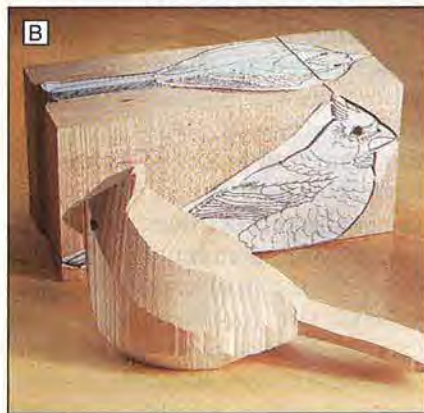
Now, shape the bird. You need to eliminate flat planes (except the bottom) and sharp corners before you begin to establish the feather groups for carving. "I've depicted the cardinal in wintertime, all puffed up," Randy comments. This means you'll want the body to look plump.

With a coarse rotary cutter such as a Kutzall or a coarse bur, grind away the angles left by sawing, as shown in *photo C*. Round the

planes and blend them into each other. Slope the upper corners down to avoid blockiness. Maintain the steps along the middle of the bird's back (the top of the blank); they'll guide you when you lay out feather groups later.

Refer to the front view and the various photos as you carve the bird's head. (It also helps to gather other photos and accurate illustrations of cardinals for carving references.) Start carving with a groove around the head, beginning beside the beak and running across the eye holes. The width across the back of the eye holes should be about $\frac{7}{8}$ ", only slightly less—perhaps $\frac{13}{16}$ "—at the front of the holes. Take measurements like these easily with vernier calipers, as shown in *photo D*.

Continued



Cardinal

Above the groove, round the corners and shape the crest at the back of the head to a point. Keep an eye on the centerline as you work to keep the carving approximately symmetrical. Below the groove, round the back of the head and neck and the front below the beak. You want to achieve the effect of a roll or hump in this area, which corresponds to the section between *points 1 and 2* on the side view.

Make it lumpy and bumpy

Referring to the top and side views, draw guidelines for carving the feather groups. Roughly sketch the lines, shown on the side view as shaded lines starting from *points 3, 4, and 5* and along the lower part of the body.

Using a finer cutter, such as a ruby carver, carve shallow grooves along these lines to set them off. Then, referring to the photos and illustrations, shape the areas established by the lines. Rely on the references to show which areas overlap others. Bird carvers sometimes call this stage—defining the feather groups—lumping and bumping.

Referring to the top view, draw the general outline of the tail feathers on the blank. Think of a couple of overlapping tongue depressors for the shape. The tail curls lengthwise; shape it by carving away the outside edges on top and the center on the bottom, as shown *below (E)*. Carve it to about $\frac{1}{8}$ " thick.

The primary flight feathers of our sitting cardinal's folded wings lie along the back of the body. To separate and define the primary groups, carve a channel where shown by the shaded area on the top view. (Refer also to the photos.) Begin the groove at the surface in the vicinity of *Point 4* and slope it almost to the tail's top surface. Sand the bird to soften the curves and blend the areas together. Your carving should now resemble the one *below (F)*.

Next, put on some plumage

Study the feather patterns shown in the three pattern views. Sketch the lines onto the appropriate areas of the carving. Draw the tail and wing feathers where shown, and sketch in the center ribs where shown.

When drawing the feathers on the front and lower body and the back, you don't need to copy the pattern precisely. Just capture the general arrangement and direction of lay for the feathers.

Carve the feathers with ruby carvers. For the body feathers, cut shallow grooves along the lines as you did earlier. Employ a sanding disc to define the wing and tail feathers. In both cases, start from the top of the feather group and work down, carving the visible portion of each feather.

Add lifelike details

Now, shape the bill. Draw a line along the side to separate the maxilla (upper part) from the

mandible (lower part). Study the three views and the photos as you carve the bill. The carving should now look like the one *below (G)*.

To set the eyes in place, mix a ball of epoxy wood filler about the size of a pencil eraser. Push some into the eye hole on each side, then press a 4 mm dark brown glass eye into the epoxy. Refer to the photos—don't set the eye too far into the head.

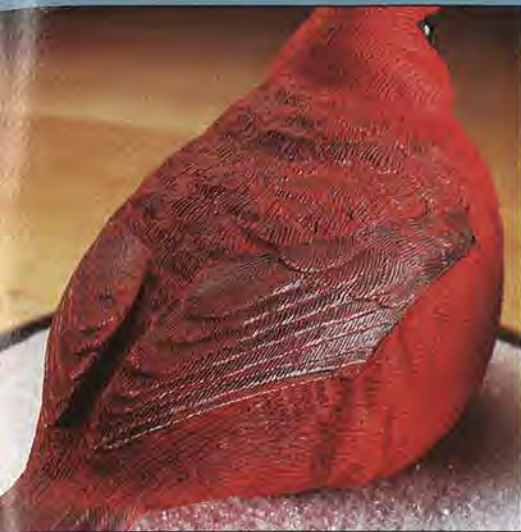
After the epoxy cures, blend the eye area into the head and model the eyelid, following the photos and illustrations. A knife with a sharp point comes in handy at this stage; power-carving bits can scratch the surface of the eye.

Texturing adds the final touch of realism, simulating the look of feather barbs. For the cardinal, Randy suggests both woodburned and carved texture.

Woodburn the quills (the central shafts) and barbs (the side members that make up the vanes) for the tail and primary wing feathers. Start by drawing guidelines for the tapered quills. Then, with the flat edge of a knife-edged woodburning tool, depress the wood alongside the line, creating, in effect, a raised shaft down the center of the feather.

Out from the shaft, burn a series of closely spaced parallel lines to represent the feather barbs. They should flow toward the tip of the feather with a slight curvature, as shown in the illustrations. Adjust your woodburning speed and the woodburner temperature to make





the burned lines a medium toast color rather than charred black. Strive for uniform appearance, as shown *below* (H). Woodburn the nostrils on the bill near the head.

Using the rotary carver with a texturing stone, striate the remaining feathers and groups. For the best effect, texture each distinct feather separately, introducing slight variations in depth or direction as shown in the photos *above*. Again, these cuts representing feather barbs should follow a natural flow along the bird's body. Picture how air would flow over the bird's body, and how the feathers would react to the flow.

With the carving completed, Randy power-brushes away loose wood fibers and sawdust, employing a nylon bristle brush (shown in front at the center in *photo A*) chucked into his power carver's handpiece. As he brushes, he watches for details that need last-minute fixing.



Paint a pretty bird

Spray on a coat or two of Deft lacquer to seal the carving for painting. This provides a smooth, non-absorbent surface for painting. Power-brush the carving once more after the lacquer dries.

Randy paints his carvings with artists' oil paints. You could use acrylics, if you prefer. Standard colors needed for the cardinal are:

- Cadmium red medium
- Cadmium red dark (or deep)
- Cadmium yellow
- Burnt umber
- Ivory black or Mars black
- Prussian blue
- Payne's gray

Thin the colors for brushing, and apply thin coats. Thin coats allow you to build color without covering up the carved details.

Paint the sides and breast with cadmium red medium. Continue that color onto the head, then blend toward cadmium red dark at the top of the crest. For the back, wing feathers, and tail, add burnt umber and Payne's gray to the cadmium red medium.

Add a touch of Prussian blue to either ivory black or Mars black for the throat. On the bill, shade from cadmium yellow near the line that separates the mandible and maxilla to cadmium red medium. (If you're using acrylics, Randy suggests stippling the yellow on first—putting it on in a dot

pattern with the tip of the brush— then painting the red.)

Build a display base

All that remains is to place your carving on a suitable base. To make a simple base, cut an oval or rectangle from $\frac{3}{4}$ "-thick hardwood. You could rout a chamfer or bead along the top edge, too. Drill a $\frac{1}{4}$ " hole $\frac{1}{2}$ " deep in the center, and attach the carving to the base with a $\frac{1}{4}$ " dowel pin $\frac{7}{8}$ " long.

For his carving, Randy constructed a turned base with simulated snow to highlight the winter cardinal. Here's how to make one:

Bandsaw a $7\frac{1}{4}$ "-dia. circle from $1\frac{1}{8}$ "-thick stock. Center your lathe's faceplate on the back of the circle. Turn the disk to the profile shown.

Fill the recess with a nonshrink-ing filler. After the filler cures, drill a $\frac{1}{4}$ " hole $\frac{3}{4}$ " deep in the base's center. Stick a length of scrap dowel rod into the hole.

Coat the filled area with acrylic textural medium (we applied DecoArt Snow-Tex, available at craft supply stores) or thick, white enamel. While the surface is tacky, dowel the carving to the base, and sprinkle crystal clear glitter all over the area around the bird. (We bought our glitter at a craft supply store, too.) Let the surface dry, then shake off the excess glitter. ♣

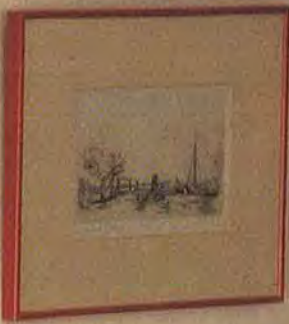
Buying Guide

Roughout. Machine-carved roughout from original carving, \$15.95 ppd. in U.S. for one, \$27.90 for two. Catalog of over 400 roughouts included with order, or available separately for \$3.95 (refunded with first order). Rossiter's Roughouts, 1447 S. Santa Fe, Wichita, KS 67211, or call 800/825-2657 (800/8BLANKS) to order.

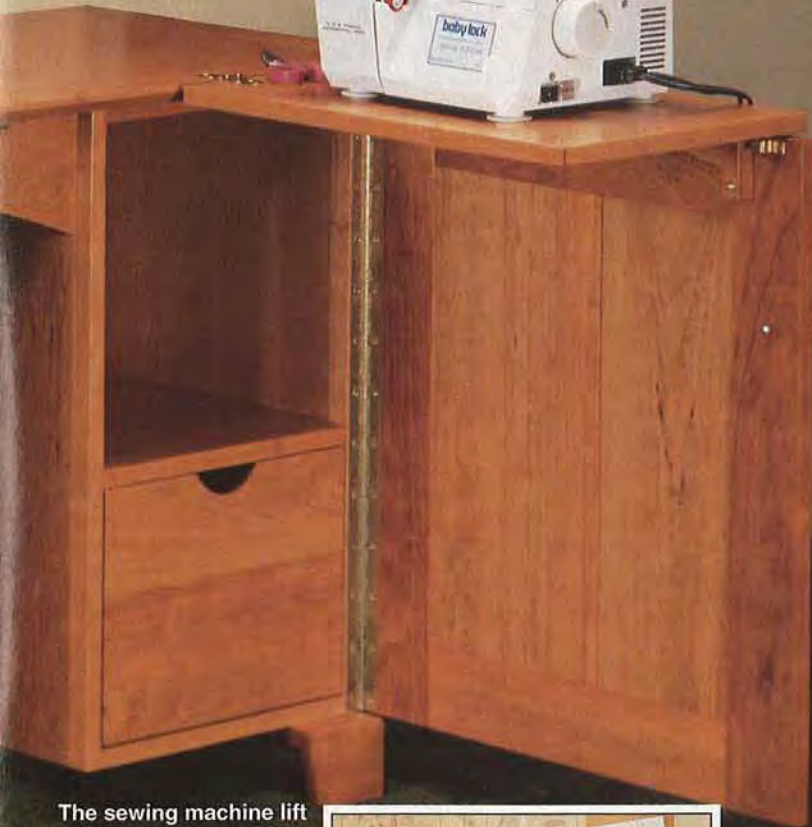
Project Design: ©Randy Hansen
Photographs: Hopkins Associates;
Hetherington Photography
Illustrations: Roxanne LeMoine; Lorna Johnson

SEWING CENTRAL





Every seamstress' dream come true



The sewing machine lift allows you to use the machine in two different positions. The free-arm position is shown at right and the flush position is shown above. In its third position, as shown at far right, the machine stores out of sight.



When I designed this Shaker-style sewing cabinet, I set out to create a compact, yet attractive, piece of furniture with features and storage galore. I included in the cabinet a quality mechanical lift with which you can raise your sewing machine to two working positions, or lower it for easy out-of-sight storage. A special compartment also makes room for a serger. Drawer storage abounds, and the hinged cabinet top flips out in two directions, effectively doubling the countertop work surface. Hope you like it.

Jan Hale Svec

Jan Hale Svec
Assistant Design Editor

Start with the right- and left-hand pedestals

1 From $\frac{3}{4}$ " cherry plywood (see the Buying Guide for our source of a hardwood lumber kit), cut the pedestal sides (A), tops and bottoms (B, C), shelf (D), and back (E) to the sizes listed in the Bill of Materials.

2 Cut the 12 drawer guides (F) to size from solid cherry stock. Drill four countersunk mounting holes through each.

3 Fit your tablesaw with a dado blade, and cut a $\frac{3}{4}$ " rabbet $\frac{1}{2}$ " deep along the top and bottom edges on the inside face of the four pedestal sides (A). See the Pedestals drawing for reference.

Continued

Bill of Materials

Part	Finished Size			Matl.	Qty.	Part	Finished Size			Matl.	Qty.
	T	W	L				T	W	L		
PEDESTALS						TOP AND EXTENSIONS					
A sides	¾"	15½"	25"	CP	4	U top panels	¾"	14½"	40½"	CP	2
B top & bottom	¾"	15½"	8¼"	CP	2	V* banding	¾"	2"	44½"	C	4
C top & bottom	¾"	15½"	14"	CP	2	W* banding	¾"	2"	18½"	C	4
D shelf	¾"	15½"	13½"	CP	1	X banding	⅞"	¾"	18½"	C	2
E back	¾"	25"	40"	CP	1	Y insert	¾"	varies		CP	1
F guides	⅝"	1⅛"	15¾"	C	12	DRAWERS					
G* banding	¾"	1"	25"	C	6	Z front	¾"	1⅞"	7⅞"	C	1
H* banding	¾"	1"	7¼"	C	2	AA fronts	¾"	2⅞"	7⅞"	C	2
I* banding	¾"	1"	13"	C	3	BB front	¾"	5⅞"	7⅞"	C	1
J kneehole apron	¾"	4"	18¾"	C	1	CC front	¾"	9⅞"	7⅞"	C	1
K cleat	¾"	¾"	17¼"	C	1	DD front	¾"	9⅞"	12⅞"	C	1
L cleats	¾"	¾"	3½"	C	2	EE sides	½"	1⅞"	15⅞"	BP	2
FEET						FF sides	½"	2⅞"	15⅞"	BP	4
M* sides	¾"	3½"	4"	C	8	GG sides	½"	5⅞"	15⅞"	BP	2
N gussets	¾"	3¾"	3¾"	C	4	HH sides	½"	9⅞"	15⅞"	BP	4
DOORS						II back	½"	1½"	6⅞"	BP	1
O side stiles	¾"	3¼"	24⅞"	C	4	JJ backs	½"	2½"	6⅞"	BP	2
P rails	¾"	3¼"	15"	C	4	KK back	½"	5½"	6⅞"	BP	1
Q muntins	¾"	2"	18⅞"	C	2	LL back	½"	9¼"	6⅞"	BP	1
R* panels	1⅜"	6¾"	18⅞"	LCP	4	MM back	½"	9¼"	12⅞"	BP	1
S astragal	¼"	1"	24⅞"	C	1	NN bottoms	⅞"	6⅞"	13⅞"	H	5
T supports	¾"	¾"	2½"	C	2	OO bottom	⅞"	12⅞"	13⅞"	H	1

*Initially cut parts marked with an * oversized. Trim to finished size according to the instructions.

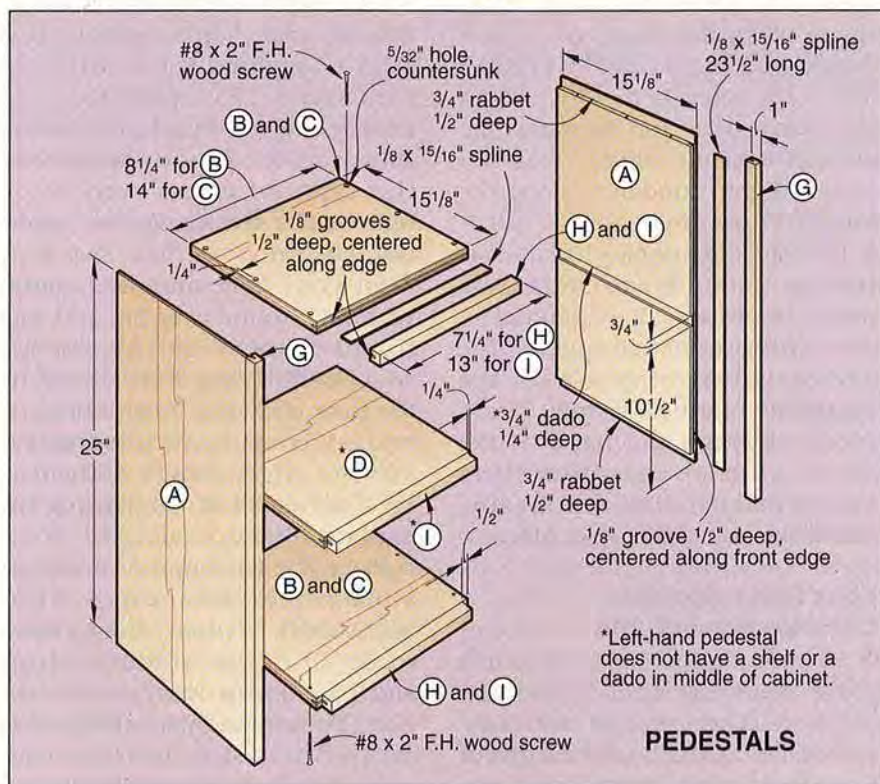
Materials Key: CP—cherry plywood, C—cherry, LCP—laminated cherry plywood, BP—birch plywood, H—hardboard.

Supplies: #8x1¼" roundhead brass wood screws, #8 brass flat washers, #8x¾" flathead wood screws, #8x1¼" flathead wood screws, #8x2" flathead wood screws, #12x⅝" pan-head sheet metal screws, 2-⅝" brass flat washers, clear finish.

Buying Guide

Hardware kit. Two pair of brass sewing machine hinges, part no. 32284, two twin-ball catches, part no. 28662, one pair of 1⅝" classic cherry Shaker knobs, part no. 15265, a pack of table pins, part no. 32334, one sewing machine lift, part no. 33100, two 1½x36" brass piano (continuous) hinges, part no. 19283. The Woodworkers' Store, 4365 Willow Drive, Medina, MN 55340. Or, call 800/279-4441 to order.

Hardwood kit. All the individual pieces shown on the Cutting Diagram cut slightly oversized in length and width from the thicknesses and materials listed in the Bill of Materials. Available in cherry and oak. Heritage Building Specialties, Fergus Falls, MN 56537. Or, call 800/524-4184 to order.



4 To house the shelf (D) in the right-hand pedestal, cut a ¾" dado ¼" deep on the inside face in two of the side panels (A). See the Pedestals drawing for location.

5 Using solid cherry the same thickness as your plywood (we had to plane our solid stock to 2⅜"), cut the pedestal banding strips (G, H, I) to size plus 1" in length each.

6 Cut or rout a ⅞" groove ½" deep in the mating edges of the plywood panels and banding. (We used a pencil to letter the mating pieces for ease in assembling them later.) See the Spline detail accompanying the Exploded View drawing for reference.

7 Cut strips of ⅞" hardboard to 1⅝" wide for joining the banding (G, H, I) to plywood panels (A-E).

8 Glue, spline, and clamp the banding (G) to the front edge of each of the plywood side panels

Continued



A pair of dadoed spacers allow you to accurately locate the drawer guides on the inside of the side panels.

(A) and to both edges of the back (E). Use a damp cloth to immediately wipe off any excess glue. Later, trim the banding flush with the ends of the plywood panels.

Add the drawer guides, and assemble the base

1 To ensure evenly spaced drawer guides (F), cut a piece of stock to $\frac{3}{4} \times 2 \times 23\frac{1}{2}$ ". Crosscut dados in the stock exactly where located on the Drawer Guide Spacer drawing on the Parts View in the *WOOD PATTERNS*® insert in the center of the magazine. Rip the piece in half. As shown in the photo *above*, use the spacers to locate the drawer guides on the inside face of the left-hand pedestal side panels (A). The top end of the spacers should be flush with the shoulder of the rabbet along the top end of each side panel. Drive the screws.

2 Glue and clamp each of the pedestals together, making sure to glue and clamp the shelf in place in the right-hand pedestal. Measure the opening, and cut banding pieces (H, I) to final lengths. Glue, spline, and clamp the banding in place.

3 Clamp the banded back (E) to the backs of the pedestals. The ends of the back should be flush with the outside surfaces of the pedestals. Drill countersunk mounting holes, and screw the back to the pedestals.

4 Cut the kneehole apron (J) to shape using the Kneehole Apron drawing on the *WOOD PATTERNS* insert for reference. (We used a thin strip of wood to mark the curved bottom edge.) Rout or sand a slight round-over along the bottom edges of the apron.

5 Cut the cleats (K, L) to size. Drill mounting holes, and screw the side cleats (L) in place $1\frac{1}{2}$ " back from the front edge of the pedestals where shown on the Exploded View drawing. Then, screw through the back of the cleats to secure the apron (J) to the front of the cleats. Finally, screw the top cleat (K) in place.

Four feet raise the base to new heights

1 To form the foot sides (M), cut a piece of cherry to $3\frac{1}{2}$ " wide by 36" long. Then, cut or rout a $\frac{3}{4}$ " rabbet $\frac{1}{2}$ " deep along one edge of the stock. Now, crosscut eight

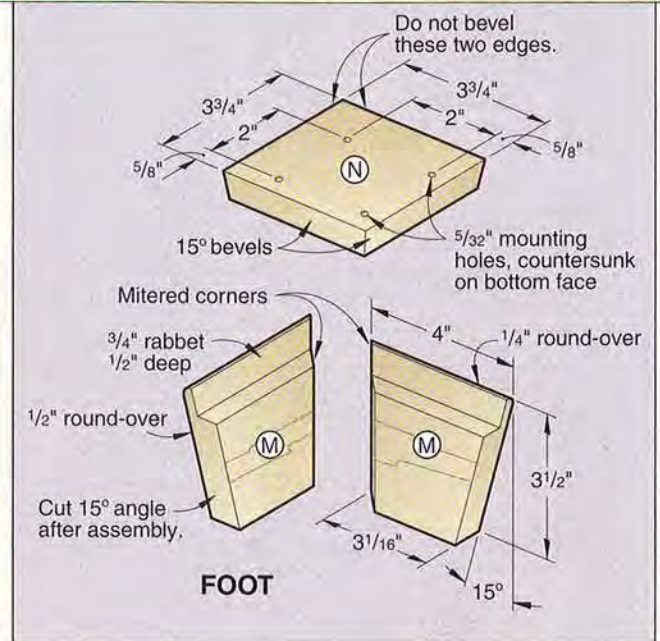
foot sides (M) from the 36"-long strip to 4" long each, miter-cutting one end of each piece. See the Foot drawing for reference.

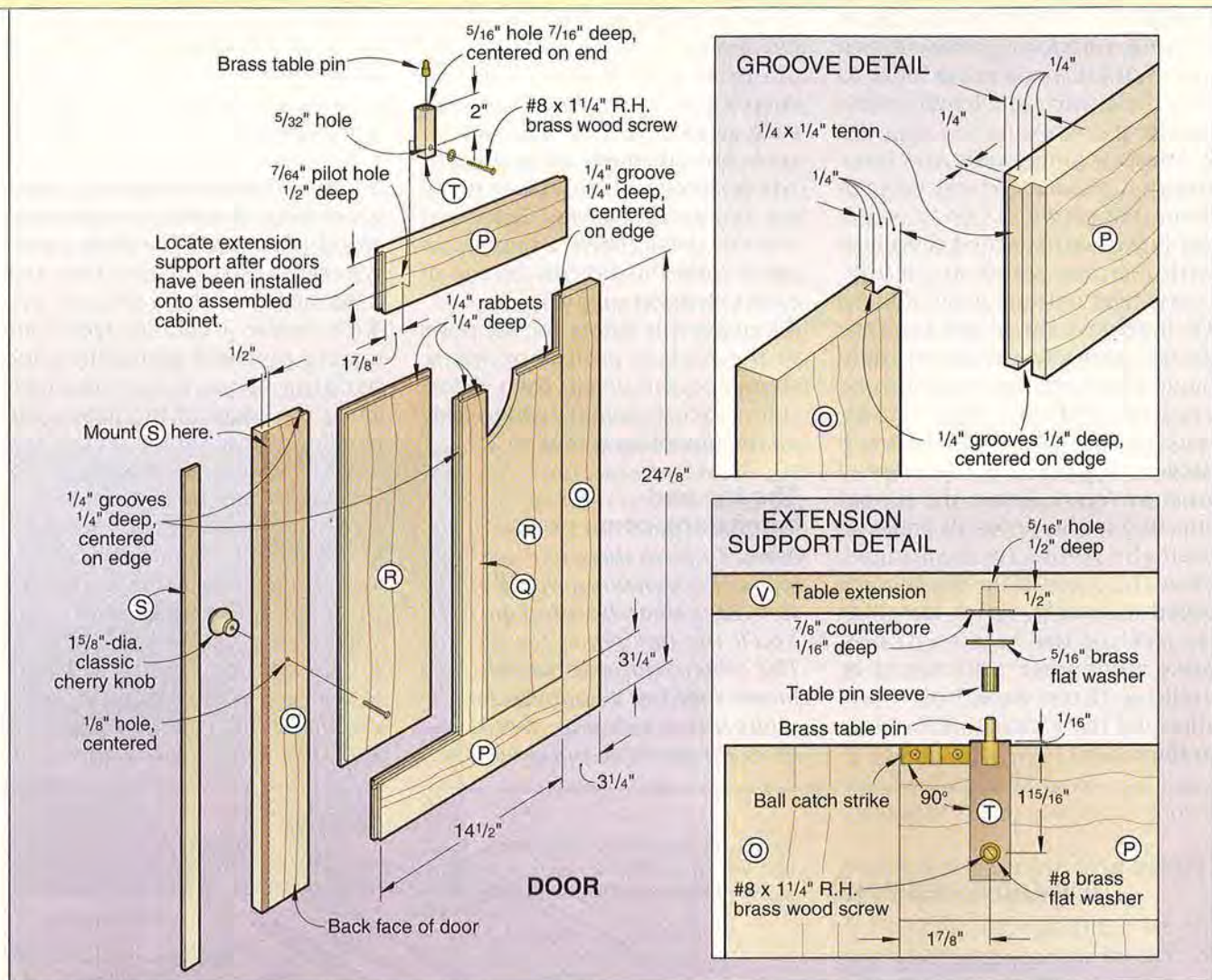
2 Cut the foot gussets (N) to $3\frac{3}{4}$ " square. Drill four countersunk mounting holes through each gusset where shown on the drawing.

3 Glue and clamp the four feet (M, N) together. Later, mark and bandsaw a 15° taper along the outside edges of each foot where shown on the Foot drawing. Sand the tapered edges smooth to remove the saw marks (we used a disc sander).

4 Fit your table-mounted router with a $\frac{1}{2}$ " round-over bit, and rout round-overs along the *outside edges* of the feet where shown on the Foot drawing. Switch bits and rout a $\frac{1}{4}$ " round-over along the *top outside edges* where shown on the Foot detail accompanying the Exploded View drawing.

5 Place the base upside down on a blanket. Position the feet and screw them in place. The feet protrude $\frac{1}{4}$ " on the sides and back and $1\frac{3}{16}$ " on the front of the cabinet. (To accurately locate the feet on the pedestal bottoms, we taped $\frac{1}{4}$ "- and $1\frac{3}{16}$ "-wide spacers





to the bottom outside edges of the pedestals, and positioned the feet against these spacers.)

Construct a pair of frame-and-panel doors

1 Cut the door stiles (O), rails (P), and muntins (Q) to the sizes listed in the Bill of Materials.

2 Fit your tablesaw with a 1/4" dado blade, and cut 1/4"-deep grooves centered along the edges of the stiles, rails, and muntins where shown on the Door drawing and Groove detail.

3 To form the door panels (R), cut eight pieces of 1/4" plywood to 7" wide by 19 1/4" long. Glue the pairs together with the good sides out.

4 Rip and crosscut the four laminated door panels (R) to final size.

5 Cut or rout 1/4"-wide rabbets along the back face of each door panel deep enough to leave a 1/4" lip on the four sides of each panel. The lip should fit snugly into its mating grooves in the door stiles and rails. (Test-cut scrap first. Our laminated plywood panels measured 1 3/32" thick, so it took a few test passes to get a lip that would fit perfectly in the grooves in the stiles and rails.)

6 Cut 1/4" rabbets on both ends of the rails (P) and the muntins (Q) where shown on the Door drawing to fit into the previously cut grooves in the stiles and rails.

7 Dry-fit the doors together. Lay a straightedge across each door to be sure all parts come together flat and square. Mark mating joints for ease in assembly later.

8 Disassemble the doors, and sand a very slight round-over along the edges of the stiles, rails, and muntins that are next to the panels. It's difficult to sand these edges later after the doors have been assembled. Then, glue and clamp each door together, checking for square. Later, remove the clamps and finish-sand each door.

9 Cut the astragal (S) to size. Glue it to the back face of the left-hand door where shown on the Door and Exploded View drawings.

Continued

Hinge the doors to the base

1 Using a hacksaw, crosscut two pieces of 1½" brass piano hinge to 24⅞" long (the same length as the two front doors).

2 Attach a hinge *with just three screws* to the outside edge of each door. (We used a VIX bit to center the holes, and attached the hinge with just one screw at the top, center, and bottom of each door.) Then, remove the hinges from the doors, and use the same technique to secure the hinges to the pedestals with just three screws, placing the top edge of each hinge ¼" from the top edge of each pedestal. Leave the hinges attached to the pedestals and reattach the doors to the hinges. Close the doors. If the doors come together evenly, finish installing the rest of the screws. If not, make appropriate adjustments by drilling three new holes and adjusting the location of the door to the hinge.

3 For supporting the extensions, cut a pair of extension supports (T) to size. Drill a ⅝" hole ⅞" deep, centered into the top end of each support. Drill a ⅝" counter-sunk hole through each support where shown on the Door drawing and accompanying Extension Support detail. Drive a brass table pin into the ⅝" hole in the top of each extension support.

4 Temporarily screw the supports to the back of each door where shown on the detail. Each extension support should swing freely on the mounting screw.

The top and extensions come next

Note: *To form the sewing cabinet top and extensions, you'll make two identical banded panels. You'll use one panel for the top. The other, you crosscut into two pieces and use one piece for the right-hand extension and the other for the left-hand extension.*

1 From ¾" cherry plywood cut the two top panels (U) to 14½" wide by 40½" long.

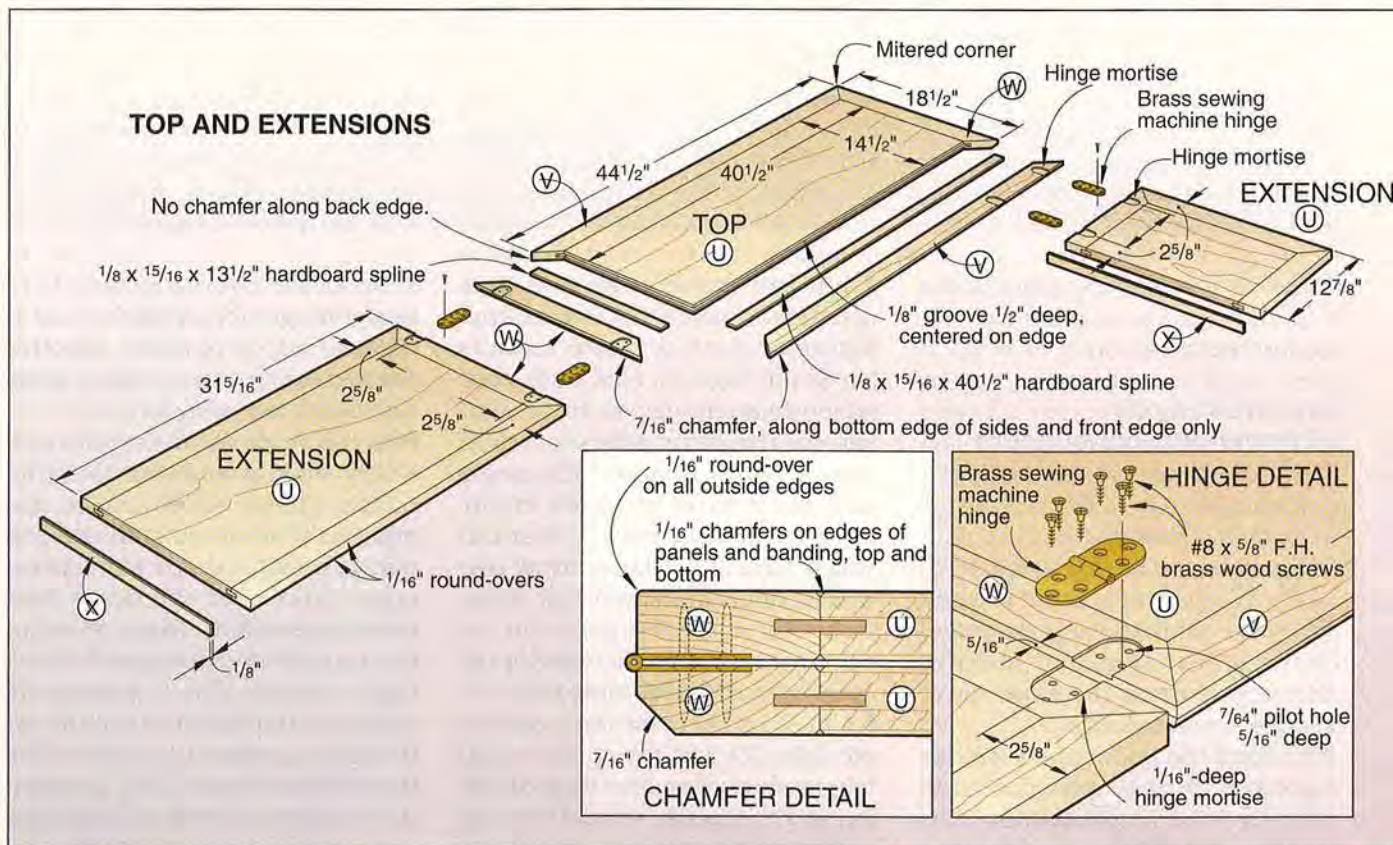
2 From solid cherry stock, cut the banding pieces (V, W) to size plus 1" in length.

3 Cut or rout mating spline grooves in the edges of the plywood panels and banding pieces where shown on the Top and Extensions drawing.

4 To create a vein between the mating plywood and solid-wood banding, rout a ¼" chamfer along the edges of the panels and banding where shown on the Top and Extensions drawing and accompanying detail.

5 Miter-cut the banding pieces (V, W) to length. Then, glue, spline, and clamp the banding to the two plywood panels. Immediately wipe off any excess glue.

6 Crosscut one of the panels into two pieces as dimensioned on the drawing. (One panel is 31⅝" long and the other 12⅞".) Now, cut



banding pieces (X) to size, and glue and clamp them in place.

7 Rout a $\frac{7}{16}$ " chamfer along the front and side bottom edges of the large banded panel only.

Add the solid-brass sewing machine hinges

1 To form perfectly shaped mortises, build the template shown on the Hinge-Routing Template drawing. The cleats on the end and edge of the plywood rotate, allowing you to position the template to rout all the mortises.



2 Fit your router with a 1" guide bushing and a $\frac{3}{4}$ " straight bit. Set the bit to cut to a depth equal to the thickness of the hinge. See the Routing detail accompanying the Hinge-Routing Template drawing. (We test-routed scrap stock first to verify the depth of cut and accuracy of template.)

3 As shown in the photo *below left*, rout the hinge mortises in the top surface of the top panel and mating edges of the extensions where shown on the Top and Extensions drawing.

4 Fit the hinges into the mortises and use a VIX bit to drill holes centered through the holes in the hinges and into the mortises. Mount the extensions to the top panel, and finish-sand the parts.

Mount the top and extensions to the base

1 Position the back edge of the top panel flush with the

Use the same template to rout all the hinge mortises in the top panel and mating extensions.

back edge of the base assembly. Center the top panel from side to side on the base. Clamp the top in place. Then, drive wood screws through the base tops (B, C) and cleat (K). Remove the clamps.

2 Open the left cabinet door 180° and open the top left extension to lay on the door. Turn the extension support (T) into its upright position, and mark its mating location on the extension with the brass pin protruding from the support. Flip the extension back onto the center panel, and use a Forstner bit to drill a $\frac{7}{8}$ " hole $\frac{1}{16}$ " deep. See the Extension Support detail accompanying the Door drawing for reference. Switch to a brad-point bit, and drill a $\frac{5}{16}$ " hole $\frac{7}{16}$ " deep centered inside the $\frac{7}{8}$ " hole. Epoxy the sleeve half of the brass tabletop pin into the $\frac{5}{16}$ " hole and a $\frac{5}{16}$ " brass washer into the $\frac{7}{8}$ "-diameter depression around the pin.

3 Repeat the operation to form the mating socket in the other extension for the opposite door.

Form the opening and insert for the top panel

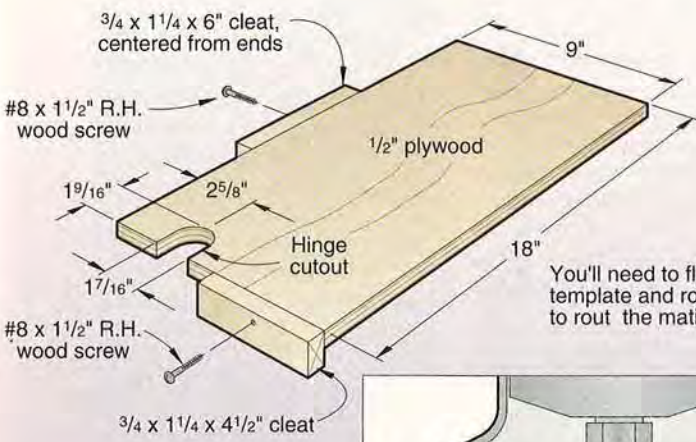
1 For ease in working with the top panel, remove the hinges and extensions.

2 Using the instructions provided with the sewing machine lift mechanism (see the Buying Guide

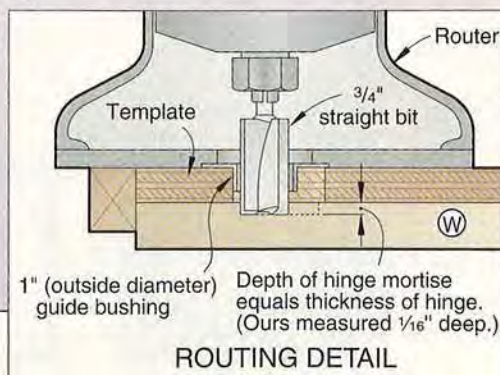
Continued



Using a portable router, a piloted straight bit, and straightedges, we straightened the edges of the cutout.



You'll need to flip the template and rotate the cleats to rout the mating mortises.



for our source), mount the lift to the plywood back panel (E). Center it between the pedestals and flush against the bottom side of the top (U). See the Front Section View drawing on the *WOOD PATTERNS*® insert for reference. (We used #12×5/8" pan-head sheet metal screws.)

3 Referring to Creating the Sewing Machine Opening drawing on the *WOOD PATTERNS* insert, create the opening in the top panel (U) and form the insert (Y).

Next, add the drawers

1 Cut all the drawer fronts (Z-DD), sides (EE-HH), backs (II-MM), and drawer bottoms (NN, OO) to the sizes listed in the Bill of Materials.

2 Using the arc on the Parts View drawing, mark the handle cutout along the top edge of each drawer front (Z-DD). Bandsaw and sand the cutouts to shape. Then, rout a 1/2" cove along the inside surface of each cutout where shown on the Drawers drawing.

3 Cut 3/4" grooves 1/4" deep along the outside face of each drawer side (EE-HH) where noted on the Drawers drawing. Cut a 1/2" dado 1/8" deep on the inside face to house the drawer back (II-MM).

4 Cut 1/2" rabbets 1/2" deep along the edges of the drawer fronts and 1/8" grooves 1/4" deep 1/4" from the bottom edge where shown on the drawing.

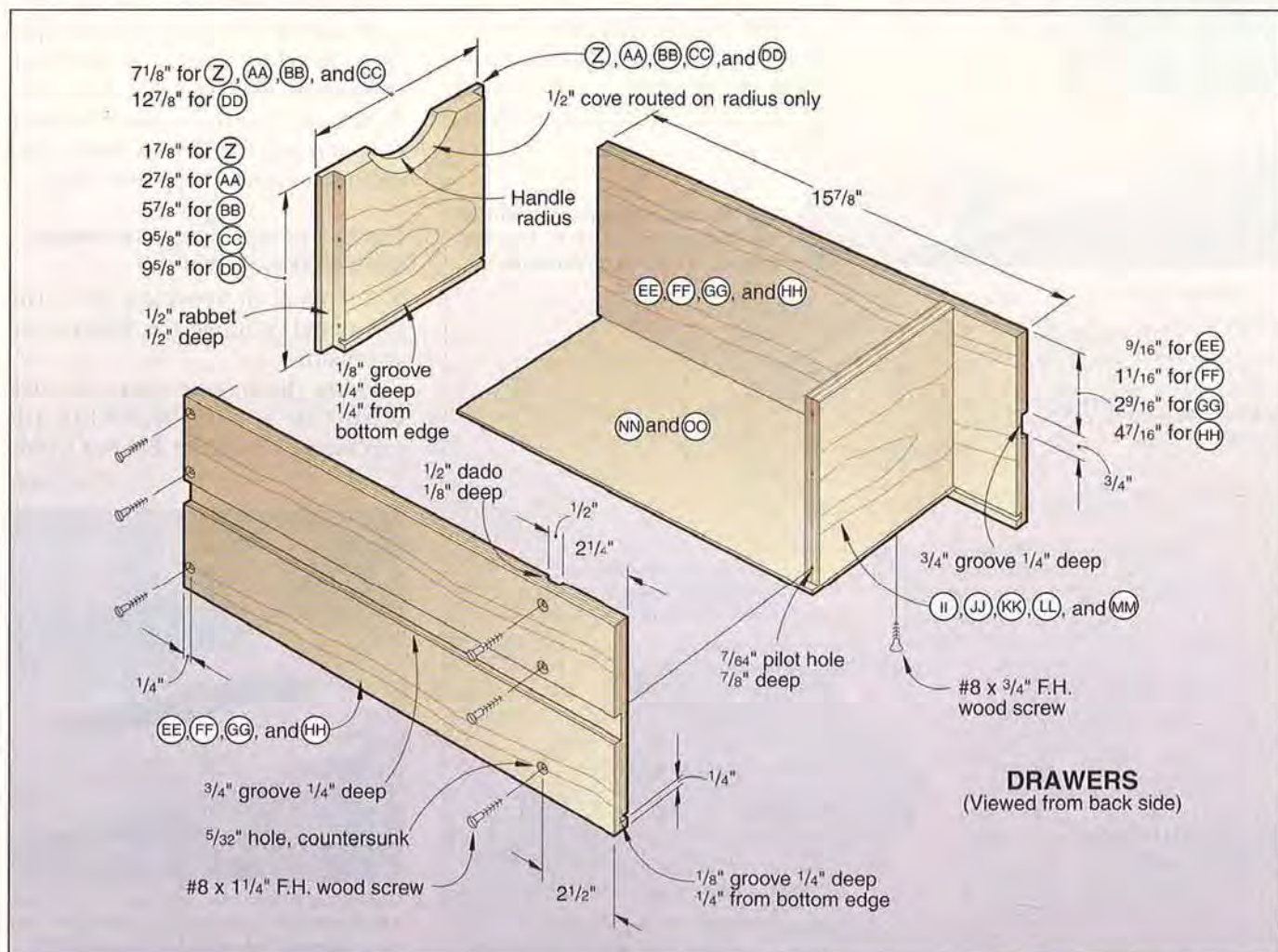
5 Glue and screw each drawer together, checking for square.

Finishing and final assembly

1 Remove all the hardware and extension supports from the cabinet and top. Finish-sand all the pieces, being careful not to sand through the thin veneer.

2 Add several coats of clear finish to all the pieces. (We started with one coat of a penetrating oil finish to bring out the color of the cherry. After this had thoroughly dried, we applied several coats of Deft lacquer, rubbing lightly between coats with ultrafine [gray] Scotch-Brite pads.)

3 Reattach the doors, supports, catches, knobs, and hinges to the cabinet and the extensions to the top. Reattach the sewing machine lift. Install the drawers. 🌲



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Something's fishy
Key Ring

See related article on page 33

To Peter Chapman, anything can become a puzzle. Want to try Peter's puzzling technique? This fish key ring is the perfect project. It'll only take you a few minutes at the bandsaw, so after the first, don't be surprised if you make more.

For the key ring, you'll need the following materials:

- A 3/4x1x3 1/8" piece of stock
- A 1/8" dowel 1" long
- Clear finishing material
- A metal key ring

First, shape your fish

Rip and crosscut a piece of 3/4"-thick stock (Peter chose cocobolo for this fish) to 1x3 1/8". Then, make one photocopy each of the full-sized Side and Top View patterns shown below right. Adhere the Top View pattern to the top (the 3/4" side) of your stock, and saw it to rough shape following the outside lines. Next, adhere the Side View pattern to the 1" side of your stock, and saw to the outside pattern lines.

Remove all paper from the stock, then smooth the edges and sand the fish to final shape with coarse sandpaper (60-grit). Finish-sand with 80-grit, then 120-grit.

Puzzle up your fish

Now, you're ready to puzzle. But first, saw the notch that represents the fish's mouth. Next, with a pencil, sketch the red cutlines shown in the Top View drawing on the top of the fish blank (close is good enough). At your bandsaw, saw the fish's body along the line you drew to remove Part A (Peter uses a 1/8" blade with 14 teeth per inch). Then, turn the fish on its side and sketch the red cutlines for the side, as shown on the Side View. As before, saw to the pencil line to remove Part B.

Turn the fish right side up again (to sit on its belly) and saw along the line that frees Parts C and D.

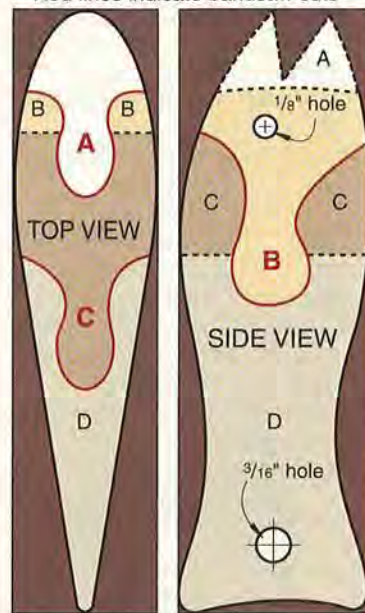
After bandsawing, you have a fish body with four loosely interlocking parts. To keep them together, join the parts, then drill a 1/8" hole through the fish's head where shown in the Side View pattern (use a backing board). Cut a 1/8" dowel to 3/4" length, round each end and insert it into the eye hole. When in place, the dowel "locks" the puzzle. Lastly, with a 3/16" bit, drill a hole through the fish's tail where shown to accept a key ring.

Remove the rough stuff

Go over the fish with 120-grit paper to knock down any raised wood along the saw lines and drilled holes. When smooth, coat the outside surface of the fish with a clear finish and let dry. To complete, add the key ring. 🐟

Drawings: Roxanne LeMoine
 Design: Peter Chapman © 1996

FISH FULL-SIZED PATTERN
 Red lines indicate bandsaw cuts





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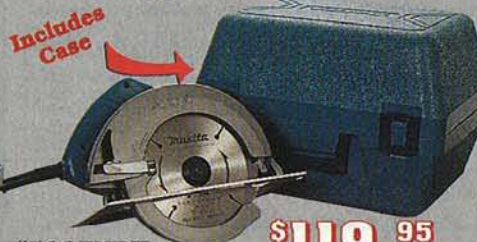
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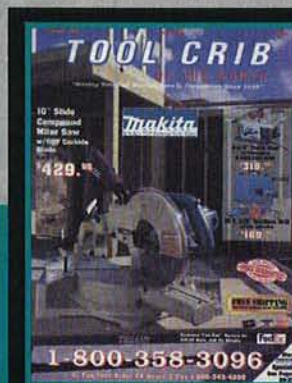
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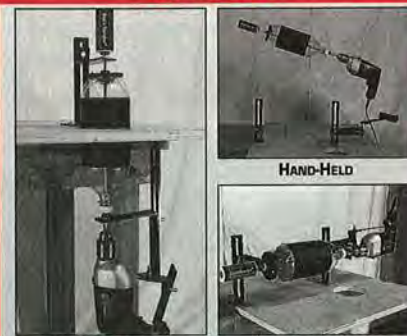
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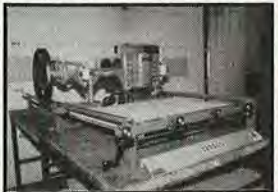
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Plug cutters give woodworkers a way to produce face-grained plugs, but if the hole being plugged is even slightly undersized, they won't fit. If the hole is too large—from drill-bit wobble or drill runout—the plugs leave unsightly gaps.

Veritas solved the fit problem several years ago by introducing a set of tapered plug cutters. MLCS and Wolfcraft followed suit and Woodworker's Supply just introduced still another set. To find out which tapered plug cutters work best, I tested all four brands.

In the course of the testing, I discovered that if the cutters shredded the wood, the plugs didn't fit tight, leaving small gaps around the hole. Also, the cutters start by making an oversize cut, then progressively taper the plug the deeper they are plunged into the wood. So, if you cut plugs too shallow, they may not fit into the hole. Cut them too deep, and they may bottom out before they fit tight, leaving gaps around them.

Veritas cutters shave wood

The Veritas Snug Plug cutters created the best-fitting, most consistent plugs. The four-finger cutters cleanly shave wood like a sharp Forstner bit, leaving the sides of

each plug glass smooth. They cut the first 1/8" of the plug with no taper, and chamfer the edge, making the plugs easy to insert. The rest of the plug has a gentle 3° taper. You can buy the Snug Plug cutters in a three-piece set (1/4", 3/8", and 1/2") or purchase them individually (about \$12.95 each).

Wolfcraft offers freehand drilling

Unlike the open four-finger design of the Veritas cutters, the Wolfcraft cutters resemble an open cylinder. The sharpened edges of the cylinder slice through the wood. I liked working with these cutters because I could use my handheld drill instead of my drill press.

Overall, these cutters performed well, but got extremely hot. Under prolonged use at high temperatures, the steel could lose its hardness and dull quickly. Wolfcraft cutters come in a four-piece set (1/4", 3/8", 1/2", and 5/8") or individually (about \$8.00 each).

MLCS cutters a mixed bag

MLCS combines both styles of tapered plug cutters into one boxed set. The eight-piece set contains 1/4", 3/8", 1/2", and 5/8" cutters in both styles, and packaged in a wooden storage box for only \$29.95.

I was impressed with the four-finger cutters. They produced plugs nearly as smooth as those made by Veritas. The cylinder cutters, however, shredded the wood, leaving plugs that were difficult to install and loose fitting.

The grind makes the difference

Woodworker's Supply offers a three-finger stainless steel cutter design with a radial relief grind—each finger has 10 different grinds. They cut aggres-

PRODUCT SCORECARD

Veritas Three-Piece Snug Plug Cutters

Performance	★ ★ ★ ★ ★
Price	\$29.95
Value	★ ★ ★ ★ ☆

Available through Garrett Wade Catalog (No. 44K02.04), 161 Avenue of the Americas, New York, NY 10013. Call 800/221-2942.

MLCS Eight-Piece Plug Cutter Set, No. 9160

Performance (finger cutters only)	★ ★ ★ ★ ☆
Price	\$29.95
Value	★ ★ ★ ★ ☆

MLCS Ltd., P.O. Box 4053 C-20, Rydal, PA 19046. Call 800/533-9298.

Wolfcraft Four-Piece Tapered Plug Cutters, No. 3386

Performance	★ ★ ★ ★ ☆
Price	\$19.99
Value	★ ★ ★ ★ ☆

Wolfcraft, P.O. Box 687, 1222 W. Ardmore Avenue, Itasca, IL 60143. Call 708/773-4777.

RTS-2000 Three-Piece Plug Cutter Set, No. 908-340

Performance	★ ★ ★ ★ ☆
Price	\$29.95
Value	★ ★ ★ ★ ☆

Woodworker's Supply, Inc., 1108 North Glenn Road, Casper, WY 82601. Call 800/645-9292.

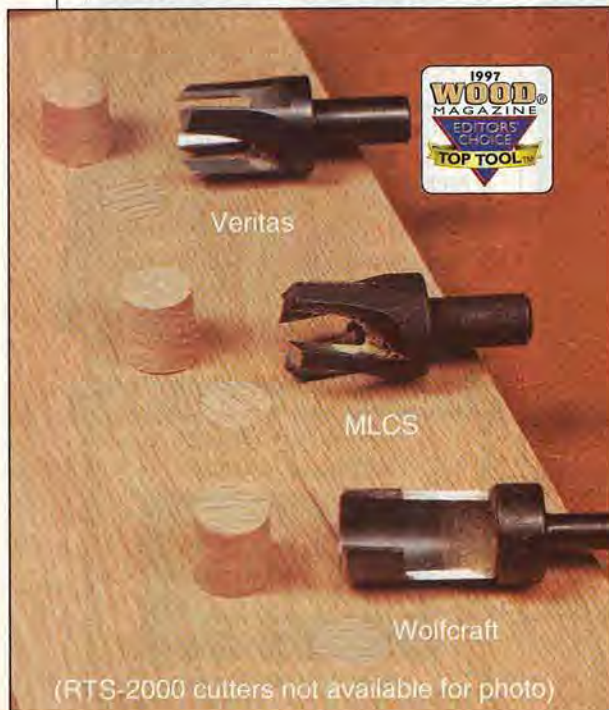
sively, but didn't heat up no matter how fast I cut plugs. But the 1/2" cutter tended to chatter and walk. A set of three (1/4", 3/8", and 1/2") costs \$29.95. Individual cutters range from \$8.95 to \$12.95.

All work, but Veritas tops

The cutters from Veritas cut the nicest plugs and were the most foolproof. The Woodworker's Supply and MLCS finger cutters give good results, but I'd definitely pass on the MLCS cylinder cutters. The freehand drilling feature of the Wolfcraft cutters is useful. Just be sure not to overheat these cutters.

—Tested by Bob McFarlin

Continued on page 92



(RTS-2000 cutters not available for photo)



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Continued from page 90

Biscuit joiner design gives a better grip

Finally, somebody has re-designed the biscuit joiner to be held and used the way it should! Most biscuit joiners are really angle grinders in disguise—with a fence and a blade at the front of the machine instead of a grinding wheel. Ryobi went back to the drawing board and developed this innovative design that uses an in-line motor similar to those that power random-orbit sanders. I found the D-ring shape of the Ryobi's handle wonderfully comfortable to hold and operate.

The 6.0-amp. motor has plenty of power for #20 biscuits. The fence adjusts for height via two knobs and tilts to 135° with positive stops at 90° and 45°. At the rear of the machine, an unobtrusive dust-collection bag catches the majority of chips.

The plastic blade-plunge mechanism on this tool doesn't slide as



smoothly as the top-of-the-line biscuit joiners. And, the fence requires a little patience to set it perfectly parallel to the blade. But you'll pay double for a better fence, and getting it set right only takes a few seconds.

—Tested by Bob McFarlin

PRODUCT SCORECARD

Ryobi Biscuit Joiner

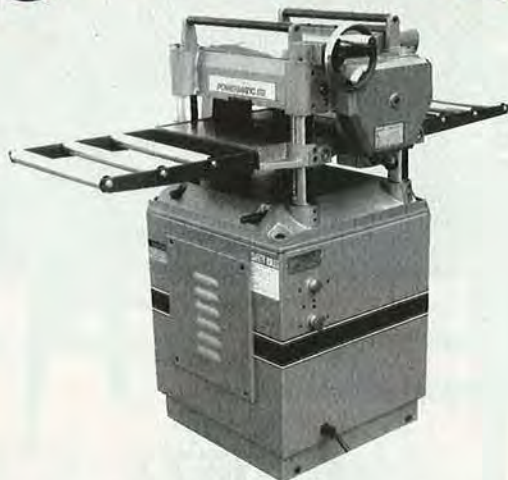
Performance ★ ★ ★ ★ ☆

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The key to the ShopBoss is a steel-reinforced wooden backbone and folding steel-leg system. The backbone spans the wide-stance legs to provide a stable work platform. Steel wing braces and a pair of locking cams hold the legs rigidly in place under the backbone. The backbone extends from both ends of the unit to form "T" intersections that I found very handy for supporting or clamping smaller workpieces.

The ShopBoss folds flat for storage and takes up a fraction of the room required to transport a pair of sawhorses. The metal parts have a durable painted finish and come in red or blue.

— Tested by Dave Henderson



PRODUCT SCORECARD

ShopBoss Work Support System

Performance ★ ★ ★ ★ ★

Price \$59.95 plus shipping

Value ★ ★ ★ ★ ☆

PMI, 3655 E. Roeser Road, Phoenix, AZ 85040. Call 800/325-6952.

Continued on page 97

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Woodworkers Resource

You can get useful ideas and product information by mail. Use the coupon in this section to order your choice of literature listed below. Each company mails the catalogs or information directly to you.

POWER TOOLS

SCROLL SAW, CRAFT & WOODWORKING CATALOG—Our '96 catalog features the 7 models of HEGNER Precision Scroll Saws, the consistent choice of the experts. Complete information on scroll saw blades and accessories is included. Also ZYLISS Portable Vise, ACCURA Benchtop Combination Machine, HEGNER Lathes and Duplicators, METABO Hand Tools and PLANO Vertical Glue Press information. **ADVANCED MACHINERY**. Free. Circle No. 3.

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available. Send for our 311-page catalog. **WOOD-MIZER PRODUCTS**. \$2.00. Circle No. 94.

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WOODWORKERS' PLANS AND SUPPLIES—Wood projects are simplified with the high quality plans, specialty hardware and other supplies offered by Armor Products. Over 100 plans are available for making toys, desks, clocks, pool tables, lamps, chests, and other furniture. Movements, dials, moldings, ornaments, dollhouse kits, door harp supplies and tuning pins are also available. **ARMOR PRODUCTS**. \$1.00. Circle No. 315.

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"YOU CAN MAKE IT" CATALOG—This comprehensive 60-page catalog is one of the best resource books any woodworker can have. It shows hundreds of project plan ideas for indoor and outdoor furniture, outdoor structures, play gyms and playhouses, rocking horses, toys, doll houses, home improvement and a variety of woodworking books. The catalog also includes handy reference information on fasteners and a \$4.00 catalog rebate coupon. Request #WM96. **CRAFT PATTERNS, INC.** \$4.00. Circle No. 326.

FULL-SIZE FURNITURE PLANS CATALOG—Illustrates and describes over 200 plans for making furniture of quality found in fine furniture stores. Plans include rollout desk, cradles, beds, dining tables, chairs, buffets, chests, dressers, gun cabinets, Queen Anne lowboy and highboy, children's furniture, rocking horse, spinning wheels, Morris chair, Adirondack and English garden furniture and more. Bill of materials and exploded drawings assist the woodworker. Fine furniture plans since 1968. **FURNITURE DESIGNS, INC.** \$3.00. Circle No. 345.

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SCROLLSAW FRETWORK PATTERNS—& supplies catalog. From simple cutouts to 50" tall clocks. Over 300 patterns for the scroll saw enthusiast. Also clock movements, tools, books, plywood, hardwood, sawblades. Great projects for the hobbyist or for profit. Catalog. **WILDWOOD DESIGNS, INC.** Free. Circle No. 475.

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QUALITY EXOTIC LUMBER/TURNING WOODS—We offer a comprehensive selection of fine quality exotic woods. Also available are mechanisms for making wooden barrel pens/pencils/roller balls/fountain pens. Ebony, Kingwood, Tulipwood, Snakewood, African Blackwood, Cocobolo, Bloodwood, Figured Maple, Spalted Maple, Padauk, etc. Unique and unusual turning woods and burls are also available. Send for catalog. **BEREA HARDWOODS**. \$1.00. Circle No. 510.

ONE STOP WOOD SHOP—Domestic and exotic hardwood plywood and lumber, marine plywood, over 30 species in stock—all under one roof. Custom cutting services to your exact specifications with little or no waste at competitive prices! We specialize in bundling and shipping. Send for catalog. **BOULTER PLYWOOD CORP.** Free. Circle No. 512.

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VIDEOS

JOINTECH CABINET MAKER'S SYSTEM VIDEO—Watch Dr. Roger Cliffe and Dave Morgan demonstrate this patented System that can perform every operation in furniture and cabinet making. See how easy it is to make raised panel doors plus techniques in making dovetails, box joints, drawer construction and even an intricate double-inlay joint. All the operations which would normally require the use of a shaper, router and a jointer can now be accomplished with the JOINTECH CabinetMaker's System. **JOINTECH, INC.** \$5.00. Circle No. 610.

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THE WOODTURNERS CATALOG—48 color pages of the finest woodturning tools, machinery and supplies available. Featuring Henry Taylor, Sorby, Richard Raffan and Dale Nish workshops. Catalog price refunded with order. **CRAFT SUPPLIES USA**. \$2.00. Circle No. 830.

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KREG TOOL CO.—Specializes in pocket hole tools, supplies and how-to videos for pocket hole joinery, including THE KREG JIG. Catalog also includes hinges, drawer slides, Crystalac water-based stains and finishes, KTC high quality router bits and more. **KREG TOOL COMPANY**. 50c. Circle No. 877.

THE WOODCRAFT CATALOG—Our FREE catalog features over 5,000 of the finest quality woodworking tools, books, lumber and hardware, all at rock bottom prices. If that's not enough, Woodcraft also offers technical assistance, tool sharpening, and something that no one else can do—same day shipping and an unconditional guarantee! Order a FREE copy today. **WOODCRAFT SUPPLY CORP.** Free. Circle No. 955.

THE WOODWORKER'S STORE CATALOG—The catalog that helps woodworkers do it right! Discover over 200 new products, including exciting items for making computer desks, entertainment centers, kaleidoscopes and humidors. Many exclusives and hard-to-find specialties like unique hardwoods, solid brass hardware, kitchen organizers, lighting systems and innovative tools—just to name a few! Toll-free ordering. Satisfaction guaranteed! **THE WOODWORKER'S STORE**. Free. Circle No. 965.

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OUR QUEEN ANNE FURNITURE KITS—are ready to assemble and finish. They include dining room chairs, a variety of occasional tables, and a personal desk. All are made in solid cherry, oak, walnut, and mahogany. We also stock individual Queen Anne legs for every project. Complete information in our brochure packet. **ADAMS WOOD PRODUCTS**. Free. Circle No. 1002.

SHIP MODELING CATALOG—Historic Ship Models—Museum quality replicas you build yourself. Pre-cut wooden parts, metal and brass fittings, cloth sails, plans and instructions. Send for 80 page color catalog. **MODEL EXPO, INC.** \$1.00. Circle No. 1075.

BUCKBOARD BENCH KIT—Kit includes steel springs that give a little, metal arms and back rails, hardware, and full-size instructions. New matching trestle table kit. **THE ROUBUSH CO.** 50c. Circle No. 1085.

PUBLICATIONS

BLACK & DECKER HOME IMPROVEMENT LIBRARY—20 volume home improvement/repair book series featuring full color step-by-step photographs throughout. Provides in-depth instruction for all home improvement projects. Includes materials checklists and tips to make the job easier. Titles include "Everyday Home Repairs", "Kitchen Remodeling", and "Building Decks". Complete any do-it-yourself project easily and successfully. **COWLES CREATIVE PUBLISHING**. Free. Circle No. 1113.

SHOP ACCESSORIES

PERSONAL SAFETY PRODUCTS—All new 18-page catalog featuring safety products specifically for the woodworker. Features both powered air and negative air respirators, all made by Racal Health & Safety. (Airmate, Airstream, Power Visor, BreatheEasy & Delta products.) Also includes several styles of ear protectors by Racal & Peltor including the new FM Radio-hearing protector combination and Integro safety glasses featuring replaceable lens. Each catalog request will include a gift certificate for \$5.00 good on first order. **AIRWARE AMERICA**. \$1.00. Circle No. 1207.

SCROLL SANDER™ ENDS HAND SANDING!—Unique tool sands edges and narrow internal cuts on your scroll saw. Removes feathering, bumps, burn marks. Corrects wandering from cutting line. As easy to attach and remove as a blade. Each Scroll Sander™ lasts many hours. Made in the USA. Send today for sample Scroll Sander™! Please specify your scroll saw. **SCROLL SANDER™**. \$1.00. Circle No. 1213.

ECON-ABRASIVES—Offers a complete line of sandpapers and woodworking related accessories. We custom make abrasive belts in any size and in any grit. Catalog. **ECON-ABRASIVES**. Free. Circle No. 1229.

EASY DOES IT—with HTC's power tool accessories. Discover many unique items, designed only with you, the dedicated woodworker, in mind. Make your machinery safer, increase the working area of your shop and accomplish nearly impossible tasks easily, quickly, accurately. Full-line catalog and price list. **HTC PRODUCTS, INC.** Free. Circle No. 1245.

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WOOD MOISTURE METER—Avoid moisture defects such as cracking, warping, splitting, delamination. The pin-type moisture meter "Mini-Ligno" can read surface or core moisture in any thickness of lumber, from veneer through heavy timbers. A flat surface is not necessarily required, thus the Mini works on rough sawn lumber and curved or round pieces. A most versatile instrument. Many hobbyists and professionals use the Mini-Ligno C or E/C with attachments to monitor lumber during air or kiln drying or use external electrode for depth readings. Catalogue describes complete line of moisture meters. **LIGNOMAT USA, LTD.** Free. Circle No. 1250.

ROUTER SPEED CONTROL—Reduces speed electronically without reducing torque. Route at the speed that gives best results with the wood and bit you are using. Speed adjustable from full speed to 0 RPM. Less tear out—stops burning—less wear on bits—easy to use. Send today for information. **MLCS LTD.** Free. Circle No. 1251.

SUPERGRIT™ SANDING/REFINISHING CATALOG CLOSE-OUT SHEET—Belts (aluminum oxide, silicone carbide zirconia), discs (plain, PSA, Hook & loop vacuum), sheets (cabinet, crocus, emery, non-lathing, waterproof), rolls (cloth or hook & loop), bowl turning & lathe supplies, dust masks, scuff pads, tack cloths, tape. **RED HILL CORP.** Free. Circle No. 1267.

VEGA PRODUCT INFORMATION—Find out about the wide range of high quality woodworking machinery and accessories manufactured in the USA by Vega. Products include retro fit Table Saw Fences (3 models) with great accessories, Mitre Gauge, Tenon Jig, Sanders, Lathes (4 models) and Duplicating Equipment to fit any lathe. Vega's products feature innovative designs utilizing the finest materials. "Thoughtfully Designed Machines." **VEGA ENTERPRISES**. \$1.00. Circle No. 1281.

THE WORLD'S BEST TABLE SAW FENCE—Evolution & Pro-Rip manual saw fences for the hobbyist & professional user. Fits all table saws made. Welded steel, stress relieved construction, yet has all the features the other guys have ignored. Free catalog, 30 day money back guarantee. **VOSS TECHNOLOGIES, INC.** Free. Circle No. 1283.

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UNCOMMON WOODWORKING TOOLS—American made quality router tables and fences, dovetail jigs, unique router biscuit joinery system, mortise machines, pin router, books, videos, commercial grade router bits and more. Buy from the manufacturer. Fast, friendly, knowledgeable service. **WOODHAVEN**. \$2.00. Circle No. 1290.

KEEP YOUR SHOP AND LUNGS CLEAN—Enjoy the benefits of a large yet mobile workbench. The Dust Eliminator Workbench removes dust from sanding before it becomes airborne. For dust created by other tools, common sense tells us that wood, even as dust, has weight and is affected by gravity making it more difficult to be collected above the woodworker's head. This is why it is much more efficient to collect dust particles at waist level. The workbench top is made of select and better grades of hard maple, the traditional choice of wood craftsmen. **WOODMARK**. \$1.00. Circle No. 1295.

BITS, BLADES, CUTTING TOOLS

FOUR-COLOR ROUTER BITS AND SAW BLADE CATALOGUES FROM CMT USA, INC.—Router bits and saw blades ideal for production work. Features include: Premium Fatigue-Proof™ steel machined from solid bar stock, anti-kickback design, sheer angle on cutting edges, CMX-4 micrograin carbide, radial relief on all straight bits, and a baked-on non-stick PTFE orange coating applied at 750°F. Saw blades have new sound-dampening channels laser-cut into the plate body of all 10" and larger blades, and anti-kickback shoulders. Router bits and blades come with sturdy hardened carrying case. Router bit sets are stored in a beautiful hinged hardwood case. **CMT USA, INC.** Free. Circle No. 1312.

PRODUCTION QUALITY CARBIDE TIPPED ROUTER BITS—Large discounts. New expanded catalog featuring a huge selection of Carbide Tipped Router Bits, Raised Panel Door Sets, Shaper Cutters, Solid Carbide Bits, The Router Speed Control, plus our unique line of clamps, tools and supplies. Save 50% to 70%. Value, quality, and prompt service guaranteed! **MLCS LTD.** Free. Circle No. 1350.

INDUSTRIAL-QUALITY CARBIDE TIPPED ROUTER BITS & SHAPER CUTTERS—Great selection at the best prices for anti-kickback design router bits and shaper cutters. Same day service. Ask about our specials and free catalog. **WOODLINE ARIZONA INC.** Free. Circle No. 1395.

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SECURE FUTURE IN FURNITURE RESTORATION WITH MINUTEMAN—Earn \$200–\$1,000 per day stripping, repairing, refinishing, mirror resilvering, veneering and more at home or in shop; part- or full-time. We provide complete training; no experience necessary. FREE workshop teaches you latest in furniture restoration. Featuring Amity, the first complete line of water-based furniture restoration products. Catalog. MINUTEMAN. Free. Circle No. 1661.

MISCELLANEOUS

AMERICAN STEEL SPAN BUILDINGS—Designed with the do-it-yourself in mind. Our buildings are made in a heavy gauge steel with a 20-year warranty. Everything is pre-cut and pre-drilled, and just bolts together. A quality pre-engineered building with style and structural integrity at a price that everyone can afford. 3 models to choose from! AMERICAN STEEL MARKETING CORP. Free. Circle No. 1780.

MECHANISMS FOR MAKING WOODEN BARREL PENS—Pencils/Roller Ball Pens/Fountain Pens. High quality. Low prices. Wholesale/Retail. Plus other related items. BEREHA HARDWOODS CO. \$1.00. Circle No. 1900.

LOOKING FOR PIERCED TIN? COME TO THE SOURCE!—70+ page color highlighted catalog introduces you to a treasury of pierced metal panels affordably priced and ready to install in your woodworking projects. Available in a wide variety of sizes, 16 different types of metal (copper & brass, tool) & over 300 designs. Custom size & design a specialty. OR all the materials and tools needed to create it yourself. Catalog includes furniture plans you can order, lantern kits, specialized metal piercing tools and MORE. COUNTRY ACCENTS. \$5.00. Circle No. 1910.

RESTORATION PRODUCTS—"Renaissance" wax/polish cleans, protects, restores your valuable machinery, tools, furniture or wood products (raw and finished), antiques, fine art, leather, paper, and much more. The #1 choice of museums and galleries worldwide. Many other restoration/conservation/preservation products available, as well as cutlery and related cutlery items. Sole U.S. Agent for all general markets. CUTLERY SPECIALTIES. \$1.00. Circle No. 1912.

TALON® PEGBOARD TOOLHOLDERS LOCK TO BOARD—CAN'T POSSIBLY FALL OFF!—End the frustration of pulling the hook off the board along with the tool. Patented nylon toolholders mount without tools and absolutely cannot pull off the board. Yet, can be removed

and replaced easily. Seven types. Special—Variety Packs: 32-Piece \$19.45; 48-Piece \$28.95. Or send for samples and brochure. THE HOLLINGSWORTH COMPANY. Free. Circle No. 1955.

TRUCK OWNERS, THE ROLL-TOP COVER™ IS QUICK AND EASY!—The Roll-Top Cover™ instantly rolls out to keep contents dry and secure. When not required it rolls into its small 9½" storage canister for carrying tall loads. The full length handle can be easily operated with one hand from either side of the truck. Send for brochure. PACE-EDWARDS CO. Free. Circle No. 1985.

HI-TECH ENGRAVING—You don't have to be an artist with the System One High Speed Engraver (400,000 RPM). The incredible high speed combined with SCM's exclusive stenciling system allows you to produce professional results. You can engrave on wood, glass, metal, stone, ceramic, egg shell. It's as easy as writing with a pen. Send for information. SCM ENTERPRISES. \$1.00. Circle No. 1990.

SALTER INDUSTRIES—Salter Industries manufacture high quality spiral stairs to meet the design needs of today. Oak and brass options are available to combine with a sturdy steel main frame. Stock or custom stairs range in diameter from 3'6" to 7'. Brochure. SALTER INDUSTRIES. \$1.00. Circle No. 1995.

STEELMASTER BUILDINGS—are available in almost any size for almost any use. From 10' to 100' wide and any length imaginable. Whether you need a back yard shop... an industrial shop... equipment storage building... whatever your requirements, you'll find a Steelmaster that's just the right size for the job. Our buildings are so easy to construct, most owners opt to construct their buildings themselves which adds up to even bigger savings. Send for information. STEELMASTER. \$1.00. Circle No. 2030.

IF YOU ARE INTERESTED IN RESTORING ANTIQUES—this 288-page catalog packed with unusual, hard-to-find items is just for you. Included are hundreds of essential items for antique restoration including top quality brass reproduction hardware, oil lamps and accessories, numerous wood component repair parts and kits, caning and basketry supplies, everything needed for wood refinishing, related tools, books, and a complete line of upholstery equipment and supplies. All at wholesale prices. Send for this informative catalog. VAN DYKE'S RESTORERS. \$1.00. Circle No. 2077.

WHOLESALE GLASS BROKERS—high quality glass shipped to your door directly from the finest manufacturers. Table tops; tempered glass; shelves; beveled glass; custom shapes; ½" to ¾" thick; tinted glass; and much more! Your one-stop discount glass source. Idea catalog. WHOLESALE GLASS BROKERS. Free. Circle No. 2079.

PEN, PENCIL PRODUCTION SYSTEM—And equipment and supplies are detailed in free brochure. Anyone can produce high-quality pens and pencils from rare woods. The "WoodWrite" production system provides all equipment, supplies and consumables for your first 50 sets. Contact us for best prices on components and pre-cut, pre-drilled wood blanks. WOODWRITE, LTD. Free. Circle No. 2098.

CARVING SUPPLIES

WOOD CARVING MACHINES AND ACCESSORIES—make all types of wood carving easy, fun and profitable. The machines do the work. Whether for sign carving, flat 3-D, decoys, panels, gun stocks or furniture, we have the proper machine for the job. Professional woodcarving for the hobbyist and superior quality for the professional. Begin your hobby or full or part-time business by ordering our catalog and price list. MARLIN INDUSTRIES. \$1.00. Circle No. 2150.

PARAPHERNALIA—A sourcebook for everyone who loves to work with their hands. Consisting of ultra high speed engraving (315,000 RPM) carving equipment, training & supplies. We are the founders of ultra high speed engraving equipment & techniques. Serving & supporting since 1983. Free catalog available. Demo video available with refundable deposit. PARAGRAPH-ICS. Free. Circle No. 2160.

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The dust port on the DusTrap accepts both 1 1/4" and 1 1/2" vacuum hoses without any adapters. When hooked up to my shop vacuum, the DusTrap did an excellent job of removing the dust. Even when I ran the sander over an edge, little, if any, dust escaped.

— Tested by Dave Henderson



PRODUCT SCORECARD

DusTrap

Performance	★ ★ ★ ★ ★
Price	\$29.95 plus shipping
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Continued on page 98

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Continued from page 97

Porter-Cable makes a splash in economical air nailer market

With the number of air-powered fastening tools on the market today, any new entry needs to offer higher quality, better service, or better price. Porter-Cable scores high marks on all three counts with its new lineup of pneumatic nail guns.

Imported from Taiwan and distributed and serviced through Porter-Cable's dealer network, the tools include a 1/4" narrow-crown stapler (1/2-1"), two 18-gauge brad nailers (5/8-1 1/4" and 3/4-2"), and two 16-gauge finish nailers (3/4-2" and 1-2 1/2"). Also new, but not available for this test, are a 1 1/2" narrow-crown stapler, a 15-gauge angled finish nailer, and two stick-type framing nailers.

I was impressed with the fit and finish of the entire line. The tools were well balanced and comfortable to use. The magazines were easy to load and have a convenient window on the side that lets you see at a glance when you're running low on fasteners.

The tools feature a quick-release nose piece for clearing jams and an excellent safety. The finish nailers also have rubber tips to prevent marring of the workpiece, but the tips prevented me from driving a nail in tight spots.

All the tools easily drive even the longest fasteners in both oak and maple and operated in either sequential-fire or bump-fire modes. Porter-Cable carries a full complement of fasteners, but the tools will accept most other brands' fasteners as well.

The nailers are extremely easy to maintain with top, bottom, and driver rebuild kits readily available to repair the problems that arise from normal wear and tear. The kits come with a comprehensive instruction sheet. To extend time between repairs, each tool

comes with a dust cap that keeps debris out of the air fitting when the tool is not in use.

While priced higher than some other imports, these nailers give you a lot for your money. Each tool comes as a complete kit that includes the nailer with air fitting, a box of fasteners, air tool oil, wrenches, a detailed operator's manual, and even a pair of safety glasses. Everything fits neatly into a molded plastic case so that you don't have to track anything down to start a job.

Since our test, Porter-Cable re-engineered the larger finish nailer (FN250), giving it an adjustable depth guide while trimming its weight by more than a third. 🌟

—Tested by Dave Henderson

PRODUCT SCORECARD

Porter-Cable Air-powered Nailers

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BN125 and BN200-18-gauge brad nailers
FN200 and FN250-16-gauge finish nailers

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Price	\$100-\$230
Value	★ ★ ★ ★ ★

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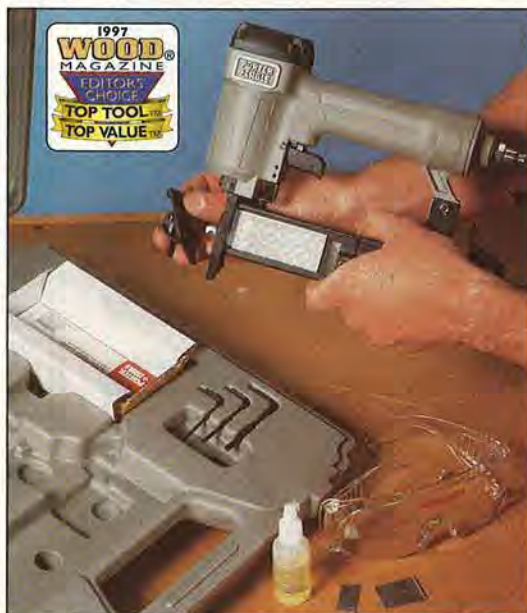
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L26A

Don't you dare touch that tree! *Manchineel*

In South Florida and along the Keys, there grows a small tree that locals in the know disdain. A cousin to the Brazilian Para rubber tree, the manchineel (*Hippomane mancinella*) has played a sometimes lethal part in history.

It is reported that when the Spanish conquistadores arrived in the Florida Keys intent on conquest, the local Indians fought back with everything at their disposal. That included the poisonous sap of the manchineel, which they used to contaminate the Spaniards' water supplies. In fact, because even the tree's leaves can trigger painful reactions, the soldiers learned to fear and avoid it. In caution to others, one Spaniard wrote, "He who sleeps under a manchineel sleeps forever."

During the turn-of-the-century construction of railroad magnate Henry Flagler's extension to Key West of his Florida East Coast Railway, manchineel again reminded man of its dangers. According to Pat Parks writing in her book *The Railroad That Died At Sea*, in 1910 a hurricane suddenly overtook a section of the railroad's building site. Endangered by the raging storm, a construction superintendent secured himself to a nearby tree with his belt. Not until it was too late did he realize that his savior was actually a manchineel! Sap from the wind-splintered branches oozed into his open wounds, adding to his peril. The man lived, but spent many months in a hospital recuperating from the tree's poison.

Needless to say, the little manchineel tree has never earned renown as a supplier of woodworking wood. Even firewood gatherers have left it alone, for poison also lingers in the smoke of burning manchineel. ♣

To survive a hurricane, a workman tied himself to a manchineel tree, only to be poisoned as a result.



Illustration: Jim Stevenson

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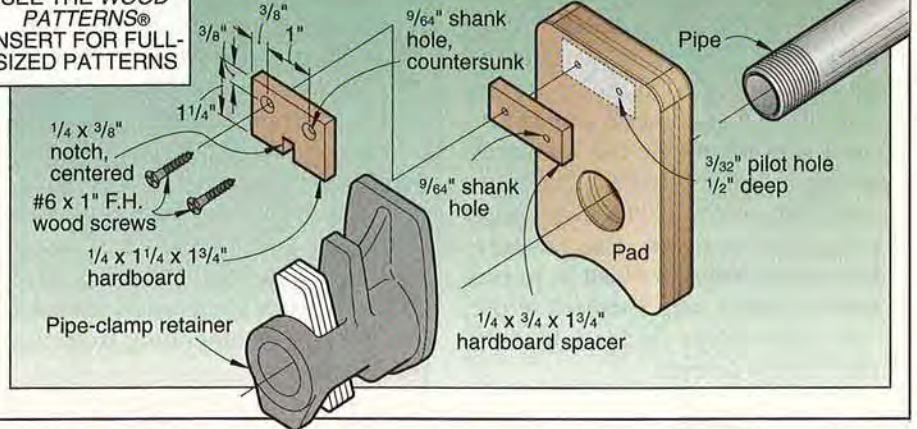
The pads shown here fit a Pony-brand $\frac{3}{4}$ " pipe clamp, but you can adapt the design to fit other brands and sizes. For a $\frac{1}{2}$ " pipe clamp, drill a $\frac{7}{8}$ " hole. The size, shape, and location of the retainer notch also may vary.

To start, cut a $\frac{3}{4}$ "x3"x24" piece of plywood, then lay out the shape and hole locations for four pads as shown in the *WOOD PATTERNS* in the center of this magazine. Cut

the pads to shape, then bore the holes where marked. Sand or rout a slight round-over on all the edges. Cut the hardboard spacers and retainers to size, attach them with screws as shown, and you're ready to clamp down on your next project. ♣



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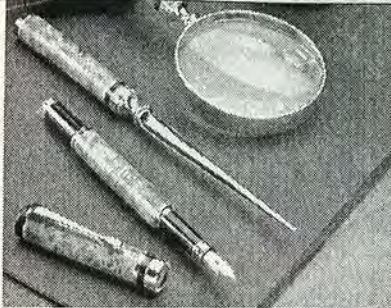


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* Rated #1 by Wood Magazine, December 1994.

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What? Your own tropical hardwood trees?

A brochure distributed at the American Association of Woodturners' 10th annual symposium in Asheville, North Carolina, touts the financial benefits of investing in tropical hardwood trees. According to the publication, \$2,600 invested in young teak trees planted on Costa Rican plantations could yield about \$103,000 in 25 years. Tropical American Tree Farms, a Costa Rican corporation formed by

Americans Steve and Sherry Brunner, says the same amount put in savings or certificates of deposit drawing compound interest at 5 percent would bring you \$8,805 in that period of time.

Betting that the future supply of teak and other tropical hardwoods will dwindle due to lost rain forest and restricted logging, Tropical American Tree Farms has put together an investment plan based on forest management. On its 3,700 acres, situated on Costa Rica's Pacific highlands, the company is planting 40 species of trees selected for growth potential and high value. Investors pay for the trees, the planting, management, and harvest costs, and share the profit. The operation is certified as environmentally sound by the Smart Wood Program of the Rainforest Alliance.

For a copy of the brochure, drop a line to Steve and Sherry Brunner, Tropical American Tree Farms, 717 City Park Ave., Columbus, OH 43206.



Project for a long Canadian winter: The Hokey Pokey Railroad

The winter of 1995 may have been particularly long in Delta, British Columbia, but woodworker J.A. Olson enjoyed it. "This train project [shown *below right*] started out as a joke, with the intention of making some hokey folk art," wrote the Canadian woodworker. "It was a winter project which I doubt will ever be regarded as complete."

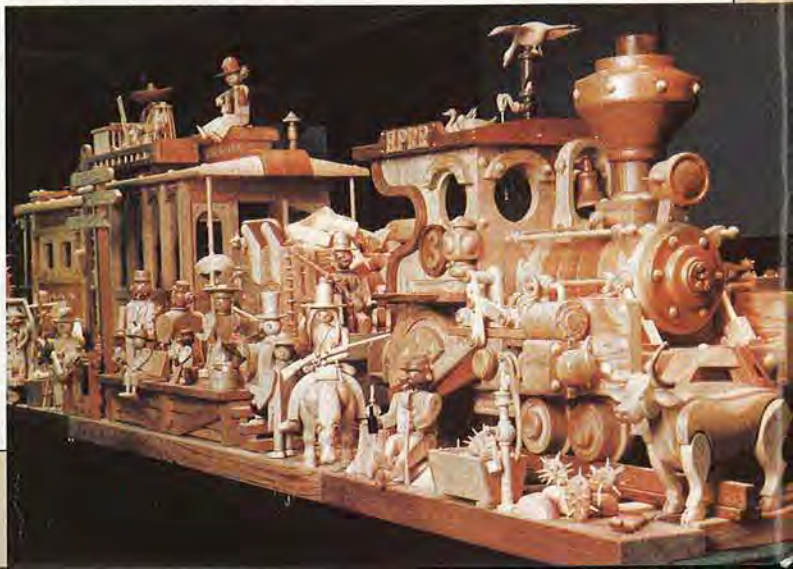
J.A. calls his project the Hokey Pokey Railroad. "It runs between the towns of Backyonder and Hereabouts to Overthar," he penned. Using nothing but scrapwood of all kinds—mostly maple for the figures—J.A. primarily pinned the pieces together with dowels or round toothpicks so that they would come apart like a puzzle. For a finish, he hand-rubbed each piece with paste floor wax. The late-1800s-style train measures 80" long, 18" wide, and 25" high.

"With this, there are no plans to follow," he advises. "A simple sketch determines the sizes and proportions, then I start cutting. Each piece leads into the next. It's been great for those days when you get the urge to cut up some wood."

A cold winter in British Columbia—plus a ton of imagination and lots of scrapwood—sparked woodworker J.A. Olson's Hokey Pokey Railroad.

Photographs: Bill Krier; J.A. Olson

Illustration: Jim Stevenson



Shavings fly to get wooden Stetson



Maple shavings flew in the *WOOD* magazine shop when Vermont turner Johannes Michelsen demonstrated how to turn a wearable wooden hat.

When features editor Pete Stephano returned from Vermont with an article and photos about woodturner Johannes Michelsen ("Hats Off to Turning," *WOOD* magazine, October 1996), the rest of the staff wanted to see more. So, in accordance with our tradition of in-service training, we invited Johannes—who specializes in turning wooden hats—to demonstrate in our shop.

Early last summer, he did just that. While staffers watched mesmerized, Johannes turned a wearable wooden cowboy hat from start to finish in just about half a day. Johannes had brought the 40-lb. rough-cut chunk of red maple for the hat from Vermont, along with his favorite tools. We hauled in a Powermatic 91 lathe with a 16" swing specially for his use.

Over the hours, staff attention never flagged as the hat took shape. "It was the highest continuous interest level I've ever seen," said editor Larry Clayton. The hat now owns a special place in the *WOOD* magazine "trophy" case. 🌲

Model	Description	List	Sale
31-280	Sanding Center w/stand	1250	769
31-695	6" Belt/Dry Sander	441	329
23-700	Wet/Dry Grinder	206	149
23-710	New Sharpening Center	217	169
23-680	6" Bench Grinder 1/4 HP	80	69
11-950	8" Drill Press	175	128
31-460	4" Belt/Disc Sander	198	135
40-560	16" 2 speed Scroll Saw	230	165
40-540	NEW 16" var/spd Scroll Saw	230	165
11-990	12" Bench Drill Press	255	184
11-090	32" Radial Bench Drill Press	405	305
43-055	12" Bench Router/Shaper	399	299
22-540	12" Bench Top Planer	Sale	369
36-220	10" Compound Miter Saw	294	199
28-185	Bench Band Saw	213	175
37-070	NEW 6" w/spd Bench Jointer	351	245
14-650	Hollow Chisel Mortiser	380	239
33-990	10" Radial Arm Saw	981	779
33-055	8-1/4" Sawbuck comp w/lgs	846	665
36-905	30" Unifence	346	245
36-906	50" Delta Unifence	444	319
36-755	10" Tilling Arbor Saw	Sale	1019
17-900	16-1/2" Floor Drill Press	490	399
37-190	6" Deluxe Jointer	603	489
36-275	8-1/4" Builders Saw	358	259
36-210	10" Compound Miter Saw	344	225
36-040	8-1/4" Compound Miter Saw	190	135
36-070	10" Miter Saw	217	165
34-355	Sliding Table	487	325
34-444	10" Contractors Table	Sale	615
36-250	10" Slide Compound Saw	925	689
36-230	12" Compound Miter Saw	480	345
31-780	Oscillating Spindle Sander	253	188

DELTA REBATES!
Prices shown are before rebate!

Model	Description	List	Sale
46-700	12" Wood Lathe	575	479
28-275	14" Band Saw 3/4 HP	Sale	649
28-280V14	Band Saw 1 HP motor	Sale	796
34-445	10" Table Saw w/30" fence	Sale	839
22-675	NEW DC380 15" Planer	Sale	1175
43-055	3/4" Shaper 1-1/2 HP	Sale	799
37-154	6" Jointer DJ-15	Sale	1289

MILWAUKEE TOOLS

6527	NEW Sawzall with case	343	169
6528	above Sawzall w/wired cord	339	165
6537-2	6527 w/quick lok blade change	224	175
0408-6	12V Drill w/keys chuck&2 batt	380	172
0224-1	3/8" Drill 4.5 amp magnum	236	192
0234-1	1/2" Drill 4.5A mag 0-850 rpm	255	129
0235-1	1/2" Drill w/keyless chuck	295	129
0244-1	1/2" Drill 4.5A mag 0-800 rpm	255	129
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	213	119
0228-1	3/8" Drill 3.5 amp 0-1000 rpm	207	119
0279-1	3/8" close quarter Drill	255	148
0379-1	1/2" close quarter Drill	288	165
6546-1	1/2" Sprowdr 200 & 400 rpm	150	86
6547-1	6546 1 w/batts 1/4" chuck 3 cts	105	105
5399	1/2" D-handle Hammer Drill Kit	356	194
6507	Original SawZall with case	278	149
5397-1	3/8" v/spd Hammer Drill Kit	275	145
5371-1	1/2" v/spd Hammer Drill Kit	360	194
3107-1	1/2" v/spd right angle Drill Kit	411	234
3300-1	1/2" v/spd right angle Drill	379	199
5980	Router 2 HP w/collets	367	165
6142	4-1/2" Grinder w/cse & acc.	224	125
6365	7-1/4" Circular Saw 13 amp	229	125
6368	6365 w/fence, blade, & cse	259	142
6256	Top Handle Jig Saw	278	149
6490	10" Miter Saw	496	265
6491	6490 w/carbide blade & bag	594	328
6494	10" Compound Miter Saw	585	315
0431-1	12V Drill w/2 batteries	441	228
6266-6	NEW Top Handle Jig Saw	315	165
6496	10" Slide Compound Saw	1050	569

FREUD CARBIDE TIPPED SAW BLADES
5/8" Bore - Industrial Grade

Item	Description	Tooth	List	Sale
LU72M010	Gen Pur. A.T.B. 10"	60	69	42
LU82M010	Cut-off 10"	60	93	47
LU84M010	Comb 10"	50	78	42
LU85M010	Super Cut-off 10"	80	115	59
LM72M010	Ripping 10"	24	69	38
LU73M010	Cut off 10"	60	84	45
LU87M010	Thin Kerf 10"	24	72	44
LU88M010	Thin Kerf 10"	60	89	49
LU89M010	Thin Kerf 10"	60	128	68
LU91M010	Compound Miter 10"	60	88	48
F410	Quiet Blade 10"	40	95	49
F810	Quiet Blade 10"	80	135	74
TK303	7-1/4" Finishing	40	38	25
TK906	10" Combo	50	53	32
SD308	6" Dado - Carbide	230	119	68
SD508	6" carbide w/case & shims	292	145	84
SD508	8" carbide w/case & shims	344	168	94
FB100	16 piece Forstner Bit Set	338	194	100
94-100	5 pc. Router Bit Door System	320	169	94
FBF35	NEW Router Table	495	289	135
FJ85	NEW Top Handle Jig Saw	229	125	78

The following tools have a \$30.00 rebate.
Price shown is before rebate.

FT2000E	3-1/4 HP variable speed Plunge Router	410	205
JS102	Biscuit Jointer w/fence & cs	355	178

NEW Freud Carbide Dado Blades

SD608	6" dial-a-width dado	389	199
SD606	6" dial-a-width dado	369	189
SD208	8" economy dado	155	85

WAP VACUUMS

Model	Description	List	Sale
766RDF	10 gallon turbo vacuum	845	465
766RDF-D	"Drywater" 10 gal turbo vacuum		
		915	549
766RDF-DAS	Above vac w/ auto start	950	589

MAGNETOOLS

7127DWE	3/8" v/spd Drill Kit w/2 batt	222	109
5090DW	3-3/8" Saw Kit 9.6 volt	280	148
DA391D	3/8 angle Drill 9.6V	166	109
DA391D	3/8" angle Drill Kit 9.6V	341	179
ML900	Incandescent Flashlight 9.6V	37	37

NEW CORDLESS BATTERIES
WITH 20 AMP HIGH CAPACITY BATTERIES

6213DWAE	12V 3/8" Drill Kit	325	165
6213DWAE	14.4V 3/8" Drill Kit	359	199

SUPER CORDLESS SPECIALS

6073DW	7.2V cdis Drill Kit, Variable speed & clutch. Complete with battery, charger, & case.	Super Sale	99
T220DW	9.6 volt Stapler Kit. Complete with battery, charger, & case.	Super Sale	99

SENCO AIR NAILERS

SFN1+	Finishing Nailer 1" - 2" w/cs	448	345
SN325	Nailer 1-7/8" - 3-1/4"	665	419
SLP20	Finisher w/cse 5/8" - 1-5/8"	422	275
SKS	Stapler 5/8" - 1-1/2"	390	279
SN70	Framing - Clip Hd 2" - 3-1/2"	725	449
SN60	Framing - Full Hd 2" - 3-1/2"	708	449
SN65	15% more power than SN60709	469	368
SFN40	Finish Nailer 1-1/4" - 2-1/2"	569	389

BOSTITCH AIR NAILERS

N80S-1	Stick Nailer	Super Sale	339
N80C-1	Coil Nailer	Super Sale	339
RN45	Coil Roof Nailer 3/4" - 1-3/4	345	369
N60FN-2	Finishing Nailer	Super Sale	339
BT35-2	Brad Tacker 5/8" - 1-3/8"	254	155
BT35-2K	BT35-2 w/ cse, oil, & brads	279	165
CCW100	1 HP Pancake Compressor	440	289
MWFS	Flooring Stapler 15 gauge	902	529
S32SX-1	Finish Stapler 1/2" - 1-3/8"	245	155
S32SX-1K	S32SX-1 with case & oil	269	165

SKIL TOOLS

77	7-1/4" Worm Drive Saw	Sale	144
77M	NEW 77 Mag Worm Saw	Sale	165

PANASONIC CORDLESS

EY6181CRKW	9.6V Drill Kit w/2 batteries, 1 hour charger, & case	307	169
EY6181EQK	9.6 volt Drill with 15 min. charger, case & Ironman battery	315	169
EY6100CRKW	12 volt Drill Kit w/2 batteries, 1 hour charger, & case	379	186
EY6100CQKW	Same as EY6100CRKW but has 15 minute charger	409	209
EY6100EQKW	12V Drill Kit w/2 Ironman batteries, 15 min. charger, & case	379	194
EY6101SQK	12 volt 1/2" Drill w/ 15 min. charger, diagnostic battery, & case	438	249
EY3502EQKW	NEW 4-3/8" 12V Metal Cutting Saw Kit	500	289

PASLODE IMPULSE GUNS

IM250	Impulse Finish Nailer Kit	1130	548
IM325	Impulse Framing Nailer Kit	1130	548
CT325SS	Cdis Framing Nailer Kit	1120	495

CLAYTON OSCILLATING SPINDLE SANDERS

140	Portable sn dr w/ 4-1/2" spindle	625	559
146	Portable sander w/ 9" spindle	665	609
100	Floor mount sn dr 4-1/2" spindle	785	709
106	Floor mount sander 9" spindle	845	759

SIoux TOOLS

8030	3/8" var/spd Drill	263	145
8000	3/8" var/spd close qtr Drill	211	125
890	5" Air Random Orbit Sander	228	132

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DW997K
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Sale 249

DW936K
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DEWALT TOOLS

Model	Description	List	Sale
DW321K	NEW Jigsaw Kit	300	164
DW364	7-1/4" Circ. Saw w/brake	294	158
DW610	1-1/2 HP 2 handle Router	266	152
DW411	1/4 sheet Palm Sander	88	58
DW100	3/8" Drill, 4 amp, 0-2500 rpm	118	68
DW682K	Biscuit Joiner with case	448	199
DW795	2" Compound Miter Saw	734	359
DW625	3 HP v/spd Plunge Router	Sale	275

DW625 Router comes with DW965 fine depth adjuster & 8-piece template guide set

DW621	NEW 2 HP Plunge Router	400	218
DW675K	3 x 1/8" Planer with case	292	164
DW431	3 x 21" v/spd Belt Sander	338	184
DW421	5" Palm Ran. Orb Sander	144	74
DW443	8" Ran Orb Sander	268	139
DW443	DW444 w/hook & loop pad	266	139
DW673KNEW	Laminate Trimmer Kit	364	205
DW935K	14.4V 5/8" Trim Saw Kit with 2 batteries	444	237

DEWALT CORDLESS DRILLS

DW952K	3/8" variable speed w/ two 9.6V XR batteries	284	139
DW962K-23/8"	variable speed w/ two 9.6V XR batteries	330	179
DW972K-23/8"	variable speed w/ two 12V XR batteries	362	189
DW904	12 volt flashlight	48	29.95
DW972K-2 drill & DW904 flashlight	Sale	205	
DW991K-23/8"	variable speed w/ two 14.4V XR batteries	415	225
DW994KQ-1/2"	variable speed w/ one 14.4V XR battery	458	235
DW994KQ-2	above drill w/ 2 batt.	Sale	259
DW998K	1/2" v/spd w/ two 14.4 V XR batt	245	
	Above drill kits come w/ charger & steel case!		
DW991KS-2	DW991K drill, DW935 trim saw, & case	Sale	349

HITACHI TOOLS

CFB2	8-1/2" Slide Compound Saw	1169	489
C10FC	10" Miter Saw	533	209
C10FS	10" Slide Compound Saw	1627	739
G12SA	4-1/2" Grinder 6.9 amp	177	95
NR83A	Framing Nailer 2 - 3-1/2 Full Hd	900	425
NR83AA	Framing Nailer 2 - 3-1/2	922	429
NT65A	16 ga. Brad Nailer 1 - 2-1/2	749	325
NV45AB	Coil Roofing Nailer 7/8 - 1-3/4		
		935	435
EC6B	1 HP Oil Compressor	540	279
EC6C	1 HP Oil-less Compressor	580	295

BIESEMEYER FENCES

9-50	50" Commer. Saw	443	325
T-SQUARE 52	52" Homeshop	360	269
T-SQUARE 40	40" Homeshop	335	249
T-SQUARE 28	28" Homeshop	325	239

PONY CLAMP FIXTURES

Model	Description	List	Sale	Lots
50	3/4" Black Pipe	15.45	6.10	92.50
52	1/2" Black Pipe	12.65	6.95	74.95

BOSCH

Model	Description	List	Sale
1587VS	Top Handle "CLIC" Jig Saw	292	139

THE NEW RYOBI DETAIL BISCUIT JOINER

THE DIFFERENCE BETWEEN WOODWORKING AND WOODNOTWORKING.

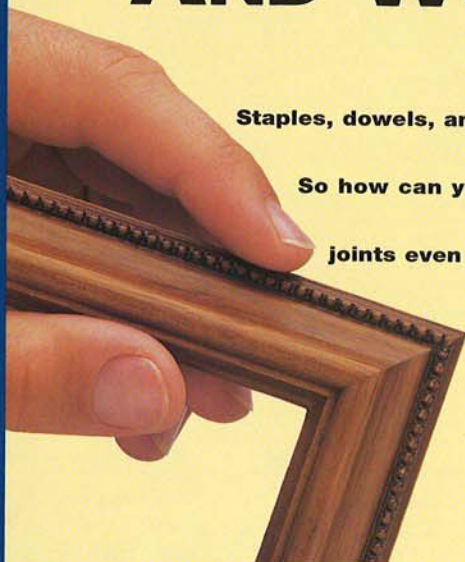
Staples, dowels, and glue won't do. Standard-size biscuits won't fit.

So how can you make neat, tight, professional joints even in small stock? With Ryobi's new

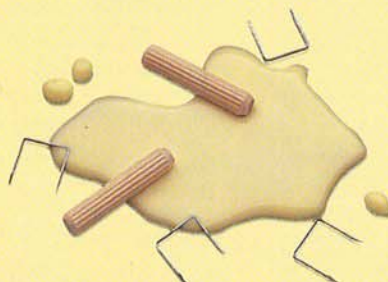
Detail Biscuit Joiner, that's how.



Standard biscuits stick out of small joints, and the mis-match shows, even after you trim the excess.



The new Ryobi Detail Biscuit Joiner uses miniature "Accu-biscuits" for neat, tight, professional joints.



This compact powerhouse cuts smaller slots and uses miniature

"Accu-biscuits™" to fit where standard biscuits don't. And its price

is as small as its biscuits. But the Detail Biscuit Joiner is big

on performance, from its beefy motor to its die-cast

base and see-through fence. So see the

new Ryobi Detail Biscuit Joiner at your

local home center. It'll get

your wood working like

never before.



Ryobi "Accu-biscuits" (actual size).

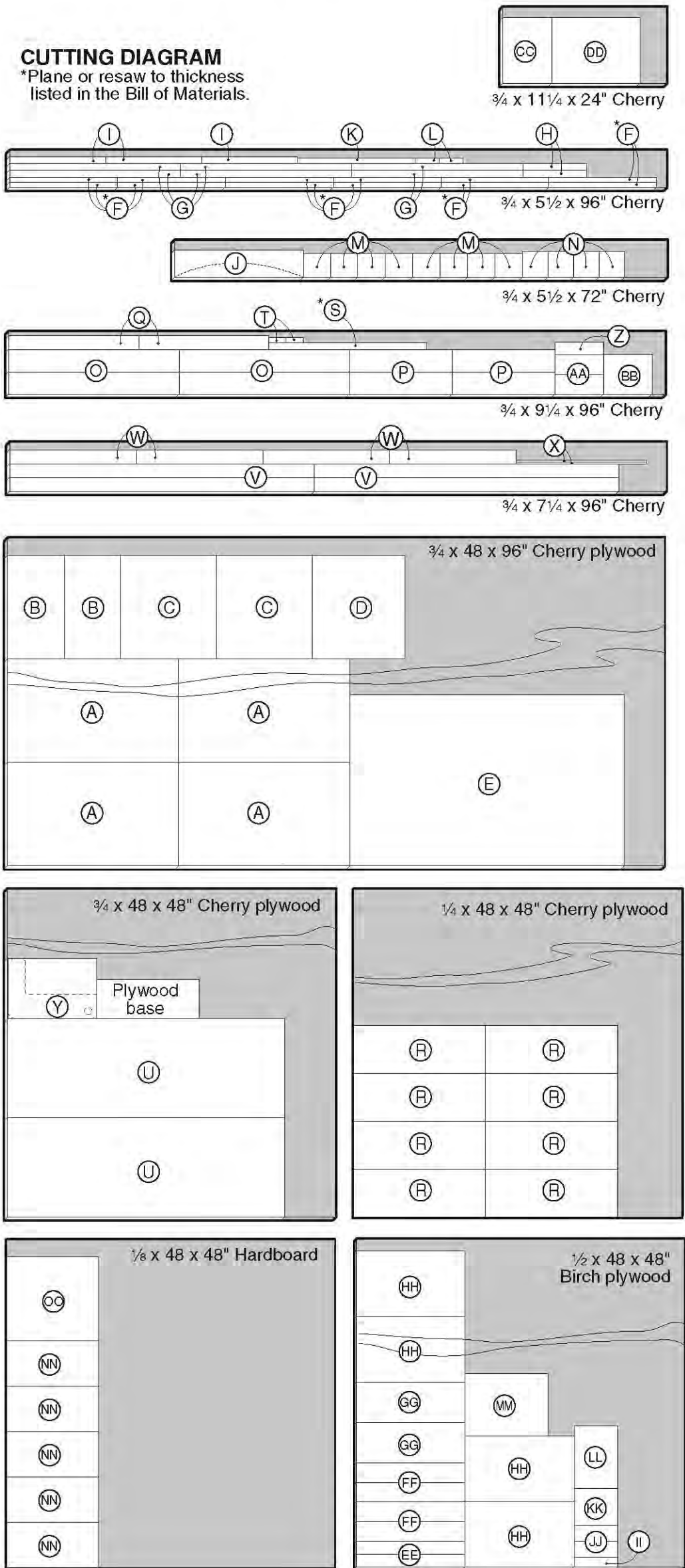


The Ryobi Detail Biscuit Joiner does everything that a bigger tool does, and fits in small joints where a bigger tool won't.

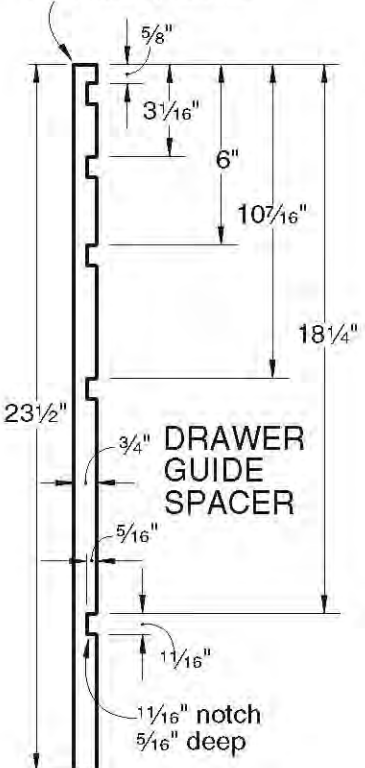
RYOBI
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SEWING CABINET
SEE ARTICLE ON PAGE 68

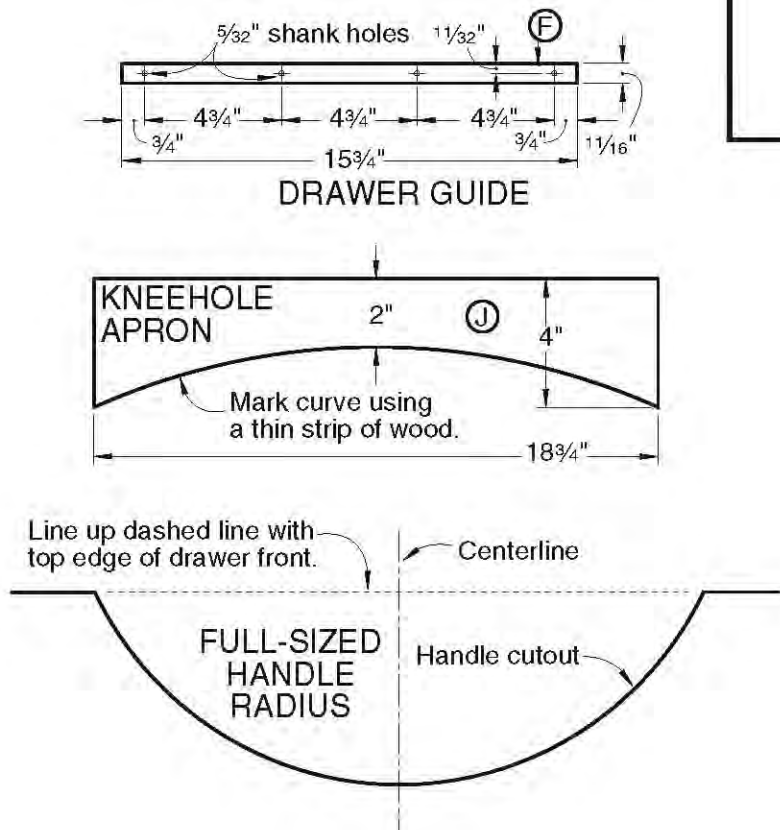
CUTTING DIAGRAM
*Plane or resaw to thickness listed in the Bill of Materials.



Position top end of spacer flush with bottom edge of rabbet at the top of side panel (A) when locating the drawer guides (F). See the photo on page 72 for reference. Use only the bottom notch to locate the drawer guides in the right-hand pedestal.



SEWING CABINET PARTS VIEW (NOT SHOWN FULL SIZE)



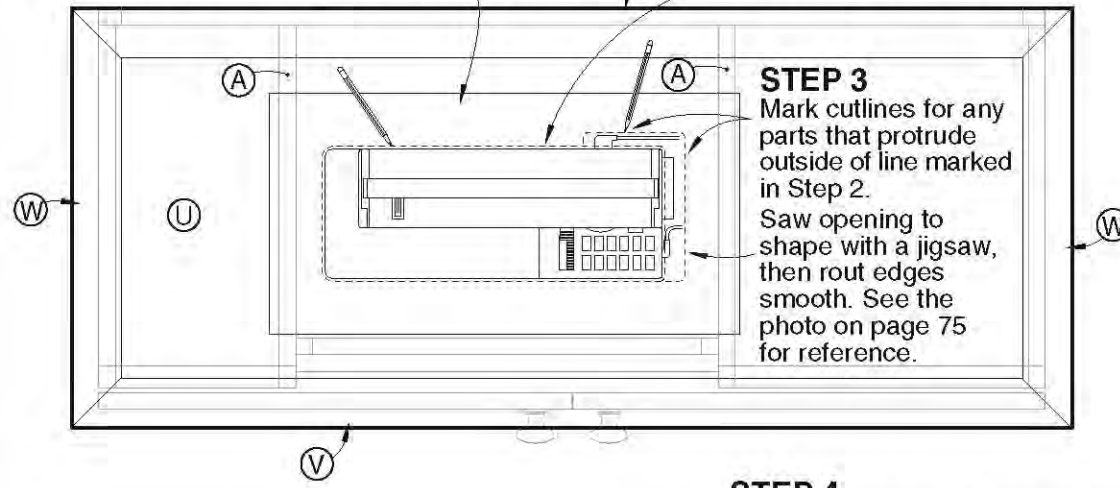
CREATING THE SEWING MACHINE OPENING AND INSERT

STEP 1

Using spray adhesive, adhere a piece of paper about 5" larger in length and width than the sewing machine base to the top (V), centering the paper over the sewing machine cavity below.

STEP 2

Center machine on top of paper. Mark a cutline 1/8" outside of perimeter of sewing machine base.

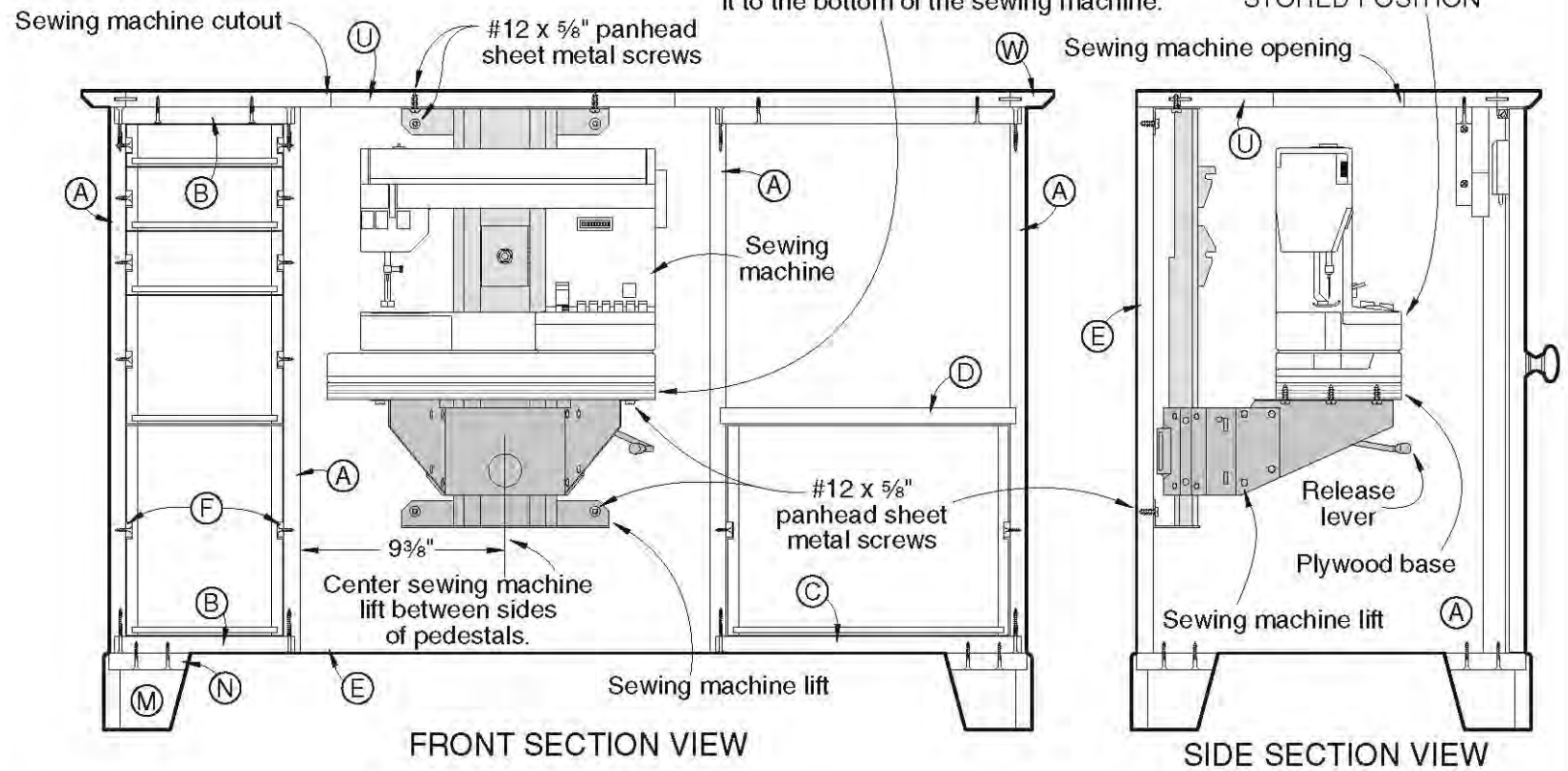


STEP 3

Mark cutlines for any parts that protrude outside of line marked in Step 2. Saw opening to shape with a jigsaw, then rout edges smooth. See the photo on page 75 for reference.

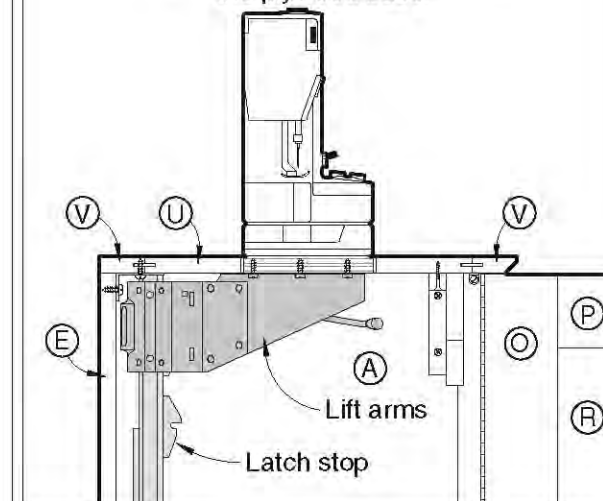
STEP 4

Cut a piece of plywood to the size of the sewing machine base. Attach it to the bottom of the sewing machine.

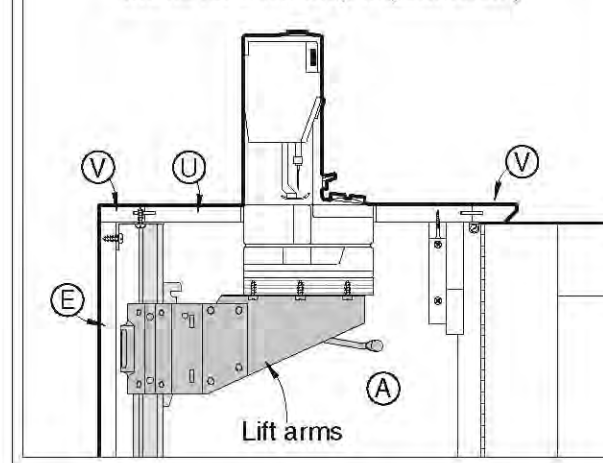


STEP 5 ADJUSTING THE LATCH STOPS

SEWING MACHINE IN FREE-ARM POSITION
Center sewing machine with attached plywood in the opening, and screw the lift arms to the plywood base.

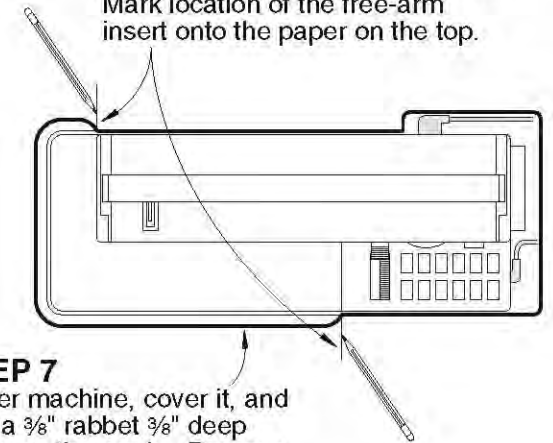


SEWING MACHINE IN FLUSH POSITION
(See the instructions accompanying the lift for latch-stop adjustments.)



STEP 6

Raise machine to the flush position. Mark location of the free-arm insert onto the paper on the top.

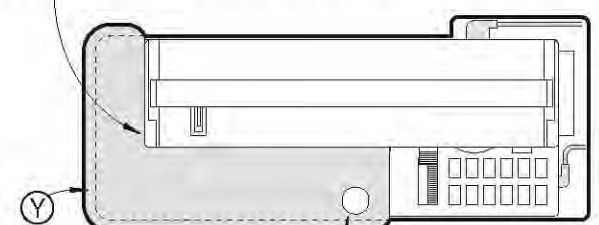


STEP 7

Lower machine, cover it, and rout a 3/8" rabbet 3/8" deep between the marks. Remove paper from top (U).

STEP 8

Raise machine to the free-arm position, and cut a piece of 3/4" plywood for the insert (Y) to fit from the rabbet up to the free arm on the sewing machine.

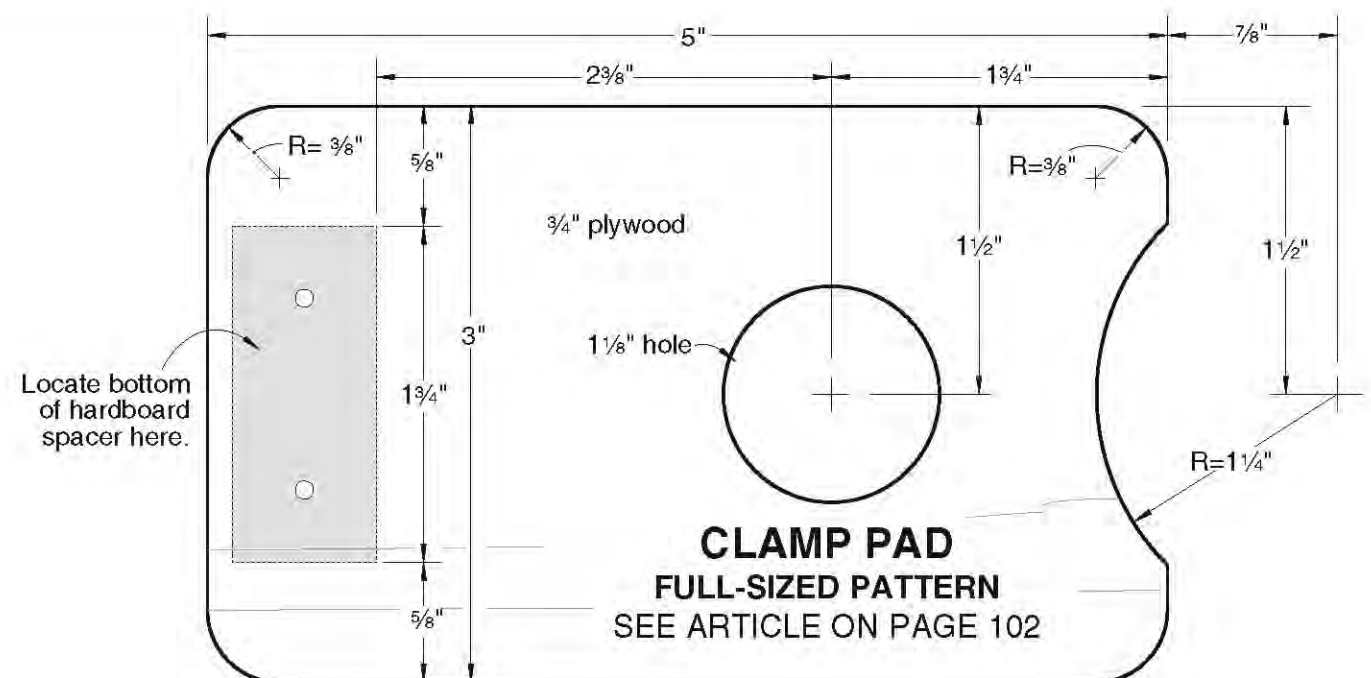


STEP 9

Rout a 3/8" rabbet 3/8" deep along bottom edge of insert.

STEP 10

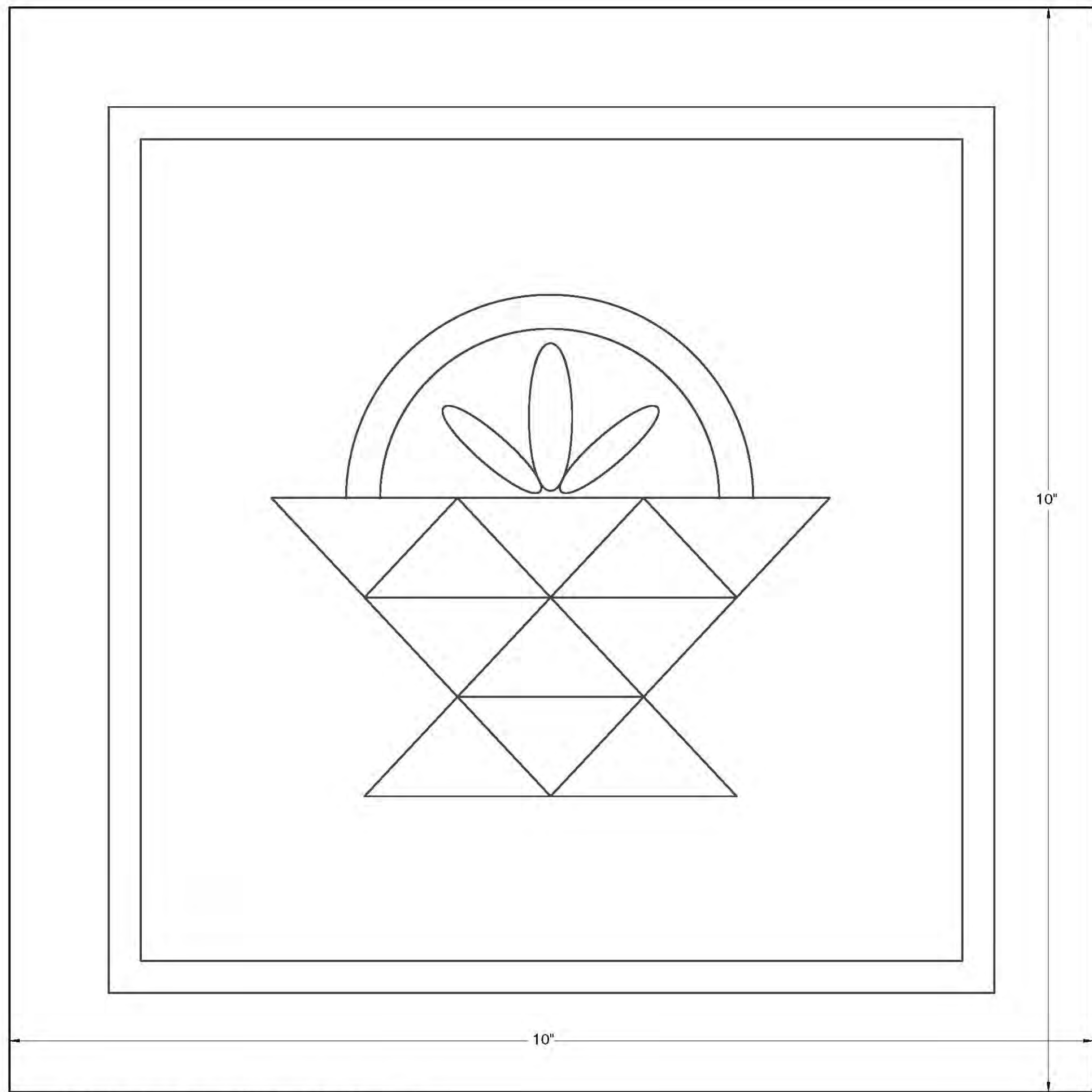
Drill a 7/8" finger hole in the insert.



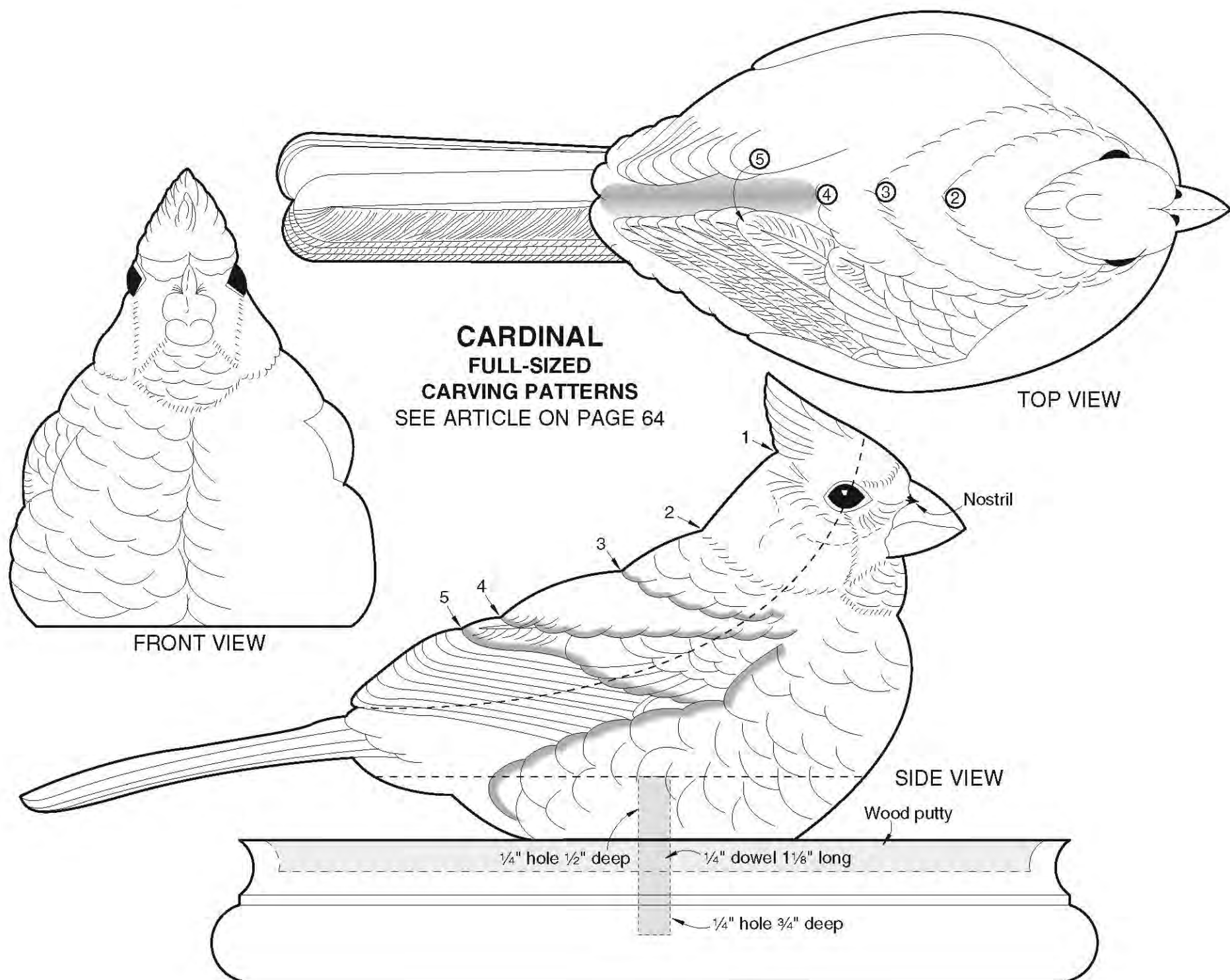
DOORMAT FULL-SIZED PATTERN
SEE ARTICLE ON PAGE 42

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★ WELCOME ★



PUNCHED-TIN WALL CABINET
FULL-SIZED PATTERN
SEE ARTICLE ON PAGE 46



CARDINAL
FULL-SIZED
CARVING PATTERNS
SEE ARTICLE ON PAGE 64