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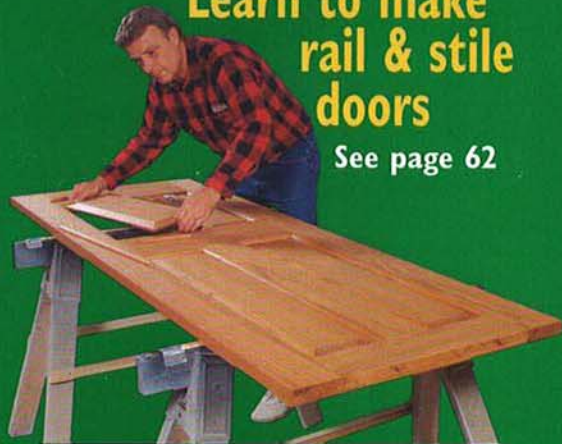
THE WORLD'S LEADING WOODWORKING MAGAZINE

JUNE 1994 • ISSUE NO. 70

Please display until June 8

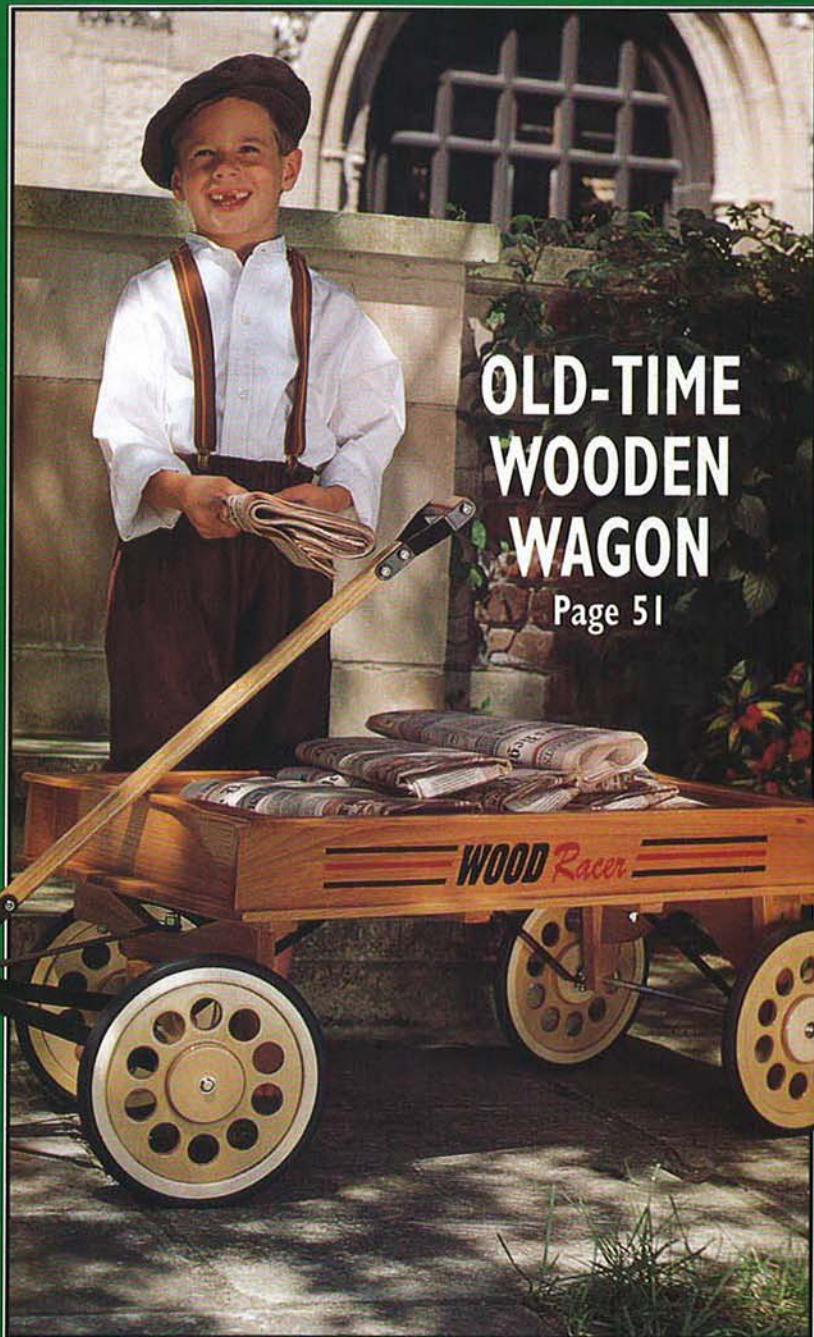
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doors

See page 62



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- Southwest bowls
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OLD-TIME
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Page 51



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EDITOR'S ANGLE

Even our ad sellers get into the woodworking act



▲Our direct-response ad staff gathering pearls of woodworking wisdom from Jim Boelling.

▼Brenden Delaney showing off his heirloom cradle—a real bit at his house.



I realized a long time ago that to be successful in the woodworking publication business, you've got to know the subject matter well. That's why at *WOOD*® magazine, we have plenty of technical expertise on staff and a stableful of free-lance specialists at the ready when we don't have all the answers.

This same philosophy spills over into our ad-sales department as well. We know that advertisers like to work with people who at least understand the fundamentals of woodworking. Because of this, all of our ad sellers, several of whom work out of New York City offices, get to spend a day in the shop with Jim Boelling, *WOOD* magazine's project builder.

Recently, three of our sellers—Brenden Delaney, Victoria Pelcyger, and Grace Chung—made the trek to Des Moines. This was a hands-on woodworking first for Victoria and Grace. But after a few hours of building a heart-shaped bandsaw box with Jim, Grace said, "Until today, I thought that woodworking was humanly impossible to do. My next project

will be the tall clock" (from Issue 53). How's that for confidence! Victoria added, "I had a little trouble with the bandsaw at first, but by the day's end, I felt like a pro."

Brenden, the third member of the group, has had considerable hands-on experience remodeling his home in New Jersey. And as the photo *above right* shows, he isn't afraid to tackle a major woodworking project, either.

Hot off the press

Looking to build a few terrific projects for your deck, patio, or lawn? Or are you the type who wants to improve your woodworking with a ton of hardworking shop tips? With our latest two publications, we've got you covered. See our ad on *page 87* for *300 Great Shop Tips, Volume II™*, a compilation of our best tips from issues 36-70, and our hot-off-the-press *WOOD Magazine's Best Outdoor Projects™*. ♣

Larry Clayton

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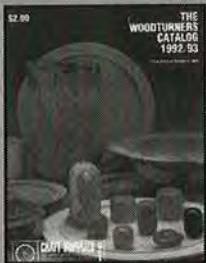
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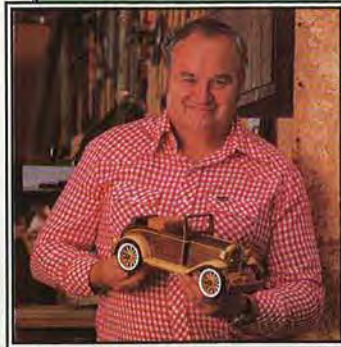
Better Homes and Gardens®

WOOD®

THE WORLD'S LEADING WOODWORKING MAGAZINE

JUNE 1994

ISSUE NO. 70



CRAFTSMAN CLOSEUP

The detail master keeps them rolling 31

When his area's steel mill closed in 1986, Pennsylvanian Tom Rolison suddenly found himself out of work. Then, he discovered wood. He developed a line of model cars, trucks, and trains to sell and, in a few short years, ran a successful business. Today, Tom couldn't be happier.

WHAT WOODWORKERS NEED TO KNOW

Bandsaw blades 36

Gather in our nuggets of bandsaw-blade wisdom as we look at blade selection, tooth differences, uses, and wear.



Ace-of-hearts triplane whirligig 38

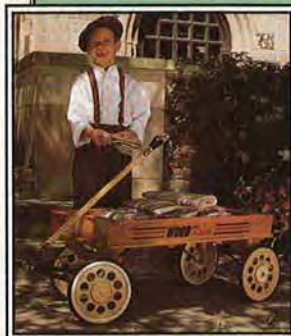
What's up? Try our clever World War I-era prop plane, complete with pilot and waving scarf. You'll find the full-sized plans inside.

WOOD® magazine builds a solar kiln 44

Dry your own lumber after building the hardworking 8x8x12' kiln shown here. For the best results, order our blueprint plans.

Nine-issue index 47

Find the wood projects, techniques, features, and tool-buying stories of issues 59-67 quickly and easily with this handy reference.



The fun-time racer 51

Delight your child or grandchild with an heirloom project that's based on an actual antique design. Our wooden wagon is tough, good-looking, and promises years of service to the lucky recipient.

This issue's cover wood grain: sweet gum sapwood

CARVING

Carving by design 58

Feast your eyes on the aquatic masterpieces by champion carver Rick Beyer. Then, read about Rick's unique creative approach.

SHOP-TESTED TECHNIQUES

Custom-craft your own rail-and-stile doors..... 62

Adorn your home by replacing your hollow-core doors with the solid-wood beauties discussed here.



TURNING

Bowls with a past..... 68

Native Southwest pottery shapes translate into beautiful woodturnings. You'll find templates for all seven shapes included in the story.

CRAFT SHOP

Lumberyard long-stems..... 72

Bandsaw the patterns found inside and make a bouquet of wooden flowers that, once painted, you can enjoy year-round.

A reel deal 74

Now, the little anglers in your family can practice pulling in the big ones indoors. Make our rod and reel from dowels, scrap, and string.

Vacuum-veneering and clamping 76

Learn a fool-proof system for applying unruly veneer, or expand your clamping horizons with a technology currently used by woodworking production shops. We show you five handy clamping jigs for helping with circle-cutting, sanding, and other common tasks.



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Tips From Your Shop.....10	Information Worth Writing
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Ask WOOD.....20	Finishing Touches.....96

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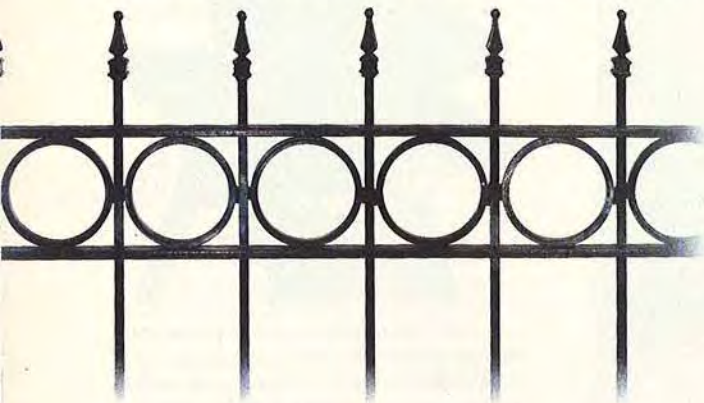
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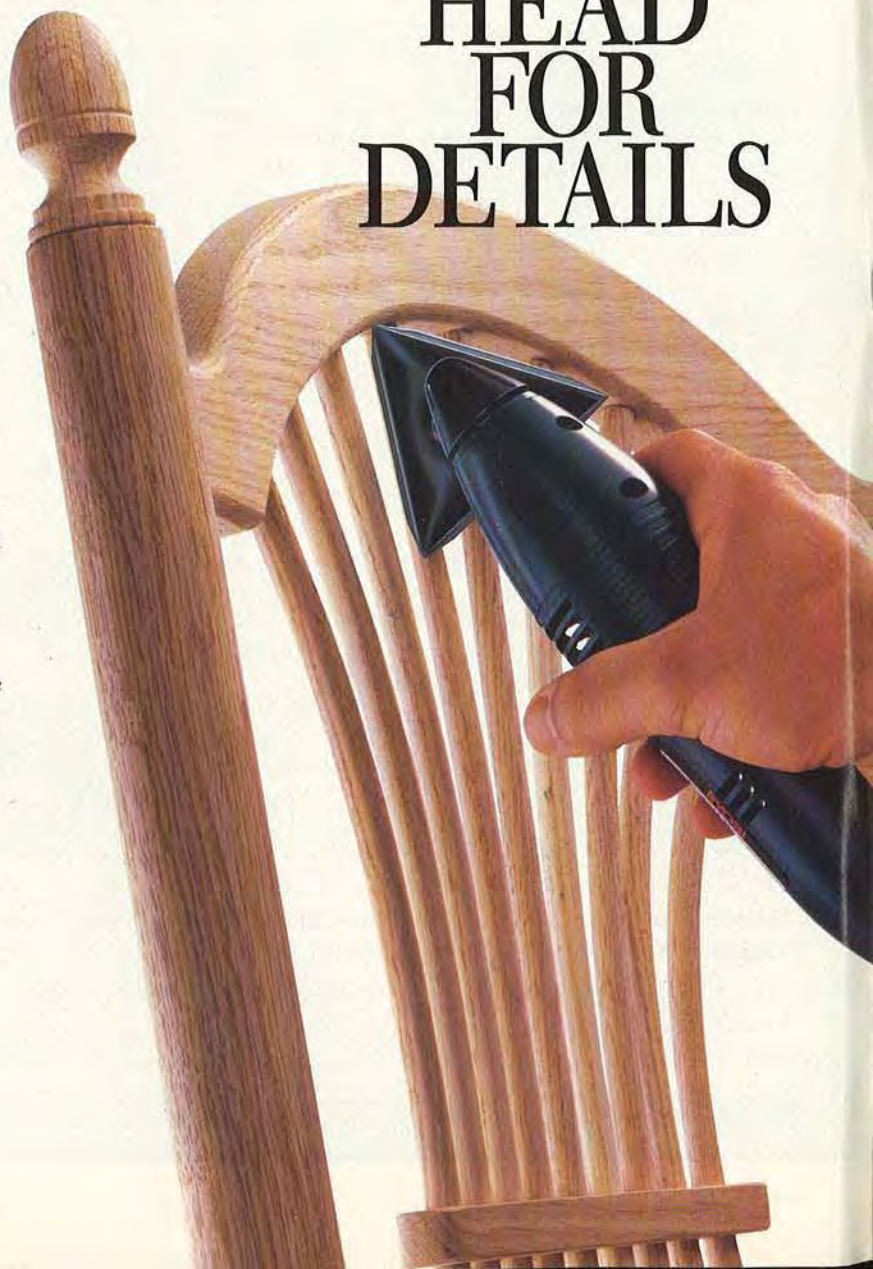
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A HEAD FOR DETAILS



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THE WORLD'S LEADING
WOODWORKING MAGAZINE

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TALKING BACK

Print this article

We welcome comments, criticisms, suggestions, and even compliments. Send your correspondence to: Talking Back, Better Homes and Gardens® WOOD® Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379



Sources for thin plywood

Can you recommend a vendor for the 1/8" oak veneer plywood required for the "Bowfront Table" in the November 1993 issue?

—George Tracy, Murphreesboro, Tenn.

We found 1/8" oak plywood, as well as other thin and bendable plywoods in the catalogs of these retailers:

Boulter Plywood Corp.
24 Broadway
Somerville, MA 02145
617/666-1340

Constantine's
2050 Eastchester Road
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Too fast can be rough on the lathe

In the article "Low Cost Lathes," in the October 1993 issue, the comment "We found this low speed handy only for boring with large drill bits" concerning the AMT 4370 lathe missed the purpose of the speed changer. The low speed of 275 rpm allows rough turning of 10" and larger diameter pieces of wood with a minimum of vibration. An out-of-balance turning block of this size spinning at the 500-550 rpm the article found "handy for turning large, out-of-round workpieces" will cause intense vibration in any lathe, and poses a safety hazard with some lathes.

—Scott Yeagley, American Machine & Tool, Royersford, Pa

Address correction

The address for Althor Products in the buying guide for "What a Show-off" display case in the January 1994 issue should be: 496 Danbury Road, Wilton, CT 06897. The phone number, 800/688-2693, is still the same. We apologize for any inconvenience this may have caused our readers.

Continued on page 8



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DUOFAST

- CN950SH Framing Nail Gun 299

DEWALT

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- DW704 12" Miter Saw 298
- DW705 12" Compound 352
- DW945K2 Cordless Drill w/2bat 168

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- 91-100 13 pc 1/2" Shank Bit Set 179
- 92-100 28 pc 1/4" Shank Bit Set 209

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- EDS132 13.2 V Cordless 188
- EDS120 12V Cordless 198

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not available in all areas

- SFN1 1"-2" Finish Nailer 289
- SFN2 1-1/2-2" Finish gun 359
- SLP20 Pinner 5/8-1 5/8" 262
- SKS 1/4" Crown Stapler 259

SFN40 Finish \$369

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Emglo

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- AM78HC2 1 1/2 HP-1 tank 279
- AM78HC4V 1 1/2 HP-2 tank 299
- AM99HC4V 2 Hp-2 tank 368
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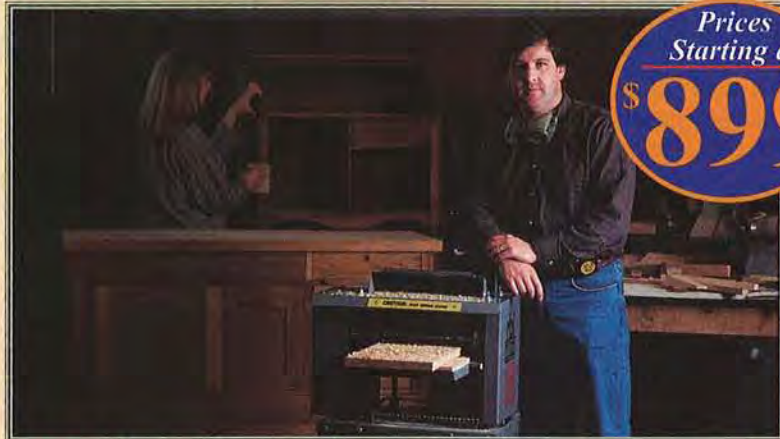


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TALKING BACK

Continued from page 6

More on food-safe finishes

The article on food-safe finishes in the October 1993 issue was very informative, and I commend you on trying to make everyone more aware of toxic chemicals and finishes. As manufacturers of wooden food-related products, our opinion varies slightly from the article. On our products we use a finish called Block Oil, a completely safe, natural, and non-toxic combination of oils and waxes blended specifically for food surfaces. You can order a 12-oz. bottle of this finish by sending \$5.95 plus \$2.00 shipping to: 'Laska Stuff, 3787 Broadway, American Canyon, CA 94589. Call 707/644-8303.



The fact that an oil does not dry completely is not bad for a food item, as it continues to protect the wood and prevent the absorption of moisture. We do not feel the introduction of a drying agent, either toxic or non-toxic, can be beneficial to the wood.

—Steve Sparks, 'Laska Stuff, Rochester, Mich.

I can still do it!

I'm 69. The article written by Larry Clayton about Bill Boian, age 101, leads me to believe I have more good years than I thought to pursue my wood-working hobby. I took my first manual art class in 1941, and I was the first girl to enroll.

—Pauline Groseclose, Gautier, Mo.

Tung oil is food-safe, too

There are several pieces of misinformation in the article "Food-Safe Finishes" in the October 1993 issue. I feel that comments about any food-safe finishes should be based on material from the Food and Drug Administration and *not* from manufacturers and vendors of competitive products.

The FDA approves tung oil for food-contact applications and as a binder for pills. In that second use, it is directly ingested. There are very few finishes that are safe for food contact, and it always troubles me when people are frightened away from one of the few finishes available.

—Leonard G. Lee, Lee Valley Tools, Ottawa, Ont.

In response to your letter, Leonard, we spoke with Marie Falcone of the FDA's Small Manufacturer Assistance Branch. She told us that tung oil (China wood oil) is indeed an FDA-approved finish for wooden items used with food.

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WOOD MAGAZINE JUNE 1994

Hunting the elusive 7474

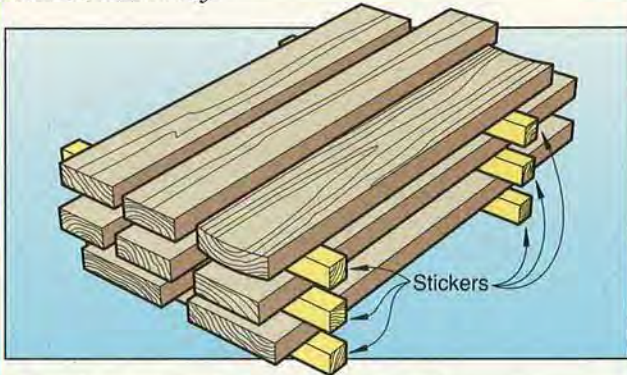
Your February 1993 issue featured an article "Random-Orbit Sanders". I've tried to buy the Black & Decker 7474 sander, partially because of its pad-braking system, but have not been able to find one. Can you help me with this?

—David Cutshall, Pitcairn, Pa.

For an answer, Dave, we contacted Anita Galloway of Image Dynamics, the public relations firm for Black & Decker. Anita said the 7474 sanders are available on a limited basis, usually in hardware stores, but for the most part have been replaced by the Black & Decker Quantum line of sanders. The Quantum models B5100 (single speed) and B5200 (variable speed) are similar to the 7474 sander, but are colored green instead of black. Both models include the pad-braking system that you found attractive in our test report.

Lumber sticking revisited

We received a number of letters concerning the article "A Lumber Sticker in the Family Tree," in the Ask WOOD® department in our October 1993 issue. Our research showed that a lumber sticker is one who grades lumber using a scaling stick. Here's what two readers had to say:



The job described in your article is known as a lumber scaler here in the northeast. A lumber sticker's job is to stack lumber in the mill yard. The boards are stacked in layers with narrow strips of wood or "stickers" placed between the layers to allow air to circulate while the wood dries.

—Donley Goodridge, Craftsbury Common, Vt.

A "sticker man" is a man that stacks lumber by layering the boards with narrow sticks placed between the layers. The lumber is stacked by species and grade, in piles up to twelve feet wide and as high as can be reached. Assure Jimmy Smith that his great-granddad had to be good at his job or he would not have had it. It was a job that called for a lot of skill and judgment. 🍄

—Carl Mowrey, Wardsboro, Vt.

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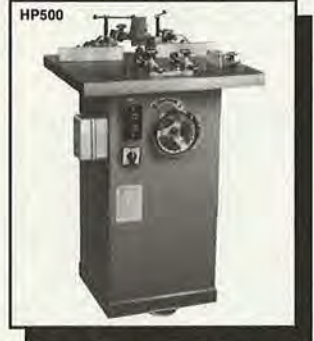


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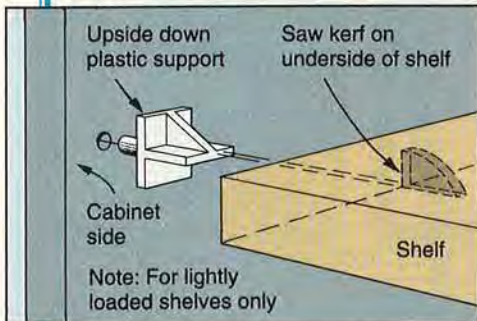
Do you have a great shop tip (or two) you'd like to share with other WOOD® magazine readers? For each published submission, you will get at least \$40 from WOOD magazine (as much as \$200 if we devote a page or more of space elsewhere in the magazine to your idea). You also may earn a woodworking tool if we select your idea as the Top Shop Tip for the issue.

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Bottom's-up solution for sliding shelves

Flat shelf supports keep your shelves from falling down, but they don't always stop them from sliding forward..



TIP: Turn one of your shelf supports upside down and cut a saw kerf in the shelf that will accept the angled brace on the bottom of the support. Slip the kerf over the inverted brace and the shelf will stay put. To avoid overloading the inverted shelf support, use these only on shelves that are lightly weighted.

—Alan Wolke, Phillipsburg, N.J.

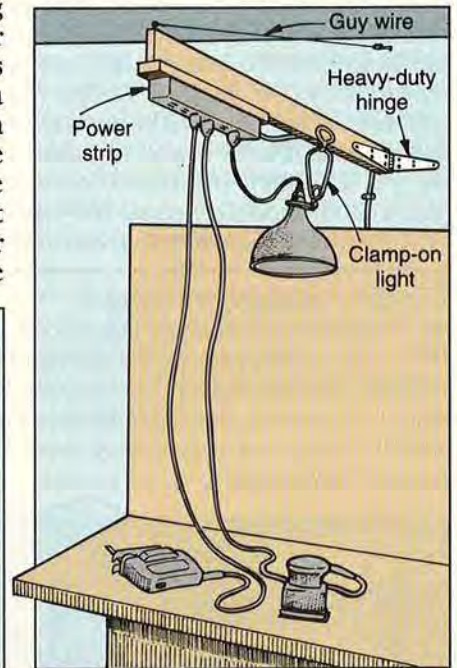
Boom provides power right above your bench

Electrical cords that get draped across a benchtop are ripe for damage, and such a situation could easily result in a serious electrical shock.

TIP: If you plug in your tools above the bench instead of behind it, you won't have to drag cords across the work surface. For an overhead outlet that goes where you need it, fashion a boom, like the one shown, from 1×4" and 1×2" boards. It should be long enough to extend from the back of the bench to slightly past the bench front. Attach a power strip to one end, and hinge the

other end to the wall behind the bench. For a long boom, add a guy wire from the free end of the boom to a point on the wall above the hinge. Rout a groove for the power cord, to avoid damage. Add a clamp-on reflector lamp for a simple, adjustable worklight.

—G. E. Wallaux, Painesville, Ohio.



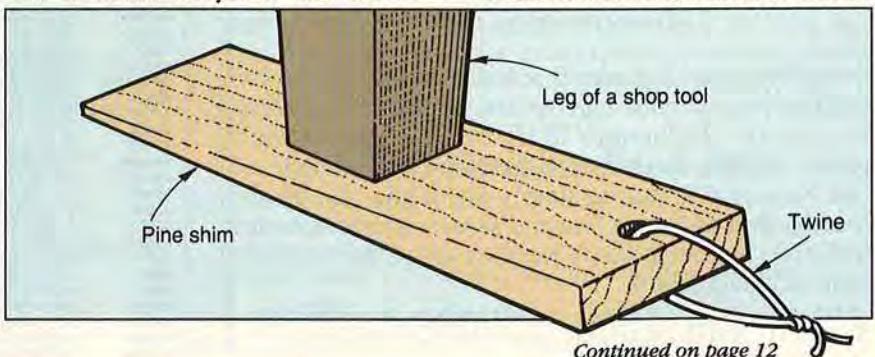
Shims steady tools on a wavy workshop floor

You rarely find a garage or basement with a perfectly smooth and flat concrete floor. And for most of us, that's the workshop floor. If you move your equipment around at all, you can spend a lot of time trying to steady it in each new location.

TIP: Buy a package of pine shims, the kind lumberyards and home-

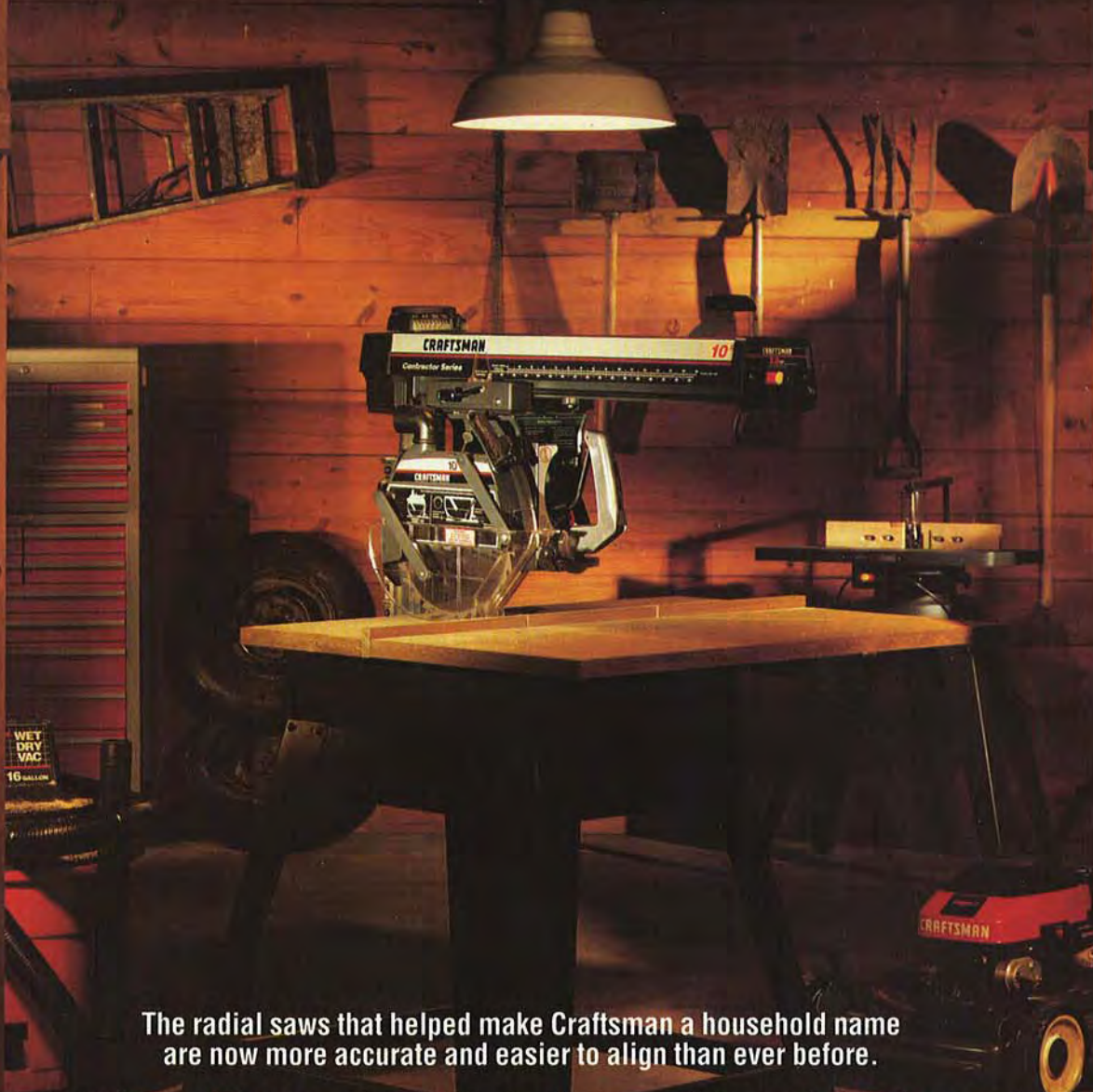
centers sell for installing windows and door jambs. Drill a hole in the thicker end of each shim and tie a loop of twine through it. Hang one of these modified shims on each piece of equipment. Now, when you move a tool, you can steady it instantly by sliding the shim under the wobbly leg.

—Michael Tamarkin, O. D., York, Pa.



Continued on page 12

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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 10

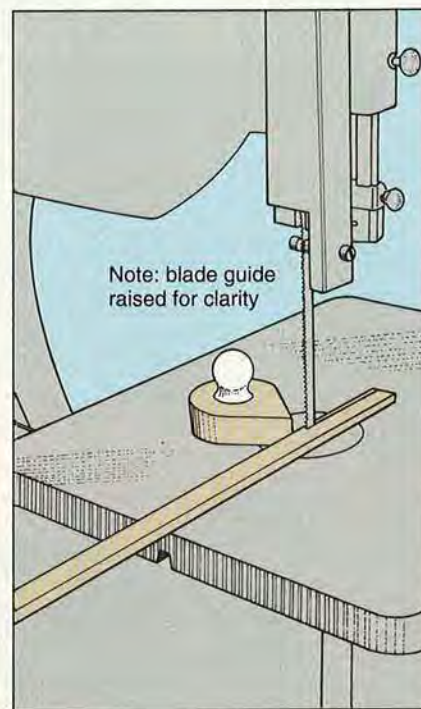
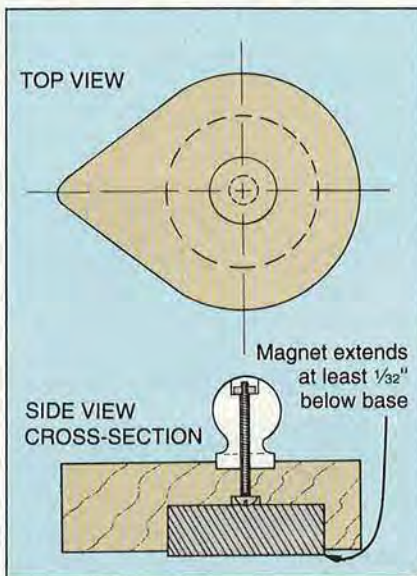
Magnetic guide points way to better bandsaw cutting
Setting up and adjusting the fence is a lot of bother when you just want to make one quick cut with your bandsaw.

of the guide against the stock adjacent to the blade to maintain a constant cutting width.

—C. R. Alexander, Topeka, Kan.

TIP: Make a handheld guide like the one shown for fast, accurate bandsawing parallel to an edge. Cut the guide body from hardwood stock 1 1/16-1 1/2" thick. Bore a hole into the bottom where shown to receive a strong magnet—one salvaged from a 10-12" speaker, for instance. Bore deep enough that the magnet will stand out from the bottom surface about 1/32". Add a knob or handle, if desired. Epoxy the magnet into place. If your bandsaw has an aluminum table, leave the bottom of the guide flat and adhere a piece of non-skid router mat to it.

To use, start bandsawing on your cutting line. Then hold the point



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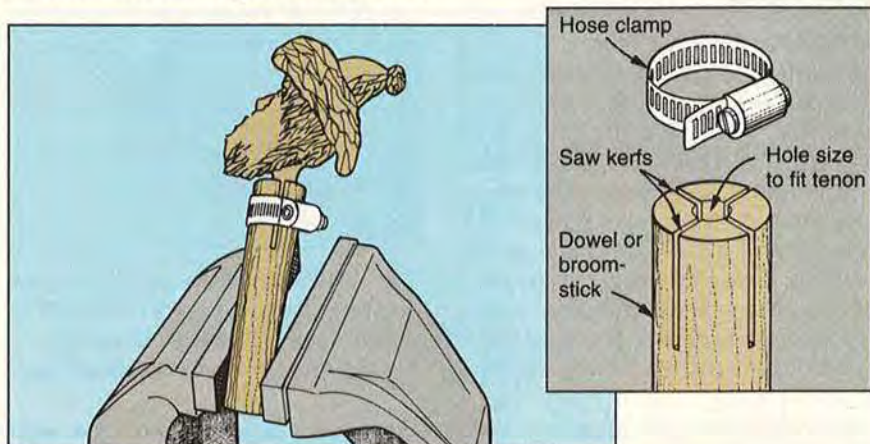
A broomstick collet holds small carvings

The main problem in carving small pieces, such as the head of a two-part figure, is hanging onto the workpiece.

TIP: Start by carving a round tenon on the workpiece (this can be the tenon that joins the carving parts or a temporary one). Next center a hole the size of the tenon and about 1½" deep on the end of

a 6-8" length of broomstick or 1-1½" dowel rod. With a bandsaw or scroll saw, cut two kerfs across the broomstick's diameter, 90° apart and as deep as the hole. Slide the tenon into the hole and tighten a hose clamp around the end to secure the carving. Now, you can hold the broomstick collet in a vise or in your hand.

—Albert Heaton, Granite City, Ill.



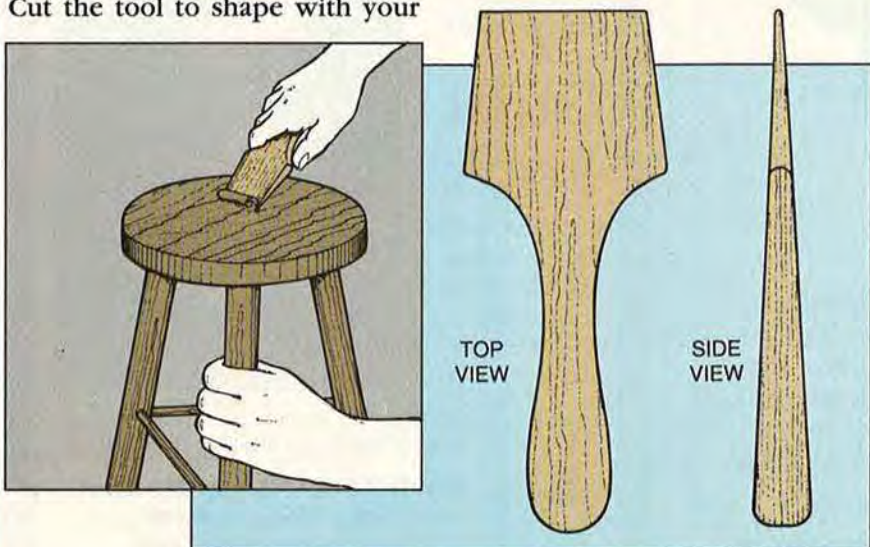
Shop-made wooden scraper won't mar refinishing job

Using a steel putty knife to scrape off stripper-softened paint or other finishes can scar the furniture you're trying to refinish.

TIP: Make a scraper like the one shown below from ¾" pine or some other soft-textured wood. Cut the tool to shape with your

scrollsaw or bandsaw and then taper it to an edge by sanding. Round over the handle edges for comfort. The wooden scraper won't nick the wood you're stripping, and the corners won't dig in as you lift off the old finish.

—Sam Stucki, St. George, Utah



Continued on page 14

"A good, strong way to join corners is with a finger or box joint."



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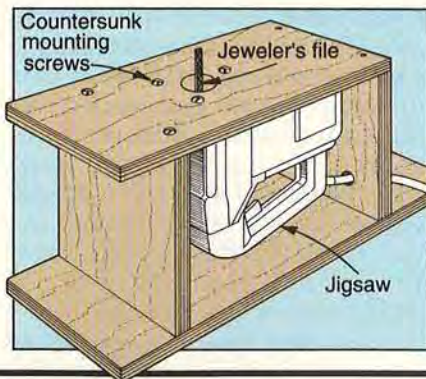
TIPS FROM YOUR SHOP (AND OURS)

Continued from page 13

Old sabersaw makes quick work of filing

Your old sabersaw still runs, but you'll probably never saw with it again because you enjoy your new one so much. It seems a shame to throw it away, though.

TIP: If you frequently file fretwork or other inside cutouts, that old sabersaw can help. Drill the blade holder to accept the tang of



a small jeweler's file. Then, mount the saw in a simple stand built from scrapwood. Drill 1/4" mounting holes in the saw's base to attach the saw to the stand with 1/4" flathead machine screws. Countersink the mounting screws on the stand's top surface. Clamp the unit securely to the workbench, then make quick work of that tedious filing.

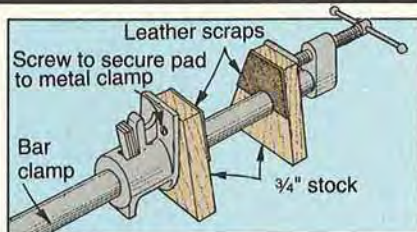
—Elliott Bogart, Tampa, Fla.

Protective pads stay put and support clamps, too

Pipe clamps will dig right into the wood unless you put some protection between the jaws and the work. Trouble is, you can't hold the pads in place, align the workpieces, and tighten the clamps with just two hands.

TIP: If you attach the clamp pads to the jaws, you won't have to fuss with them when your hands

are full. Cut pads similar to those shown to fit your particular clamps. You want the large hole to fit the pipes yet allow free movement. Drill holes for #6 or #8 sheet-metal screws where indicated, and attach the pads to the clamp jaws. For further protection, glue a leather facing to the clamping area on the pad. The pad design shown offers a bonus,



too: The wide bottom allows you to stand the clamps on a bench or sawhorses for easier clamping.

—Hayden C. Jones, Shenandoah, Iowa

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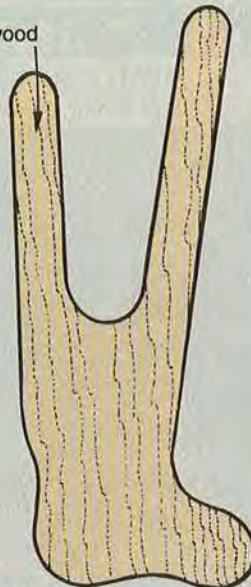
Keep cuts under control with a two-legged pushstick

A pushstick keeps your fingers way from harm, but sometimes you'd feel more in control if you had better contact with the wood. Bandsawing is one of those times.

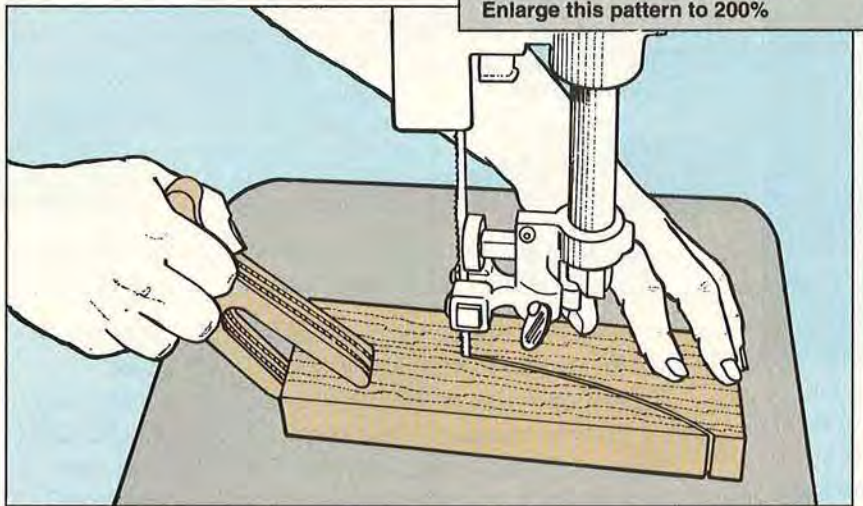
TIP: Make a two-legged pushstick like the one shown at right for better bandsawing. Cut it from 3/4" plywood. In use, push the workpiece with the short leg; hold it down and control its movement with the longer one.

—Clarence G. Searles, San Francisco

3/4" plywood



Enlarge this pattern to 200%

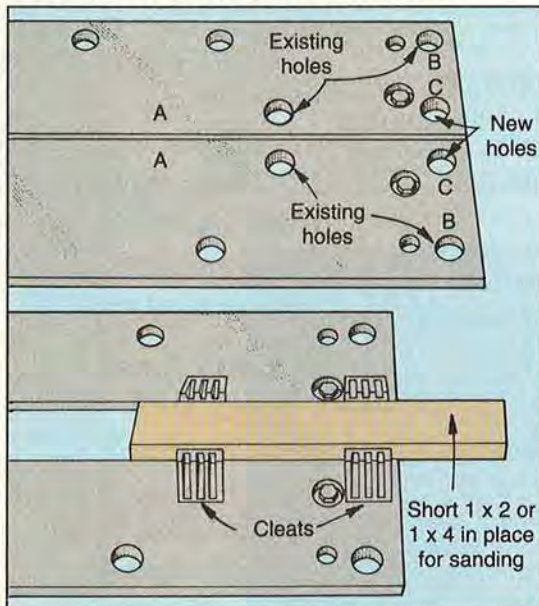


Extra holes help Workmate grab short, narrow work

Workmate portable workbenches can hold almost anything. But they have a hard time holding on to a short, overhanging piece of 1x2 or 1x4.

TIP: Drill an extra pair of holes, one in each Workmate jaw. Locate the new holes (C) in relation to existing holes A and B, where shown. Insert the standard Workmate dogs into holes A and C to take firm hold of stock that's short and narrow.

—Michael Covington, Athens, Ga.



Continued on page 17

"Use quality hardwood and your chair will last for generations."



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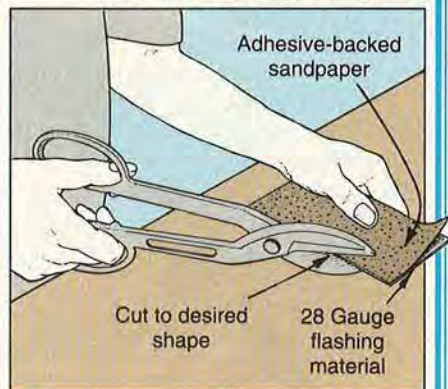
TIPS FROM YOUR SHOP (AND OURS)

Continued from page 15

Flashing and sandpaper team up in the tight spots
Sanding blocks and most portable power sanders don't reach into small spaces well, and hand sanding in tight spots can wear out your fingers.

TIP: Create your own custom-shaped sanding plates from flashing material. With a pair of tin snips, cut the shapes you need from the 28-gauge aluminum roof flashing you find at most hardware stores. Attach adhesive-backed sandpaper to the flashing and trim to size. The rigidity of the flashing enables you to maintain firm pressure, especially when you're sanding in areas where your fingers can't reach.

—William J. Carroll, Dallas, Pa.



A FEW MORE TIPS FROM OUR WOODWORKING PROS

- With a piece of scrapwood, you can build a doweling jig that automatically aligns rails and stiles. See our door-building article on page 64 for this technique.
- If crafting a perfectly round wooden circle seems difficult, check out our circle-sanding jig on page 86.
- Drilling into dowels just got a whole lot easier. With our two easy-to-build V-block dowel holders on page 84, you can securely and accurately drill into the side of a dowel, or even into the end. ♣

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TV Woodworker Visits IDEA SHOP™

Be sure to watch the PBS television show "The American Woodshop" during April when host Scott Phillips pays a visit to the *WOOD* magazine IDEA SHOP.

Phillips spent a day early last November in Des Moines, Iowa, talking with the editors of *WOOD* magazine on the topic of workshop design. Then, Design Editor Jim Downing guided him through the many innovations of the IDEA SHOP that will be seen on the program.

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The program, titled "Designing the Ultimate Woodshop", will discuss workshop design considering safety, work flow, dust collection, storage, plus tool layout and placement, using the IDEA SHOP as a model.

The American Woodshop program blends traditional methods of wood-working with the latest techniques to show viewers how to complete projects safely at home. Phillips also travels the country to meet other artisans at work in their shops.

To discover exactly what he found out at the IDEA SHOP, check the listings for your local PBS station in April to catch the program.

YESTERDAY'S TOOLS

A stand-up plane for flattening floors THIS TOOL WAS MADE FOR WALKING

Players in the old-tool collecting game often have to figure out a few things when they spot a newly uncovered treasure. What does this do? How does it do it? Who would have used it, and when?

Sometimes, the answers come easily. Consider, for instance, the plane shown *below*. It weighs in at more than 20 pounds and has a pole almost four feet long for a handle. Even at first glance, you know it has to be for floors.

This Stanley 74 floor plane was designed to do one thing—to plane flush the uneven joints of wooden-plank floors. Like so many specialized tools, this one represents a simple variation on a standard workshop implement.

When the 74 first appeared around 1886, all America stood on wood. Practically every home featured wooden-plank floors. Wood was underfoot in skating rinks and ballrooms, classrooms and gymnasiums, saloons and butcher shops, trams and train cars. Ships had wooden decks. All those planked floors needed to be planed.

With the pole-handled Stanley 74, a craftsman could stand up to do the job rather than get down on

his hands and knees. A tapered end on the 1¼"-diameter wooden pole slips into a socket on the plane body. The socket pivots up and down at a point right behind the plane's frog. A pair of hand grips can be positioned anywhere on the pole.

The plane itself is a heavy iron casting (later models weigh about 21 pounds, early ones half that). Less than 10½" long by 4½" wide, the slightly coffin-shaped body looks decidedly chunky. It carries an iron 2⅝" wide.

Last manufactured in 1923, the Stanley 74 commands a price today that floors many people—\$800-\$900 for one complete with handle and grips. A plane without the handle brings \$200 or less, depending on condition.

Tool from the collection of Neil Stoll, Glenbrier Antiques, Dexter, Mich.
Photograph: John Hetherington

Stanley's no. 74 floor plane let workers stand up, making it easier to put more oomph into the job.



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Mitersaw markings seem backwards

Please explain why mitersaw manufacturers mark their tables 0° to 45°, when in relation to the standard fence, it should be 90° to 45°. With the current markings, cutting a 22½° angle as marked on the saw results in a 67½° angle on the board, measured from the fence.

—Perry C. Benton, Vacaville, Calif.

We had to shake the rust off of our geometry skills on this question, Perry. When cutting miters, we're concerned with the degrees of angle measured from the line perpendicular (or square) to the fence. (See drawing right.) These traditional markings on mitersaws (including hand miter boxes) correspond to the formula for calculating

the miter angles needed to cut the joints of a case or a molding.

This formula is:

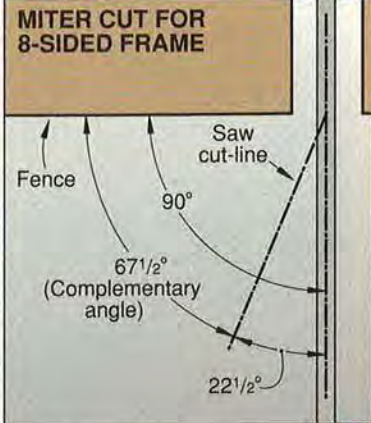
$$(360^\circ \div \text{number of sides}) \div 2 = \text{angle of cut}$$

Using the example of 22½° (for 8 sides):

$$360 \div 8 \text{ sides} = 45^\circ \div 2 = 22\frac{1}{2}^\circ$$

Setting the mitersaw at 22½° off the perpendicular will give you the proper angle for an eight-sided box or molding.

The 67½° you mention, measured from the fence, is the complementary angle to the 22½° miter angle we want to cut for an eight-sided box. To figure miter angles measured from the fence would require a whole new set of formulae to calculate miter joints. We have enough fun dealing with the one that exists.



Continued on page 22

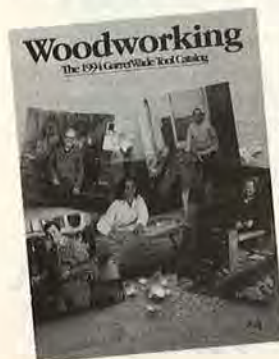
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ASK WOOD

Continued from page 20

Mothballs and cedar don't mix

We recently inherited the cedar chest my father-in-law built in 1937. Is there any way I can get the smell of mothballs out of it?

—Kathie Riedl, LaCrosse, Kan.

For an answer, Kathie, we contacted John West of West Metro, an odor-control company in Altoona, Iowa. He told us: "Use a water-soluble odor counteractant to remove the smell of the mothballs. Mix this with water, and spray a fine mist on the inside of the cedar chest." John recommended that you contact a chemical-supply business in your area for the odor counteractant.

We located a supplier for a water-soluble odor counteractant called "Eliminator", available for \$9.95 per quart from:

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The board flew apart

I was ripping a piece of parana pine, when the strip I was cutting started to curve. I used a wedge to keep the kerf open. When I was about 12" from the end of the board, the board exploded into two pieces. Why did this happen?

—James T. Rucker, Houston

We suspect, Jim, that you found a board that contained "internal stress." This develops in trees grown on steep slopes, or any other situation where one side of the tree has more stress on it than the other side as the tree grows.

Apparently, this particular board had been cured and flat-planed, and the internal stresses were balanced enough for the board to remain straight. When you started to rip the piece, you changed the balance of stress, and the wood came apart.

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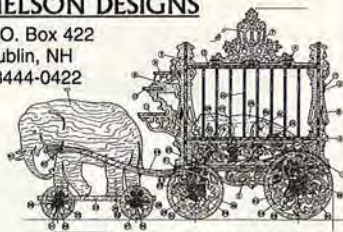
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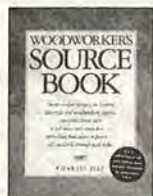
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PRODUCTS THAT PERFORM



Print this article



A nifty thread-making attachment for lathes

I've always enjoyed turning small wooden vessels, and have long dreamed about producing such vessels with threaded lids. Recently, I tried a product that makes my wish a reality.

The Threadmaster system consists of a thread-cutting bit that mounts to a drill chuck on the headstock of your lathe, and a feed mechanism that mounts to the lathe bed and holds your workpiece. (Chuck shown in the photos at right is not included with the product.)

To produce a lidded vessel, you need to first turn the vessel and its lid in the usual fashion. Then, remove your workpieces from the lathe and put the Threadmaster components into place. By rotating two cranks on the feed mechanism, you control the cutting depth and rate of thread cutting.

To test the product, I turned numerous vessels and lids ranging from 2" to 8" in diameter, in maple, cherry, and walnut. I quickly discovered that I got the smoothest possible cuts with my lathe set to its highest speed. I further reduced chip-out by making my cuts in three passes.

After practicing with the product for a few days, I produced vessels that fit together perfectly, with near-flawless threads. Because I used the product on my full-sized lathe, I needed an optional extender bolt (\$10 from Penn State Industries). This allowed me to place the feed mechanism on a wooden block so that I could raise smaller vessels up to the cut-



ting bit. The standard Threadmaster cuts 10 threads per inch, which seemed fine for the projects I produced. You

also can buy optional threaders that produce four or 16 threads per inch (\$59 each).

—Tested by Lee Gatzke

Threadmaster, \$242.95 ppd. from Penn State Industries, 2850 Comly Road, Philadelphia, PA 19154. Call 800/377-7297 to order, or 215/676-7609 for more product information.

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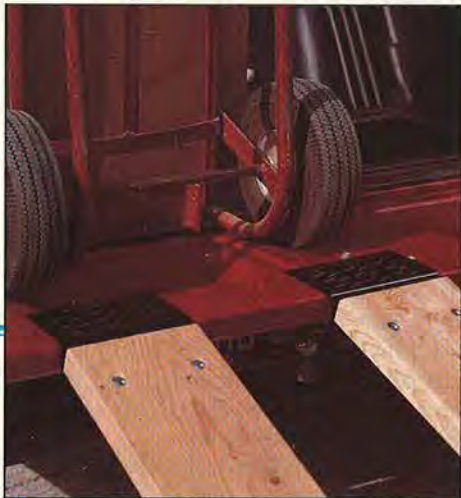


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OR PICK UP ON THE NEWSSTAND MARCH 29, 1994

Save your back: ramp kit eases loading and unloading

Most home woodworkers encounter some heavy lifting, whether it be bringing home a new stationary tool or delivering a large furniture piece. A dolly helps on flat ground, but what do you do when you've got to hoist something up two or three feet? The Insta-Ramp Combination kit tackles this problem by enabling you to convert a pair of 2x8's into a stable ramp that can handle loads up to 1,400 pounds.



The kit consists of two sturdy steel ramp tops, two rubber ramp feet, and the necessary hardware. The tops bolt to 2x8's that you supply, and the rubber feet slip over the lower ends. Using these ramps I easily loaded and unloaded a boxed-up bandsaw weighing 150 pounds. Heavier loads also tracked steadily up the ramps, but I did need a helper pushing from below.

If you've got a vehicle with a tailgate, these ramps will come in handy. They make loading and unloading much safer, and they'll keep your back out of the chiropractor's office too.

—Tested by Bob McFarlin

Insta-Ramp Kit, about \$35, at hardware and homecenter stores or call Universal Industrial Products at 800/922-6957.

Continued on page 26

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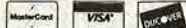
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PRODUCTS THAT PERFORM



Continued from page 25

Big clamps take a bite out of tricky setups

Traditional pipe clamps work great on the edges of glue-ups, but what do you do when you need clamping pressure in the center of a wide project? The Mastodon Jaw Extenders solve this problem with 8"-deep clamping jaws. These lightweight aluminum attachments slide onto regular 3/4"-pipe clamps.

Building your own deep-clamping fixtures eats up a lot of time, and these clamp extenders give you all the long-arm clamping you need in just seconds. I used these extenders to glue up a 24"-deep bookcase and they created plenty of pressure at the center of the shelf dadoes. I recommend the Mastodon Jaws for anyone who puts together bookshelves, bowl



laminations, or other projects that require clamping pressure in the middle of a wide workpiece.

—Tested by Dave Henderson

Mastodon 8" Jaw Extenders, model JE-1 about \$30 a pair, from Wade Manufacturing Co., P.O. Box 2366, Portland, OR. Call 503/692-9027.

Drill-press clamp sets up fast, holds material safely

Most woodworkers don't realize how dangerous a drill press can be until they've had a loose workpiece take wing at whatever spindle speed they're using. In the past, I've used C-clamps to hold material, but they eat up a lot of time and effort. Now, American Tool Companies has tackled this problem by reconfiguring its Vise-Grip locking pliers with a stud bolt and a new clamping jaw.

The stud bolt fits into any drill press (or any kind of tool table) with a 1/2" slot, and attaches with a wing nut. It took me less than

30 seconds to install and remove the clamp. To adjust for material thickness and clamping pressure, simply tighten the knob at the end of the handles as you do with the regular locking pliers.

I tested this clamp with a variety of woods and drill bits including a Forstner bit, and it held everything fast. The jaw pads protected the wood surfaces well, and I also liked how quickly I could reposition the work and reclamp.

For an especially tough test, I loaned the clamp to a friend who works in a machine shop. After a week, he reported that it held everything he could throw at it.

In my opinion, if you own a drill press, you should own one of these clamps. With it you'll be able to work faster than with any other type of clamp, and greatly improve your safety.

—Tested by Bob McFarlin



Vise-Grip Locking Hold Down Clamp, about \$28, from American Tool Companies Incorporated, P. O. Box 337, DeWitt, NE 68341. Call 402/683-2315.

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Note: Fine Woodworking Editorial Nov./Dec. 1988 No. 73, pg. 65, S.N. recommends high alternating top bevel (ATB) thin kerfs and large blade stiffeners for smoothest cuts on RADIAL SAW, etc.



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GEL STAINS

A little dab'll do ya'



Drips and runs on vertical surfaces pose no problems with thicker, easy-to-apply gel stains.

If you've had problems with liquid stains, the claims for gel stains might sound too good to be true. They're billed as easier and less messy to apply, and you don't have to stir them up first. They also promise better color control, with no lapping hassles. What's more, you don't need to seal softwoods before you apply gels.

Taking aim at lofty claims

Because of all of the manufacturers' hype about gel stains, we decided to give them a close, hands-on look. In fact, we tried out seven brands to see if they lived up to their lofty claims.

Most of these were solvent-based, but two were one-step gels that combined a solvent-based stain with a varnish topcoat. Just about all had the same gloppy consistency as soft pudding. And altogether, we counted a total of 47 color choices.

Though you can apply gels with a brush, roller, or sponge, we used a clean cotton cloth. That's because you must rub the gel into the wood to liquefy it.

After that, you have several choices. You can wipe the gel off right away, wait up to five minutes before wiping, or continue rubbing it in until it looks shiny. In all cases, try to make final color adjustments before the manufacturer's full drying time.

Made to please

We found plenty of flexibility when applying gel stains. We tried two things you'd never attempt with liquid stains—staining unfinished wood next to an area that we stained and let dry, and removing stain completely.

As promised, lap marks were no problem when we went back to

an area we'd already stained. The trick is to go over both the unfinished and the previously stained areas together. But don't worry. As long as the first area hasn't completely cured, applying more gel stain won't darken it.

When you do want to darken the color, just allow the full drying time between applications. Another plus: you don't have to sand between coats—you've already rubbed the stain smooth.

We also were pretty successful when we tried to remove the gel stains. We waited 30 to 60 minutes, and then rubbed a small stained area with a cloth dampened with paint thinner. Most of the stain came off every time.

Just need to lighten an area? We got good results by rubbing in a little paint thinner, or even more of the gel itself, which softened the previous coat and let us rub it down to a lighter color.

Costs and compromises

Ounce for ounce, gel stains cost a little more than liquid stains (\$4 to \$7 for eight ounces). But, they'll cover two to three times the area.

What about disadvantages? Because you have to rub them in, they're not the best for large areas, such as floors. And, as with all stains, read label directions and test the color on scrap first. 🌲

Photograph: Wm. Hopkins

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505	1 2 SHT FIN SANDER	125
506	NEW POCKET CUTTER	178
556	BISC JOINER W CASE & TILT FENCE	172
556K	SAME AS ABOVE W 1000 BISCUITS	195
690	1 1/2 HP ROUTER W 1 1/4" & 1 1/2" COLLETS	134
690K	690 W CS, EDGE GUIDE, & TEMP GD KIT	178
9660	1 1/2 HP ROUTER W CASE	144
691	1 1/2 HP "D" HANDLE ROUTER	149
693	PLUNGE BASE ROUTER, 1 1/2 HP	169
695	SHAPER TABLE W 1 1/2 HP ROUTER	217
696	SHAPER TABLE	129
2620	3 1/8" VSR DRILL, 0-1200 RPM W CHK	89
5008	DOVETAIL TEMPLATE	79
5009	MORTISE & TENON JIG	47
5116	OMNI JIG	267
6831	PLUNGE ROUTER BASE	74
7116	NEW 24" OMNIJIG	298
7310	LAMINATE TRIMMER, 5.6 AMP	90
7312	OFFSET TRIMMER	129
7319	TILT BASE TRIMMER	102
7335	5" RANDOM ORBIT SANDER, VS	131
7335K	7335 W CS, DUST EX SYS, 100 SHTS PPR	175
7336	6" RANDOM ORBIT SANDER, VS	135
7336K	7336 W CS, DUST EX SYS, 100 SHTS PPR	182
7333	RANDOM ORBIT DUST EXTRACTION	24
7518	3 1/4 HP FIXED BASE ROUTER-5 SPEED	269
7519	3 1/4 HP FIXED BASE ROUTER-1 SP	235
7536	2 1/2 HP FIXED BASE ROUTER	202
7537	2 1/2 HP FIXED BASE "D" HNDL RTR	209
7538	3 1/4 HP PLUNGE ROUTER-1 SPEED	235
7539	3 1/4 HP PLUNGE ROUTER-5 SPEED	269
7549	TOP HANDLE BAYONET SAW	134
7649	BARREL GRIP BAYONET SAW	147
7700	NEW 10" LASERLOC MITER SAW	345
9118	PORTA PLANE KIT W CASE, CRBD BLD	209
9314	4 1/2" TRIM SAW KIT	152
9315	7 1/4" BUILDERS SAW KIT	142
9345	SAW BOSS 6" CIRCULAR SAW KIT	125
9637	TIGER SAW VAR SPD RECIP SAW KIT	144
9647	TIGER CUR RECIP SAW KIT	119
9840	CRDLS DRILL KIT W 2 BAT, CS KYLS CK	148
9833S	12V CRDLS KIT W 2 BAT, CASE	169
97310	LAMNT TRIMMR KIT W 4 BASES & CS	191
9751	1 1/2" VS, 2 SPD HAMMER DRILL KIT	149

Panasonic

EY6181CRKW	NEW PREDATOR 9.6V CORDLESS KIT VSR W KYLS CHUCK, 22 STAGE CLUTCH W 2 BAT, CASE & CHRGR	158
EY6100CRKW	NEW PREDATOR 12V CORDLESS KIT VSR W KYLS CHUCK, 22 STAGE CLUTCH W 2 BAT, CASE, & CHARGER	192

RYOBI

BT3000S	10" TABLE SAW WITH STAND	549
AP12	12" PORTABLE PLANER	419
TS2520	8 1/2" SLIDE COMPOUND MITR SAW	479
TS-380	15" MITER SAW	369
OSS450	OSCILLATING SPINDLE SANDR	174
D38VSR	3 1/8" VSR DRILL, 4.0 AMP, 0-2500 RPM	59

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OSCILLATING TRIANGULAR SANDER INCLUDES CASE & PAPER ASSORTMENT

DELTA

22-540	12" BENCH TOP PLANER	409
28-180	BENCH TOP BAND SAW	179
31-080	1" BELT 5" DISC SANDER	99
31-460	4" BELT 6" DISC SANDER	129
33-060	NEW SIDEKICK 6 1/2" FRAME & TRIM SAW	379
37-070	NEW 6" VS BENCH JOINTER	259
40-560	16" SCROLL SAW, 2 SPEED	179
50-075	DUST COLLECTOR SWEEPER, 3 1/4 HP	254
50-175	NEW KICKSTAND PORTBL WORK STAND	179

Milwaukee

006-1	9.6V KYLS CDLS DRILL KIT W 2BAT, CS	164
007-1	SAME AS ABOVE BUT 12 VOLT	199
6010	1 2 SHEET FINISHING SANDER	126
6017	1 4 SHEET FINISHING SANDER W BAG	125
6125	5" RANDOM ORBIT SANDER	117
6126	6" RANDOM ORBIT SANDER	120
6256	TOP HANDLE JIG SAW	148
6365	7 1/4" CIRCULAR SAW, 13 AMP	122
6490	10" MITER SAW	257
6491	10" MITER SAW W BAG & 80T BLADE	238
6492	10" MITER SAW KIT COMPLETE	334
6507	VAR SPEED SAWZALL W BLADES & CSE	145
6508	SAME AS 6507 BUT W PERMANENT CRD	145
6527	SUPER SAWZALL W BLADES & CASE	174
6528	SAME AS 6527 BUT W PERMANENT CRD	174

AEG

TXE150	6" VS DUST FREE RANDOM ORBIT SANDER W VELCRO PAD	\$144
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DEWALT

DW100	3 1/8" DRILL, 0-2500 RPM, 4 AMP	69
DW318K	4.5 AMP HVY DTY JIG SAW KIT W CS	149
DW360	7 1/4" SAW W BRAKE	152
DW430	3" X 21" DUSTLESS BELT SANDER	164
DW431	3" X 21" DSTLS BELT SANDER VAR SP	182
DW610	1 1/2 HP ROUTER, 9 AMP	147
DW614	1 1/4 HP PLUNGE ROUTER	143
DW615	1 1/4 HP PLUNGE ROUTER, VAR SP	158
DW624	3 HP HVY DTY PLUNGE ROUTER	245
DW625	3 HP HVY DTY PLUNGE RTR, VAR SP	275
DW682K	BISCUIT JOINER KIT W 100 BISCUITS	234
DW705	12" COMPOUND MITER SAW	339
DW944K2	9.6V CORDLESS KIT W 2 BATTERIES	169
DW945K2	12V CORDLESS KIT W 2 BATTERIES	189

HITACHI

D10DFKBE	9.6V CRDLS DRILL KIT W 2BAT & CS-KYLS	143
D10SVKBE	12V CORDLESS DRILL KIT W 2 BAT	189
D10VC	3 1/8" DRILL VAR SP, REV, 3.2 AMPS	59
SV12SA	4 3/8" PALM GRIP SANDER	54
SB75	3" X 21" 2 SPEED BELT SANDER	139
SB10T	4" X 24" 2 SPEED BELT SANDER	164
CJ65V2	TOP HANDLE JIG SAW W CASE	158
P20SB	3 1/4" PLANER, 3.4 AMP	89
TR6	LAMINATE TRIMMER	92
TR8V	VAR SPEED PLUNGE ROUTER, 1 1/4"	149
TR12	3 HP PLUNGE ROUTER	184
M12V	3 HP VAR SPEED PLUNGE ROUTER	232

BOSCH

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1001VSR	3 1/8" 1100 RPM DRILL	89
1021VSR	3 1/8" 1100 RPM DRILL	115
1194VSR	1 1/2" VSR, 2 STAGE HAMMER DRILL	146
1272D	3" X 24" DUSTLESS BELT SANDER	205
1273D	4" X 24" DUSTLESS BELT SANDER	210
1273DVS	4" X 24" VS DUSTLESS BELT SANDER	
	INCLUDES 10 FREE BELTS	229
1370DEV5	6" VS DSTLS RNDM ORB SNDR	239
1584VS	CLIC BARREL HANDLE JIG SAW, VS	
	INCLUDES FREE CASE	157
1587VS	TOP HANDLE JIG SAW, VS W CASE	162
1604	1 3/4 HP ROUTER W FREE CASE	137
1608	LAMINATE TRIMMER	95
1609KX	DELUXE INSTALLERS KIT W 4 BASES	229
1613EVS	2 HP VAR SP PLUNGE ROUTER	
	INCLUDES FREE EDGE GUIDE	199
1614EVS	1 1/4 HP VAR SP PLUNGE ROUTER	159
1615EVS	3 1/4 HP VAR SP PLUNGE ROUTER	289
1655	7 1/4" CIRCULAR SAW	114
3050VSRK	9.6 V VSR CRDLS DRILL W 2 BAT, CS	149
3282DVS	5" VS DUSTLESS RANDOM ORBIT	95

Emglo

AM78HC4V	1 1/2 HP COMPRESSOR	\$299.00
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SKIL

77	7 1/4" WORM DRIVE CIRCULAR SAW	145
1605-02	BISCUIT JOINER WITH CASE & FREE GLUE SYSTEM	139
2736-04	12V VSR CORDLESS DRILL KIT WITH 15 PIECE BIT SET	147
3410	10" TABLE SAW W FREE CARB BLADE	179
5657	7 1/4" CIRCLE SAW W 6 CARBIDE BLD	119
5860	8 1/4" WORM DRIVE SAW	172
9410	4 1/2" DISC GRINDER	59

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	60 - 320 GRIT	12.95
6"	SOLID PSA PAPER - 100 PER ROLL	
	80 - 400 GRIT	15.95
6"	HOLED PSA PAPER - 100 PER ROLL FOR PORTER CABLE 6" HOLED PAD	
	80 GRIT	17.95
	100 - 320 GRIT	16.95
5"	HOOK & LOOP PAPER FOR PORTER CABLE	
	5" HOOK & LOOP PADS - 50 PER BOX	10.95
5"	HOOK & LOOP PAPER FOR BOSCH 3283DVS 50 PER BOX	
	80 - 320 GRIT	10.95
6"	HOOK & LOOP PAPER FOR BOSCH 1370DEV5 50 PER BOX	
	80 - 320 GRIT	12.95

freud

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JS100	BISCUIT JOINER	164
JS100K	BISCUIT JOINER W 1000 BISCUITS	187
FT2000E	3 1/2" hp PLUNGE ROUTER VS	205
EB100	EDGE BANDING SYSTEM	208
FC107	7 PC CARBIDE FORSTNER BIT SET	84
F410	10" X 40T QUIET BLADE	53
F810	10" X 80T QUIET BLADE	75
LM7231010	10" X 24" FLAT TOP RIP BLADE	36
LU82M10	10" X 60T CROSSCUT RIP BLADE	49
LU84M10	10" X 50T ATB COMBO BLADE	42
LU85M10	10" X 80 T ATB FOR MIRROR FINISH	58
LU87M10	10" X 24T RIP BLADE THIN KERF	39
LU88M10	10" X 60T CROSSCUT THIN KERF	46
LU89M10	10" X 72T TCH NON FERROUS METAL	57
LU92M10	10" X 80T TCH - BEST FOR LAMINATES	59
LU94M10	10" X 80 T TCH PLEXIGLASS BLADE	58
LU98M10	10" X 80 T TCH LAMINATES OR WOOD	67
SD309	8" SAFETY DADO WITH CASE	116
SD508	NEW 8" SUPER DADO SET	189
TK206	10" X 24T THIN KERF RIPPING	25
TK306	10" X 40T THIN KERF COMBINATION	25
TK606	10" X 60T ATB COMPOUND MITER BLD	39
TK806	10" X 80T ATB ULTIMATE CROSSCUT BLD	44
TK906	10" X 50T THIN KERF CROSSCUT	30
TK406	10" X 60T THIN KERF FINISHING	34
90-100	15 PC ADVANCED ROUTER BIT SET	159
91-100	13 PC ROUTER BIT SET	179
94-100	CABINET DOOR SET, 1 1/2" SHANK	158
95-100	5 PC CABINET & MOULDING BIT SET	193

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Includes 1 1/2 hp Router with case, edge guide, & template guide kit with 1/2" & 1/4" collets

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Includes 2 batteries, charger & steel case. 12V, 1 hour charge. Var. speed, reversible.

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ITEM	JAW LENGTH	OPEN CAP	OUR PRICE EACH	BOX OF 6
ADJUSTABLE HANDSCREWS				
#0	6"	4 1/2"	12.10	62.90
#1	10"	6"	13.25	71.90
#2	12"	8 1/2"	15.35	82.90
STYLE 37 2 1/2" THROAT 1 1/4" X 3 1/4"				
3706	6"	6"	7.50	36.50
3712	12"	12"	6.00	39.50
3718	18"	18"	7.50	42.50
3724	24"	24"	9.50	45.50
3730	30"	30"	9.50	51.50
3736	36"	36"	10.50	57.50
PONY CLAMP FIXTURES				
#50	3 1/4"	BLACK PIPE CLAMPS	8.25	
		BOX OF 12	592.00	
#52	1 1/2"	BLACK PIPE CLAMPS	6.90	
		BOX OF 12	576.00	
PONY SPRING CLAMPS - 320THT 1"				
3202HT 2"			1.25	
3203HT 3"			3.99	

AIRY

ITEM	DESCRIPTION	PRICE
0241SK	18 GAUGE BRAD NAILER 3 8" - 1 9 16" WITH CASE & 5000 NAILS (SAME AS SLP200)	109
0250SK	18 GAUGE BRAD NAILER 3 4" - 2" W CASE & 5000 NAILS	184
0565T	ANGLE FINISH NAILER 1" - 2 1 2" (SAME AS SFN1 & SFN2)	214
0626SK	NARROW CROWN 1 4" STAPLER 1 2" - 1" WITH CASE & 5000 STAPLES	119
0645S	NARROW CROWN 1 4" STAPLER 3 4" - 1 3 4" CAPACITY	169
8290	STICK FRAMING NAILER - 6 TO 16 PENNY CAPACITY, COMPATIBLE W SENCO OR HITACHI NAILS	319

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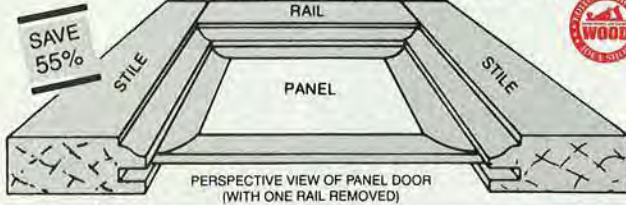
Professional production quality bit makes it quick and easy to produce matching rails and stiles — the panel raising bit with ball bearing guide makes the raised panel perfect every time.

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 1/4" Shank

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 (For making matching rails and stiles in raised panel doors, etc.) Works with stock from 11/16" to 7/8" thick



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ITEM NUMBER	DESCRIPTION (ALL 2 FLUTE)	SHANK SIZE	PRICE		ITEM NUMBER	DESCRIPTION (ALL 2 FLUTE)	SHANK SIZE	PRICE
#1306	CLASSICAL - 3/16" Radius — 5/8" Cutting Length	1/4"	\$22.50		#1337	FLUSH TRIM - 3/8" Diameter — 1" Cutting Length	1/4"	\$ 7.50
#1307	CLASSICAL - 1/4" Radius — 3/4" Cutting Length	1/4"	\$25.00		#1338	FLUSH TRIM - 1/2" Diameter — 1" Cutting Length	1/4"	\$ 8.00
#1308	CLASSICAL - 3/16" Radius — 5/8" Cutting Length	1/2"	\$22.50		#1339	FLUSH TRIM - 1/2" Diameter — 1-3/16" Cut. Length	1/2"	\$ 8.00
#1309	45° CHAMFER - 3/8" Cutting Length	1/4"	\$13.00		#1340	PATTERN / FLUSH TRIM - 1" Cutting Length	1/4"	\$15.00
#1310	45° CHAMFER - 5/8" Cutting Length NEW!	1/4"	\$15.00		#1341	PATTERN / FLUSH TRIM - 1" Cut. Length NEW!	1/4"	\$17.00
#1311	45° CHAMFER - 3/8" Cutting Length	1/2"	\$17.00		#1342	PATTERN / FLUSH TRIM - 1" Cutting Length	1/2"	\$19.00
#1312	THUMBNAIL - 1 - 3/16" Large Diameter	1/4"	\$18.50		#1343	KEYHOLE CUTTER - 3/8" (bit not shown)	1/4"	\$ 8.50
#1313	THUMBNAIL - 2 - 5/8" Large Diameter	1/2"	\$35.00		#1344	KEYHOLE CUTTER - 1/2" shown	1/4"	\$ 9.00
#1314	ROUND OVER - 1/8" Radius	1/4"	\$11.00		#1345	DOVETAIL (HSS) - 1/4" Diameter — 7-1/2°	1/4"	\$ 6.50
#1315	ROUND OVER - 3/16" Radius	1/4"	\$11.00		#1346	DOVETAIL - 1/2" Diameter — 14° NEW!	1/4"	\$ 6.00
#1316	ROUND OVER - 5/16" Radius	1/4"	\$14.00		#1347	DOVETAIL - 1/2" Diameter — 14°	1/2"	\$ 6.50
#1317	ROUND OVER - 1/4" Radius NEW!	1/2"	\$12.00		#1348	BEADING - 1/4" Radius	1/4"	\$13.00
#1318	ROUND OVER - 3/8" Radius	1/2"	\$15.50		#1349	BEADING - 3/8" Radius	1/4"	\$15.50
#1319	ROUND OVER - 1/2" Radius	1/2"	\$17.00		#1350	BEADING - 1/2" Radius	1/4"	\$17.00
#1320	ROUND OVER - 3/4" Radius	1/2"	\$21.00		#1351	LOCKMITRE - 7/8" Cutting Length NEW!	1/4"	\$32.00
#1321	MULTIFORM MOULDING - 15/16" Carbide Height	1/4"	\$40.00		#1352	LOCKMITRE - 1-1/8" Cutting Length	1/2"	\$45.00
#1322	MULTIFORM MOULDING - 2" Carbide Height	1/2"	\$40.00		#1353	OGEE RAISED PANEL - 2" Large Diameter	1/4"	\$28.00
#1323	SLOT CUTTER - 3/8" Deep	1/4"	\$14.00		#1354	OGEE RAISED PANEL - 2-3/4" Large Diameter	1/2"	\$32.95
#1324	RABBETING - 1/4" Deep	1/4"	\$15.00	#1355	EDGE BEADING - 3/16" Diameter of Circle	1/4"	\$15.00	
#1325	RABBETING - 3/8" Deep NEW!	1/4"	\$13.00	#1356	EDGE BEADING - 5/16" Diameter of Circle	1/4"	\$15.50	
#1326	RABBETING - 3/8" Deep	1/2"	\$13.00	#1357	SPIRAL UPCUT - 1/8" Diameter (solid carbide)	1/4"	\$ 9.00	
#1327	CORE BOX - 3/8" Large Diameter	1/4"	\$11.00	#1358	SPIRAL UPCUT - 1/4" Diameter (solid carbide)	1/4"	\$12.00	
#1328	CORE BOX - 1/2" Large Diameter	1/4"	\$13.00	#1359	SPIRAL UPCUT - 1/4" Diameter (solid carbide)	1/2"	\$12.00	
#1329	CORE BOX - 3/4" Large Diameter	1/4"	\$15.00	#1360	SPIRAL UPCUT - 3/8" Diameter (solid carbide)	1/2"	\$24.00	
#1330	BULL NOSE - 1/2" Diameter of Circle	1/4"	\$16.00	#1361	SPIRAL UPCUT - 1/2" Diameter (solid carbide)	1/2"	\$29.00	
#1331	BULL NOSE - 3/4" Diameter of Circle	1/4"	\$21.00	MOULDING PLANES				
#1332	BULL NOSE - 3/4" Diameter of Circle	1/2"	\$21.00	#1362	1" C.L.	1/4"	\$24.95	
#1333	TONGUE & GROOVE - Straight	1/4"	\$29.00	#1363	1-5/8" C.L.	1/2"	\$29.95	
#1334	TONGUE & GROOVE - Straight	1/2"	\$29.00	#1364	1-5/8" C.L.	1/2"	\$31.95	
#1335	TONGUE & GROOVE - Wedge	1/4"	\$29.00	#1365	1" C.L.	1/4"	\$31.95	
#1336	TONGUE & GROOVE - Wedge	1/2"	\$29.00	#1366	1-11/16" C.L.	1/2"	\$31.95	

* (proper adapter will be supplied)

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FEATURES:

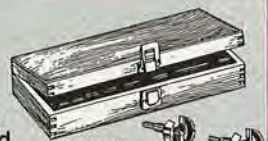
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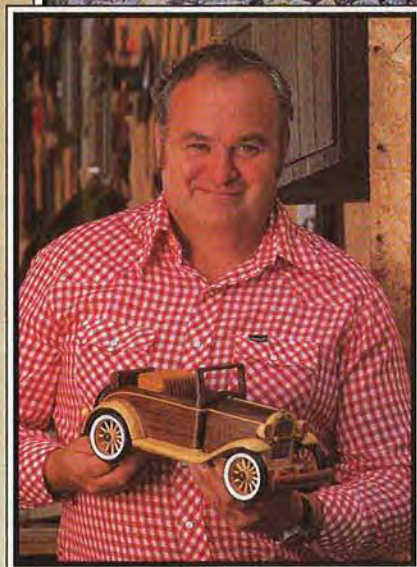


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THE DETAIL MASTER KEEPS THEM ROLLIN'

Tom Rolison can't help referring to vehicles he long ago sold as if they were still in his inventory of wooden cars, trucks, trains, planes, and steam engines. That's because he pours so much of himself into his work he can't forget them. "I have this '32 Chevy roadster, made with white ash fenders and a black walnut cowl..." he'll say as he fondly recalls detail after detail. But if it wasn't for a near financial catastrophe a number of years ago, his woodworking memories might not be quite so pleasant.

Tom, 50, was born, reared, married, and raised a family in Scottsdale, Pennsylvania. That's a town of about 12,000 situated

square in the middle of the nation's once prosperous steel industry region. For 23 years he had held down a job at a nearby mill—a job that started with laying track for the company's railroad and that ended in the yard as a car-shop repairman when the mill suddenly closed down. There wasn't much warning, but as Tom says, "You could pretty well see the handwriting on the wall." For a career replacement, he promoted his woodworking hobby to full-time status.

A future found in a magazine

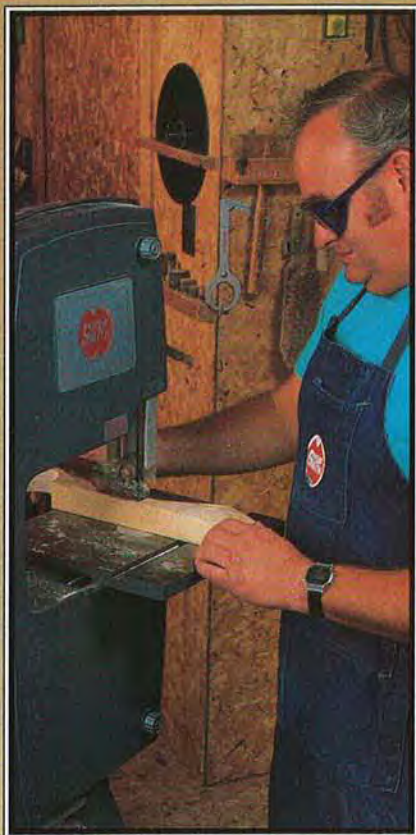
"It was in one of the very first issues of *WOOD*," recalls Tom, flip-

ping through a pile of periodicals. "Yep, here it is." He holds up the 1984 Nov./Dec. issue of *WOOD*® magazine. And turning to an article called "Heirloom Toys," he says, "I looked at Steve Baldwin's [an Omaha, Nebraska, craftsman] trucks, cars, and trains made out of pretty dark and light woods and thought, 'I can do that.' That was back in 1986. Well, I've improved some since then." Indeed. Especially when he gets down to details.

Please pass the ammunition and other recyclables

Pointing to a model of a 1930s Packard, Tom says, "That brass

Continued



Above: At his Shopsmith bandsaw, Tom cuts out the fenders for a vintage vehicle from white oak that he saved especially for that role.

Right: Tom even built the tracks on which his 1856 Tiger steam engine and tender ride. See if you can find familiar fittings—such as the drawer-pull plate—that Tom used as trim on the engine.

horn there started out as a .22-caliber shell casing. You'd never know unless I told you, right?" He almost laughs.

On close inspection, the past life of the tiny fluted horns on the vintage auto he holds becomes evident. And a glance at the contents of a jar on his bench top tells you that they're not one of a kind. Tom has hundreds of the casings of various lengths.

"I just flare them out by light tapping with a hammer on a cone-shaped piece of metal that I insert in the end," Tom explains. "I have to go really slow, though, or they'll split."

In addition to the shell casings, this master of detail features many

other common items in his vehicles. On his steam engine, for example, you'll find small brass fittings normally more at home as gas-line couplings. Compression rings, the type used in connecting faucets to water lines under the kitchen sink, find a new home in a steam-whistle assembly. The same applies to brass brads, tiny brazing rods, wire, and even drawer-pull plates (check out the ornate faceplate on the steam engine's boiler in the photo *below*). Tom admits that he never throws anything out before thoroughly examining it for another potential use.

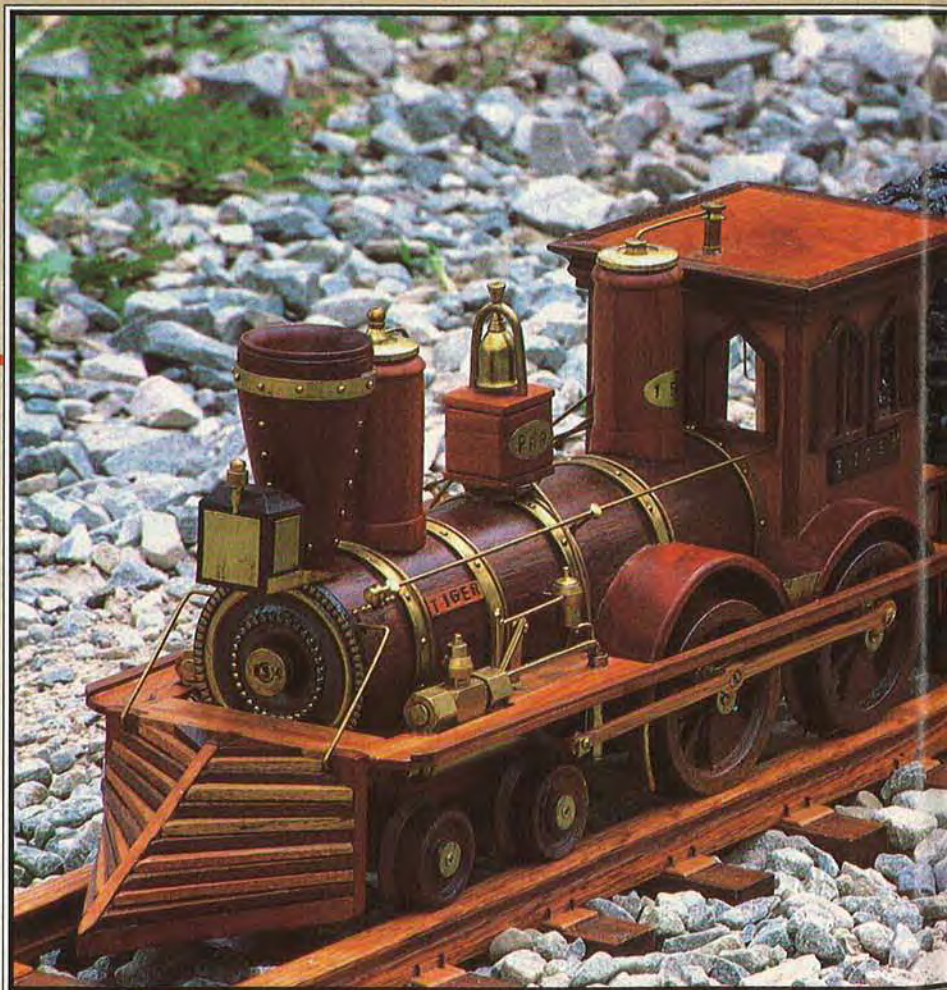
Yet, the steelworker-turned-woodworker doesn't hesitate to mail-order parts that seem perfect. He points to the wheels on the Mack trailer truck he's perfecting.

"I've got \$30 worth of tiny bolts that serve as lug nuts on this one project alone."

Anything with wheels is fair game

Tom's list of cars and trucks that he's crafted over the years reads like the inventory of an antique car collector. On it you'll find Ford pickups, roadsters, and woodies from the 1920s and 1930s, Chevies (including a '57 convertible) and GMCs of the same vintage, a Pontiac or two, a Stutz Bearcat, a Duesenberg, even a Mercedes and a Bugatti. There are 18-wheelers, too—Peterbilt and Freightliners, not to mention the Mack shown on *page 34*.

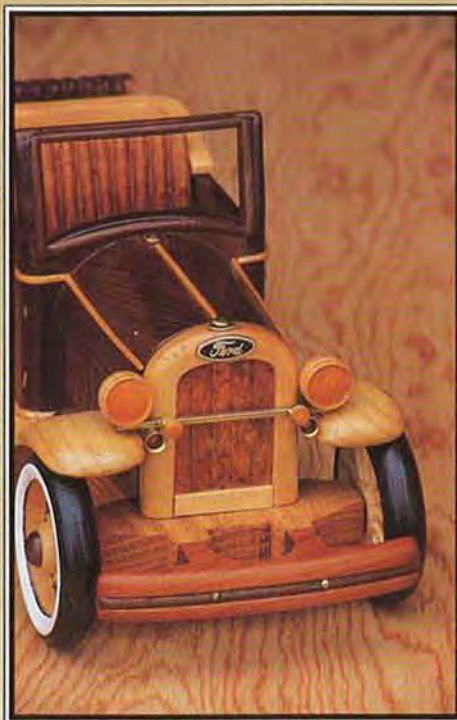
Tom also likes the intricacies of old-time steam engines. He has built a model of *The General*, a



Civil War era steamer, one of The Denver Express, and the 1856 Tiger, an engine right out of Pennsylvania history.

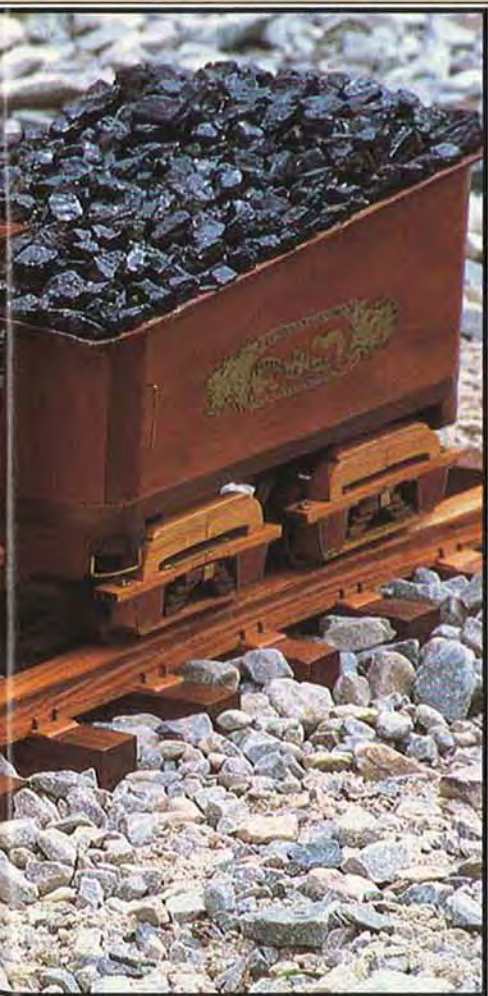
He even looks skyward on occasion. "I carved a P-51 Mustang awhile back, and I mean carved it," says Tom as he starts to describe the process. "To taper the wings just right, I took the wood off with a spokeshave. And that was a lot of work. But that's the only way I know of to do it." Tom's photo album also reveals a beautiful B-17 bomber, executed in walnut and ash, a Cobra helicopter, and a P-40 Flying Tiger.

Tom admits that he orders plans for many of his vehicle models, but they prove to be only a starting point. Because from there, he relies on photographs he takes, old advertising brochures, calen-



Left: The Ford emblem on the radiator, the carved tufting on the seats, the tiny hood moldings—all contribute to the appeal of Tom's cars.

Below: A .22 caliber shell casing finds its way onto this panel delivery truck as a gas tank filler tube. The walnut doors open on tiny hinges.



dars, and even close, personal inspections of vehicles. "I was working on a semi-trailer truck—maybe the Mack—and I saw one at a truck stop," he recalls. "So, I was out there poking around the cab, seeing what details I could pick up, and out of nowhere the driver appears. He was big, and a little concerned with what I was doing. But," Tom chuckles, "when I showed him pictures of my models, he just grinned and told me to go ahead and photograph all that I wanted to. You know, it's all those little details, often personal ones, that make my work special." And it's Tom's attention to those special details that often leads to good commissions.

"A lady from Illinois came by my booth at a big show," Tom says as he begins another story. "Seems she had a grown son with a birthday coming up and wanted to give him one of my trucks, but a special one. Apparently, he had worked his way through college doing odd jobs with the help of an old pickup truck, a 1949 International Model K. She had a photo of it. I had to combine parts I was familiar with to make it—a

little bit of Chevy body and a little Ford cab—but I did it, out of cherry, complete with the signage he had had on it! Was she ever thrilled!"

Detailing, it seems, could go on forever. So how does he know when to quit? "It's really hard," says Tom, with somewhat of a grimace. "I think I'm all finished with a vehicle, and then I see one going down the road with another detail that I'd like to put on. But I have to draw the line."

Here a collector, there a collector

At \$275 to \$400 for a car or pickup truck, up to \$700 for an airplane, \$2,000 for a semitrailer truck like the Mack shown, and as much as \$2,500 for a train, how many buyers can there be? According to Tom, the number of folks who want his trucks and other models would surprise you.

Continued

"There are some of my models in Florida, New York, Ohio, Maryland, Kentucky—they're just about all over," says Tom. "And some people have really turned to collecting them."

With righteous pride, Tom tells how he sold his first Peterbilt semi to the owner of the company that makes the transmission parts used on the real truck. That was five years ago. Now, the buyer has about five of his vehicles. Then there's the collector who lives in the Florida Keys. An ex-pilot, he owns many of Tom's aircraft and always asks for more. And at one particular show, a certain buyer couldn't get enough of Tom's work, all the while trying the craftsman's patience.

"This older fellow was looking at my work and talking about this and that. Eventually, he tried to talk my prices down," Tom remembers. "So I told him my motto, 'B.S. walks, money talks.' Guess what? He pulled a wad of bills out of his pocket and peeled off enough of them for all the cars I had with me—and that was at least seven!"

It pays to be particular

Tom and his wife, Edna, work arts and crafts shows from June through October. During that time, they might be gone as much as every weekend selling Tom's work—without ever leaving the state of Pennsylvania. Such a grueling schedule means that when Tom is at home, his focus must be strictly woodworking.

"I get so absorbed with what I'm doing in the shop that I don't even know when people come and go," Tom comments with a glance out to the road. "I'm really enjoying myself, though." It wasn't always like that.

"There was a time after I was laid off when if a project wasn't going just right, I'd lose my temper and the project would generally suffer," the craftsman continues. "Now, if I get frustrated with a project, I just put it in a box and

set it aside for awhile and work on something else."

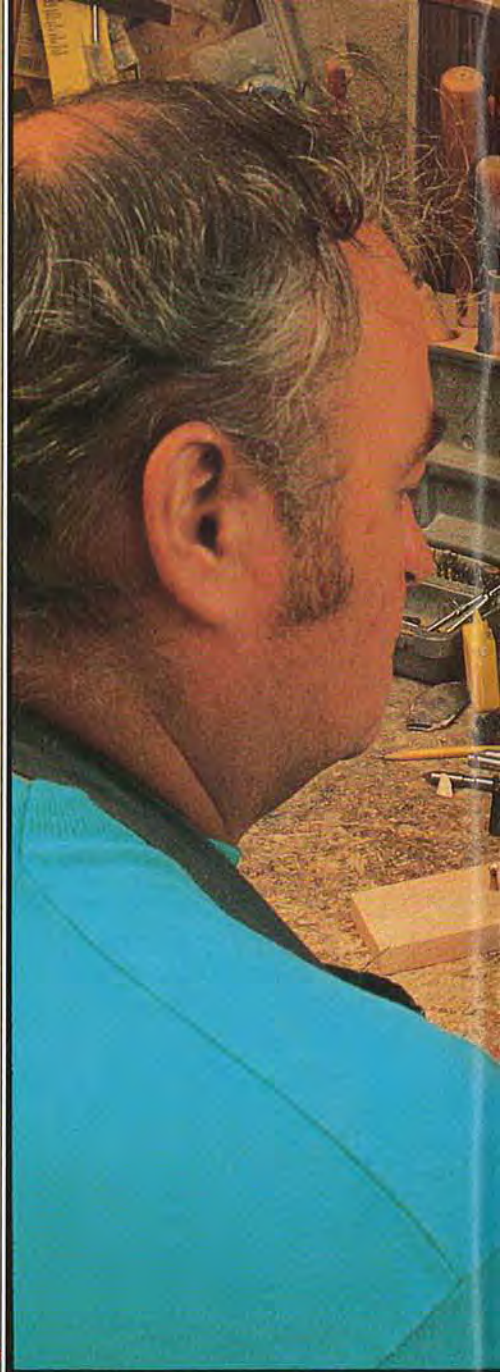
Edna knows her husband well, and understands why he sometimes gets annoyed with himself.

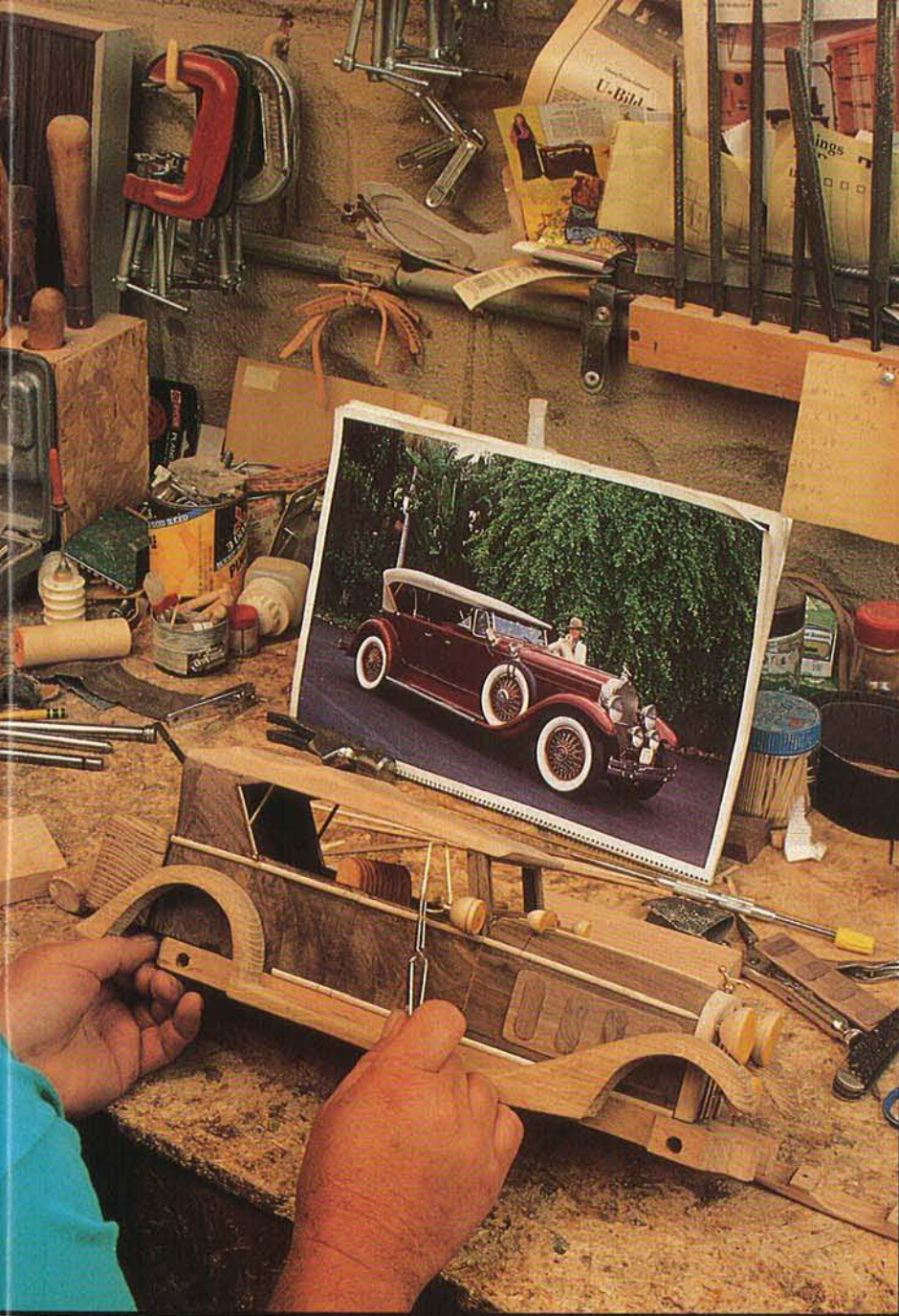
"He's real particular about what he's making," she says. "But that's what makes his vehicles so popular." By "particular" Edna refers to everything from Tom's selection of wood to the finishing.

In Tom's shop, a separate building that adjoins the garage behind his house, wood lines the walls. "I buy most of my wood from a mill just a few miles away. But knowing that I like unusual wood, folks bring me some from time to time, and I do cut my own right around here," says Tom as he picks through an assortment of boards. "Here's some purple plum—that looks good for radiators. There's a piece of nicely grained white ash that I've saved for fenders." Tom could go on and on because there's yet another building—a storage shed—brimming with more odds and ends of wood. And no matter what species, where it's been stored, or for how long, Tom won't use it for a project if it

Right: After shaping a wind wing from a tiny piece of brass, Tom carefully fits it in place on the '30 Packard.

Below: Tom just loves 18-wheelers. Working on it off and on, this 48"-long Mack took a year to build and has a \$2,000 price tag.





has more than eight percent moisture content.

Tom is real particular about veneer, too. He uses that for the panels that appear on the sides of some cars' cowels, and prefers to resaw it himself. That's because the typical veneer available commercially is just a little too thin and it buckles when glued up. "So to get thicker stock, I just run boards through my the table-saw—easy as pie, no problem," he says with confidence.

Then, of course, there's the finishing. "Because we haul those vehicles around from fair to fair, the finish has to take a beating from the packing and unpacking and the handling, and still look good. So everything gets a coat of tung oil. Then it dries for a week or so before getting two coats of polyurethane varnish with sanding in between. Last, I rub on paste wax. You can bet that they'll take handling after that." ♣

Fascinated by detail?

For more information on Tom's vehicles, send a self-addressed, stamped envelope to:

Rolison Woodcrafts
R.D. 1, Box 219
Scottsdale, PA 15683

Written by Peter J. Stephano
Photographs: Steve Uzzell



BANDSAW BLADES

What woodworkers need to know

The versatile bandsaw fits into the picture virtually everywhere in woodworking. From carving to furniture-making, you'll find tasks that a bandsaw does best. But, to get the most out of your machine, you're going to have to pick the best blade for the job. Here's how.

You need to know

You'll commonly find three tooth configurations: regular, skip-tooth, and hook-tooth.

A **regular-tooth** (or standard) blade makes the smoothest cut, and is the best bet for sawing thin material. But in thick cuts and resawing, it cuts slowly and clogs

The rule for bandsaw blades

Make the blade fit your machine and your job

Bandsaw blades, like suits, boots, and deli sandwiches, come in a wide variety, either off-the-rack or made-to-order. Many tool dealers, homecenters, and hardware stores sell ready-made blades to fit popular saws. But some custom-make them, cutting a length from a roll of bandsaw-blade stock and welding the ends together, often while you wait.

In either case, you first need to know your saw's blade length.

Install a wrong-length blade and you may not be able to tension it properly, which could be hazardous to you, your saw, or your project—maybe all three.

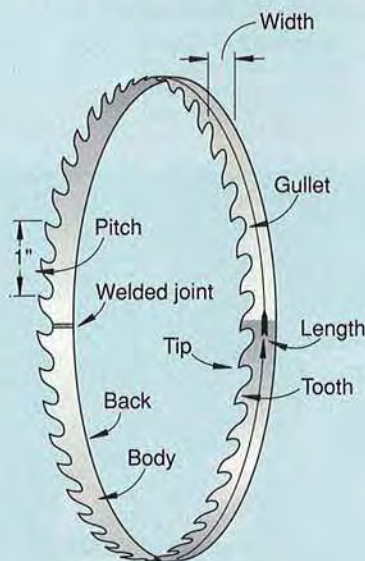
Check your saw's instruction manual for the recommended length, or measure the factory-installed blade. Many dealers can find the right blade just by knowing your saw's make and model.

The type of cutting you'll be doing determines blade width, which may be from $\frac{1}{16}$ " up to $\frac{3}{4}$ " or even larger, depending on the

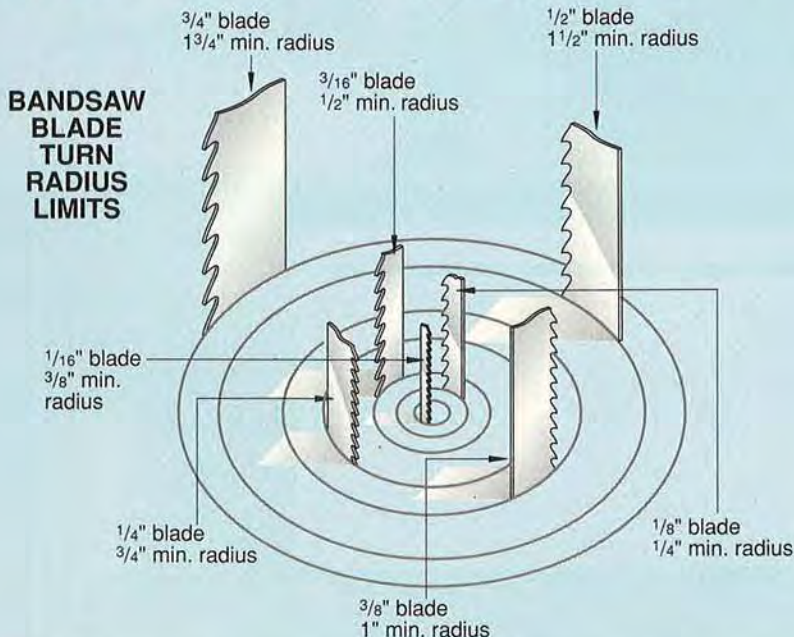
machine. Your saw's manual specifies the narrowest and widest blades recommended.

For crosscutting, ripping, and resawing stock, install the widest blade your saw can take. You'll cut straighter, and be less likely to break the blade.

Curved cuts call for a narrower blade. The illustration *below* shows the minimum cutting radius for various blade widths. Pick the widest blade that will cut the smallest radius in the pattern you're sawing.



ANATOMY OF A BLADE



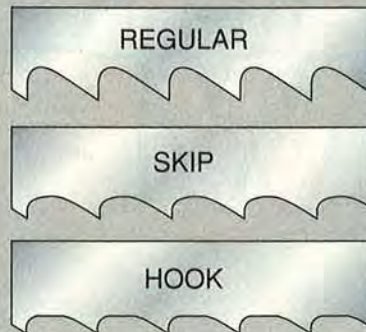
If you want one general rule for choosing the correct bandsaw blade, remember this: *Use the widest blade with the coarsest teeth that will make an acceptably smooth cut in your material.* Here's the information you need to apply this simple rule effectively.

the tooth

with chips, making it a poor choice for such operations.

A **skip-tooth blade**, as the name suggests, has teeth slightly farther apart and larger gaps for carrying chips away. This blade can handle faster feed rates than the regular blade. Turn to a skip-tooth blade for general cutting and resawing.

The teeth on a **hook-tooth** blade angle forward (in the direction of rotation) at the cutting tip. That is, they have a positive rake angle. This enables the hook-tooth blade to cut more aggressively than the others. This blade is well suited to straight and curved cutting in dense or hard woods.



You'll strike out with the wrong pitch

For woodcutting blades, the pitch, or the number of teeth per inch (TPI), falls between 3 and 24 TPI. Which pitch you need depends on the thickness of the material you're cutting.

The fewer the teeth in the wood, the faster (and rougher) the cut, generally. To lessen the chances of blade or tooth breakage, saw with a blade that keeps at least three teeth in the wood. More will yield a smoother cut, but a blade with too many teeth in the wood will cut slowly and dull rapidly. For the best balance between cutting speed and smoothness, pick a blade that keeps 6-12 teeth in the wood (see chart at *right*).

As on other saws, bandsaw teeth are set—bent to the sides—to

saw a kerf slightly wider than the thickness of the blade body. The most common sets for woodworking bandsaw blades are alternate and raker, shown *below*.

The raker-set blade has a repeating pattern of one tooth set to the right, one to the left, and then one, the raker, left unset. The set teeth cut the wood, and the rakers help clear away chips.

With an alternate-set blade, every tooth is set either left or right. Alternate-set blades cut faster, and some bandsaw users maintain that spreading the cutting load over all the teeth helps the blade stay sharp longer.



RAKER SET



ALTERNATE SET

BLADE-PITCH SELECTION

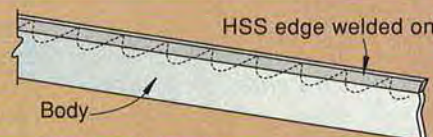
(Rounded to nearest standard pitch)

Cutting thickness	Minimum pitch (TPI)	Optimum pitch (TPI)
1/8"	24	24
1/4"	14	24
3/8"	10	18, 24
1/2"	6	14, 24
3/4"	4	10, 14
1"	3	6, 10
2"	3	3, 6
3"	3	3, 4
Over 3"	3	3

Blades for big-time sawyers

Bi-metal blades, becoming more readily available to home woodworkers, offer a high-performance alternative to standard blades. High-speed steel (HSS) electron-welded to the edge gives each tooth a tough tip, shown *right*. These blades stand up to abrasion and heat that would dull a carbon-steel blade fast.

A bi-metal blade will set you back about three times the cost of a same-size standard blade (\$30 vs. \$11 in one comparison). But, it can save money (and time) in the long run by staying sharp longer than a standard blade. That's why we use bi-metal blades on the 14" Delta bandsaw in the *WOOD*® magazine shop.




BI-METAL BLADE

Tougher yet is the carbide-tipped resaw blade, at about \$100. Only if you resaw hard, abrasive woods in production quantities would you need one of these.

Continued on page 81

Ace-of-Hearts TRIPLANE WHIRLIGIG



Modeled after the Fokker triplane flown by the Red Baron in World War I, our whimsical version features a rotating propeller and flapping pilot's scarf. Sturdy construction guarantees that our trusty airplane can fly through years of stormy weather. And its brightly painted surface makes it a pleasure to look at, too.

Note: For joints that will stand up to the extremes of Mother Nature, use Titebond II or Weather-Tite water-resistant glues, slow-set epoxy, or resorcinol glue. Although we used clear pine for our model, Honduras mahogany is an excellent exterior alternative.

Start with the laminated fuselage

1 Cut a piece of $\frac{3}{4}$ " stock to 2x20" long for the fuselage (A).

2 Cut a $\frac{1}{4}$ " groove $\frac{1}{8}$ " deep $\frac{3}{4}$ " from the bottom edge of the piece where shown on the Fuselage drawing. Crosscut two

9 $\frac{3}{8}$ "-long fuselage pieces (A) from the 20"-long piece. Next, cut a $\frac{3}{4}$ " dado $\frac{1}{2}$ " deep in each piece where shown on the Fuselage drawing.

3 Cut a piece of pine to $\frac{1}{4}$ x $\frac{1}{4}$ x4 $\frac{3}{16}$ " to plug the crankshaft-tube groove behind the crank opening where shown on the Fuselage drawing.

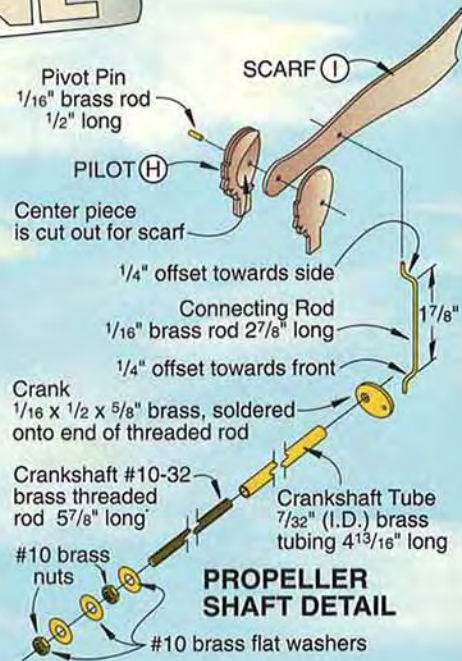
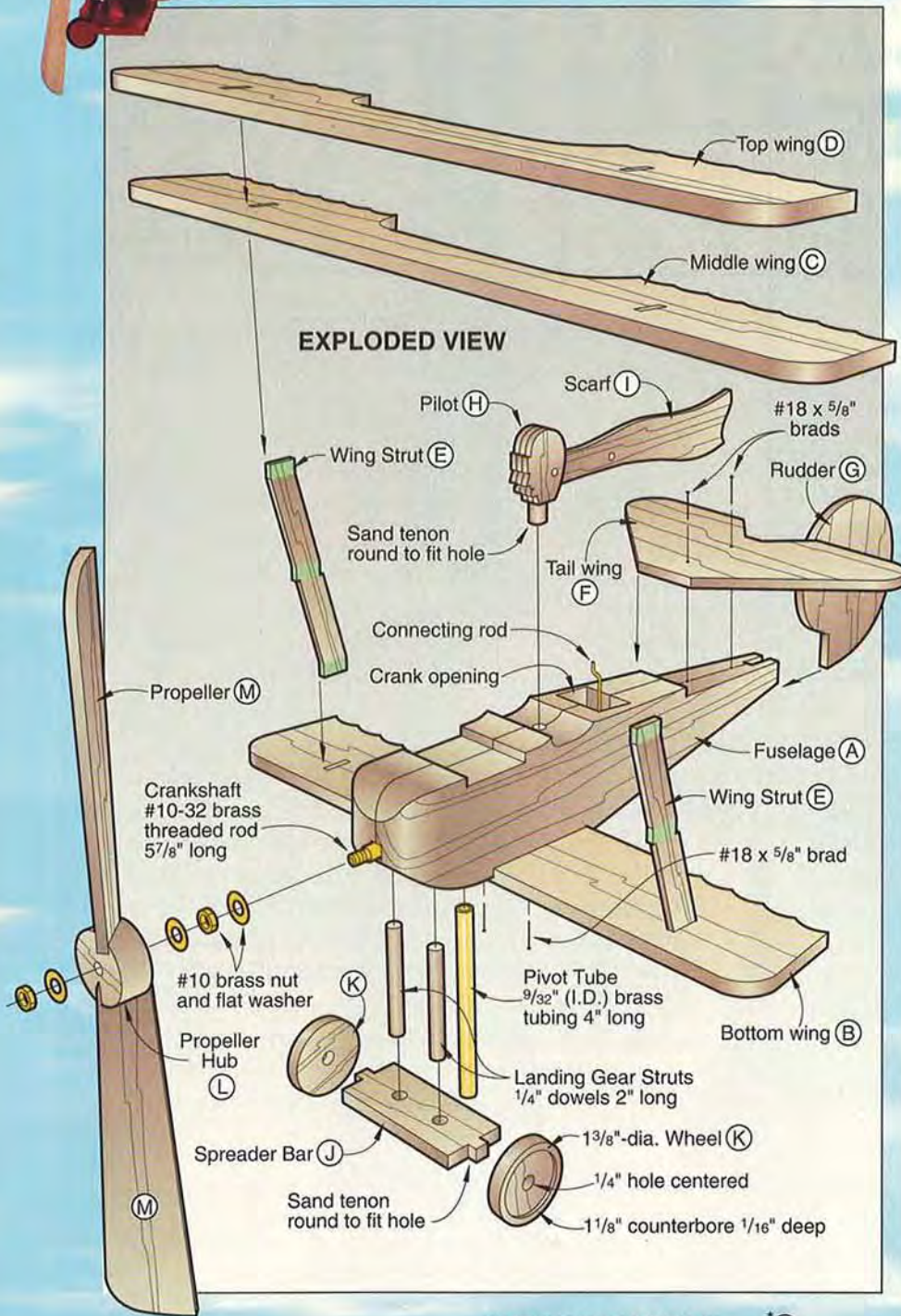
4 With the edges and ends flush, the filler block in place, and dadoes and grooves aligned, glue and clamp the two $\frac{3}{4}$ " fuselage pieces together.

5 Make a photocopy of the full-sized Side and Top View Patterns. Cut the rectangular paper patterns, and adhere

 Print this article



TRIPLANE



Bill of Materials

Part	Finished Size			Matl.	Qty.
	T	W	L		
A fuselage	1 1/2"	2"	9 3/8"	LP	1
B btm. wing	1/4"	2 1/8"	12"	P	1
C mdl. wing	1/4"	2 1/8"	14 3/8"	P	1
D top wing	1/4"	2 1/8"	13 3/16"	P	1
E wing struts	1/8"	1 1/2"	4"	P	2
F tail wing	3/16"	3 3/8"	6 1/8"	P	1
G rudder	3/16"	2 3/4"	3 1/4"	P	1
H pilot	3/8"	7/8"	1 5/8"	LP	1
I scarf	3/32"	1"	4 3/4"	P	1
J spreader bar	1/4"	1 1/8"	3"	P	1
K wheels	1/4"	1 3/8"-dia.		P	2
L hub	1/2"	1 1/8"-dia.		P	1
M propeller	1/8"	1 1/4"	5 1/2"	P	2

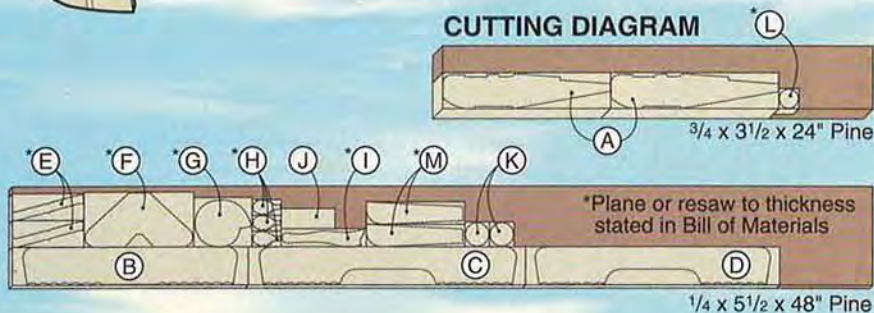
Materials Key: LP—laminated pine, P—pine.

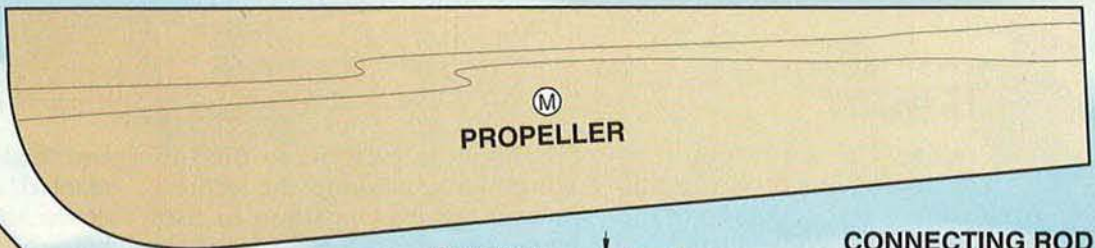
Supplies: double-faced tape, colored tape (3M plastic tape), solder, flux, 1/4" dowel stock, slow-set epoxy, plus items listed in the Buying Guide.

Buying Guide

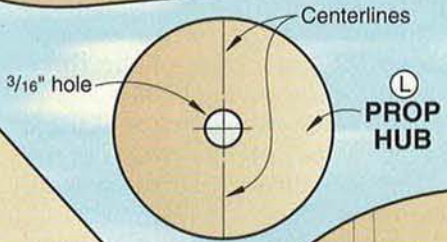
Whirligig hardware kit. 1/16" brass rod 6" long (connecting rod and pilot pivot pin), 1/16" x 1/2" x 4" solid brass (crank), #10-32 brass threaded rod 6" long (crankshaft), 7/32" (I.D.) brass tubing 4 13/16" long (crankshaft tube), 9/32" (I.D.) brass tubing 4" long (pivot tube), 1/4"-dia. brass rod 8" long (pivot pin and pivot tube plug), 2—#10 brass nuts, 3—#10 brass flat washers, #18x5/8" brads. Kit no. AP1, \$14.95 ppd. Miller Hardware, 1300 M. L. King Parkway, Des Moines, IA 50314. Or call 515/283-1724 to order. No CODs please.

CUTTING DIAGRAM

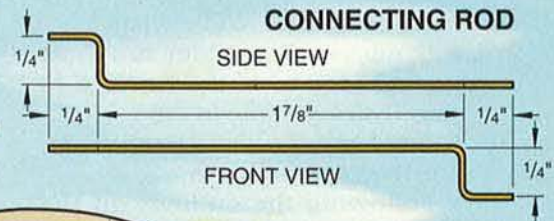




(M) PROPELLER



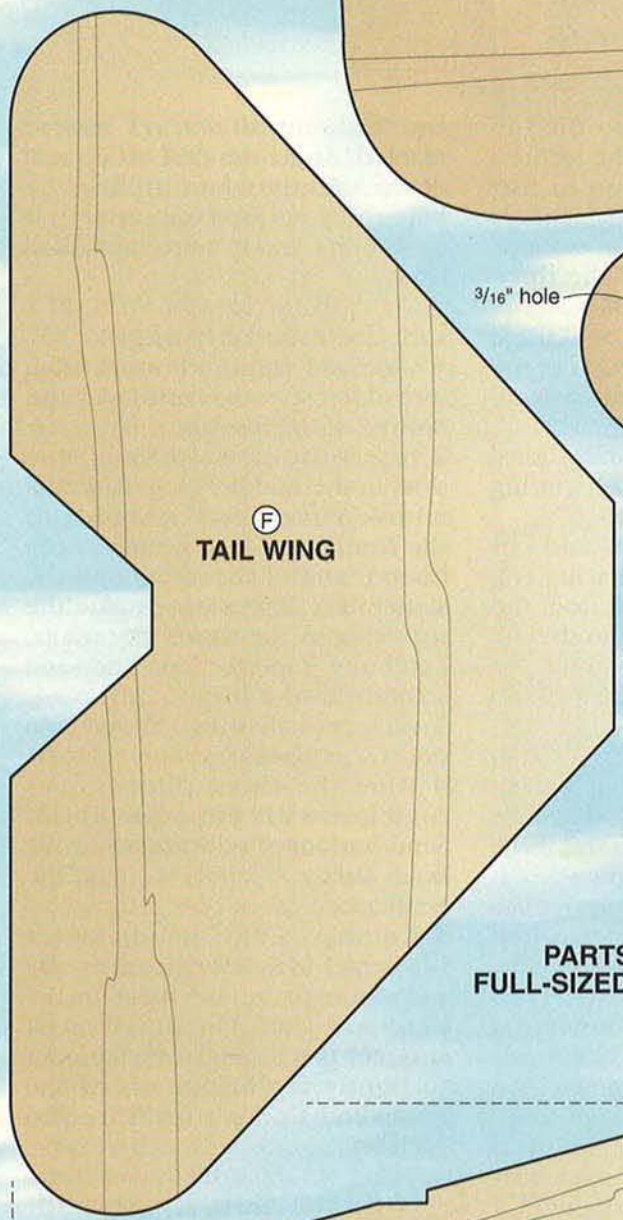
(L) PROP HUB



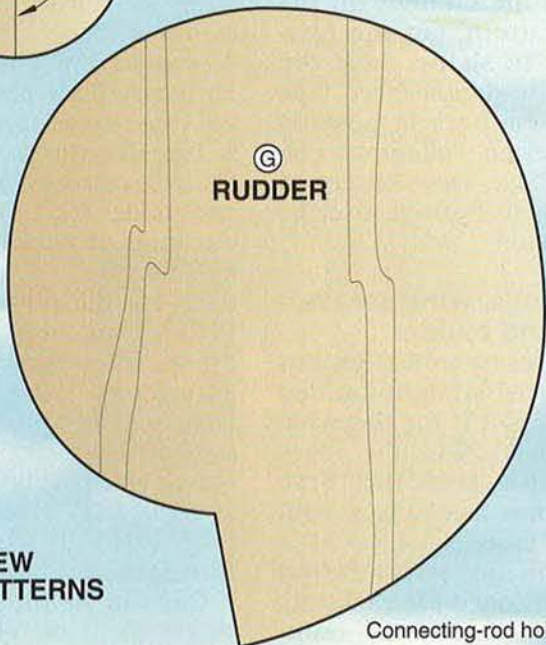
CONNECTING ROD

SIDE VIEW

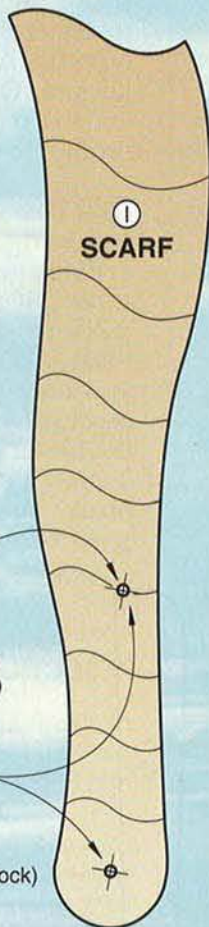
FRONT VIEW



(F) TAIL WING

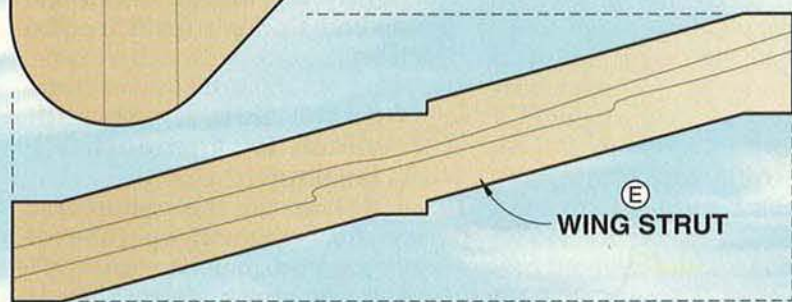


(G) RUDDER

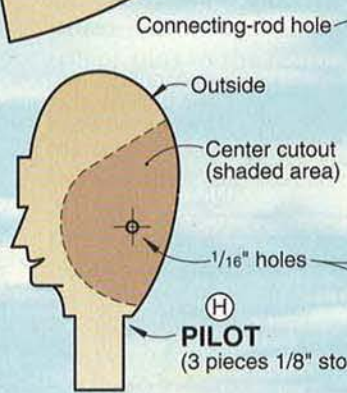


(I) SCARF

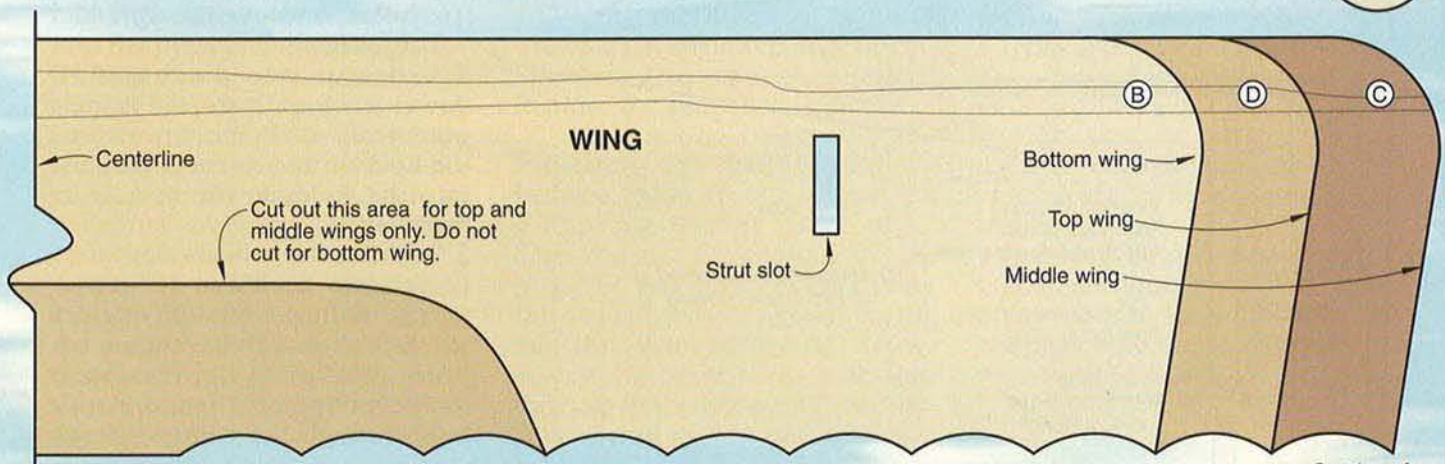
PARTS VIEW
FULL-SIZED PATTERNS



(E) WING STRUT



(H) PILOT
(3 pieces 1/8" stock)



WING

(B) (D) (C)

Bottom wing

Top wing

Middle wing

Continued



TRIPLANE

wing. Cut a $1\frac{1}{4}$ " notch to the depth shown on the full-sized pattern across the top of the fuselage for the middle wing.

8 Bandsaw the rudder notch in the tail section of the fuselage to size. Drill a $\frac{1}{4}$ " hole in the cockpit. Next, bandsaw the cockpit outline to shape.

9 Following the cutlines on the Top View Pattern, cut the fuselage profile to shape. Save the scraps and use double-faced tape to adhere them back in position onto the fuselage. Follow the cutlines on the Side View Pattern to cut the top and bottom fuselage profiles to shape.

Cut the wings, wing struts, tail wing, and rudder

1 Plane or resaw and then cut three pieces of straight-grained stock to $\frac{1}{4} \times 2\frac{1}{8} \times 15$ " for the wing blanks (B, C, D). With the edges and ends flush, stick the three pieces together face-to-face with double-faced tape.

2 Draw a centerline across the top blank. Twice (once for each full-sized trio of half patterns), trans-

fer the wing patterns to the top wing blank, aligning the centerline on the paper pattern to that marked on the top blank. Using a bandsaw or scrollsaw, cut scallops along the back edge of the three taped-together wing blanks.

3 Drill blade start holes, and use a scrollsaw or coping saw to cut the strut slots through all three wing blanks to shape.

4 Separate the wing blanks, transfer the cutlines, and finish cutting the three wings to shape.

5 Transfer the patterns and cut the wing struts (E), tail wing (F), and rudder (G) to shape from the thickness of stock listed in the Bill of Materials.

6 To cut the pilot pieces (H) to shape, stack and tape three 1×4 " pieces of $\frac{1}{8}$ " stock face-to-face. Transfer the pilot outline to the taped-together pieces, and cut the stack to shape. Separate the three pieces and cut the center section to final shape. See the Propeller Shaft detail for reference when cutting the pilot center to shape.

7 Cut the $\frac{3}{32}$ "-thick scarf (I) to shape. Drill the $\frac{1}{16}$ " connecting

rod hole in the scarf where marked. Angle the drill bit up and down slightly when drilling the hole to allow the connecting rod to operate freely when installed later.

Let the assembly begin

1 Glue and nail the bottom wing into its respective notch in the bottom of the fuselage.

2 Insert the struts through the slots in the middle wing. Glue the middle wing/struts assembly to the fuselage. Glue and insert the bottom end of the struts into the slots in the lower wing. Glue the top wing to the top of the struts. Putty any imperfections and sand smooth.

3 Glue the tail wing (F) and rudder (G) in place.

4 Glue the three pilot pieces together with the edges flush. Sand bottom of pilot to fit into $\frac{1}{4}$ " hole. Drill a $\frac{1}{16}$ " hole through the lamination.

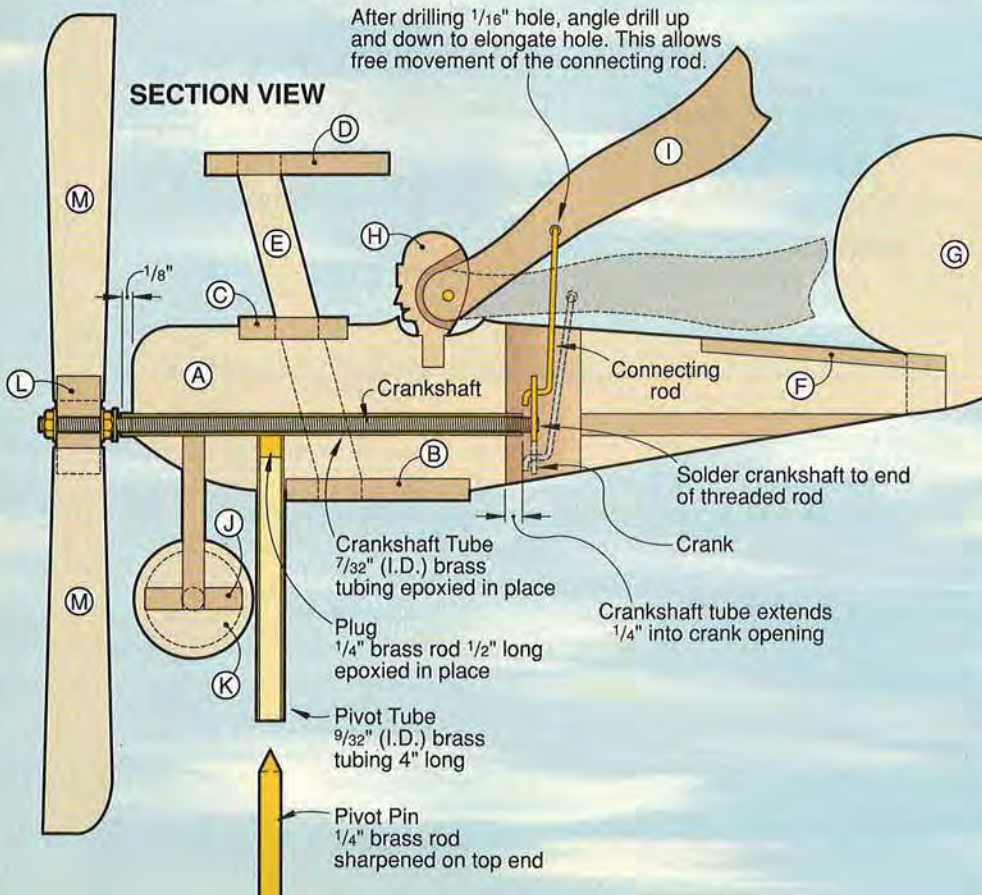
5 Cut a piece of $\frac{1}{16}$ "-diameter brass rod to $\frac{1}{2}$ " long. Insert the rod through the $\frac{1}{16}$ " holes in the head and scarf. On a hard metal surface, use a ball peen hammer to lightly tap both ends of the brass rod to rivet (mushroom) each end.

Add the axle, struts, and wheels for a smooth landing

1 Transfer the outline and the hole centerpoints for the spreader bar (J) to $\frac{1}{4}$ "-thick stock. Drill the $\frac{1}{4}$ " holes, and cut the spreader bar to shape.

2 Crosscut two pieces of $\frac{1}{4}$ " dowel stock to 2" for the landing gear struts. Glue the dowels into the holes in the spreader bar, and into the holes in the bottom of the fuselage.

3 To form the wheels (K), use a compass to mark two $1\frac{3}{8}$ "-diameter ($\frac{1}{16}$ " radius) circles on $\frac{1}{4}$ "-thick stock. Using a $1\frac{1}{8}$ " Forstner bit, bore a $\frac{1}{16}$ "-deep depression at each centerpoint. Then, drill a $\frac{1}{4}$ " hole through the center of each



wheel. Cut the wheels to shape. Sand the tenoned ends of the spreader bar until they fit into the holes in the wheels. Glue the wheels in place.

Machine the propeller for maximum power

1 To form the propeller hub (L), start by cutting a 1 1/8"-diameter disc from a piece of 1/2" pine. Next, drill a 3/16" hole through the hub at the centerpoint.

2 Attach a wood extension to your miter gauge, and follow the 5 steps on Notching the Propeller Hub drawing at *right* and shown in the photo *below right* to cut the kerfs.

3 Cut the propeller blades (M) to shape. Next, glue or epoxy them to the propeller hub (L).

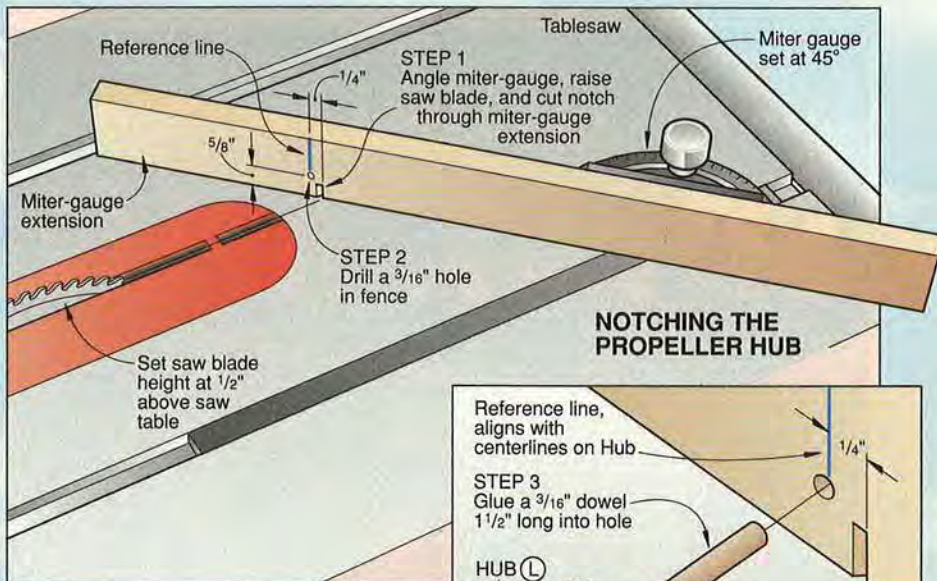
The metal parts convert wind energy to motion

1 Using the Propeller Shaft detail accompanying the Exploded View drawing and the Section View drawing for reference, cut all the brass parts except the crank to length. Drill the holes in one end of the crank blank (see the Parts View drawing for reference). It's safer drilling the holes in a long piece rather than the 3/8"-long finished piece. Crosscut the crank to length and file to shape.

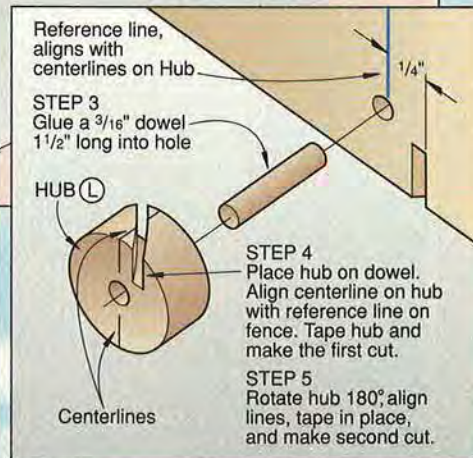
2 Slide and epoxy the 7/32" (I.D.) brass tubing 4 3/16" long (crankshaft tube) into the fuselage until it protrudes into the crank opening where shown on the Section View drawing. Slide the #10-32 brass threaded rod (crankshaft) into the brass crankshaft tube.

3 Using needle-nosed pliers, bend the 1/16" brass rod (connecting rod) to shape. See *both* the Parts View and Propeller Shaft detail for reference. Note that the bend on one end is 90° from that on the other end. Both ends need bending.

4 Working inside the crank opening, slip the crank onto the end of the connecting rod, then slide the crank onto the crankshaft where shown on the Section View drawing. Apply flux. Next, use a solder-



NOTCHING THE PROPELLER HUB



Attach a wood extension to your miter gauge, and cut a pair of angled notches in the propeller hub.



ing gun to solder the crank onto the crankshaft (threaded brass rod) where shown on the Section View drawing, being careful not to solder the crank to the crankshaft tube.

5 Slide the top end of the connecting rod (attached to the crank in the previous step), into the hole in the pilot's scarf. Now, insert the pilot/scarf assembly into the hole in the cockpit.

6 Attach the propeller to the front end of the threaded rod. Adjust as necessary for smooth movement. Shorten the rod if needed. Remove the propeller assembly.

Finishing touches before takeoff

1 Epoxy a 1/2"-long piece of 1/4" brass rod into the end of a 4"-long piece of 3/2" (I.D.) brass tubing (pivot tube) where shown on the Section View drawing. Now, epoxy the brass pivot tube into the hole in the bottom of the fuselage. Grind or file one end of a

piece of 1/4" brass rod 7" long (pivot pin) to the shape shown on the Section View drawing.

2 Finish-sand the wood parts. Mask the protruding ends of the brass tubing and threaded rod.

3 Apply a clear exterior finish to the propeller (we used spar varnish), and paint the propeller hub with an exterior enamel.

4 Apply two coats of aerosol primer to the plane. Follow up with two coats of red paint (we used Chinese red aerosol).

5 Detail-paint the pilot and scarf.

6 To make the emblem designs, either paint them onto the wings and fuselage, or transfer the patterns to colored tape. Apply the tape "decals" where shown on the opening photo.

7 Drill a 1/4" hole in the top end of a post, and insert the 1/4x7" brass pivot pin into the hole. Slide the whirligig onto the pivot pin. ♣

Written by Marlen Kemmet
Project Design: James R. Downing
Photographs: John Hetherington
Illustrations: Kim Downing

WOOD magazine builds a **SOLAR KILN**



...with a little help from our friends



Above: According to the thermometer, it was 95° inside WOOD magazine's solar kiln one day last November when editor Pete Stephano checked moisture content. The kiln was newly built, and the air-dried wood had just been stacked. Note the overhead baffle that directs air flow delivered by the fans.

Left: The solar panel, made of clear, corrugated fiberglass panels, faces south at a 45° angle.

Dry wood in six weeks!

The lumber industry has kiln-drying down pat. Over the decades, they've learned how to tame even the most stubborn woods and turn them into useful stock. Heavy-duty commercial kilns rely on heat from a furnace or other fueled source. And they often introduce steam to relieve stress in the drying boards. It's all really pretty technical and complicated. Yet, we found that on the do-it-yourself level, it doesn't have to be that way.

In searching for answers, one source often leads to another. And that's how it was when we went looking for some kiln-drying know-how.

At the U. S. Forest Service's Forest Products Laboratory in Madison, Wisconsin, wood-drying expert Sid Boone was most helpful. Besides tips, he handed over rough drawings for two basic solar kilns. One seemed much too involved. The other, a design concept originally created by University of Wisconsin-Extension forester Eugene Wengert in 1978, was a lot sim-

In our December 1993 issue, we relayed the staff's experience with logging and sawing our very own pile of wood-working stock. And we promised you that we would follow up with a kiln design to dry that sawn-on-site stack of ash, cherry, and walnut.

Since then, we've consulted with experts, worked with a designer and a builder, and constructed the nifty 8×8×12' passive-solar building you see here. And boy does it work, not to mention save money! Better still, we developed a plan for our kiln so you can build one just like it.

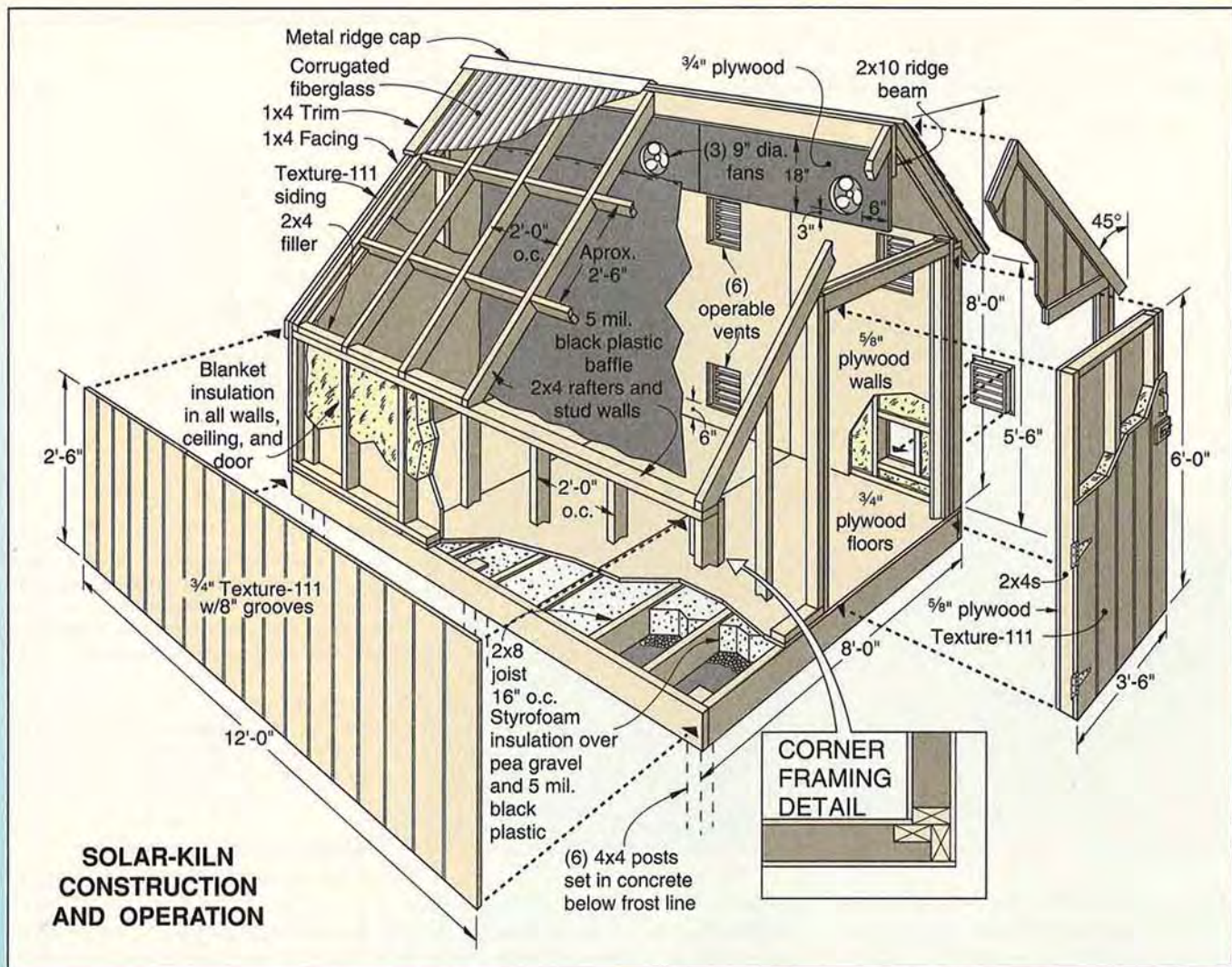
Unless you live in a desert, you'll never air-dry green wood down to six to eight percent moisture content, the preferred dryness for stock destined to become furniture or other indoor projects. That's because the average outdoor relative humidity for most of the U.S. hovers at about 65 percent—equivalent to 12 percent moisture content in a board. But, indoor humidity runs a lot less, so projects for use there must be built

from kiln-dried stock in the lower moisture-content range or you'll see lots of wood movement. (For outdoor projects, such as porch furniture, the appropriate wood with a higher moisture content is okay.)

To most woodworkers, though, the technique of do-it-yourself kiln-drying is a mystery. Then there's the cost, and the maintenance involved. Who has the money or the time? That's how we thought, at first.



Print this article



pler. We chose it as the basis for our kiln because, according to Wengert, the kiln dries fresh-sawn hardwood lumber down to six to eight percent moisture in about six weeks of mostly sunny, warm weather (half that time for most softwoods).

Wengert calls his concept a "semi-greenhouse, solar recirculation dryer." We just call it a passive-solar kiln, yet heeded his advice in building the structure shown on these pages. It cost just about \$2,000 plus labor, but will practically pay for itself with the first load. (For example, take our staff-harvested and sawn 614 board feet of ash, cherry, and walnut. At a combined average retail price of \$2.95 per board foot, our wood would have cost about \$1,800.)

Kiln-construction guidelines

According to Wengert and his associate, Dan Meyer, in their guidelines for a solar kiln of this type, you determine the size of the kiln with the following rule of thumb: Consider the maximum capacity in board feet you want the kiln to hold to be roughly 10 times the solar panel roof area in square feet. We wanted our kiln, for instance, to dry 1,000 board feet per load (no sense drying more than you can use). So the solar panel had to contain 100 square feet. Our solar panel measures 8'6"×12' (102 square feet).

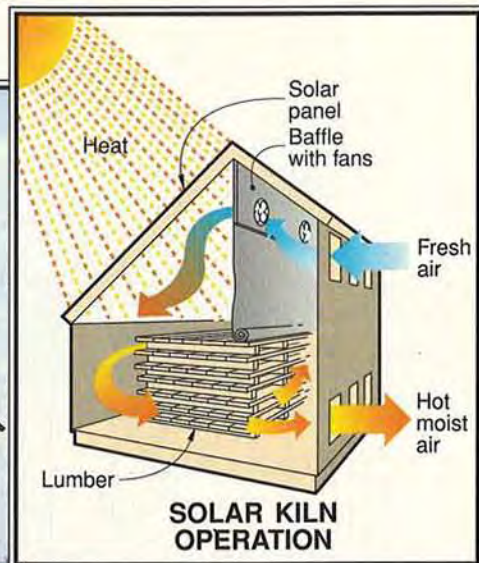
Here's another important guideline. For maximum year-round performance, the kiln's roof (the solar panel) angle should be equal to the latitude of where you live in degrees north of the equator.

In Iowa, with a latitude ranging from about 40°-45°, an angle of 45° works fine, and from a construction point of view, that angle was easier to contend with. In Austin, Texas, though, an angle of 30° will suffice. In North Dakota, a steeper angle, of say 50°, would perform better. There's more, too.

- Use pressure-treated (CCA) lumber for all framing.
- Select exterior-grade plywood for the interior as well as the exterior.
- Insulate the floor with non-water soluble, solid-foam (rigid) insulation. Use blanket-type insulation without a foil facing in the walls and door.
- Seal interior surfaces against moisture while allowing them to absorb the maximum amount of solar heat by applying a base-coat of aluminum- or oil-based paint to

Continued

SOLAR KILN



Above: The drawing shows how the kiln works. The stickered green wood dries from the heated air forced down and through the pile by fans in the baffle. Some air exits, some recirculates.

Left: On the kiln's north side, vents provide for air entrance and exit. The extra-wide and insulated door allows easy stacking and removal of lumber.

the walls and floor. Add a final coat of flat-black paint. (To trap even more solar heat, it wouldn't hurt to stain the exterior a dark color, too.)

- Kiln-ventilation fans should not contain plastic parts. Inside temperatures can reach 150° F.

To those guidelines we incorporated the following goals:

- Keep construction simple and as maintenance-free as possible.
- Since the kiln won't operate all the time, it should do double-duty as an attractive storage shed, or a greenhouse, or even a flower-and-fruit dryer.

- For cost-savings and minimum waste, the design uses standard-dimension sheet goods.

- Inside dimensions allow for boards 10' long as well as the stacking and removal of stock by one person. At least 12" of space on all sides of the stack provides for air flow.

Editor's note: The solar-kiln design we used has been built all over the world, in many ways. Our adaptation is admittedly more elaborate than actually needed. A simple version might just have plywood walls and floor and a solar panel made from clear plastic sheeting. It wouldn't be as permanent, but it would still work.

We have also discovered that winter drying is aided by installing clear plastic sheeting *inside* the solar panel to help retain heat.

For more informative tips on drying lumber, see page 80

Want to learn more about wood drying?

For a free list of available texts and handbooks covering lumber drying and kiln operation, send a stamped, self-addressed, business-sized envelope to: *Wood Drying, Dept. of Forestry, University of Wisconsin-Extension, 1630 Linden Dr., Madison, WI 53706.*

APA-rated sheathing/siding, American Plywood Assoc.; Pressure treated southern pine lumber, Southern Pine Marketing Council; Stain, Thompson & Formby, Inc.; University of Wisconsin-Extension. ♣

Build Your Own Kiln

For complete plans and a materials' list for the 1,000-board-foot-capacity solar kiln shown in this article, send your check or money order for \$9.95 ppd. (U.S.) to: *Kiln Plans, WOOD® magazine, 1912 Grand Ave., Des Moines, IA 50309-3379.*

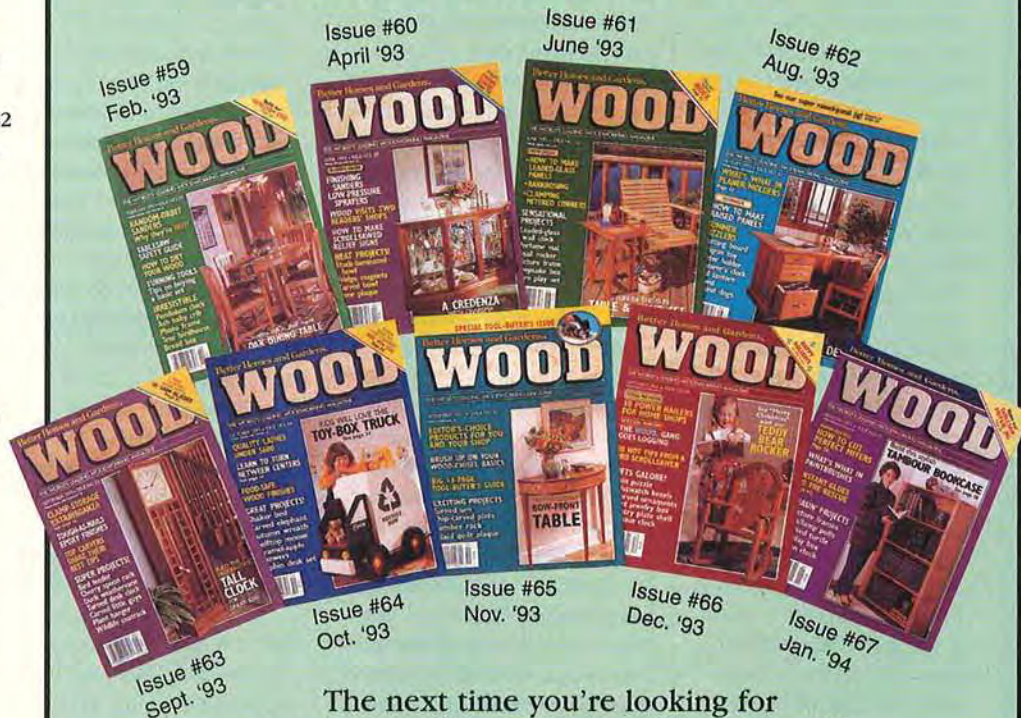
Note: Solar-drying isn't the only way to get kiln-dried wood. For manufacturers of other types of drying kilns and kiln kits, see advertisers elsewhere in this issue.

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The next time you're looking for a project or feature story in issues 59 through 67, use this handy reference to help you find it fast. We kept it simple. For instance, when searching alphabetically for the story on butternut, you'll find "Butternut, 65:16." To locate the story, go to issue 65, page 16. If you're looking for a like reference for issues 1 through 60, order our *WOOD* Cumulative Index. To do this, send \$6.95 (price includes shipping and handling) and your name and address to:

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AN ADVENTURE JUST
WAITING TO HAPPEN

THE FUN-TIME RACER

Have you ever stumbled onto a woodworking project whose looks and styling stopped you cold? Well, that's what happened to *WOOD*® magazine design editor Jim Downing and me not long ago. We were passing by a local antique store, and there it was—the neatest old kid's wagon in creation. We looked at each other and decided right then that we wanted to design a version of it just for you.

We were careful to retain its classic lines, and to make sure this beauty will stand up to lots of outdoor use. We built the deck and box out of white oak and the wheels from exterior birch plywood. To find the hardware for the wagon, buy the parts at a local hardware store, or use our handy Buying Guide kit. We tell you how to machine these parts to fit.



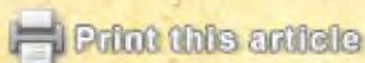
Marlen Kemmet

Marlen Kemmet
How-To Editor



Continued

FUN-TIME RACER



Note: To receive full-sized patterns, send \$3 and a 10x13" self-addressed envelope with \$1.25 postage to *Fun-Time Racer*, WOOD Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. You'll need thin stock for this project. You can resaw or plane thicker stock, or see the *Buying Guide with the Bill of Materials* for our source of white oak and exterior birch plywood. Also listed is a supplier for all the hardware and strap iron needed.

Let's start with the deck

1 From white oak (one of the heaviest and strongest of all the oaks), cut the deck boards (A) and the cleats (B) to the sizes listed in the Bill of Materials. (We planed 1/2" stock to 3/8".) Sand a slight round-over on all edges to avoid splintering.

2 Dry-clamp (no glue) the deck boards edge-to-edge, with the ends flush. Lay out and clamp the cleats to the deck bottom. Turn the assembly over, and mark the four screw-hole centerlines across the surface of the clamped-together deck boards. See the Exploded View for reference.

3 Position and clamp the cleats (B) on the deck assembly. Drill countersunk screw holes through the deck boards 1" from the edges and 1/4" into the cleats. Use #6x3/8" screws to secure the cleats to the deck boards. Remove the clamps.

Construct the rear axle assembly next

1 From 3/4" white oak, cut two pieces to 2 1/2 x 6 1/4" for the rear axle supports (C). Using double-faced tape, stick the two pieces together, with the edges and ends flush.

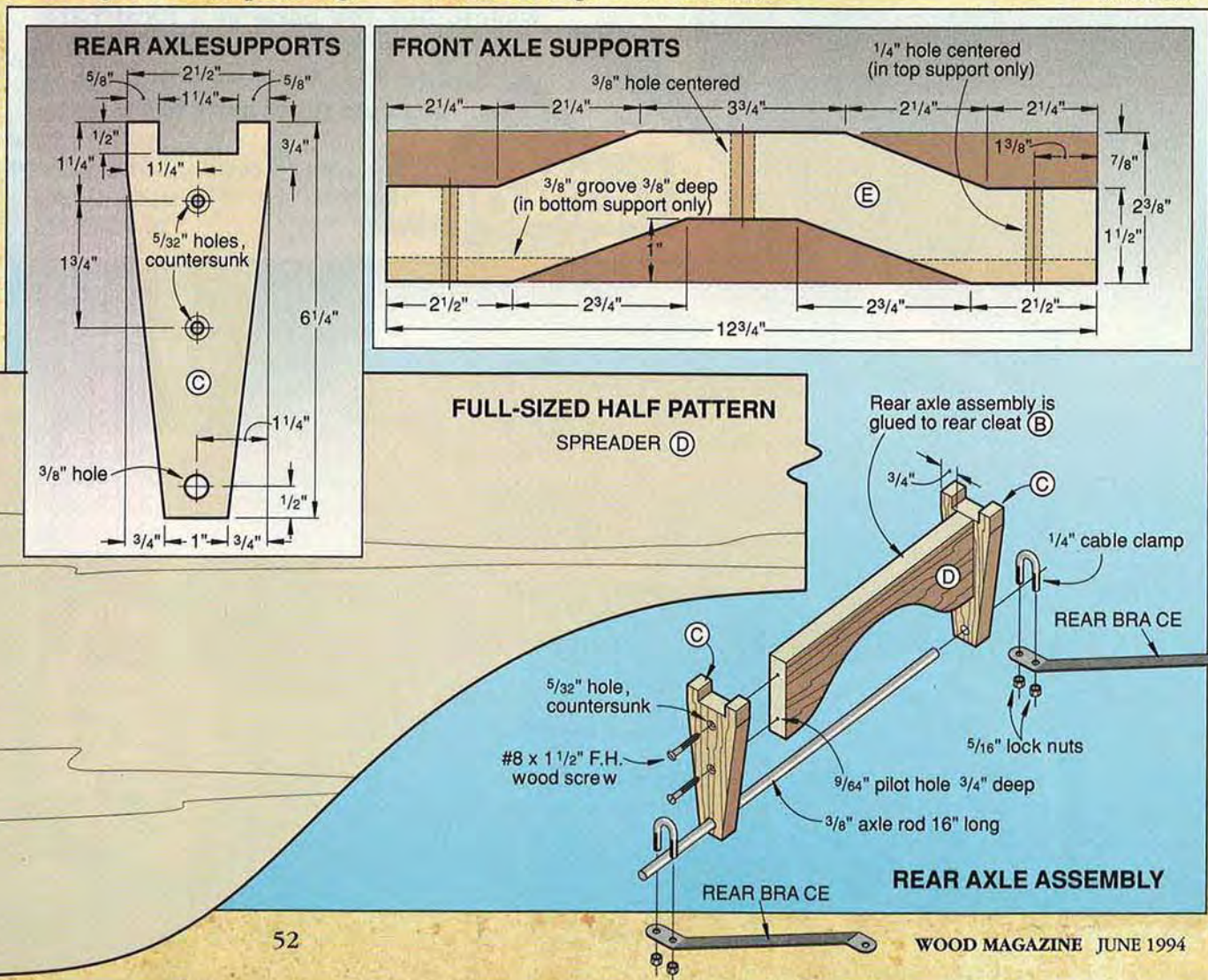
Using the dimensions on the Rear Axle Supports drawing below, lay out the shape, notch, and hole centerpoints on the top piece.

2 Drill the countersunk screw and axle holes through the taped-together pieces. Bandsaw the pieces to shape. Check the fit of the notch against the rear cleat on the wagon deck, and trim if necessary. Separate the parts, remove the tape, and sand smooth.

3 Cut a piece of 3/4" stock to 3 1/2 x 10 1/4" for the spreader (D). Transfer the full-sized half pattern twice to the spreader blank, and cut it to shape.

4 Glue and screw the rear axle assembly (C, D) together where shown on the Rear Axle Assembly drawing. (We inserted the axle rod in the holes in C to keep the pieces aligned when assembling.)

Continued



EXPLODED VIEW

Mount top trim pieces (L) and (M) 1/2" from edge of (J)

1/4 x 2 3/4" F.H. machine screw

1/4 x 1 1/4" F.H. machine screws

3/32" pilot hole 5/8" deep

#6 x 1" F.H. wood screw

3/8" dado 3/16" deep 1 1/8" from end

#6 x 5/8" F.H. wood screw

Mount (B) here

Assembled wheel

3/8" friction cap

REAR BRACE

1/4" lock nuts

LOWER STEERING BRACE

1/4" flat washer

3/8" flat washer

1/8" round-over on top edges of (L) and (M)

16"

1 1/8"

3/8" dado 3/16" deep

Remove #6 x 5/8" wood screw from this hole on both sides and enlarge for 1/4" machine screw

UPPER HANDLE BRACKET

1/4" round-overs

10-24 lock nuts

7/32" holes

10-24 x 1 1/2" R.H. machine screw

10-24 x 4" R.H. machine screw

1/4" round-overs stopped at handle brackets

7/32" holes

10-24 x 1 1/4" R.H. machine screw

LOWER TONGUE BRACKET

STEERING BRACE

3/16" holes

1"

1/4" hole

Screw-hole centerlines

10-24 lock nuts

3/16" grooves 3/32" deep

9/32"

3/4"

3/16"

CUTTING DIAGRAM

1/2 x 9 1/4 x 96" White oak

3/8 x 12 x 12" Exterior birch plywood (4 pieces reqd.)

1/2 x 7 1/4 x 72" White oak

3/4 x 5 1/2 x 60" White oak

1/4 x 24 x 48" Exterior birch plywood

*Plane or resaw to thickness listed in Bill of Materials

Bill of Materials

Part	Finished Size*			Mati.	Qty.
	T	W	L		
A deck boards	3/8"	4"	32"	WO	4
B cleats	1/2"	1 1/4"	15"	WO	4
C rear axle supports	3/4"	2 1/2"	6 1/4"	WO	2
D spreader	3/4"	3 1/2"	10 1/4"	WO	1
E front	3/4"	2 3/8"	12 3/4"	WO	2
F* universal joint discs	1/2"	3 1/2"-dia.		WO	2
G yoke	3/4"	1 3/4"	2 1/8"	WO	1
H tongue	3/4"	1"	22"	WO	1
I* handle	3/4"	3/4"	3 1/2"	LW	1
J sides	3/8"	3"	32"	WO	2
K ends	3/8"	3"	14 5/8"	WO	2
L top ends	3/8"	2 1/8"	16"	WO	2
M top sides	3/8"	7/8"	27 3/4"	WO	2
N* wheels	3/8"	8"-dia.		EP	4
O* rims	1/4"	8 3/8"-dia.		EP	8
P hubs	3/8"	3"-dia.		EP	8

Supplies: 2-3/8" steel rods 16" long, 4-3/8" friction caps, 2-1/4" cable clamps, 4-5/16" lock nuts, 1/8x3/4x8" steel strap, 8-1/4" lock nuts, 6-1/4" flat washers, 5-3/8" flat washers, 4-10-24x1 1/2" R.H. machine screws, 1-10-24x4" R.H. machine screw, 5-10-24 lock nuts, 1-1/4x3" R.H. machine screw, 1-1/4x2 3/4" R.H. machine screw, 1-1/4x1 1/4" carriage bolt, 18-#6x1" F.H. wood screws, 1-3/8x4 1/2" hexhead bolt, 1-3/8" lock nut, 28-#6x5/8" F.H. wood screws, 2-1/4x2 3/4" F.H. machine screws, 3-1/4x1 1/4" F.H. machine screws, 1-1/4x3" R.H. machine screws, 4-3/8x1" I.D. bronze sleeve bushings, 2-#8x3/4" F.H. wood screws, 4-#8x2" F.H. wood screws, 10'-5/8" O.D. hose, 12'-3/8" O.D. hose, 3/16" dowel, clear exterior finish.

Buying Guide

Wagon hardware kit. All the parts stated in the Supplies listing *except* for the dowel stock and finish. Kit no. WM-HW, \$49.95 ppd. Miller Hardware 1300 M. L. King Parkway, Des Moines, IA 50314. Or call 515/283-1724 to order. No CODs please.

Wagon lumber kit. All the individual oak and plywood pieces shown in the Cutting Diagram cut slightly oversized (length and width) from the thickness stated in the Bill of Materials. Stock no. W70, \$99.95 ppd. Heritage Building Specialties, 205 North Cascade, Fergus Falls, MN 56537. Call 800-524-4184 to order.

Self-adhesive vinyl decals. Two WOOD Racer decals with stripes, \$17.95 ppd. Kness Signs, 5291 NW 72 Street, Johnston, IA 50131. No phone orders please.

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

Materials Key: WO=white oak, LW=laminated white oak, EP=exterior birch plywood.

FUN-TIME RACER

Add the front steering assembly

1 Cut a pair of $\frac{3}{4}$ "-thick front axle support blanks (E) to $2\frac{3}{8} \times 12\frac{3}{4}$ ". Using the Steering Assembly and Front Axle Supports drawings for reference, drill the $\frac{1}{4}$ " and $\frac{3}{8}$ " holes in the top support blank. Drill a $\frac{3}{8}$ " hole centered in the bottom blank. Next, cut a $\frac{3}{8}$ " groove $\frac{3}{8}$ " deep along the bottom edge of the bottom blank (E).

2 Transfer the cutlines from the Front Axle Supports drawing to the top E, cut it to shape, and use it as a template to mark the shape on the bottom E. Cut it to shape.

3 To make the universal-joint discs (F), cut a piece of $\frac{1}{2}$ " stock to 4×12 ". Mount a dado blade to your table saw, and cut a $\frac{3}{4}$ " dado $\frac{1}{4}$ " deep centered along one face of the 12"-long piece. Using a compass, mark a pair of $3\frac{1}{2}$ "-diameter circles on the surface opposite the dado and centered over the dado. Drill a $\frac{3}{8}$ " hole at the centerpoint used to mark the circles. Bandsaw and sand the universal-joint discs to shape.

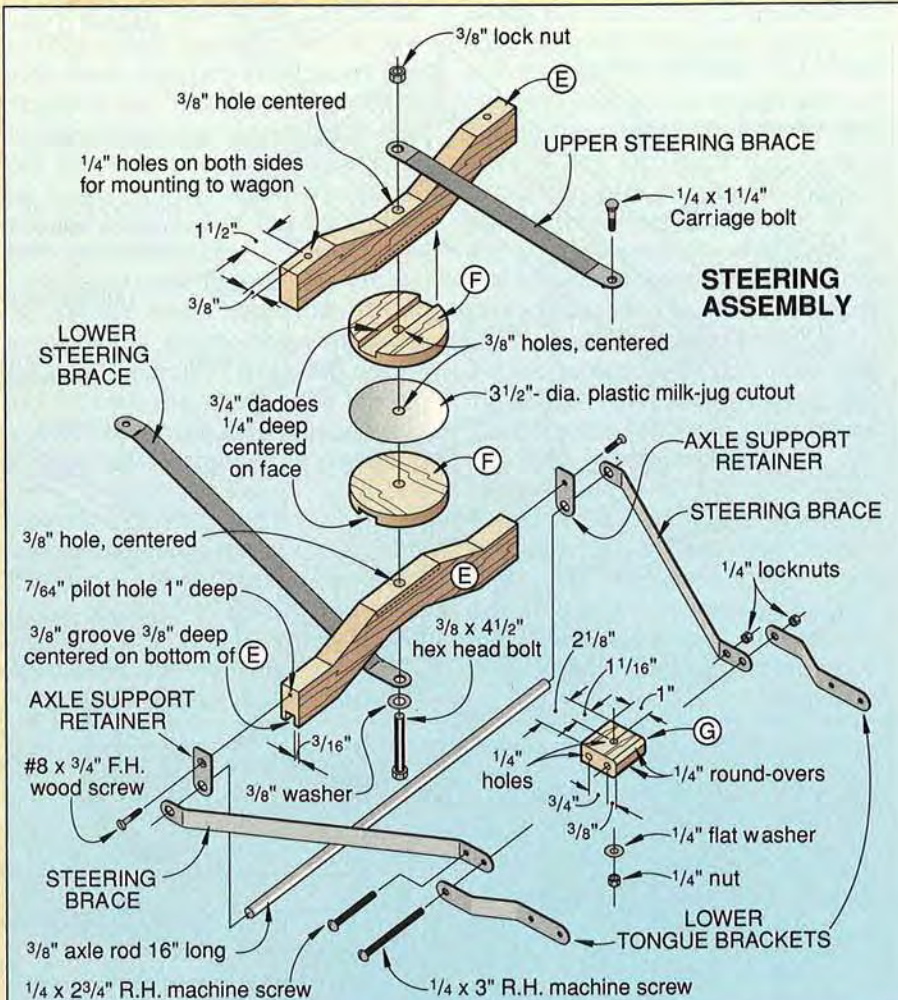
4 Glue and clamp one universal joint disc (F) to each front-axle support (E), using a $\frac{3}{8} \times 4\frac{1}{2}$ " hex-head bolt to align the holes.

5 Cut a $3\frac{1}{2}$ "-dia. disc from a plastic milk jug for use as a slip joint between the universal-joint discs.

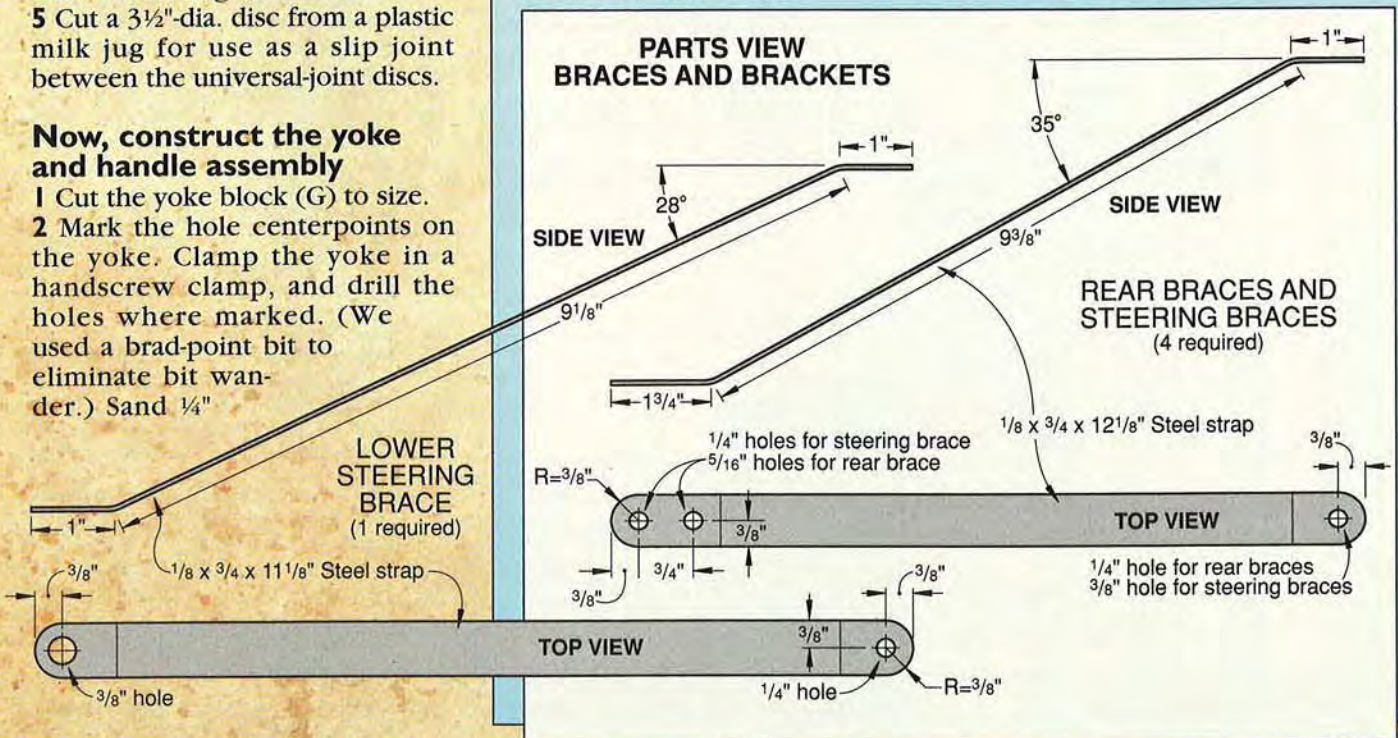
Now, construct the yoke and handle assembly

1 Cut the yoke block (G) to size.

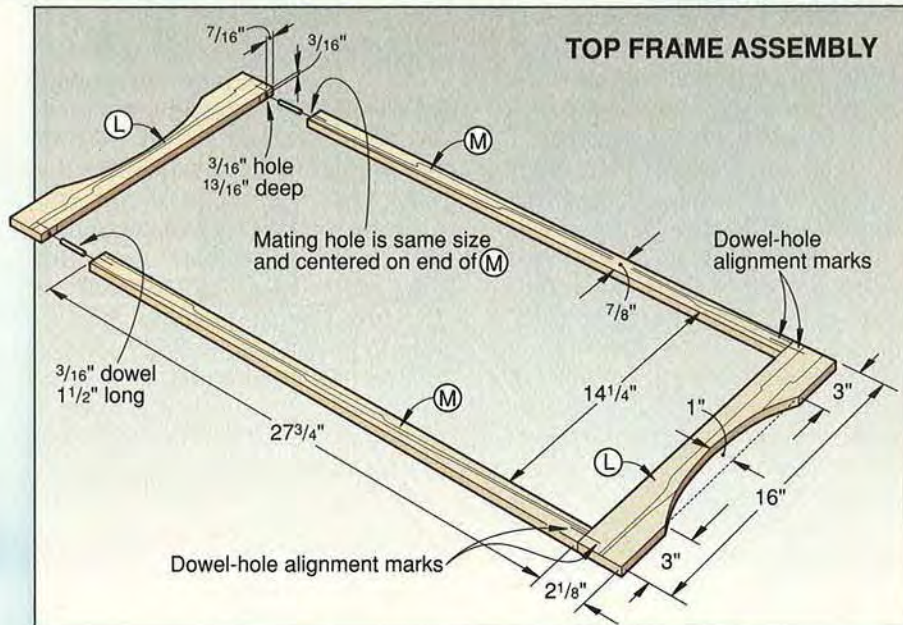
2 Mark the hole centerpoints on the yoke. Clamp the yoke in a handscrew clamp, and drill the holes where marked. (We used a brad-point bit to eliminate bit wander.) Sand $\frac{1}{4}$ "



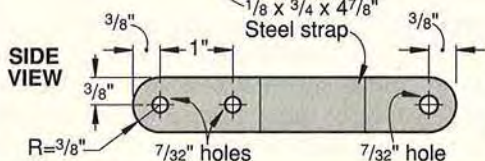
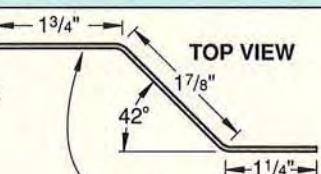
PARTS VIEW BRACES AND BRACKETS



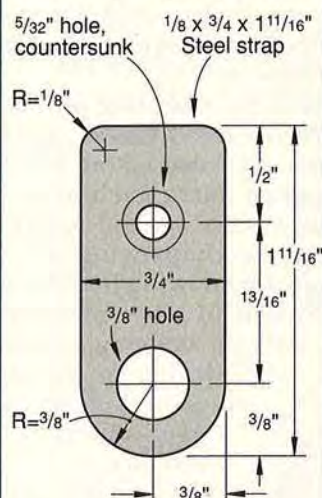
TOP FRAME ASSEMBLY



UPPER HANDLE BRACKETS (2 required)

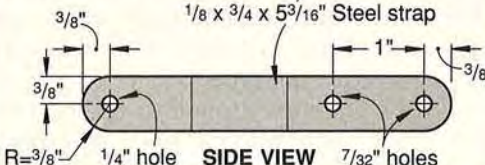
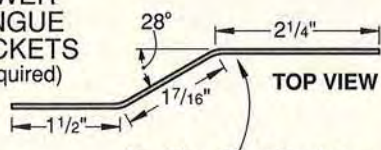


AXLE SUPPORT RETAINER (2 required)

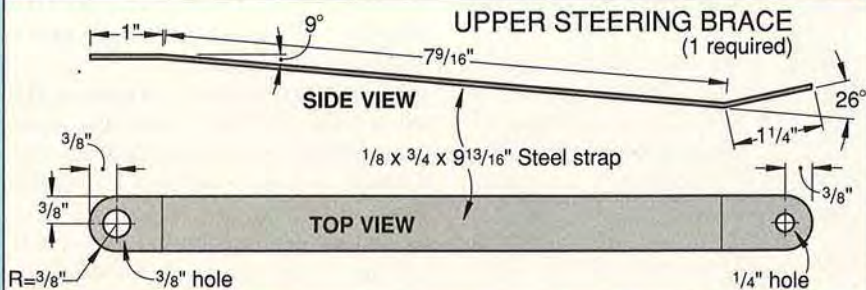


FULL-SIZED PATTERN

LOWER TONGUE BRACKETS (2 required)



UPPER STEERING BRACE (1 required)



round-overs along the front edges of the yoke.

3 Cut the tongue (H) to size.

4 To form the handle (I), cut a piece of $\frac{3}{8}$ " stock to $\frac{3}{4}$ "x12". Cut a $\frac{3}{16}$ " groove $\frac{3}{32}$ " deep centered along one face of the handle blank. Next, rout $\frac{1}{4}$ " round-overs along the edges opposite the groove. Trim two pieces to $3\frac{1}{2}$ " long from the 12"-long strip. With the edges and grooves aligned, glue and clamp the two pieces together to form the handle.

Form the wagon box and top frame assemblies

1 From $\frac{3}{8}$ " stock, cut the wagon sides (J) and ends (K) to size.

2 Cut a $\frac{3}{8}$ " dado $\frac{3}{16}$ " deep $1\frac{1}{8}$ " from the ends in each side piece (J). See the Exploded View drawing for reference.

3 Sand the interior faces of the wagon sides and ends. Glue and clamp the four pieces, checking that the mating edges are flush and that the assembly is square.

4 Cut the top frame members (L, M) to size. Mark a radius on the front and rear pieces (L) where shown on the Top Frame Assembly drawing. Cut the curved sections to shape.

5 Clamp the top frame in the configuration shown on the Top Frame Assembly drawing. Mark the dowel-hole alignment marks across each joint. Remove the clamps, and use a doweling jig to drill $\frac{3}{16}$ " holes $\frac{13}{16}$ " deep in the mating pieces. Glue, dowel, and clamp the top frame together, checking for square.

6 Center and glue the top frame assembly (L, M) on the wagon box (J, K). (We placed masking tape on the areas next to the glued areas to catch glue squeeze-out.)

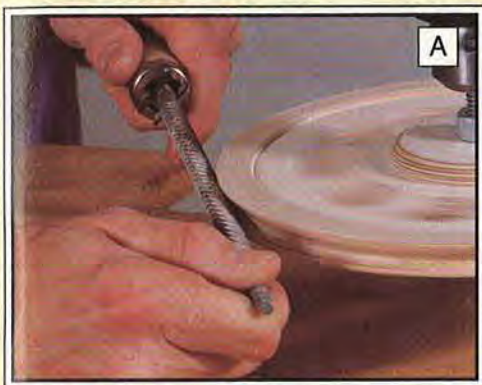
7 Sand the inside surfaces where part M meets part J. Rout a $\frac{1}{8}$ " round-over along the top edges of the top frame.

8 Carefully position and clamp the wagon box to the deck. Drill countersunk mounting holes, and screw the box to the deck.

Continued

terpoint of each. Rout a $\frac{1}{4}$ " round-over along the outside edge of each hub. Glue the hubs in place, aligning the holes.

14 Using a hacksaw, cut the head off a $\frac{1}{2}$ " bolt 3" long. Chuck the bolt into your drill press, and use two nuts to secure a wheel to it. Using the lowest speed on your drill press, use a rat-tail file to contour the inside edges of the rims to the shape shown on the Section View detail accompanying the Wheel Assembly drawing and as shown in Photo A. The coves allow the rubber hose (tire) to fit snugly around the outside of the plywood wheel.



Use a round file to shape and smooth the inside edge of the wheel rims for a flush fit against the tire.

Homemade tires for a soft, inexpensive ride

1 To make a tire, cut $\frac{3}{8}$ " O.D. ($\frac{3}{8}$ " I.D.) fuel-vapor hose to $27\frac{1}{4}$ " long. Then, cut four pieces of $\frac{3}{8}$ " O.D. ($\frac{1}{4}$ " I.D.) hose to 3" long.

2 Insert half of the smaller hose into one end of the larger hose where shown on the Wheel Assembly drawing. Slide the opposite end of the larger hose onto the protruding end of the smaller hose. Check for a *tight* fit of the tire onto the wheel. Trim the hose if necessary. Use instant glue (cyanoacrylate) to adhere the mating ends, striving for a tight joint. Repeat Steps 1 and 2 for each tire.

3 Lightly sand the tires to remove any visible lettering or exposed instant glue. Set the tires aside for now; you'll epoxy them to the wheels after finishing.

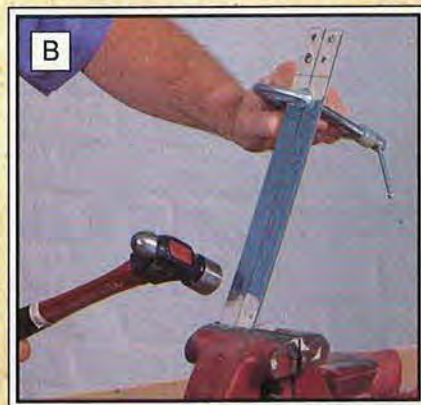
Next, shape and drill the braces and brackets

1 To form the rear braces and steering braces, start by cutting four pieces of $\frac{1}{8}\times\frac{3}{4}$ " strap iron to $12\frac{1}{8}$ " long. Place two pieces of the strapping edge-to-edge (not face-to-face), and adhere duct tape to the back surface to hold them together. Apply masking tape to the opposite surface on the ends. The masking tape makes it easy to mark visible bend lines and radii.

2 Lay out the hole centerpoints and bend lines for the braces on the masking tape where shown on the Braces and Brackets Parts View drawing. Dimple each centerpoint with a center punch. Drill $\frac{1}{4}$ " holes at each dimpled centerpoint, except for the steering braces. They have a $\frac{3}{8}$ " hole.

3 To bend the ends to the angles shown, clamp the taped-together parts in a machinist's or woodworker's vise so that the marked bend line is flush with the top surface of the vise jaws. As shown in Photo B, use a hammer to strike the steel straps until they conform to the angle shown on the Parts View drawing. Check your bend against the drawing, and continue bending and checking until they match. Repeat for the opposite end of the braces. Then, repeat for the other set of braces.

4 Remove the tape to separate the pieces. Trace around a dime to mark the radius on each end of each brace. Grind the radii to



Align marked bend line on masking tape with top edge of vise jaws, and bend steel strap to correct angle.

shape and file or sand to remove the burrs.

5 Repeat steps 1 through 4 above to form the handle brackets, tongue brackets, upper and lower steering braces, and axle support retainers. See the Braces and Brackets Parts View drawing for shape and hole sizes.

Assemble the rear-axle and steering assemblies

1 Using a hacksaw, crosscut two pieces of $\frac{3}{8}$ "-diameter steel rod to 16" long for the axles.

2 Assemble and glue the rear axle assembly (C, D) in the configuration shown on the Rear Axle Assembly and Exploded View drawings. Repeat for the Steering Assembly and Handle. Check that the parts fit correctly.

Add the finish, and let the good times roll

1 Remove the metal parts from the wood parts. Seal the plywood wheels and oak pieces with a clear exterior finish (we used Minwax exterior polyurethane).

2 Sand the metal parts to remove any burrs or sharp edges. Buff the surfaces of the metal parts with 00 steel wool to rough it up, and then wipe the parts clean with acetone to remove any residue.

3 Apply a coat of primer and two coats of satin black exterior paint to all the metal strapping.

4 Reassemble the metal parts to the finished wagon. Slide a $\frac{3}{8}$ " (I.D.) by 1" bronze bearing onto each axle where shown on the Wheel Assembly drawing.

5 Apply a bead of epoxy to the wheel coves, and stretch the tires onto the wheels.

6 Slip the wheels and washers onto the axles in the configuration shown on the Exploded View drawing. Secure the axles with $\frac{3}{8}$ " friction caps. For an added bit of flare, apply a decal to each side of the wagon. See the Buying Guide for our source. ♣

Produced by Marlen Kemmet
Photographs: John Hetherington
Illustrations: Kim Downing

CARVING BY

We all recognize a great carving when we see one. But we can't always put a finger on what makes it so. Here, champion carver Rick Beyer explains what separates top-rank carvings from also-rans. His advice could help you carve your masterpiece.

Sometimes as I wander up and down the aisles of a carving show, a piece will stop me dead in my tracks. "What makes this one such a grabber?" I'll wonder. "Is it some skill or technique, or was the carver just lucky?"

To find out, I went to Racine, Wisconsin, to visit Rick Beyer, a carver whose name often appears on those eye-catching works. Here's what he told me.

Larry Johnston
Special-Interest Editor

"Artistry makes the difference." That's how championship carver Rick Beyer sums up when asked what sets a great carving apart from the crowd. Now "artistry" might sound mystical, maybe even a little bit hoity-toity, but it boils down to some basic, common sense

steps that anyone can follow, according to Rick. Novice or old hand, any carver will do better work by paying attention to some of the elements of artistry, things like research and reference, planning and design.

Research starts you right

"Research is the key element in making a really good piece," Rick says. Before starting a carving, he assembles a mass of reference material about his subject. He haunts libraries, museums, zoos, aquariums—any place he can find photographs, illustrations, and mounted or live examples of the fish or bird he will be carving. He keeps a reference library in his studio, too.

He sometimes shoots his own study photos. "I'll run off

rolls of film of a bird or fish so I'll know not only what the whole thing looks like and how it moves, but what each part of it looks like," Rick explains. Commissioned recently by a racing-pigeon fancier to carve a favorite flier, Rick snapped some shots of the very bird he'll be modeling. "I took a lot of tight close-up pictures," he says, "especially of important features like the eyes and primary flight feathers."

Overall photos along with material gleaned from



Form, color, and realistic rendering of the fish emerging from the wave give this carving a sense of motion. Arrested motion always adds interest to a carving.

DESIGN

Champion carver Rick Beyer plans for better results

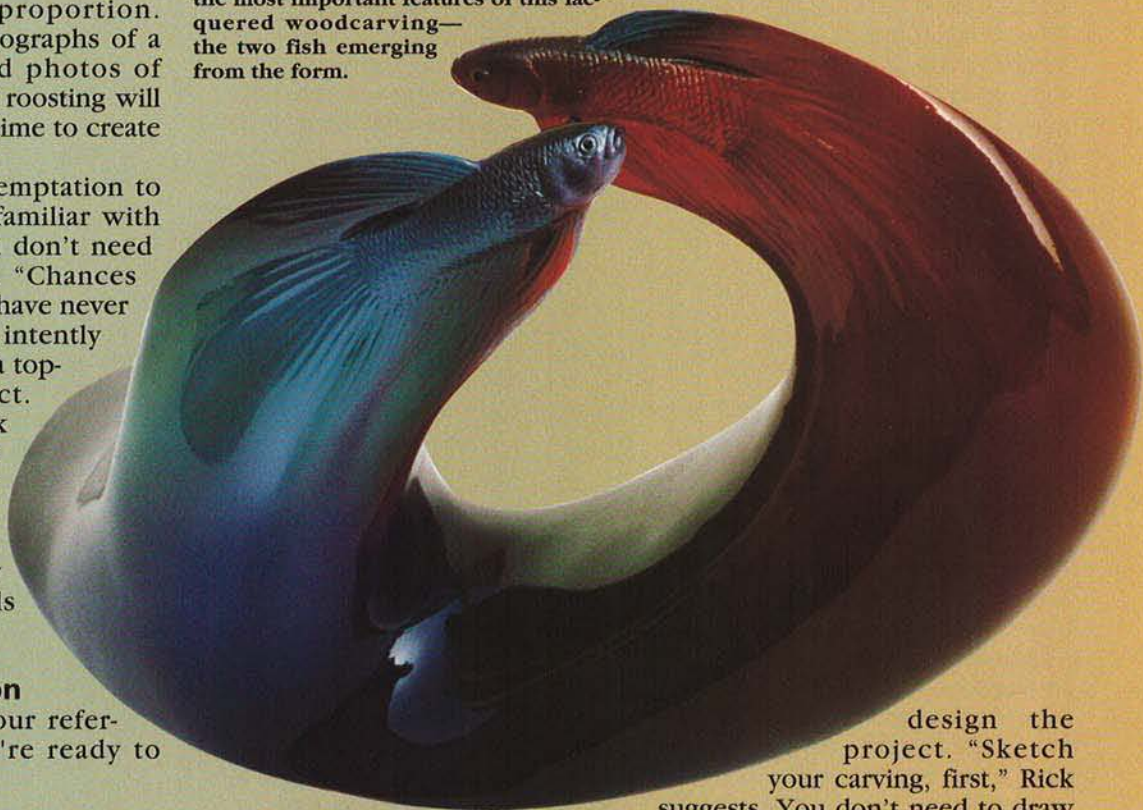
books and magazines will answer questions about proportion. Illustrations or photographs of a bird's skeleton and photos of pigeons in flight and roosting will help when it comes time to create a realistic pose.

Always resist the temptation to feel that you're so familiar with the subject that you don't need to do any research. "Chances are," says Rick, "you have never studied anything as intently as you'll have to for a top-rank carving project. You just can't work out of your head with nothing to look at," he says. When he carves, the reference materials may outnumber the tools on his bench.

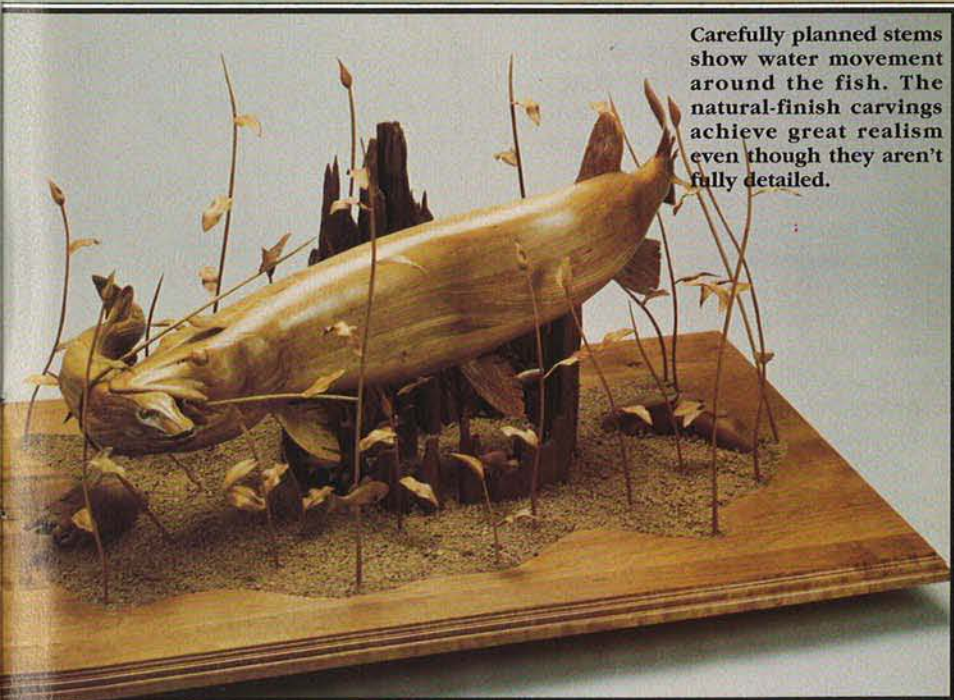
Plan for perfection

Once you gather your reference material, you're ready to

The abstract shape draws the viewer's eye to the most important features of this lacquered woodcarving—the two fish emerging from the form.



Carefully planned stems show water movement around the fish. The natural-finish carvings achieve great realism even though they aren't fully detailed.



design the project. "Sketch your carving, first," Rick suggests. You don't need to draw detailed plans, just some loose sketches. These will help you decide such basic questions as whether the subject will be sitting or standing; looking up, down, left, or right; in action, or at rest.

And while you're designing the carving, consider how you will display the finished piece. Will it be on a base? If so, design the base to complement the carving. You don't want it to look like an afterthought. The base for the turtle carving on *pages 60-61*, for instance, helps depict motion and instantly places the turtle in a natural location—underwater.

During the design stage, Rick asks himself a lot of questions. Does the pose look stiff and unnatural? Does that joint really bend that way? Is this a distract-

Continued

CARVING BY DESIGN

ing element? Being critical at this stage helps avoid the kind of clinkers that demote a carving to second-rate.

Watch for technical challenges, too, Rick suggests as he pulls a magazine from a desk drawer. The cover photo shows a heron standing on one leg, the other raised up beside its head. He's been commissioned to model a carving on that photo.

"I'll put it on a brass base, cast to look like a shoreline puddle," Rick says. "The long, skinny legs will have to be made separately from the body," he comments. "I could carve them from wood, but it would be better to cast them in metal, like the base. Then," he says, "I could cast the

one leg [the one the bird stands on] as part of the base, rather than making it separate and trying to fasten it to the base later."

Sometimes, the best solution to a carving problem comes by working it out in three dimensions. "Lots of carvers make clay mock-ups first," Rick notes. "I don't like working with clay, so I don't. Sometimes, I *will* make a wooden model before I start, just so I can see how things are going to work out." Often, the wooden model is no less than a full-sized rendition of the proposed carving.

You might even need to consider the sequence for your work. For example, take a carving Rick recently started, a mythical figure holding a dove on an outstretched hand. "I haven't done the main figure yet, but I've carved the dove," he remarks, pushing the



For this carving, "The Thirteenth Tee," Rick integrated the stand, which he styled to look like an out-sized, broken off, weathered golf tee, into the overall design.

basswood bird across his desk.

"This way, I can model the hand to hold the bird properly. With the dove in place, I can carve the figure's eyes to focus on the dove," he explains.

Trying to place the bird in front of already-carved eyes could result in an arm and hand position more suited to a carving of a contortionist, Rick adds.

Find your style

"Whenever someone comes to me for carving advice," Rick says, "I tell them one thing: Develop your own style." Having your own style simply means that there's something about your work that enables viewers to

recognize it as yours.

"Style can be anything that sets your work apart—a look, the wood you use, a certain carving technique, a way of painting. Even specializing in a certain subject could become your style," Rick explains. "I've carved a lot of fish in cherry wood with a natural finish; it came to be recognized as my style."

"Most carvers just need to set their minds to being different," Rick adds. "Now, you don't have to be bizarre or strange; just don't make your carving look like everyone else's."

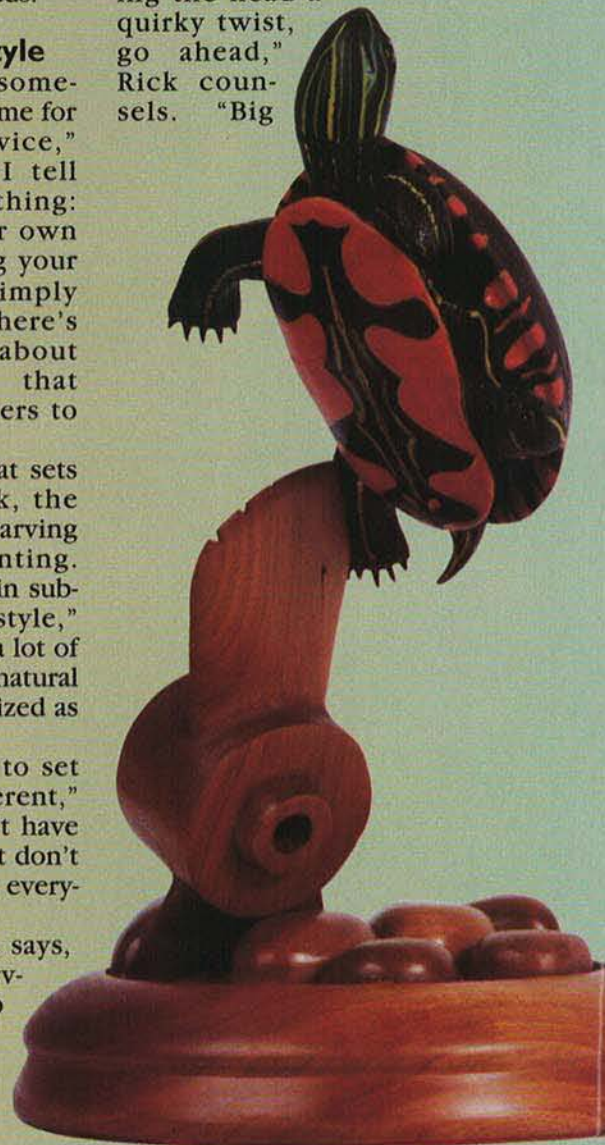
To accomplish that, Rick says, "loosen up, enjoy the carving, get some feeling into the piece." But, what if you're set on carving painstakingly accurate waterfowl, for instance?

Wouldn't loosening up and being different make your carving a less-accurate rendition of nature? Probably, Rick agrees. But to him, that's no problem.

Again he stresses design. "Carvers should set their minds into design rather than reproduction," Rick maintains. "I mean, God makes ducks; carvers should make art."

"Get away from feather-counting somewhat and look at the total design. Every part needs to be pretty realistic, but how you put them together determines the carving's success as art," he says.

"If you feel like giving the head a quirky twist, go ahead," Rick counsels. "Big



deal, so someone doesn't like it. There are probably ten other people who do."

Couldn't that shoot your chances of winning a show ribbon? "Not necessarily," Rick replies. "And, anyway, carving for a judge or show juror can backfire. If you go to a competition trying to please the judges rather than yourself, odds are that what you think the judges want isn't what they're looking for at all."

Rick's best advice on shows? "Enter work that shows your best effort. And realize that competition is not a good way to judge artwork; it dictates how a person is supposed to create, which contradicts art."

In other words, when it comes down to passing judgment on your work, you have the final say. "There are no set rules," Rick says. "That's why so many of the top carving artists have totally different carving styles. They all have their own ideas."

What about workmanship?

With the planning and designing done—the largest part of the project, Rick says—it's time to carve. And, according to this award-winner, you may already have the skills of a big-time carver and not

even realize it. "Most people who know how to carve can meet the technical demands of the show circuit," he declares.

Good craftsmanship—clean cuts, well-executed details, fine finishing or painting—always wins a lot of admirers. But following the path of artistry can lead you and your work to the winners' table more often. "There are a zillion good craftsmen; but only about one out of 20 pays any attention to artistry," Rick comments. "Those who combine artistry with craftsmanship win the prizes, and win them consistently."



A carver's accounting of his path to the pros

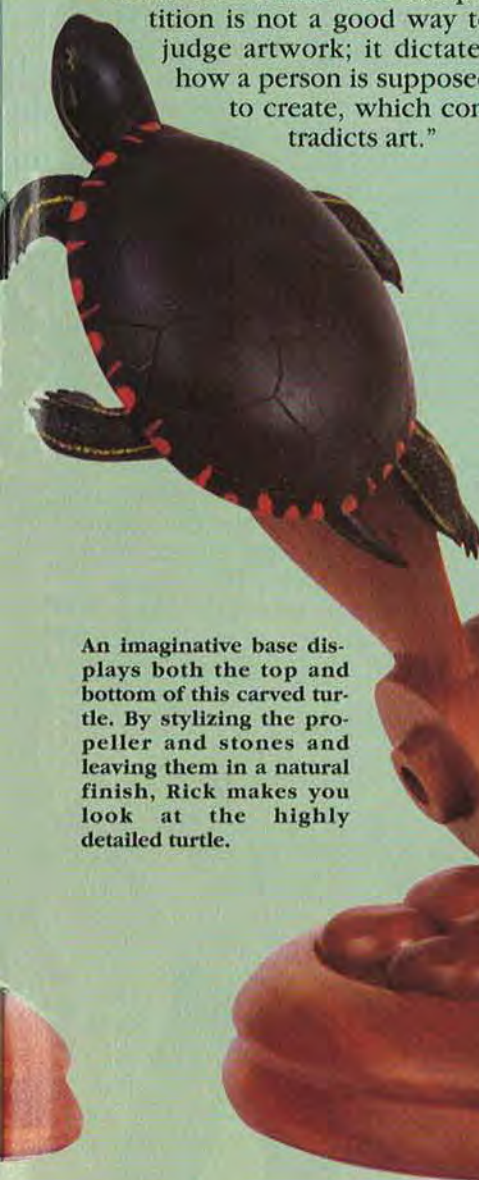
Making a living from woodcarving wasn't Rick Beyer's original plan. Oh, he's enjoyed woodworking and carving for quite a while (he took up carving at age 16). But, armed with a degree in accounting, Rick left college destined for a career in business management. He worked as a restaurant manager, then as a shipping manager

er for a furniture manufacturer.

All the while, he worked on perfecting his carving. "I was working 40 hours at my job, and spending another 40 hours a week carving," he recalls. He entered shows, took on some commissions, and generally pursued his art as a hobby that paid its own way. Pretty soon, he opened R.J. Beyer Galleries in Racine as a part-time business, a place to display (and sell) his carvings and other artwork.

About the time he was opening the gallery, the company he worked for pulled up stakes to move to another state. Though offered a transfer, Rick and his family opted to stay in Racine. For work, he decided to take a chance on art. "Between the job and carving, I was putting in 80 hours a week. I figured if I just carved a little more, we could make it," he says.

That was nearly a decade ago. Today, Rick's carvings reside in private, public, and corporate collections around the nation. He teaches carving classes, carves for shows and exhibitions, sells work through his gallery, and takes on commissions. He's no longer just taking a chance on carving. ♣



An imaginative base displays both the top and bottom of this carved turtle. By stylizing the propeller and stones and leaving them in a natural finish, Rick makes you look at the highly detailed turtle.

Photographs: Jon Bolton

CUSTOM-CRAFT YOUR OWN RAIL-AND



Few projects can showcase your woodworking skills better than a handsome set of interior doors. But if the seeming complexity of door construction has kept you from building your own, take note. We teamed up with master craftsman Chuck Hedlund and developed a set of straightforward procedures that enable you to build one, or a whole house-full, of these elegant rail-and-stile doors.

The job's not begun until the paperwork's done

You must first calculate and draw all the dimensions of the door on paper. Start with the measurements of your door opening, side jamb to side jamb for width, and top jamb to finished floor for the height. Then subtract the dimensions of the various parts to develop your bill of materials. Don't be tempted to build the

door slightly smaller than the opening. You trim the door to fit after you've built it.

For four-panel doors such as ours, tradition and practicality dictate a few standard widths for the rails, stiles, and mullions as listed *below*. These proportions allow you to center a door knob with a 2 $\frac{3}{8}$ " backset on the stile.

Note that these techniques apply only to interior-door construction. Exterior doors require entirely different construction methods.

Top rail: 4 $\frac{3}{4}$ "	Stiles: 4 $\frac{3}{4}$ "
Lock rail: 8"	Mullions 4 $\frac{5}{8}$ "
Bottom rail: 9 $\frac{5}{8}$ "	

 Print this article

Feel free to vary these sizes for a different style or look. To calculate the rest of the dimensions, refer to the box at *right*.

Good wood for a good door

We used oak for our door, but any kiln-dried, straight-grained wood will do. Poplar makes an excellent paint-grade door. If you use a clear finish, select evenly colored pieces with complementary grain pat-



-STILE DOORS

Our step-by-step guide tells how

HOW TO SIZE UP A DOOR'S DIMENSIONS

STILES

Height equals the full length of the door opening, top jamb to finished floor.

RAILS

Length equals the width of the door opening between the side jambs, minus the width of the two stiles.

TOP MULLION

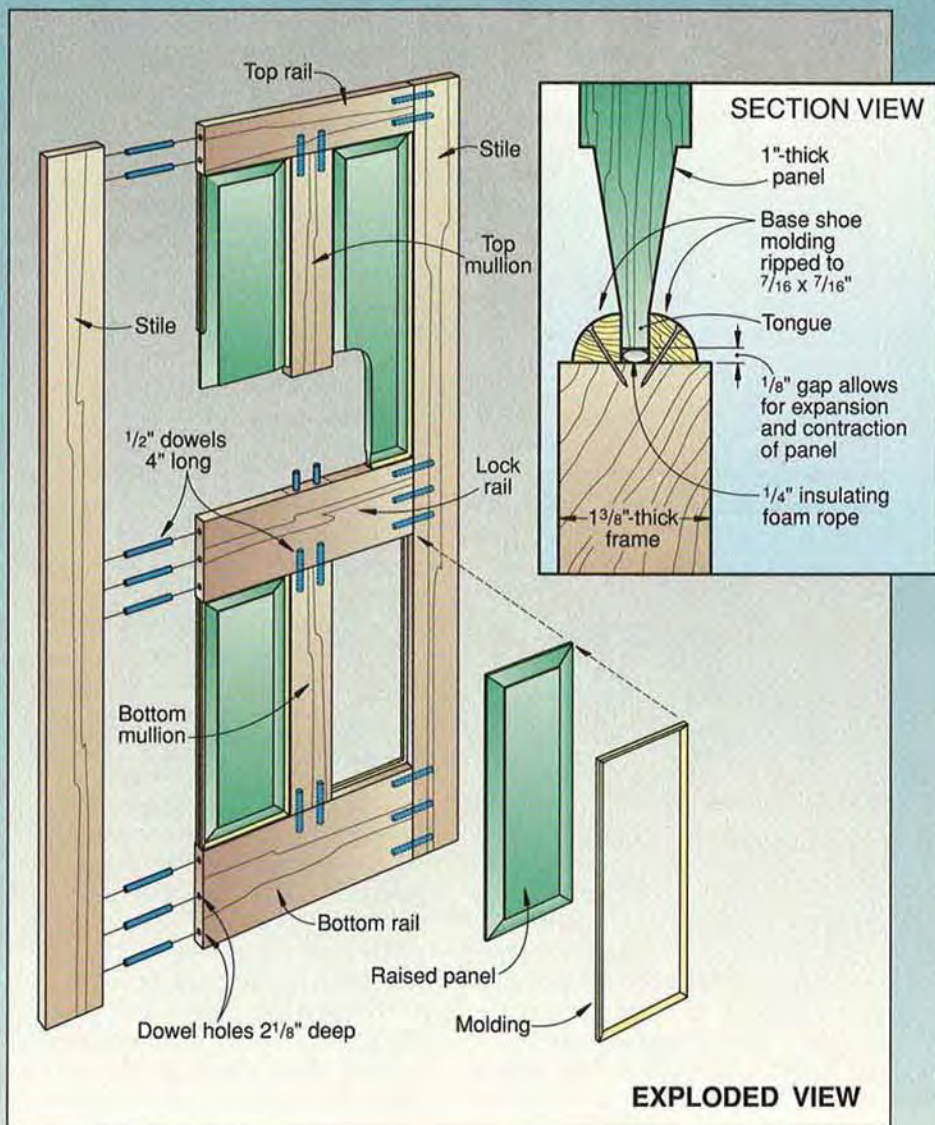
Length equals the height of the door minus the width of top rail, minus 36", minus half the width of the lock rail. (36" is the recommended height from the floor to the middle of the doorknob and lock rail.)

BOTTOM MULLION

Height equals 36" (or the height of the center of your doorknob) minus the width of the bottom rail, minus half the width of the lock rail.

PANELS

The dimensions of the panels match the inside dimensions of the frame minus $\frac{1}{4}$ " in length and width.



terns. You'll need $\frac{3}{4}$ stock for the rails, stiles, and mullions; and $\frac{5}{4}$ stock for the panels.

Start by machining your rails and stiles

Using a jointer, flatten out any bow or twist that you find on the faces of the rails and stiles. Once these pieces are perfectly flat along their length, use a thickness planer (if necessary) to bring them down to $1\frac{1}{16}$ ". This leaves an extra $\frac{1}{32}$ " on both faces for scraping and sanding. Then joint

the edges of the boards to their final width. Finish by crosscutting the pieces to their final length, but cut your stiles 2" longer than the door height so that you have a 1" lug on both ends to protect the door until it's hung. If you want wide bottom and lock rails like ours, glue them up from two or three narrower pieces.

To build up the panels, edge-glue two pieces of $\frac{5}{4}$ stock for each panel, and then plane them down to their final 1" thickness. If you want a different panel style from

on ones shown, see "Door Panel Options" on page 83 for a variety of styles and details.

Laying out the frame

To assemble the door you'll need a clean, flat, layout table about 1' longer and wider than the finished door. Start by laying out your pieces and face marking them with a colored lumber crayon so as not to get them mixed up or turned around later. Then lay out your rails and mullions as shown in *Photo 1* on the next page. At

Continued

RAIL-AND-STILE DOORS



1. Lay out the rails and mullions.

the top of the door, place the mullion as close to the center of the rail as you can get with a ruler or tape measure.

Now, use a combination square for your final check. Butt the blade of the square against the mullion, slide the head of the square flush with the end of the rail, and tighten it in place. Check the fit of the square on the other side and, if necessary, divide the difference and check again. This gives you more accuracy than reading numbers off a tape measure. After you've centered the mullion, scribe pencil marks on the inside edges of the rail where the mullion abuts it. Use the same technique to mark the mullions on the lock rail and bottom rail.

For fast, foolproof alignment, try our doweling jig

You can use a standard doweling jig to bore your holes, but our scrapwood jig automatically aligns all your dowel holes, and eliminates the need to measure and mark a lot of pencil lines.

To build the jig, cut a scrap piece that's exactly the same thickness as your frame, as shown in the illustration *below*. Put a $\frac{1}{2}$ " brad-point bit in your drill press, and attach a fence to the table. Use the fence to center the drill bit on the thickness of the scrap piece, with the brad point about $1\frac{1}{4}$ " from one end.

Keep the motor off, but lower the drill bit until the brad makes a small dent in the wood. Raise the bit, turn the wood around, and lower the bit, again making a very slight indentation. By carefully nudging the fence you'll get to the point where the brad makes an indentation in exactly the same place regardless of which side of the jig is against the fence.

At that point the bit is centered. Turn on the drill press and bore a $\frac{1}{2}$ " hole through the wood. To complete the jig, glue and nail guides to each side, as shown.

Here's the secret to our self-aligning doweling jig

To bore perfectly matching dowel holes, simply clamp the jig on the end of a mullion, and flush with one edge. Bore the first hole as shown in *Photo 2*. Turn the jig



2. Top: Bore dowel holes in the end grain of the mullions.

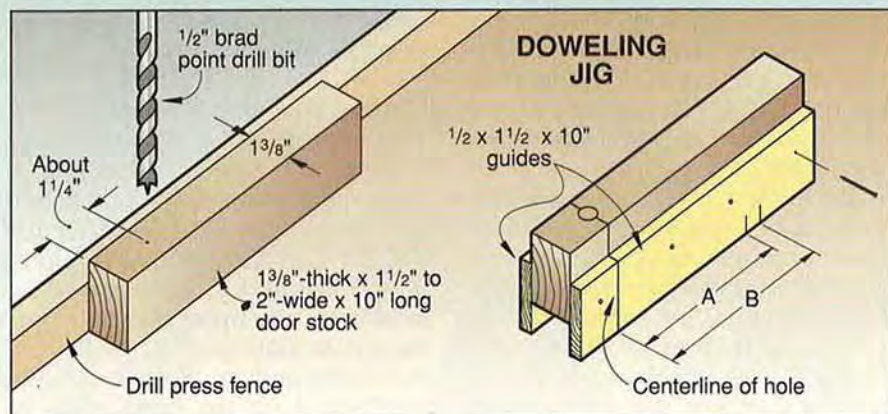
3. Bottom: Use the jig to align the corresponding dowel holes in the edges of the rails.

around and bore the second hole.

Clamp the jig flush with the pencil mark on the adjoining rail, as shown in *Photo 3*, and bore. Since the pencil mark represents one edge of the mullion, the hole you drill should align with the hole in the end of the mating mullion. Turn the jig around, align it with the other pencil mark, and bore the other hole. Bore all the holes $2\frac{1}{8}$ " deep. See the Exploded View drawing for the location of all the dowels.

Put the squeeze on before marking the stiles

To mark where the rails join the stiles, lay the stiles flat on the table as shown in *Photo 4*. Clamp the mullions between the rail ends for the correct spacing, and lay this assembly on top of the stiles. Then, mark the position of





4. Mark the position of the rails on the stiles

the rails on the edges of the stiles.

Now, you need to locate the position of the middle dowel holes for the lock and bottom rails. To do this, place the jig over the end of the lock rail with the guide hole centered in the middle. Mark on the jig where the top edge of the rail meets the overhanging end of the jig and label that "point A," as shown in *Photo 5*, then drill the hole. Position point A on the corresponding pencil mark on the stile, and drill the matching hole as in *Photo 6*. Follow the same procedure for the bottom rail, marking that (since it's slightly wider) as "point B" on the jig. To avoid confusion, make sure that if you take your reference mark from the bottom edge of the rail, you transfer it to the bottom mark on the stile.

Big projects need big dowels, so make your own

We cut our own 4"-long dowels from 1/2"-thick oak dowel rods to

give the door frame the strength it needs. To provide an escape route for glue and air, cut two glue channels in each piece with the jig and a bandsaw as shown in the illustration at *right*. Bevel the dowel ends and check the fit in the holes.

If the dowels fit too tight, get a metal plate at least 1/4" thick, bore a 1/2" hole through it, and hammer the dowels through the hole to size them. If the dowels are still too tight, tap the top of the hole in the metal plate a few times with the round end of a ball peen hammer. That will close up the hole enough to remove more wood from the dowels.

And now, the main event—glue-up number one

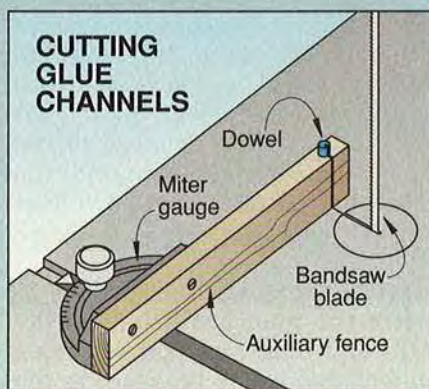
Glue-up the rails and mullions by spreading glue in all the holes and inserting the dowels. Clamp the pieces together, and slip the stiles under the ends of the rails. Align the edges of the rails with the

Continued



5. *Top*: Bore the center dowel hole on the edge of the lock rail.

6. *Bottom*: Bore the corresponding center dowel hole in the stile.



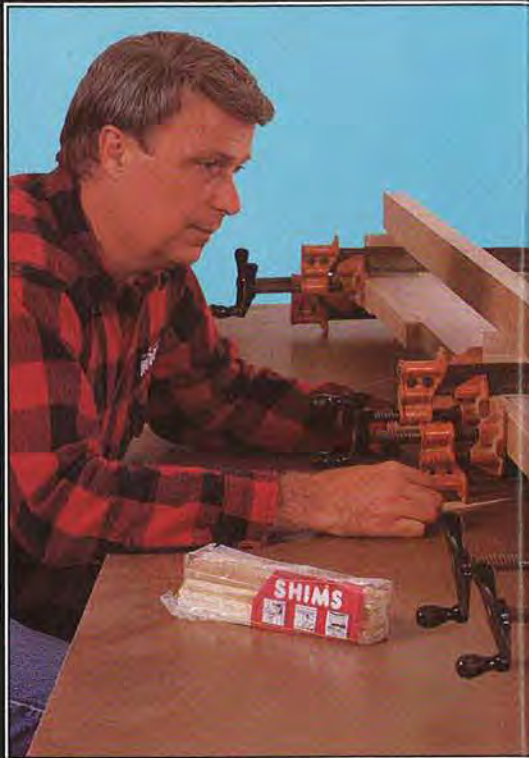
7. Use the marks on the stiles to keep the first glue-up square.

RAIL-AND-STILE DOORS



8. *Above:* Dowel glue, and clamp the rails to the stiles, and level the frame across the rails using shims where necessary.

9. *Right:* Check and adjust the frame to ensure it lies flat by sighting across its length with a straightedge. Shim up any low spots to meet the straightedge.



pencil lines on the stiles as shown in *Photo 7*. If your assembly is square, the rails will just touch the lines on the stiles in all four corners. If they're not aligned, ease off the clamping pressure on one side and watch how that moves the rail in relation to the line. Adjust the pressure until the stiles are touching the pencil lines on all four corners.

Glue-up number two

After the glue has dried on the rails and mullions, you can glue, dowel, and clamp the stiles to the rails to complete the frame. Put one clamp over and one clamp under each rail. Then level the assembly. Shim the bottom of the clamps until the door lies level across each rail as in *Photo 8*. To check the stiles for flatness, place equal-height blocks on each rail near the stiles and lay a straightedge or long level on top of the blocks. Shim under the clamps if necessary to bring all the blocks up to the straightedge, as shown in *Photo 9*. This span does not need to be level, just straight.

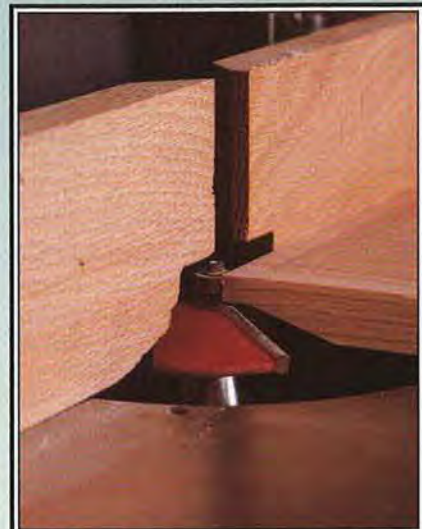
Let's make the panels

A good time to make the panels is while you're waiting for the glue to dry on the door frame. Measure the openings in the frame, and then cut the panels $\frac{1}{4}$ " smaller in height and width to get a $\frac{1}{8}$ " gap around the perimeter of the panel. This gap compensates for the swelling and shrinkage caused by changes in humidity.

We used a panel-raising router bit (Freud Model 99-216) to cut the bevels, as shown in *Photo 10*. To minimize tearout when routing, cut the tops and bottoms first, and finish by routing the long edges. (You also can create a raised panel with a tablesaw. See our article on *page 83* for this technique.) Leave a $\frac{3}{8}$ "-thick tongue around the perimeter of the panel to slip into the channel created by the molding.

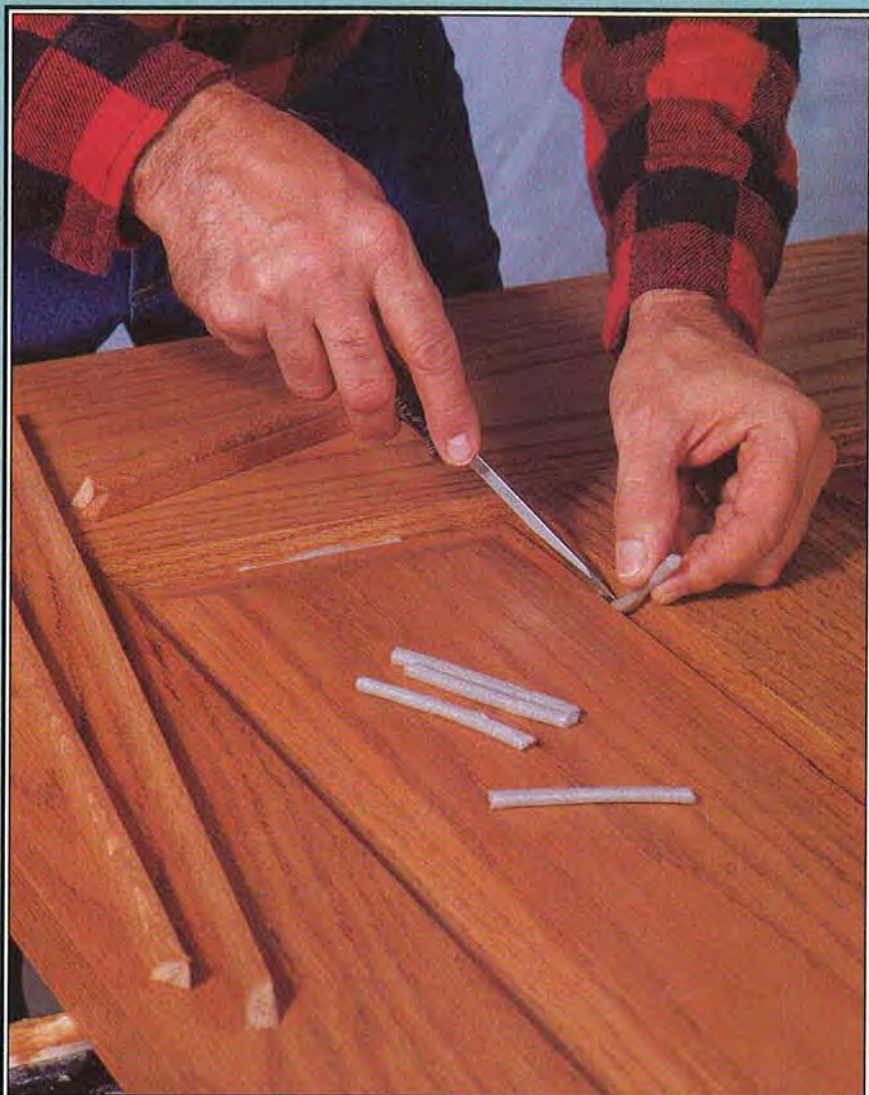
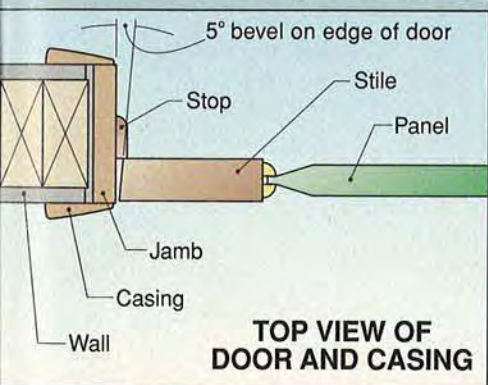
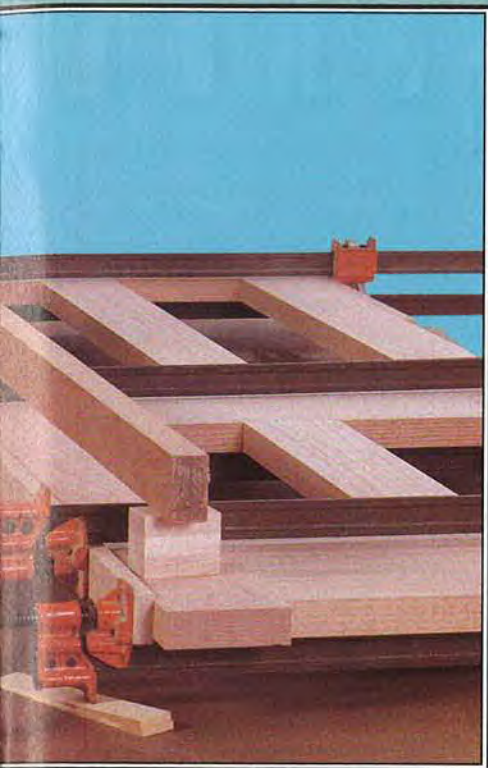
Size the door to its opening

The best time to size the door to the opening is before you put in the panels. The door frame weighs less and is easier to handle at this point. First, place the door



10. Rout the edges of the panels.

in the opening and push it tight against the stops. Then scribe any irregularities in the jambs onto the edges of the door and leave $\frac{1}{8}$ " clearance from the jambs and floor. Now remove the door from the opening and carefully plane the edges down to the scribe marks. Check the door fit in the opening again and if you have a good fit with the proper



11. Insert foam spacers between the panel and the frame, and then cover them up with mitered moldings. The foam stops rattles and centers the panels.

clearance all the way around, remove the door again and plane a 5° bevel on the edges of both stiles, as shown in the drawing *above*. These bevels enable the door to clear the jambs when opening and closing.

At last, you're nearing the finish line

To hold in the panels we used oak base shoe molding ripped to $\frac{7}{16} \times \frac{7}{16}$ ". Use a featherboard to control the molding during the cut and a zero-clearance insert to prevent the small pieces from falling inside your tablesaw.

Written by Tom Jackson Illustrations: Kim Downing

After you've ripped the molding, prepare the door for finishing. Sand or scrape the intersecting parts flush, and sand everything with 150-grit sandpaper and then 220 grit. Stain all the pieces of the door—panels, frame, and molding—before you assemble them. This will prevent unstained edges from peaking out under the molding when the panels shrink during dry weather. (We used Minwax Golden Oak stain.)

After the stain dries, tack a stop to the inside edges of the door frame. Miter the moldings, and nail them in place with 3d finish

nails using the stop as a guide. To avoid splitting the wood, drill pilot holes for all the nails.

Remove the stops, turn the door over, and drop in the panels. Insert short pieces of $\frac{1}{4}$ " foam insulating rope between the panel edges and the door frame, as shown in *Photo 11*. Cut and nail the remaining moldings to the door. Then apply your final finish coat. (We used a clear Watco Danish Oil). Hang the door and set the lock as you would with any other door, but use extra-sturdy hinges and extra-long hinge screws to support the weight. ♣

Photographs: John Hetherington

BOWLS WITH

Looking for new turning designs? Then, look to the past. Arizona turner Phil Brennon finds beautiful woodturnings in classic Native American pottery shapes from the Southwest.

Long before there was woodturning, there was pottery. As early as 3500 B.C., Sumerian potters threw jars, bowls, and other vessels on hand-powered potter's wheels. That was more than 3,000 years before Grecians invented the woodturning lathe.

By the time woodturners developed the equipment, tools, and techniques necessary for turning hollow forms, such as vases, urns, and bowls, the shapes and proportions for those forms had been defined by several thousand years of pottery-making. With few exceptions, woodturners today tend to follow classical design guidelines in creating new pieces.

And they do it for a very good reason: Those ancient rules still lead to beautiful bowls.

Time-honored designs

Woodturner Phil Brennon of Chino Valley, Arizona, is one who recognizes and appreciates that design sense from the past. He draws inspiration for his stunning turned vessels from Native American pottery of the Southwest United States. In fact, it was his love of those shapes that led him to take up woodturning in the first place.

Like so many timeless designs, the Southwest native pottery Phil likes so much combines simplicity with practicality. The pots also show a unity of design he admires. "Tribal potters often throw their pots knowing what adornment—usually painted designs—will be put on them," Phil comments. By considering the ornamentation and the shape as a whole, the potters create pieces that embody beauty

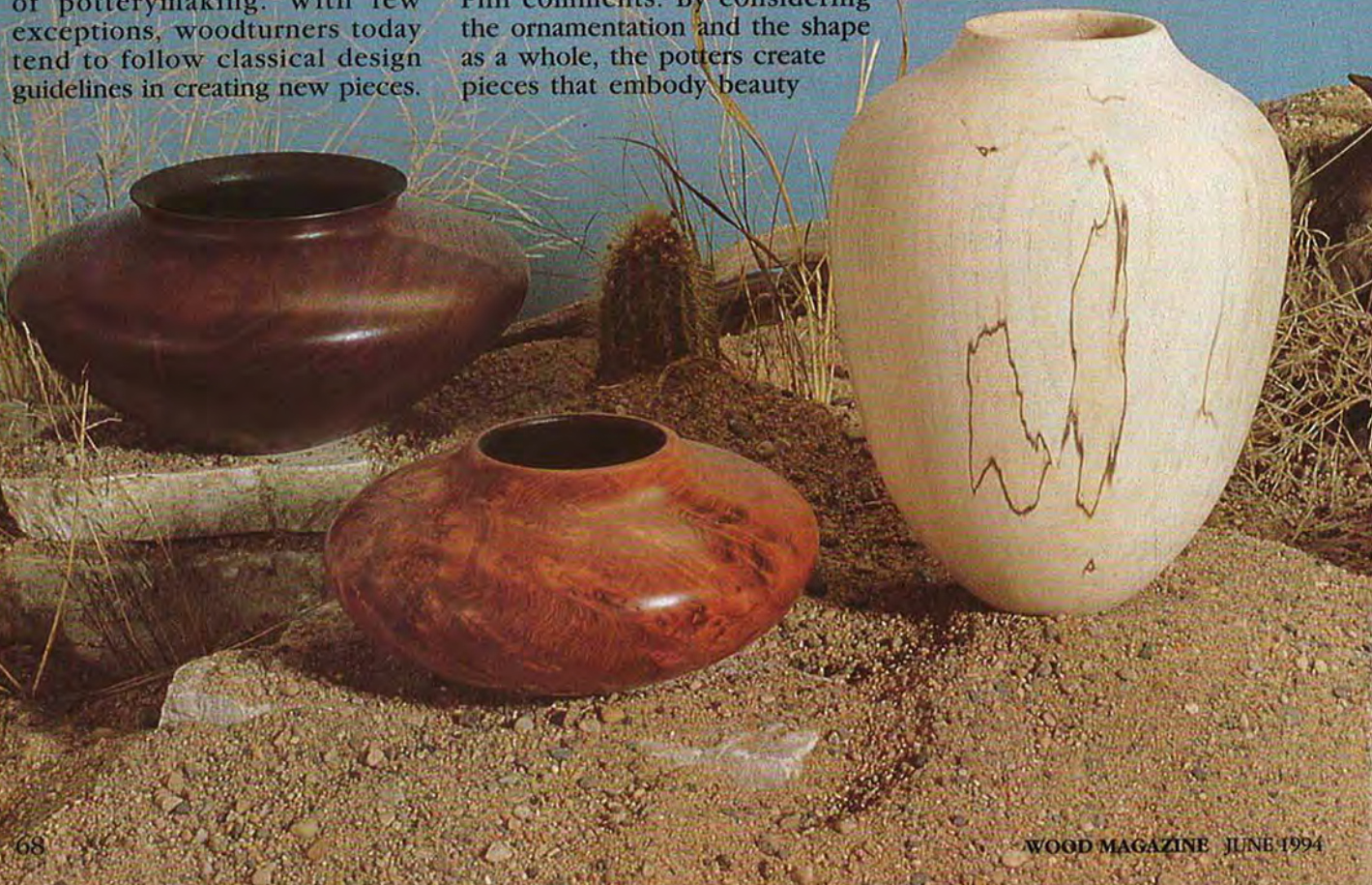
and harmony—no element of the whole seems out of place nor overwhelms any other element.

"The same should hold true for woodturning," Phil maintains. The wood grain and the vessel shape should complement each other, not fight each other for attention. "You often can show off the best grain features in a piece of wood" he says, "by choosing a shape that accentuates it. Also, use simple shapes for highly figured wood"

Principles of proportion

Numerous formulas, mathematical proportions, and rules-of-thumb have been handed down through the centuries in attempts to quantify good design. Phil considers three of these guidelines above all others when turning his Southwest containers:

- Make the base smaller than the mouth of the vessel.



A PAST

Native American pottery shapes make great turnings

•Place the major diameter above or below the middle of the pot, not right on it.

•Curve the sides from the neck out to the major diameter and back in to the base. Don't make straight-sided forms.

Phil often sketches an outline—or a template—for a piece before turning it. But he doesn't like to lean too heavily on preplanned shapes. He finds enjoyment in watching the vessel emerge from the piece of wood on the lathe. "Don't be a slave to a template," Phil cautions. "Use it as a guide."

Phil's turning technique

The Arizona turner begins a bowl by bandsawing a blank a little larger than the diameter of the finished piece.

The extra diameter allows him some leeway in the turning's final shape—to accommodate wood features, for instance.

After bandsawing his blank, Phil mounts a faceplate on the side that will be the bottom of the bowl. Usually, he attaches the faceplate directly to the blank with #10×1½" sheet metal screws.

When he's dealing with a burl or a thin piece of stock (or one he wants to get the biggest possible turning from), he glues a scrap-wood waste block to the blank with yellow woodworker's glue. Then, he screws the lathe's faceplate to the waste block.

Unlike many bowl turners, Phil always

uses the tailstock as he turns the outside profile. The tailstock lends extra support to the turning and keeps it running true, helping prevent breakage at the small base.

With the lathe running at 1,000 rpm or less, Phil rounds the blank and establishes the top of the rim and the bottom of the base with parting-tool cuts. Then, he turns the blank to the major diameter and forms the profile with a ⅜" or ½" bowl gouge.

He leaves the neck and base somewhat larger than finished size for extra strength while he cleans out the inside. "To start the inside, I bore through the neck with a Forstner bit, to within about ½" of the base," Phil explains. A drill chuck mounted on the tailstock holds the bit.

After boring the starting hole, Phil cleans out the inside with a ½" round-nose scraper or an angled boring-bar tool, depending on the design. (He used the round-nose scraper for all of the bowls shown in this article.)

With the bowl cleaned out, Phil completes turning the outside. As for wall thickness, "it isn't necessary to go for ultimate thinness—

Continued



BOWLS WITH A PAST

$\frac{3}{16}$ " is good," the turner says. "Shapes are most important to me; I don't get lost trying to turn down to microwalls."

He then turns the neck and base to final outside size, and sands to 320 grit. He usually doesn't sand the inside of a bowl. When he parts off the turning, he forms a slightly concave base for stability.

Some finishing tricks

Phil favors semigloss finishes for his work. "Southwest designs generally don't work well with high-gloss finishes," he says. He typically applies three coats of Deft semigloss lacquer, sanding between them. He goes over the last coat with steel wool, applies Trewax, and buffs the piece. The amount of buffing he does allows him to control the gloss.

Phil finishes some turnings with Waterlox, a tung-oil product. A few, such as the hackberry seed jar shown *far right* and on *page 68*, receive no finish at all. To emphasize the shape or add depth to a pot, Phil sometimes paints the inside flat black. ♣

Written by Larry Johnston
Photographs: John Hetherington
Illustrations: Kim Downing

Seven Southwest designs

Here's a collection of Southwest designs you can turn yourself. The templates show the actual size that Phil turned, but you can enlarge or reduce them as you prefer.

Water jug

This form, in a style typical of the Casa Grande, represents a vessel most likely used for water storage.

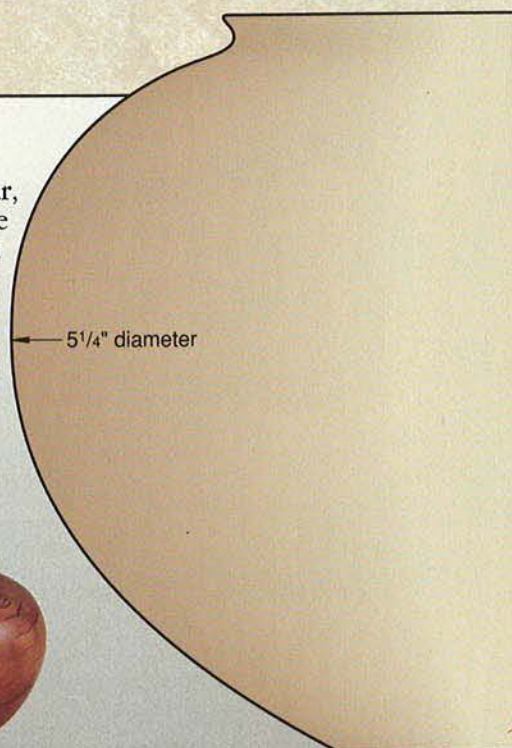
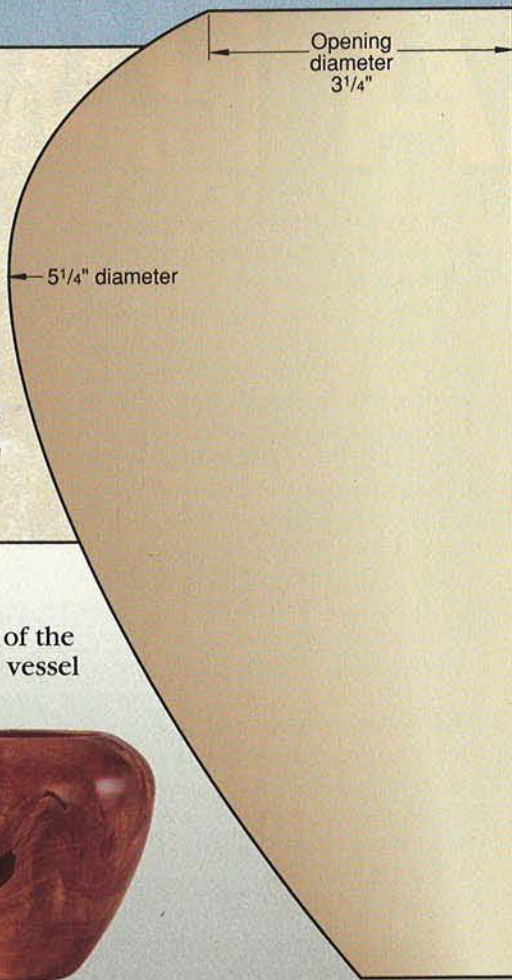
Wood shown:
walnut,
Waterlox finish.



Dry-storage jar

A lipped rim, as on this jar, provided a way to seal the mouth. A hide stretched over the top could be secured with a thong tied around the groove. This shape closely resembles a Zuni drum.

Wood shown:
juniper,
lacquer and wax finish.



Bead pot

This style could have held beads, or practically anything else. Potters made these general-storage jars in a variety of sizes.

Wood shown: hackberry, lacquer and wax finish.

5³/₄" diameter

Opening diameter
2¹/₈"



Seed jar

Tall vessels like this could have served as large seed jars. Native American potters most often produced this style as a vase to sell to tourists, however.

Wood shown: hackberry, no finish.

5" diameter

Opening diameter
1⁷/₈"



Dinner bowl

This open design represents the shallow eating bowl found in most Southwest cultures. Sand and finish both the inside and outside when you make this one.

Wood shown: mesquite burl, Waterlox finish.

5¹/₄" diameter



Sikyatki

Native Americans once carried these jars on their heads, hauling water long distances. The flat shape was easy to carry, and the small opening minimized loss of water from splashing out.

Wood shown: juniper, Waterlox finish.

5¹/₄" diameter

Opening diameter
1⁷/₈"



Olla

The olla, or large jar, was for water storage. The mouth needed to be large enough to dip from, but small enough to reduce losses to evaporation in the arid, American desert.

Wood shown: juniper, lacquer and wax finish. ♣

Opening diameter
1⁷/₈"

6" diameter



LUMBERYARD

A rose for those who prefer

 [Print this article](#)

Note: Cut the rose parts from two blocks of softwood stock 1½×3½×6" (scraps of standard 2×4 fir or pine work great). You'll need a 5/16" dowel 14" long for the stem and two short lengths of 1/8" dowel for the leaf stems.

Trace the Full-Sized Petal and Leaf Blank Side View pattern *opposite page* onto one face of one 2×4 block. Butt the bottom of the pattern against one edge of the stock near the end, where shown in the Petal and Leaf Blanks drawing.

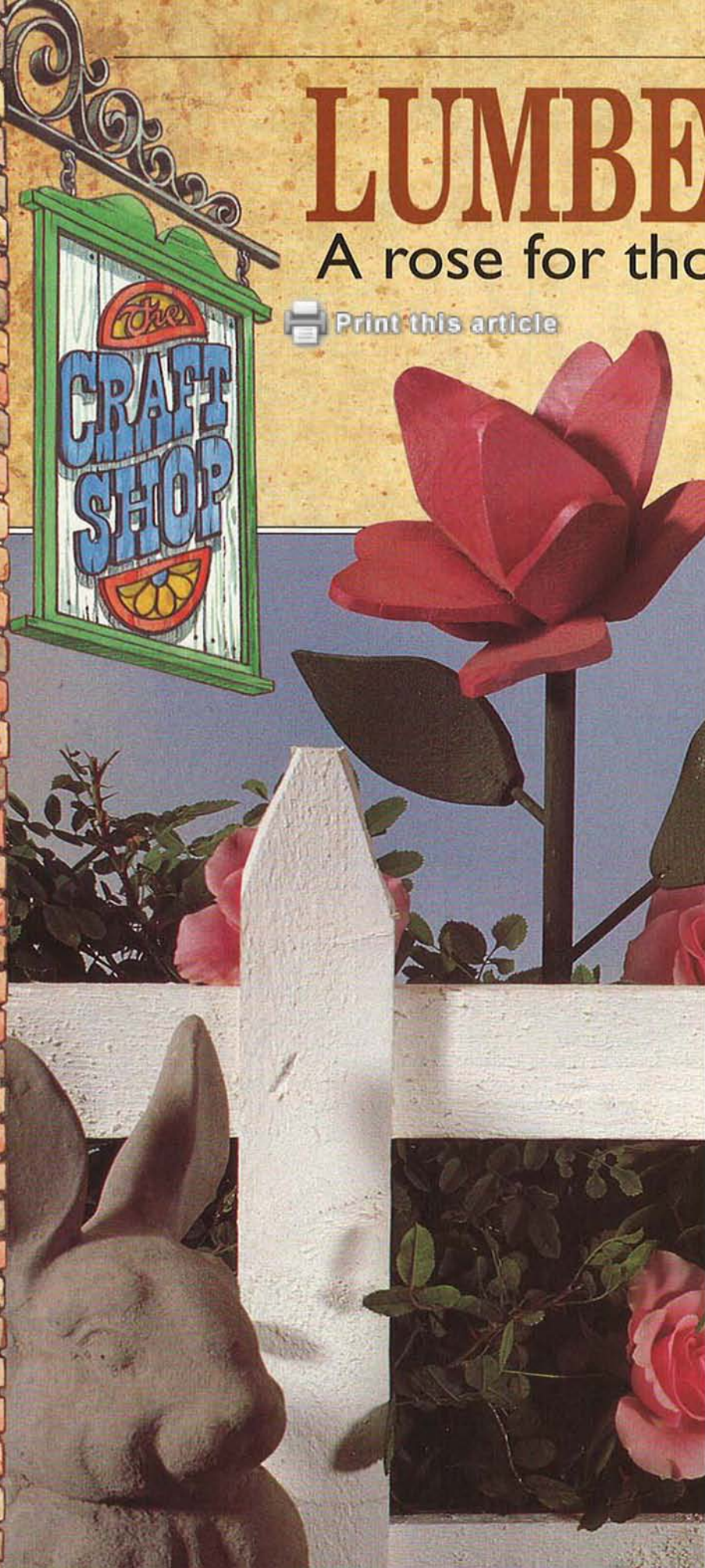
Bandsaw or scrollsaw along the pattern line. A bandsaw fitted with a 1/8" blade works great, but you also could use a scrollsaw with a heavy blade, such as a no. 9 (.053×.018" with 11.5 teeth per inch). Saw one line from the edge to the tip, back out, and saw in along the other line.

Now, cut nine more blanks. Rather than tracing the paper pattern repeatedly, simply stand the first cut piece on edge on the stock and draw around it with a sharp pencil or utility knife for each remaining part. You'll need a total of 10 blanks.

Trace the full-sized petal pattern onto eight of the blanks, the leaf pattern onto the other two. Place the patterns on the side of the blank that curves upward from the thick end, with the pattern's bottom at the thick end.

Cut out the petals and leaves. The blank's curvature prevents full contact with the saw table, so saw carefully, particularly in the unsupported area. Rock each blank on its curve as you cut to keep as much of it on the table as possible.

To make the rosebud, rip the remaining 2×4 block to 1½×1½". Trace the pattern onto two adjoin-



LONG-STEM

saws to spades

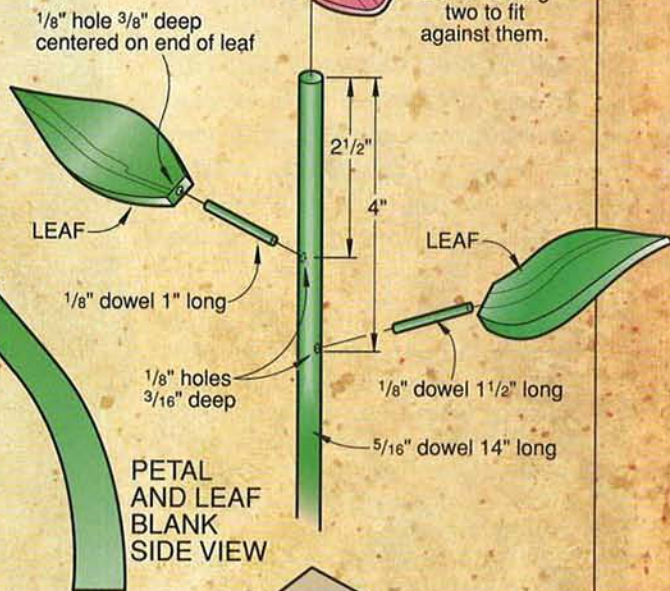
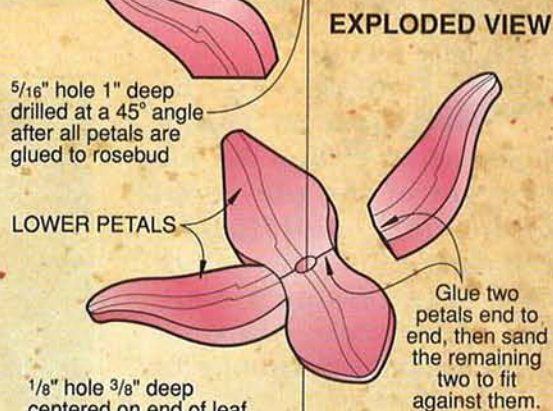
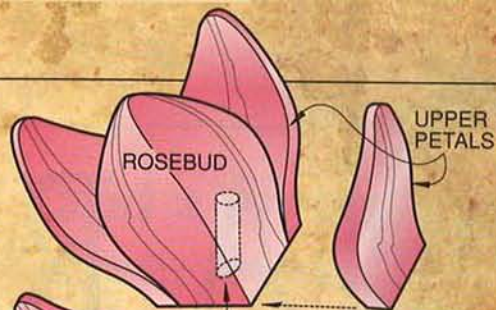
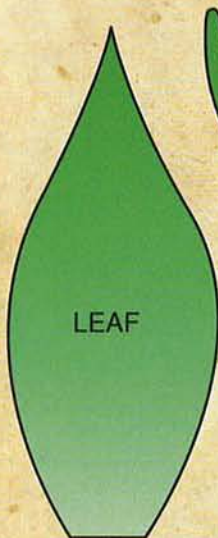
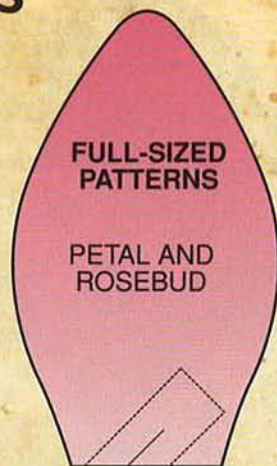
ing faces, as shown in the Rosebud Blank drawing. Scrollsaw or bandsaw one face, then tape the waste back onto the block to saw the other face.

Sand the parts, rounding over the curved edges slightly. Then, select four petals that are approximately the same thickness at the thick end. Refer to the Exploded View drawing, and glue two of the petals together, end to end. Trim the thick ends of the other two to fit against the sides of the glued pair where shown.

Glue the remaining four petals to the sides of the rosebud where shown. Then, glue the rosebud assembly onto the lower petal assembly. When dry, drill a $\frac{5}{16}$ " hole at about a 45° angle into the bottom of the rose.

Drill $\frac{1}{8}$ " holes where shown in the two leaves and the stem. Assemble the leaves to the stem with $\frac{1}{8}$ " dowels. Glue the top of the stem into the hole in the rose. Paint the bloom with acrylic paint in your favorite rose color (we used metallic pink). Paint the stem and leaves dark green. ♣

Project Design: Danny Barr
Photograph: John Hetherington
Illustrations: Kim Downing



ROSEBUD BLANK

$1\frac{1}{2}$ x $1\frac{1}{2}$ x $2\frac{3}{4}$ " stock

STEP 1

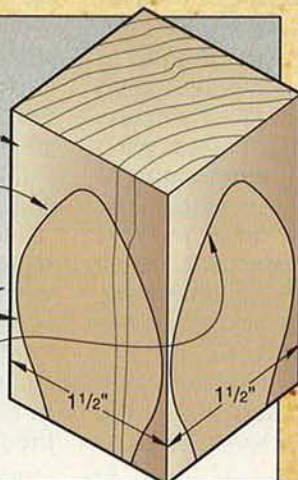
Cut out pattern on one side of blank.

STEP 2

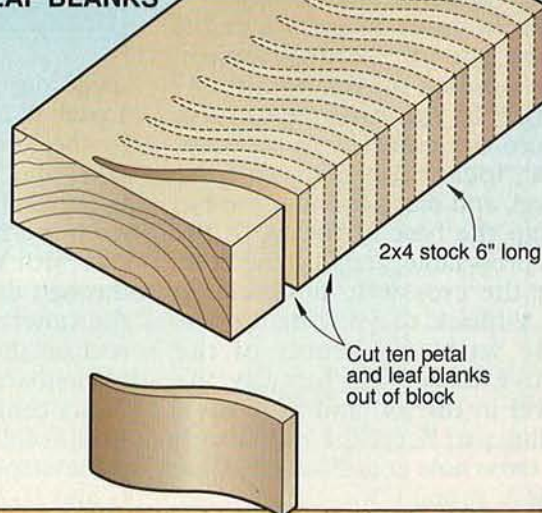
Tape parts cut from previous step back together. Cut out adjoining side.

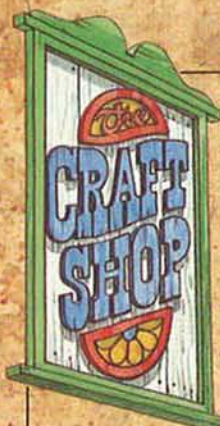
STEP 3

Sand top of rosebud to pattern line on both sides



PETAL AND LEAF BLANKS





A REEL DEAL

Here's all the gear a young angler needs to lure the big ones out of the playroom fishin' hole. Building it? Well, that's not much more work than tossing a hook into a cool, clear lake on a sunny Sunday afternoon.

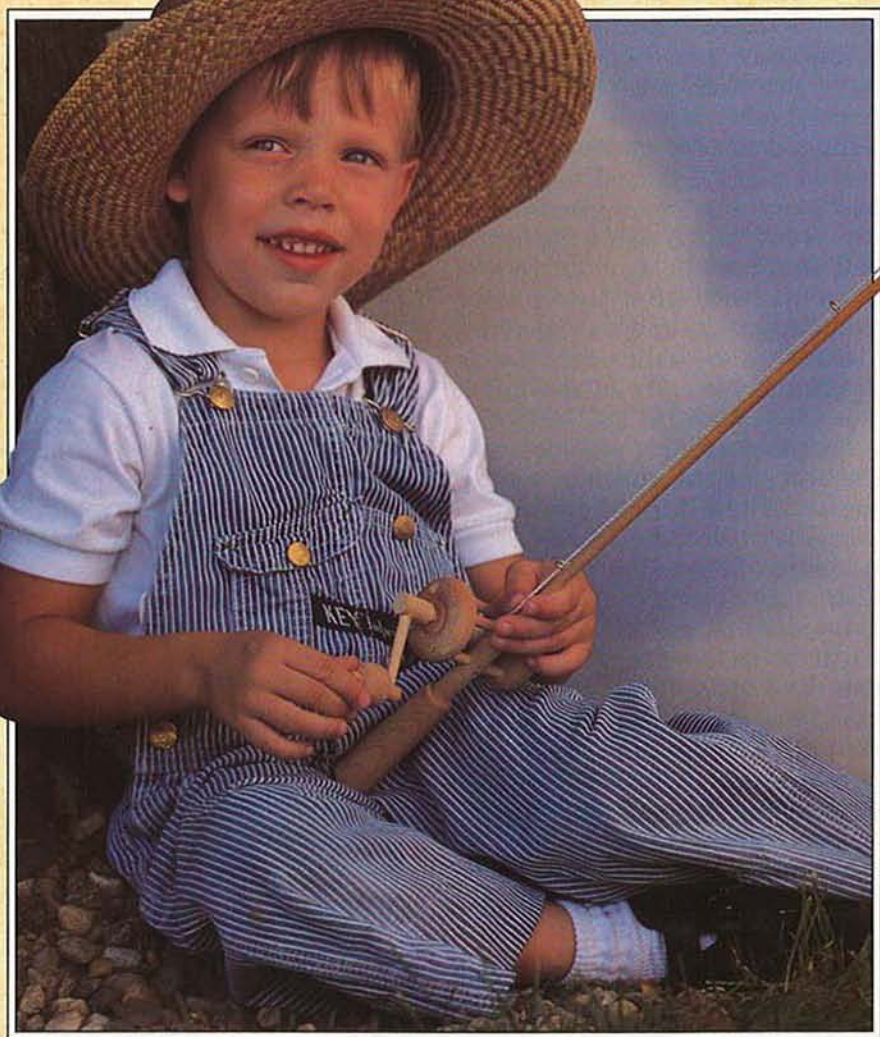
Note: Dowel diameters may vary from the nominal size, so select drill bits to match the diameter of your 1/8", 1/4", and 1/2" dowels. Use those bits wherever the instructions call for 1/8", 1/4", or 1/2" holes.

To build the fishing pole, you'll have to drill into the side of a few dowels (crosswise) and into the end of some (lengthwise). To make those tasks easier and safer, start by building the two jigs shown on page 84 to use with your drill press.

For the rod, cut parts A, B, and C to length. (We cut the short pieces of dowel by hand, holding them in the V-block and cutting them with a fine-tooth backsaw.)

Drill the holes in parts A and B where shown. To drill lengthwise, position the dowel in the V-groove of the drilling fixture. Secure the dowel with a clamp. Now, locate the center of the dowel, and place it under the bit. Clamp the base of the jig to the drill-press table, and drill the hole.

For the crosswise hole, clamp the V-block to your drill-press table with the center of the groove under the bit. Lay the dowel in the jig, and drill. After drilling part B, cut the end nearest the cross hole at a 45° angle. Glue parts A, B, and C together.



Drill four equally spaced holes in a pair of 2" wheels where shown by the Reel Side detail. Cut parts D, E, and F to length. Glue parts D into one wheel, extending out from the back of the wheel (the flat side). Slide one part D through the hole in part B, install the other wheel, and center the reel on the rod. Glue the assembly in place in part B.

Refer to the Crank Hub and Shaft Retainer drawing, and follow the three steps shown to make parts G and H. Cut parts I, J, and K to

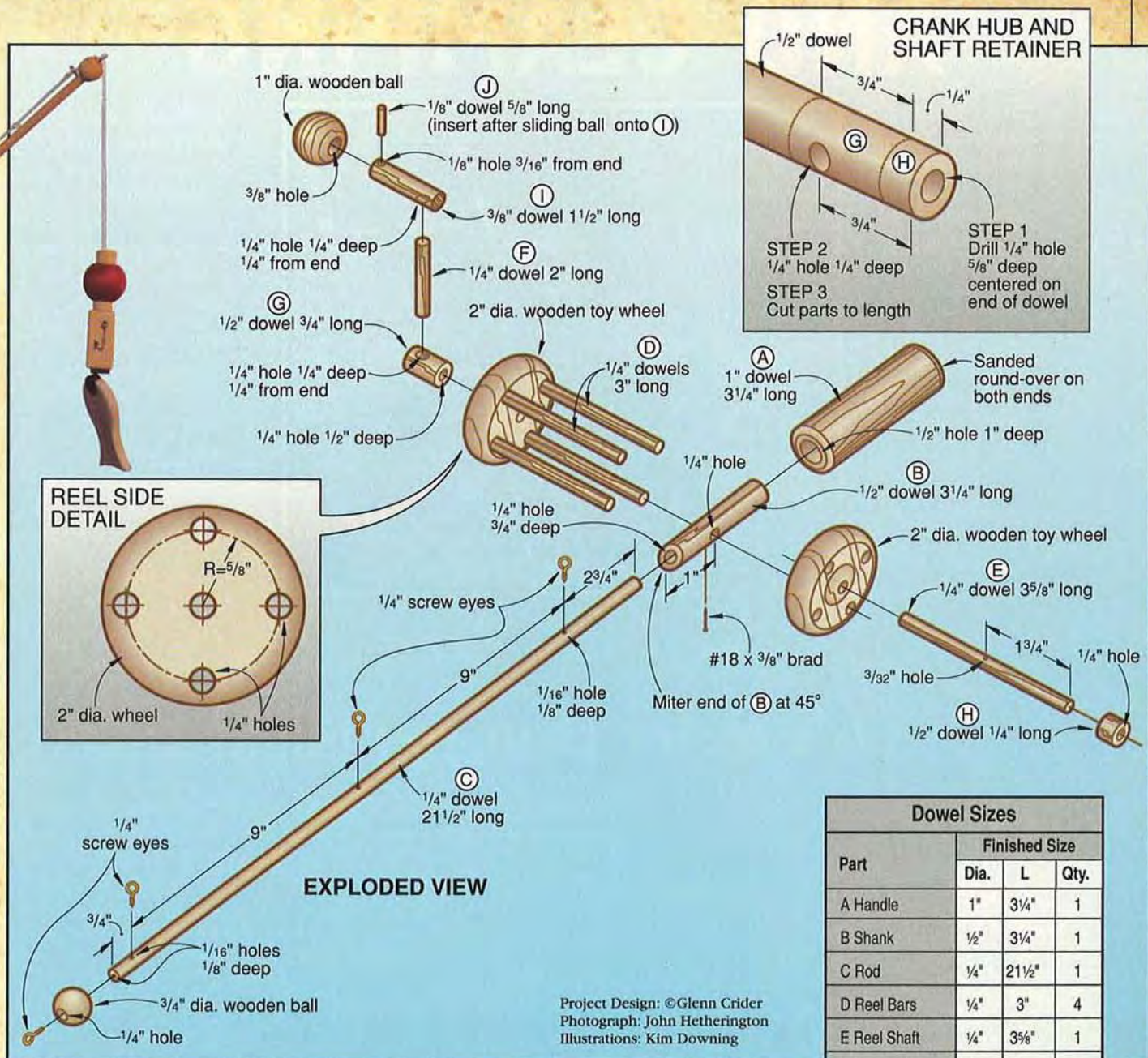
size. Drill parts E, I, and K where shown, and assemble the reel. Enlarge the wheel center holes to allow part E to rotate freely. Slide E into position, and glue parts G and H to it, leaving E free to turn.

Glue parts F and I together, then slide a spandrel ball (a 1" ball with a 3/8" hole through it) over I. Secure the ball with part J. Grip a 3/4"-diameter ball in a handscrew clamp, and drill a 1/4" hole through it. Glue the ball onto the end of the fishing rod.

Continued on page 82

FOR KIDS

Land a whopping "Gee, thanks!" with this tackle



Buying Guide

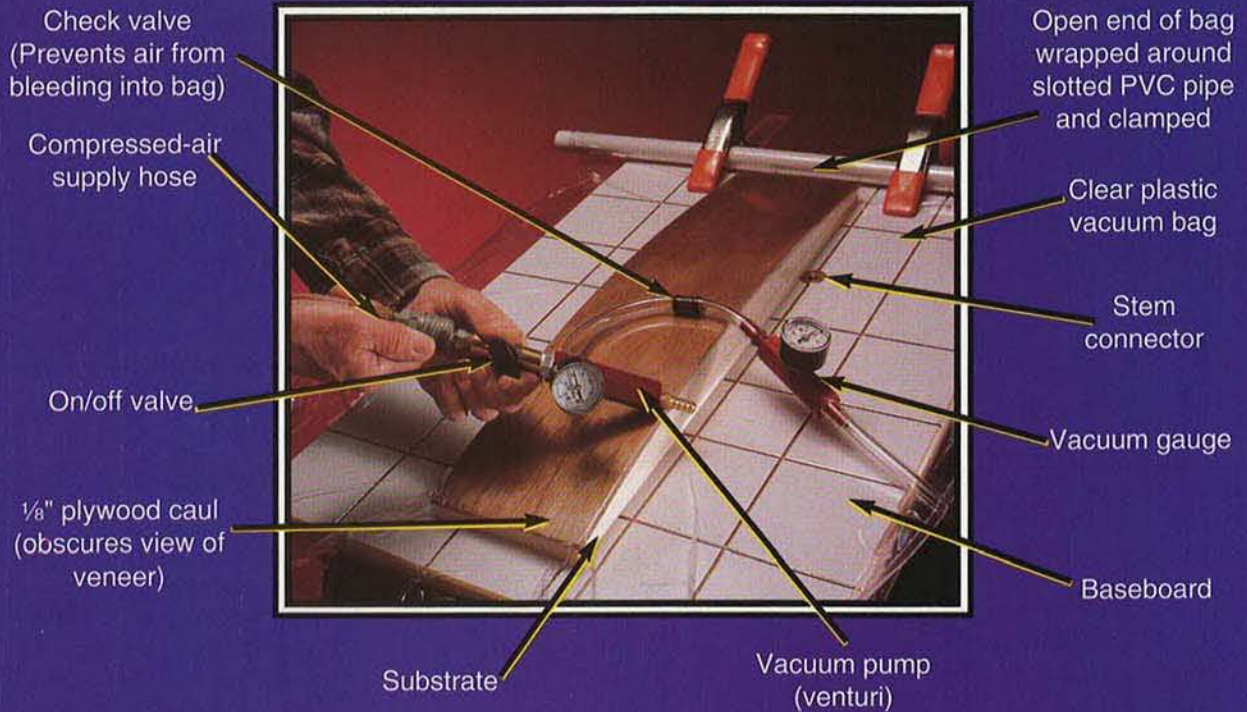
Parts kit. Wheels, spandrel balls, 3/4" balls, magnets, screw eyes, and twine for two fishing rods. Order no. 1355 Toy Fishing Rod Hardware Package, \$4.95 per

kit plus \$3.50 per order shipping and handling (MN residents add 6.5% sales tax) from Meisel Hardware Specialties, P.O. Box 70W, Mound, MN 55364-0070. For telephone orders call 800/441-9870

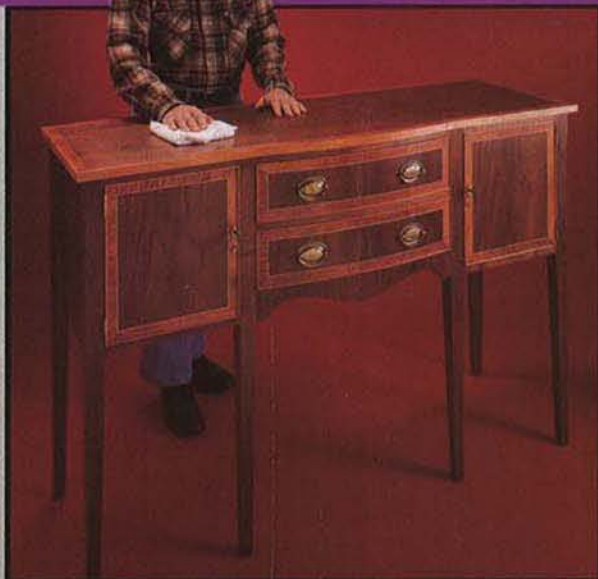
*Start with longer stock, and cut to finished length in accordance with how-to instructions.

Get great results at minimal cost

VACUUM-VENEERING AND CLAMPING




It's easier than you might think



Above: This simple vacuum-veneer setup costs about \$200 and yields perfect results, even with curved workpieces such as this bowed drawer front.

Left: Former *WOOD* magazine photographer Bill Hopkins used vacuum-veneer to produce this Hepplewhite-style sideboard.

 [Print this article](#)

Like a lot of other people, we used to think that only professional woodworkers could reap the benefits of vacuum-veneer. Were we ever wrong! After trying it for ourselves, and after making the clamping jigs on the following pages, we found the procedures and equipment remarkably simple, and surprisingly affordable. And the results? Fantastic!

Working in a vacuum: how it's done

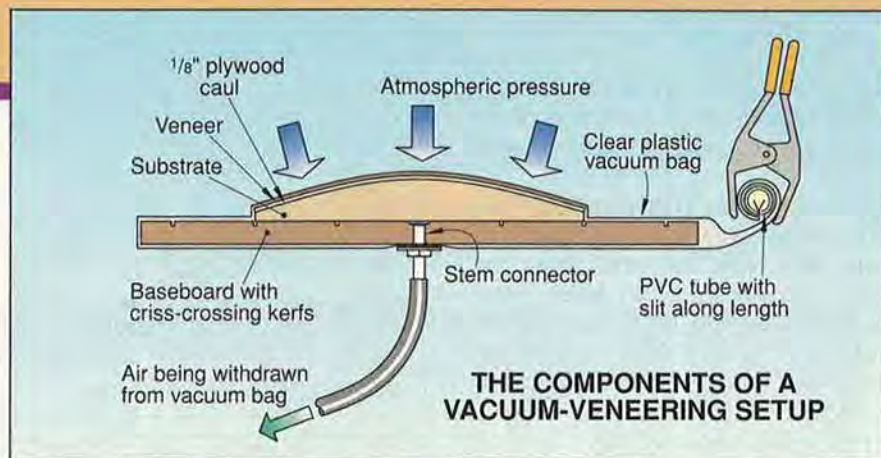
Vacuum-veneering and clamping systems work on a simple principle: At sea level, the atmosphere applies more than 2,000 pounds of pressure per square foot in all directions. By removing air from one side of a workpiece, the atmosphere places all of its pressure on the opposite side of the workpiece. (The drawing *right* shows this principle in action.)

To remove the air, you can choose between electric- and air-powered vacuum pumps. For this article we experimented with an economically priced air-powered version. These units cost as little as \$100, including a vacuum pump (often called a venturi), on/off valve, hose, and other basic accessories. They do require a compressor, though, that produces at least two cubic feet per minute (cfm) of air. By contrast, electric-powered pumps cost upwards of \$300.

To use a vacuum pump for veneering you'll also need a special vacuum bag. Inside this large, clear-plastic bag you place veneer, adhesive, and a substrate stacked on top of a baseboard with criss-crossing saw kerfs. When you seal the bag and draw the air out of it, atmospheric pressure forces the veneer perfectly flat.

You'll find veneer bags in these approximate sizes: 4×4', 4×8'6", 4×10'6", 4×12', and 6'6"×10'6". You can buy them in vinyl (.020" or .030" thick) or polyurethane (.020" thick) in prices ranging from \$85 to \$675 each. A .020"-thick vinyl bag, your least expensive option, suits the needs of occasional users.

As you draw air out of the bag, the vacuum gauge acts like a barometer and measures the pressure according to inches of mercury (Hg). The pump will easily pull 25 Hg (about 1,800 pounds per square foot of pressure). Since



a small amount of air leaks into the bag on its closed end and through any small pinholes, you need to check the pressure gauge every now and then. When it drops to 15 Hg, you need to bring the pressure back up by running more compressed air through the venturi.

If you would rather not bother checking the pressure from time to time, you can buy automatic controllers that maintain pressure by switching the pump on and off. This feature will add several hundred dollars to your investment, though. We suggest you add this device later if needed.

One man's success story with vacuum veneering

Bill Hopkins (the proud guy in the photo *left*) used to spend a lot of time on the other side of the camera, taking pictures for *WOOD*® magazine. Since retiring from his photography business a few years ago, Bill still finds time to stop by and see us. Only these days, he usually has woodworking, not photography, on his mind.

On one recent visit, Bill was planning the Happlewhite-style sideboard he's posing with. Although he had never tried vacuum veneering, he thought it might be just the ticket for his new project. As he told us: "In my previous veneering attempts, it seems I always ended up with a troublesome bubble I couldn't quite roll down flat. And, clamping the veneer to the bowed drawer

fronts on this project could get real tricky." Since we had a vacuum-veneering setup on hand, we asked Bill to give it a try and get back to us with his findings.

Well, the results speak for themselves: Bill's sideboard turned out fantastically. Here's what he had to say: "I used some bumpy veneer, but the vacuum press layed it dead flat. By carefully closing the bag, I was able to hold the vacuum fairly well with a loss of less than 3 Hg over a period of an hour or so. While it would have been nice to have the automatic controller, I didn't find this piece of equipment necessary for doing excellent work. I'm sold on using a vacuum setup for veneering."

Five handy clamping jigs

Although manufacturers tell us that vacuum systems get their greatest use in veneering, you'll also find them indispensable for certain clamping chores. On the next page, we've illustrated some of the possibilities. To learn about more applications, such as vacuum featherboards, right-angle clamps, and straightedges, contact the manufacturers listed at the end of this article.

You can make our jigs from any tight-grained, 3/4"-thick wood such as hard maple. When you need a flat, inexpensive surface, plywood will do. The manufacturers in the Buying Guide on the next page will outfit you with the necessary fittings, vacuum tape, and other

Continued

accessories. We found both suppliers easy to reach and more than willing to dispense advice.

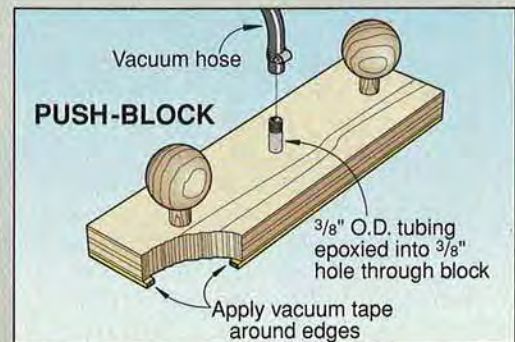
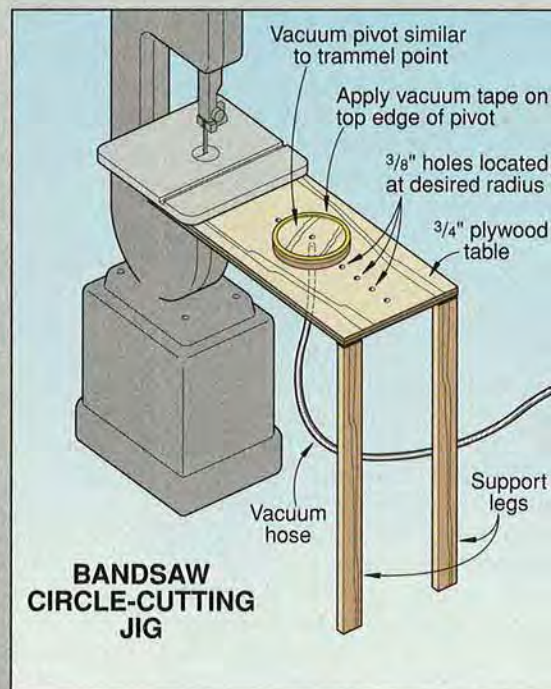
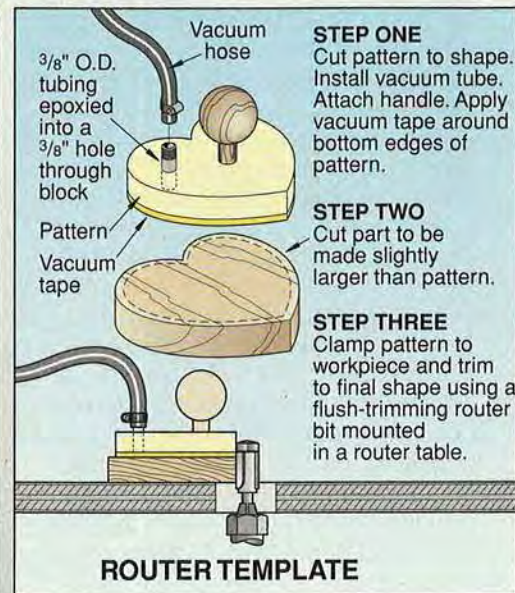
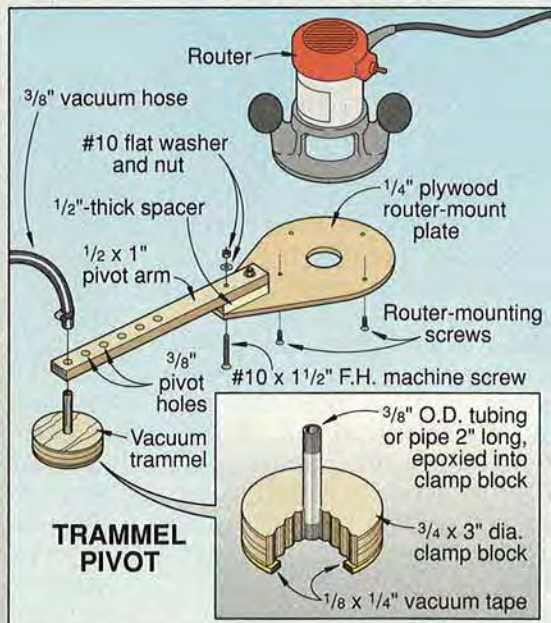
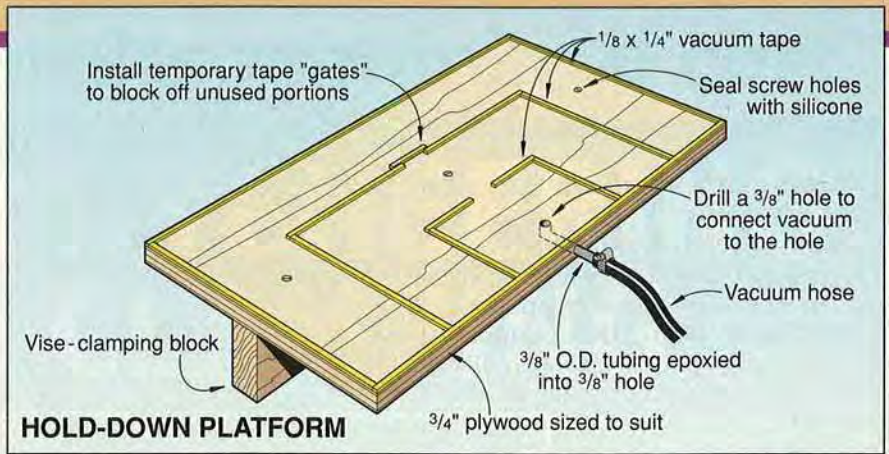
•**Hold-down platform.** With this fixture clamped securely in your vise, you can sand, rout, or carve workpieces without cumbersome clamps. By using the vacuum-tape "gates," you can control the area of suction for various-size workpieces.

•**Trammel pivot.** Conventional trammel pivots require you to drive a nail or drill a hole into the center of your workpiece, but this version leaves your project unscathed. Possible applications include cutting circles or molding their edges.

•**Bandsaw circle-cutting jig.** If you would rather cut your circles with a bandsaw, here's a super setup for getting the job done. The same jig works with a stationary sander for sanding perfect circles to shape.

•**Pushblock.** We designed this handy helper for jointing tasks, but smaller versions work great for holding tiny pieces for router-table operations. You can use this basic idea to customize push-blocks for all sorts of machining tasks.

•**Router template.** You'll really appreciate this little device if you need to produce quantities of simple shapes. The reason: You'll spend little time at the bandsaw or scrollsaw if you cut the objects to rough shape, then rout them to finished shape with this jig and a flush-trimming router bit.



Buying Guide

For more information on vacuum-veneering and clamping, contact these manufacturers:

•**Quality Vakuu Products**, 32 Longmeadow Rd., Lincoln, MA 01773. Call 800/547-5484 or 617/259-1490.

•**Vacuum Pressing Systems**, 553 River Rd., Brunswick, ME 04011. Call 207/725-0932.



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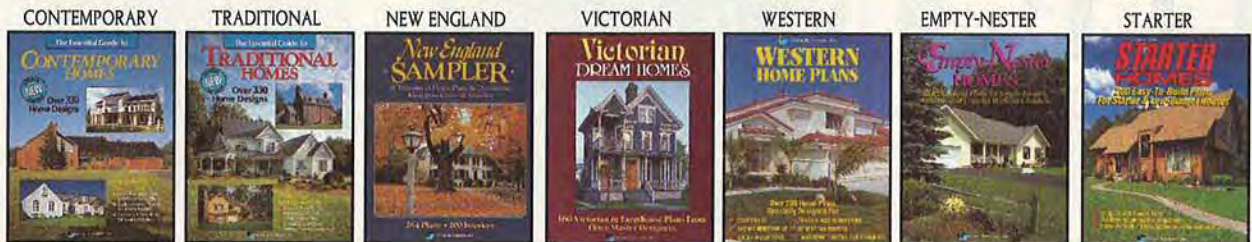
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WMM45

WOOD-DRYING TIPS



Contrary to what you might think—and what we thought—air-drying green lumber before putting it in the solar kiln on *page 44* won't speed up the drying process. Says Eugene Wengert of the University of Wisconsin, "You'll only be ruining the prime on the pump, so to speak. Wood that's first air-dried takes as long to kiln-dry to the final moisture content of about six percent as green wood does." That's because after the free water that fills the cavities of the green-wood cells evaporates, the moisture remaining in the cell walls becomes bound water. And like a damp cloth, only low-humidity heat can dry it further.

Here's more great tips

• For wood to dry in a solar kiln, you should try to maintain an interior temperature that's a mini-

mum of 50° F. Ideally, the kiln temperature should read about 30° higher than outdoor temperature. Fans help hold this temperature difference in hot weather.

• Wood can dry too fast. All hardwood species have a maximum moisture content that they can lose per day without suffering damage (their drying rate). Oak, for instance, can't lose more than 2.5 percent. Walnut, on the other hand, can lose as much as 8.5 percent. With a mixed load, dry to the wood with the slowest drying rate, like oak. Let other species go along for the ride.

• Partially filling a kiln may result in the green wood drying too rapidly and developing stress. The solar kiln design allows for drying a full load to the slowest rate. (For a shorter stack, extend the black plastic baffle down to the top of the wood pile.)

• Never introduce a supplementary heat source. Too much heat can cause defects such as case hardening, which hardens the wood's surface only.

• The kiln must cool off at night. Condensation that collects on the walls at night (with the fans off) reduces any potential stress in the drying wood.

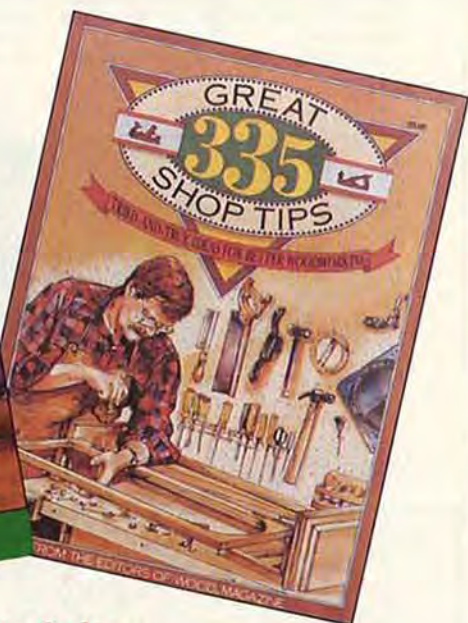
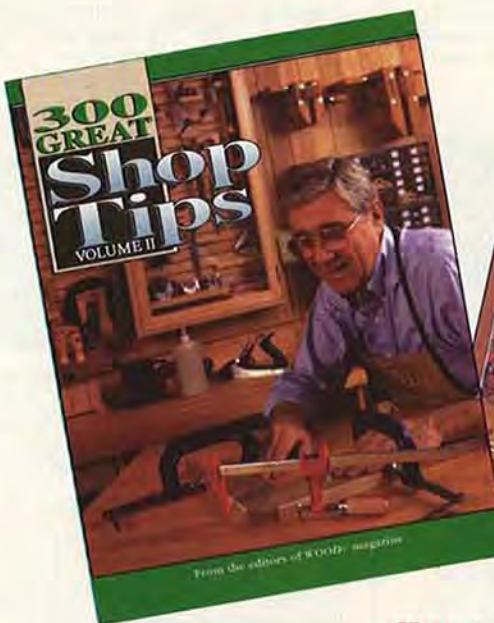
• Regulate the drying rate with vents. In some cases, you may have to keep vents closed at first, then open them for awhile, then close them again to control moisture loss.

Although there's a lot to learn at first about kiln-drying green wood, the effort's economically worthwhile. And if you're in the woodworking business, you can depreciate the solar kiln's cost for tax purposes because it's considered equipment (consult with your tax advisor). ♣

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What woodworkers need to know about... **BANDSAW BLADES**

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• **Better cornering.** For a blade that takes tight curves smoothly, round its back corners with a coarse whetstone. Many dealers sell a dry stone mounted on a handle—called a blade-tuning stone—designed especially to do this.

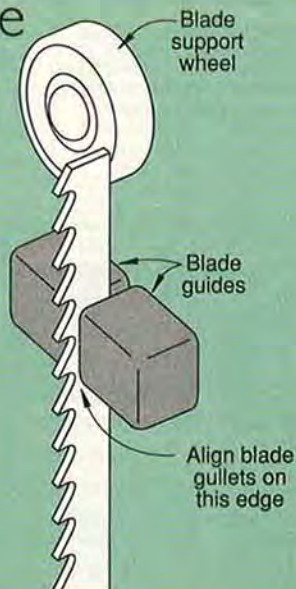
• **Don't attempt re-entry.** If you replace a blade in the midst of a cut, don't saw into the old kerf with the new blade. That's a sure way to dull the new blade prematurely. Instead, turn the work around and start at the other end.

• **Straighten up and cut right.** For accurate cutting, you must adjust the tension and blade guides correctly. Here's how we do it in three simple steps:

1. Set the blade tension in accordance with your saw's instruction manual.
2. Adjust the tracking to bring the bottoms of the blade gullets into line with the front of the saw's guide pins or blocks (see illustration *above right*).
3. With the saw running, carefully slide the blade support

toward the back of the blade. When the blade rotates the wheel, slide the support away from the blade just a smidgen so the free-running blade won't rotate the guide wheel. Tighten the setting.

• **Blades that won't cut straight.** A blade that continually tracks off a cutting line in the same direction may be dull on one side. The blade will lead toward the sharper side. The only cure: sharpen the blade or install a new one on the saw.



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Can't find the blade you want locally? Try these mail-order dealers for a wide variety of bandsaw blades:

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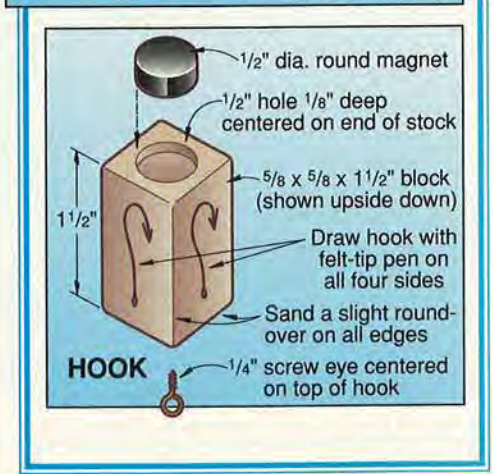
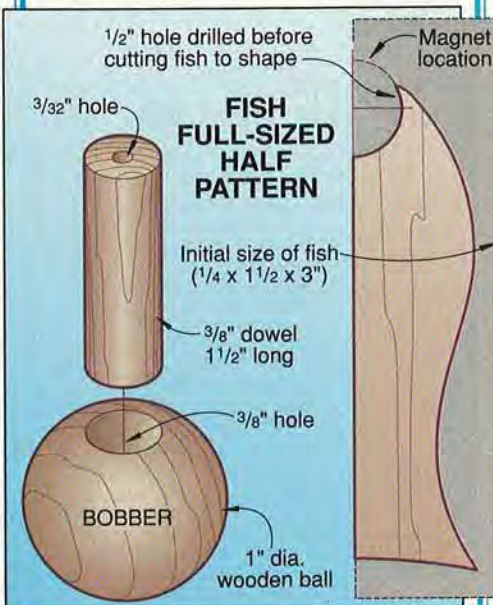
FISHING REEL

Continued from page 75

Assemble the bobber and hook, referring to the drawings below. Epoxy the magnet into the hook. With a marking pen draw a hook on each side of the hook block. Paint the bobber ball red.

Scrollsaw several fish from 1/4"-thick stock. Glue a magnet into each where shown. Finish the fish and the rod as desired.

Install four small screw eyes, three spaced evenly along the rod and one on the end where shown. String the rod with nylon or cotton twine about 1/16" in diameter, passing through the screw-eye guides. Tie one end through the hole on the reel shaft. Thread the other end through the hole in the bobber, tie a knot about 1" from the end, then tie the free end to the screw eye in the hook. 🐟



DOOR-PANEL OPTIONS

Print this article

Different styles for different needs

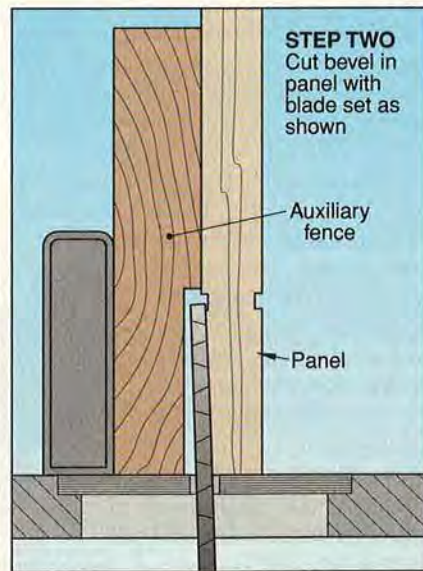
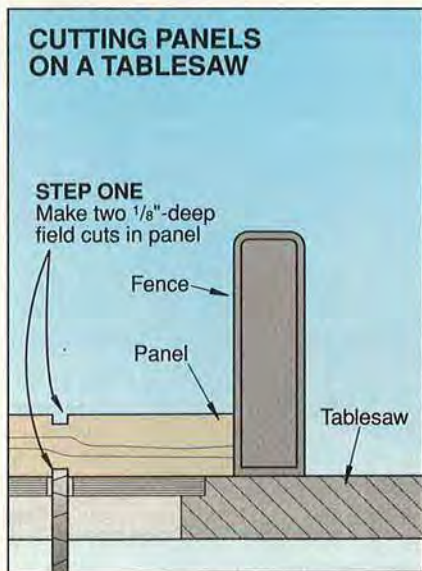
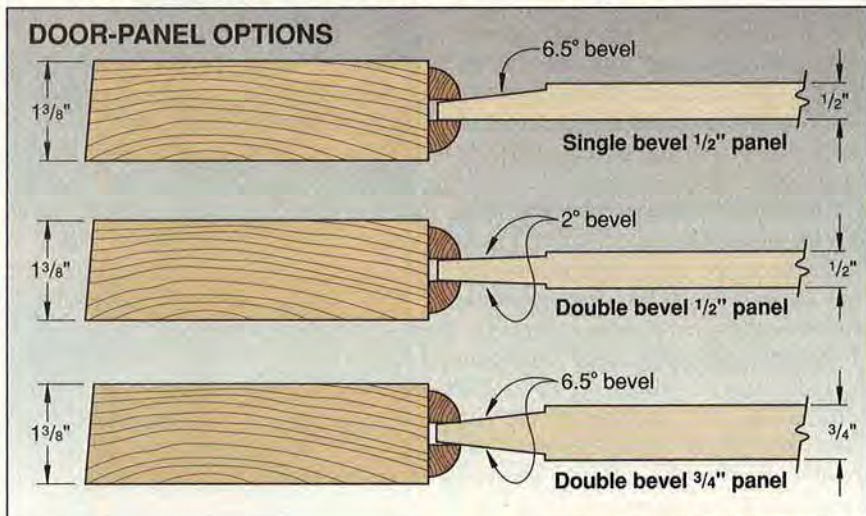
Traditional door styles employ a raised panel within a frame, but there are several options you can explore other than the 1" panel we used. You can make the door panels $\frac{3}{4}$ " or $\frac{1}{2}$ " thick and still maintain a bevel on the edges.

By making the panels thinner you reduce the weight of the door a bit and save a little money too. You can also make the panels flat on one, or both sides. Closet doors, for example, don't need a bevel on the side that nobody

sees. Thinner panels, however, result in shallower bevels and don't impart the same massive look as do the deeper shadow lines of thicker panels.

If you don't have a panel-raising router bit to cut the bevel profile you want, set up your tablesaw to do the cutting as shown in the two drawings below. Whatever panel style you choose, just be sure to leave a $\frac{3}{8}$ "-thick outer edge on your panel to fit into the groove created by the molding.

Illustrations: Jim Downing



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GREAT IDEAS FOR YOUR SHOP

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JUST FOR DOWELS DRILL-PRESS JIGS



Clamped to the drill-press table, this grooved piece of scrapwood holds dowels steady for flat drilling.



Screw the shorter V-groove block to an upright to drill straight down into the end of the dowel.

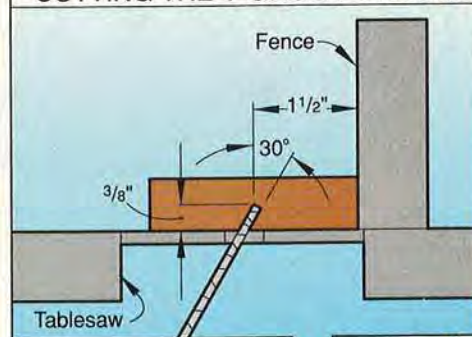
Drilling holes into the sides and ends of dowels, such as those required for our Craft Shop fishing pole, *page 75*, can challenge even the best woodworkers. The problem: trying to hold round stock in position. Here are a couple of simple jigs that will hold your dowels rock-steady.

Both jigs rely on a V-groove that you cut into a piece of $\frac{3}{4} \times 3 \times 20$ " scrapwood. To cut the V, tilt the blade of your tablesaw to 30° from vertical, and set the cutting depth to $\frac{3}{8}$ " as shown in the illustration at *right*. Adjust the fence to place the top of the cut on the centerline of the board. Make one pass over the saw blade, turn the board around, and run it through again, creating a 60° V-groove.

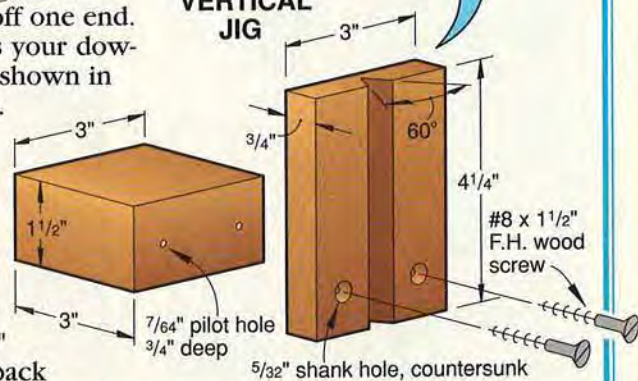
Crosscut a $4\frac{1}{4}$ " piece off one end. The longer piece holds your dowels flat on the table, as shown in the photo *above left*. The shorter piece forms the basis for the second jig, which holds dowels vertically for drilling into their ends.

To complete the vertical jig, cut a $1\frac{1}{2} \times 3 \times 3$ " block, clamp it to the back

CUTTING THE V-GROOVE DETAIL

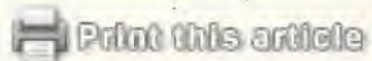


VERTICAL JIG



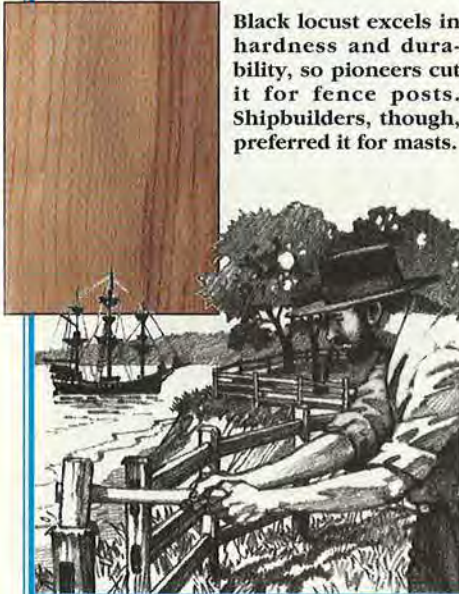
Photographs: John Hetherington Illustration: Roxanne LeMoine

WOOD ANECDOTE



BLACK LOCUST THE ENDURING TREE OF TALL-SHIP FAME

Black locust excels in hardness and durability, so pioneers cut it for fence posts. Shipbuilders, though, preferred it for masts.



When English naturalist Mark Catesby first visited Jamestown, Virginia, 100 years after its founding, he saw only the stark ruins of what the first inhabitants in 1602 had called home. But at each corner of the tumble-down huts remained a post—as solid as the day it was erected. He marveled at the still-sound wood, which had been named “locust” after an old-world look-alike.

Other colonists eventually learned of locust’s longevity, too, because the tree became widely used. No wonder.

Black locust (*Robinia pseudoacacia*), as it has come to be called, offers superb qualities. Because a locust’s trunk contains mostly sapwood, it’s strong. In drying, locust hardly shrinks. In stiffness, it outdoes hickory. Fighting decay, it outlasts white oak. Burned, a cord of black locust throws off the heat

of a ton of coal. And machined and sanded, the wood takes on a high luster.

Yet, black locust has never attained commercial status. That’s because in most of the areas where it grows the tree suffers from insect attack, leaving few trees sound enough to harvest. So instead of becoming commercial lumber, black locust winds up as fence posts, firewood, and railroad ties. Except for one fleeting moment of historical greatness, that’s the way it has always been.

You see, a variety of black locust, caringly cultivated in the late 18th century in New Jersey and New York—especially Long Island—earned renown. The tree’s straight, branchless trunk proved perfect for shipmasts. Even today in the area, you can still find examples of those once sought after “shipmast locusts.”

Illustration: Jim Stevenson

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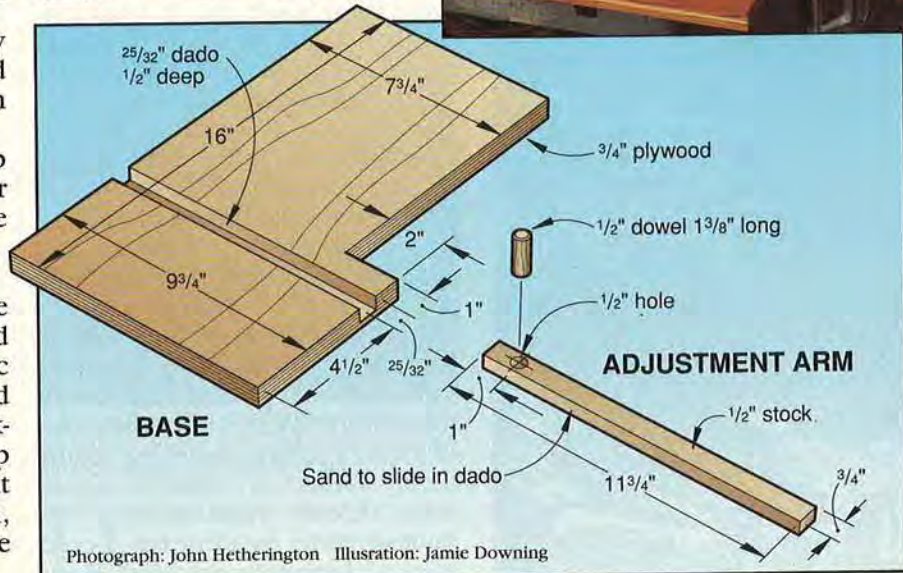
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Photograph: John Hetherington Illustration: Jamie Downing

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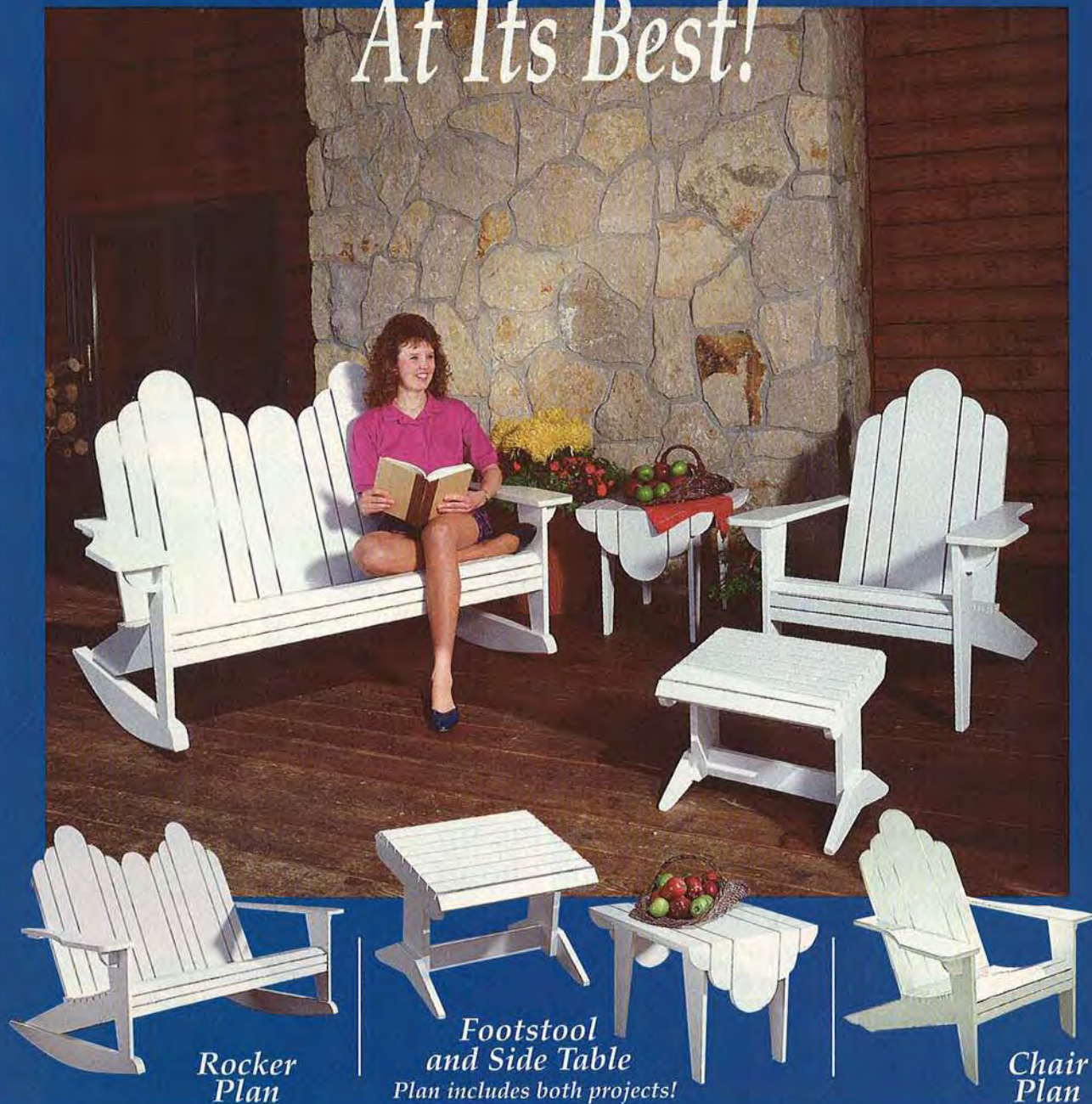
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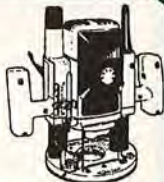


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23-680	6" Bench Grinder 1/4 HP	86	75
23-880	8" Bench Grinder 1/2 HP	151	111
11-950	8" Drill Press	199	144
31-050	1" Belt sander 2.0 amp	104	78
31-460	4" Belt/Disco Sander	198	135
31-340	1" Belt/8" Disc Sander	268	204
31-080	1" Belt/5" Disc Sander	134	94
40-560	16" 2 speed Scroll Saw	266	178
11-990	12" Bench Drill Press	276	205
11-090	32" Radial Bench Drill Press	399	289
43-355	3/4" Shaper 1-1/2 HP	964	729
43-505	1/2" Bench Router/Shaper	399	279
22-540	12" Bench Top Planer	398	282
36-220	10" Compound Miter Saw	350	229
28-180	Bench Band Saw	232	165
28-190	12" Band Saw	465	355
40-640	20" Bench Scroll Saw	466	295
37-070	NEW 6" w/spd Bench Joiner	337	248
14-650	Hollow Chisel Mortiser	668	289
46-700	12" Wood Lathe	548	445
33-990	10" Radial Arm Saw	818	639
37-280	6" Motorized Jointer	488	395
37-154	DUJ5 6" Jointer w/3/4HP motor	1451	1155
50-179	3/4 HP 2 stage Dust Collector	848	345
70-200	20" Floor Drill Press	1049	829
33-055	8-1/4" Sawbuck comp w/legs	865	615
34-330	8-1/4" Table Saw 13 amp	343	245
32-100	Stationary Table Joiner	645	249
36-040	8-1/4" Compound Miter Saw	224	155
34-915	30" Unifence	385	239
34-897	50" Delta Unifence	525	285
36-755	10" Tilt Arbor Saw	1264	965
34-444	Contractors Table Saw	812	629
34-445	34-444 Saw w/30" Unifence	1200	775
34-458	34-444 w/Bies. 50" saw fence	1300	889
17-900	16-1/2" Floor Drill Press	462	399
40-601	18" Scroll Saw with stand	1003	749
22-661	13" Planer with 2HP motor	1513	1199
33-060	NEW "Sidekick" Miter Saw	501	369
14-070	NEW 1/4" Floor Drill Press	540	349
50-075	Dust Collector/Sweeper 3/4 HP	360	249
28-283	14" Band Saw w/enc. stand	910	745

Model	Description	List	Sale
6527	NEW Sawzall with case	320	168
6528	above Sawzall w/wired cord	316	168
6125	NEW 5" Random Orbit Sander	200	114
6126	NEW 6" Random Orbit Sander	205	115
9199	12V cordless Drill Kit comp	315	172
4002-1	above Drill w/kyls chuck & 2 batt.	172	102
0395-1	9.6V cordless Drill with case	290	158
0224-1	3/8" Drill 4.5 amp magnum	227	114
0234-1	1/2" Drill 4.5A mag 0-850 rpm	237	124
0244-1	1/2" Drill 4.5A mag 0-600 rpm	237	123
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	198	107
0228-1	3/8" Drill 3.5 amp 0-1000 rpm	195	105
0375-1	3/8" close quarter Drill	237	127
0379-1	1/2" close quarter Drill	268	145
6546-1	cots Scrdvr 200 & 400 rpm	141	82
5590-1	1/2" D-hole Hammer Drill Kit	332	194
6197	Drywall Gun 0-4000 5 amp	171	94
6507	Original SawZall with case	264	144
6010	Orbital Sander 1/2 sheet	214	118
8977	variable temp. Heat Gun	131	77
5397-1	3/8" var. spd Hammer Drill Kit	258	138
5107-1	1/2" var. spd Hammer Drill Kit	340	184
3371-1	1/2" w/spd right angle Drill Kit	209	129
6754-1	Drywall Gun 0-4000 5.4 amp	196	112
3300-1	1/2" var. spd right angle Drill	356	185
5680	Router 2 HP - 12 amp	362	198
0235-1	1/2" Drill w/keyless chuck	237	128
6145	4-1/2" Grinder 10,000 rpm	168	99
6142	6145 with case & accessories	208	124
6749-1	Drywall Gun 0-2500 5.4 amp	218	124
6365	7-1/4" Circular Saw 13 amp	218	77
6366	6365 w/fence & carbide blade	228	127
6368	6365 w/fence, carb. blade & case	249	139
6377	7-1/4" Worm Drive Saw	330	184
6256	Top Handle Jig Saw	264	144
6490	10" Miter Saw	444	255

Item	Description	Teeth	List	Sale
L072M010	Gen Pur. A.T.B. 10" 40	60	69	39
L082M010	Cut-off 10"	60	93	49
L084M010	Comb 10"	50	78	42
L085M010	Super Cut-off 10"	80	115	59
L072M010	Ripping 10"	24	69	38
L073M010	Cut off 10"	60	84	45
L078M010	Thin Kerf 10"	24	72	39
L088M010	Thin Kerf 10"	60	88	45
L099M010	Ultimate 10"	60	128	68
L091M010	Compound Miter 10"	60	88	54
F410	NEW Quiet Blade 10"	40	95	49
F810	NEW Quiet Blade 8"	60	135	74
TK303	7-1/4" Finishing	40	38	22
TK306	10" Finishing	40	47	25
TK906	10" Combo	50	53	29
SD306	8" Dado - Carbide	215	112	61
SD308	8" Dado - Carbide	230	118	64
SD506	6" carbide w/fence & shims	292	148	80
SD508	6" carbide w/fence & shims	344	168	94
F10	1-3/4" x 5/8" Biscuit 1000 Qty	43	29	15
F20	2-1/8" x 3/4" Biscuit 1000 Qty	43	29	15
F20	2-3/4" x 1" Biscuit 1000 Qty	45	29	15
FA	Assorted Biscuits 1000 Qty	338	184	40
FB100	16 piece Forester Bit Set	338	184	40
94-100	5 pc. Router Bit Dst System	320	159	50
TR215	NEW 10" Slide Compd Miter Saw	588	358	218
FT200E	3-1/4 HP w/spd Plunge Router	410	205	110
JS100	Biscuit Joiner with case	334	164	85

Model	Description	List	Sale
6070DW	3/8" w/spd Reverse Drill 7.2V	128	74
6071DVK	above Drill wiremovable batt.	216	119
51090DW	3-3/8" Saw Kit 9.6 volt	270	139
60105DW	3/8" cordless Drill Kit 7.2V	99	59
ML900	Incandescent Flashlight 9.6V	37	22

Model	Description	List	Sale
6012HDWE	2 speed Drill Kit w/2 batt.	243	129
6039DWE	6093DW Drill Kit w/2 batteries	270	145
6035DWE	6095DW Drill Kit w/2 batteries	252	139
6012HDWE	NEW 9.6V Drill Kit w/2 batt.	298	158
6211DWE	12V Drill Kit with 2 batteries	330	168
63200T4	9.6 volt Battery	47	30
63200T4	7.2 volt Battery	39	28

Model	Description	List	Sale
5007NBA	7-1/4" Saw w/electric brake	263	127
5008NBA	8-1/4" Saw w/electric brake	348	195
604510	1/4 sheet Pad Sander	108	59
9900B	3" x 21" Belt Sander w/bag	344	159
9240DB	3" x 24" Belt Sander w/bag	329	169
4301BV	Orb. var. spd Jig Saw 3.5A	292	169
JR3000V	var. speed Recip Saw w/case	252	135
LS1200	10" Miter Saw 3.5 amp	630	355
9820-2	Blade Sharpener	394	195
N1900B	3-1/4" Planer with case	244	129
1911B	4-3/8" Planer 7.5 amp	309	179
9514B	4" Disc Grinder 4.6 amp	111	65
3601B	1-3/8 HP Router	298	165
045500	1/4 sheet Pad Sander w/bag	98	54
DA3000R	3/8" Angle Drill	314	159
2708W	8-1/4" Table Saw	585	298
11011	10" Table Saw with brake	1067	569
6404	3/8" Drill Rev 0-2100 rpm	112	58
6104L	Contractors Drill Rev 0-1050 rpm	168	93
6820V	0-4000 rpm Drywall Gun	171	92
6013BR	1/2" Drill Rev 6 amp	280	139
5402A	16" Circular Saw 12 amp	743	429
9401	4" x 24" Belt Sander w/bag	378	205
4302C	var. speed Orbital Jig Saw	351	199
5077B	7-1/4" Hypoid Saw	281	155
LS1030	NEW 10" Miter Saw	428	215
5007NB	7-1/4" Circular Saw 13 amp	232	119
2012	12" Portable Planer	959	525
LS1011	10" Slide Compound Saw	946	539
AN8300	NEW Pneumatic Fram. Nailer	850	445

Model	Description	List	Sale
8100X	NEW 3/8" var/spd Drill	250	139
9000	3/8" var/spd close qtr Drill	201	123
6000	5" Air Random Orbit Sander	139	132

Model	Description	List	Sale
SFN1	Finishing Nailer 1" - 2"	448	298
SFN2	Finsh. Nailer 1-1/2" - 2-1/2"	571	375
SNP25	Nailer 1-7/8" - 3-1/4"	665	419
SLN20	New Pinner w/cse 5/8" - 1-5/8"	399	269
SKS	Stapler 5/8" - 1-1/2"	390	259
SN70	Fram. Nailer Clip Hd 2-3-1/2"	690	475
SN60	Fram. Nailer-Full Hd 2-3-1/2"	638	455

Model	Description	List	Sale
N80S-1	Stick Nailer	348	205
N12B-1	Coil Roofing Nailer	845	395
N60F-1	Finishing Nailer	650	335
T31	Brad Nailer	281	145
CWC100	1 HP Pancake Compressor	463	289

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DW3647-1/4"	Circ. Saw w/brake 13 A...	285	148
DW945K-2 3/8"	12V cals Drill Kit w/2 batt/309	169	99
DW944K-2 3/8"	6V cals Drill Kit w/2 batt/283	149	79
DW610 1-1/2"	HP 2 handle Router	274	148
DW411 1/4"	sheet Palm Sander, 1.7 amp.	57	58
DW1003K"	Drill, 4 amp, 0-2500 rpm, rev.116	68	38
DW510K1/2"	v/spd Hammer Drill w/case/311	165	95
DW682KNEW	Biscuit Joiner with case	429	225
DW705 12"	Compound Miter Saw	706	358
DW615NEW	1-1/4 HP Elec. Plunge Router	290	158
DW625NEW	3 HP var. spd Plunge Router	269	158
DW675KNEW	3-1/8" Planer with case	289	159
DW431NEW	3 x 21 v/spd Belt Sander	331	185

Model	Description	List	Sale
401	Porta Nailer complete	265	205
501	Face Nailer complete	265	205

Model	Description	List	Sale
6204	4 Fiberglass	179	65
6205	5 Fiberglass	199	75
6206	6 Fiberglass	225	92

Model	Description	List	Sale
F1000A12"	Planner/6" Jointer	2970	1559
P12R	12-3/32" Planer	1470	769
P12RA	Planner/Joiner	1940	989
C8FB	8-1/2" Side Compound Saw	1400	599
G12SA	4-1/2" Grinder 6.9 amp	160	89
DS100VAK	NEW 12V Cordless Drill Kit	393	199
NR83A	Framing Nailer 2 - 3-1/2"	700	385
NR83AA	Framing Nailer 2 - 3-1/2"	750	409
NT65A	16 ga. Brad Nailer 1 - 2-1/2"	610	318
NV45AB	Coil Roofing Nailer 7/8 - 1-3/4"	750	395
NV83A	Coil Nailer 2 - 3-1/4"	750	409

Model	Description	List	Sale
B-50	50" Commer. Saw Fence	345	298
T-SQUARE 52"	52" Homeshop Fence	279	238
T-SQUARE 40"	40" Homeshop Fence	259	2

FINISHING TOUCHES

OFF TO CONGRESS

The continent's longest-running competitive woodcarving show will reconvene at the Putnam Museum, in Davenport, Iowa, on June 23 and conclude on June 26. For nearly three decades now, the International Woodcarvers' Congress has featured top North American carvers vying for prizes in 12 categories and more than 40 classes, plus special awards. Admission is free, but carvers must belong to the Affiliated Woodcarvers, Ltd., to compete.

For more information, write: Larry Yudis, P.O. Box 10408, Bettendorf, IA 52722-8408, or call 319/359-9684.



Finger-to-finger redwood

The annual growth in California's coastal redwood forests is about 2.9 percent, with some areas nearing six percent. By the year 2040, the total annual growth rate will increase by at least 28 percent due to the number of newly emerging young redwood forests, predict officials at the California Redwood Association.

At the same time, redwood lumber producers make better use of existing timber by marketing finger-jointed products. Available in thicknesses of $\frac{3}{4}$ -2", widths to 12", and lengths up to 24', the joined wood equals architectural quality redwood in strength and appearance but sells for less. For information, request the data sheet for finger-jointed products from: *The California Redwood Assoc., 405 Enfrente Dr., Suite 200, Novato, CA 94949.*

Photographs: Mitch Kezar, Jim Kahler
Illustrations: Jim Stevenson



A place where woodworkers have aged to perfection

Drop by the Kuempel Chime Clock Works and Studio in the suburban-Minneapolis community of Excelsior, and in the shop you'll see grandfathers making grandfather clocks. Yessiree, in these days of company down-sizing through early retirement, Kuempel management embraces the opposite approach. In fact, 15 of the clock company's 20 employees are ages 63 to 85!

Zeroing in on older workers isn't new to this manufacturer of wood-cased clocks and clock kits (from grandfather-size to mantel). Way back in 1916, founder Rueben Kuempel often enlisted the aid of older visitors to his workshop. Today, Kuempel lists among employees a retired school principal, a former banker, and other active senior citizens who



Russ Barnard, at 65 one of Kuempel's youngest craftsmen, has managed the wood shop for nearly 20 years.

learned woodworking on the job in the company's clock shop.

According to Bruce Hedblom, one of the owners, older workers make ideal employees because they're meticulous about quality, honest, early on the job, and they work hard. But, they do like to have time off, so the company provides flexible hours. Because of this, about the only type of clock you won't find at Kuempel is a time-clock.

Visitors to Kuempel Clock are welcome to tour the shop. You'll find them at 21195 Minnetonka Blvd., Excelsior, MN 55331. Call 800/328-6445.

HIGH-WATER LUMBER



In July 1993, surging water from the Raccoon River in Des Moines, Iowa, flooded the Frank Paxton Lumber Co. yard (loading dock shown) and other businesses.

Floodwater can do great damage—just ask any Midwesterner—but it's especially damaging to kiln-dried stock because the wood becomes rewetted. All wood need not be lost, though, says the University of Wisconsin's Department of Forestry.

Its free guidance bulletin No. 67, "Drying Rewetted Kiln-dried Lumber," by Gene Wengert and Dan Meyer, gives complete instructions for handling flooded

wood, as well as dry stock that's been exposed to high humidity. In the bulletin, the authors emphasize the need to act quickly in order to avoid fungal staining and other defects that render wood a total loss. If you have a stack of wood in or near a potential flood area, hurry a request off to: *Wood Processing, University of Wisconsin-Extension, Dept. of Forestry, 1630 Linden Dr., Madison, WI 53706.*

HOW TO FIND YOUR WAY THROUGH THE WOODS.



of the way. Confidently enter the thickest woods with the new HD 3640 10" benchtop band

saw. Its powerful induction motor makes small work of resawing stock up to 7 inches wide. And afterward, navigate intricate curves on the large, tilting table that adjusts from -6° to 50°.

Whatever your plans call for next, the HD 1875 plunge router is sure to be part of them. Its 2¼ hp motor can carve signs, cut joints and trim decorative edges with power to spare.

For accurate, repetitive drilling, the new HD 3580 13" benchtop drill press is exactly what you need. Its exclusive fence can be set a precise distance from the drill bit, to ensure consistency from first hole to last. This unique fence also offers plenty of room to clamp

down your workpiece for additional support.

When it's time for assembly, try the innovative HD 1605 plate joiner.



Simply cut matching slots, pop in a wooden biscuit, glue and you have yourself a quick, durable joint.

Once it's all together, give your project a

once over with the HD 7575 palm grip sander. The 7575 performs an exacting 1/16" orbit 13,000 times a minute for a fast finish.

Next time you explore the woods, bring along the perfect traveling companions—Skil Woodshop Tools. You'll find those shown here and other Woodshop tools in stores everywhere. Just look for this label.

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- CAST IRON TABLE

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