CLAMP-STOREAGE EXTRAVAGANZA
See page 58

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Dr. J. scores points at home with his

Breakfront Hutch

Those of you who read WOOD® magazine regularly know that Jim Boelling (a.k.a. Dr. J.) builds the prototypes for most of the projects in the publication. So, you might think that he'd get his fill of woodworking during the week, right? Wrong! This guy verges on the unbelievable; he always has something going, and it usually involves wood. He has built projects for his church and other charitable causes, and for hire. Plus, he's made numerous creations as gifts for family and friends.

His latest project, the striking walnut breakfront hutch, shown here, offers clear evidence that he's taking care of business at home, too. It took Jim about eight months, working on the hutch when he found a few spare hours, to get the job done. And he figures that he has over $1,800 worth of materials invested in it. Still, that's only a fraction of what this piece would cost at retail.

Where does he get all of his woodworking energy? I asked him one day, and he attributes much of his current activity to Karen, his wife of almost three years, and his son Joel. It turns out that in the future they're planning to build a new home, and as Jim says, "We're starting inside out—building the furniture first, and then the house."

Jim, Karen, and Joel Boelling gather proudly beside their new hutch.

Our resident woodworking expert also gives Karen credit for being a big help in actually completing their furniture pieces, especially when it comes time to apply finish. "She's even taken the beginning woodworking adult-education class I teach to learn more about woodworking," Jim adds approvingly. Joel, on the other hand, played a key role during the assembly and construction stages of the hutch.

So what's up next on the Boelling after-hours woodworking agenda? Jim says he, Karen, and Joel plan to build a dining table and chairs that match the hutch, (and the sofa, end, and coffee tables completed earlier.) Phew! Talk about a woodworking machine. I can't wait to see what other projects Jim has up his sleeve in the years ahead.

Photograph: John Hetherington

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WOOD MAGAZINE SEPTEMBER 1993
Better Homes and Gardens.

WOOD

THE WORLD'S LEADING WOODWORKING MAGAZINE

This issue’s cover wood grain: jelutong. Cover photograph: Wm. Hopkins

SEPTEMBER 1993 ISSUE NO. 63

CRAFTSMAN CLOSE-UP
He makes old tools sing again 25
It seems only natural that Missourian Jim Price collects and uses antique tools, what with his advanced woodworking skills and Ph.D. in anthropology. Just how many old tools does he own? Try 25,000!

TURNING
Down-under desk clock 30
Give a new function and pleasing look to an unusual shape, the seed pod from the Australian Banksia tree. Find our seed source inside.

COVER STORY
Turn-of-the-century tall clock 32
You’ll play The Price Is Right when you build this beautiful oak project. Imagine paying $200 or less for a full-sized tall clock!

DEVELOP YOUR SHOP SKILLS
Clean-as-can-be screw plugs 39
In five easy steps, learn how to make, install, and conceal wood plugs used for covering recessed screw heads.

TOOL BUYMANSHP
10” carbide-tipped saw blades 40
Before you purchase your next 10” saw blade, see which blades make the cut and why in our in-depth roundup. We look at 32 models priced over $40.

Birds-and-such snack shop 46
Fill the hopper of this rustic bird feeder with tasty treats, and you’ll have all of your fine feathered friends singing for their supper.

CARVING
Tips from the top 50
The pros know, and now you will, too, as 13 top-notch carvers offer better, more efficient ways for you to improve your hobby.
**Wild kingdom coatrack** 54
Choose among three intarsia patterns—a mallard duck, a colorful hummingbird, or a lovable panda bear—for this delightful project.

**IDEA SHOP**

**Clamp storage extravaganza** 58
Organize your shop with one or more of the five special clamp holders featured here. You'll find holders for C-clamps and locking C-clamps, spring clamps, handscrews, and Quick-Bar clamps.

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**IN SEARCH OF THE PERFECT FINISH**

**Epoxy: As tough as nails and beautiful, too** 62
Discover the secrets behind making and applying Wisconsin woodturner David Lory's lifetime-guarantee wood finish.

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**CRAFT SHOP**

**The plant hanger from paradise** 64
Capture the lush beauty of the jungle with this leafy bracket, complete with a painted cockatoo.

---

**Decorador duck** 66
Try the full-sized patterns inside to make our pleasing shelftop waterfowl. It's a natural for outdoorsmen and those with country interiors.

---

**A stirring display** 68
Spoon collectors, spend an evening building this design, and you'll be rewarded with a showy rack that's perfect for accenting a kitchen or dining room.

---

**CARVING**

**Little guy, lotta fun** 70
Amuse your carving buddies with our thumb-sized caricature of—you guessed it—another carver.

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THE WORLD’S LEADING WOODWORKING MAGAZINE

September 1993 ♦ Vol. 10, No. 6 ♦ Issue No. 63

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What it takes to cut it as a Consumers Digest Best Buy.

You don’t get named a Consumers Digest Best Buy without working at it. You have to be an outstanding value. That’s the Dremel 1671 Scroll Saw.

The Dremel 1671 has a lot of features that make it a pleasure to use. It has two cutting speeds and a powerful motor that lets you buzz through wood up to two inches thick, as well as sheet metals and plastics.

The sturdy, 12-inch cast aluminum table is adjustable from 0° to 45° for accurate bevel cuts up to 1-inch thick. Of course, not all the features of the Dremel 1671 Scroll Saw are as obvious. A special mechanism quickly stops cutting action if the blade breaks. And the heavy cast-iron base keeps vibration to a minimum.

So if you’re searching for the perfect scroll saw for your craft or other woodworking projects, check out the Dremel 1671.

A 16-inch throat and the ability to cut from both the front and the side, means you can handle large work pieces.

The saw accepts both plain- and pin-end blades, for the greatest possible cutting versatility. The see-through blade guard pivots out of the way for easy blade changing. And a convenient sawdust blower keeps your cutting line clear for accurate cuts.

And see why Consumers Digest placed it a cut above the rest.

For a free copy of the Dremel Scroll Saw Blade Application Guide write to: Dremel, Dept. S-W, P.O. Box 1468, Racine, WI 53406-1468.

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In woodworking, every project is an adventure. You explore the wood, studying its grain, searching for something hidden within. Your goal is to emerge, weeks later, with a proud souvenir: A planter. A Shaker chair. Or perhaps a rustic chest of drawers.

Ironically, the ease of any woodland journey depends largely on a decision you make before embarking: your choice of tools. To this end, a move in the right direction is Skil Woodshop Tools.

Skil Woodshop Tools are a full line of wood-working tools designed to make any project a pleasure. Aligning, quick-set rip fence makes short work of sizing raw stock. Afterward, smooth off cuts and round corners with the 3370 combination 4" belt/6" disc benchtop sander. A quick-release belt adjustment (another Skil exclusive) lets you effortlessly switch between vertical and horizontal bed positions.

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Once it's all together, give your project a once over with the HD 7576 palm grip sander. The 7576 performs an exacting 1/32" 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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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.

Heads-up spin-off on our dovetail jig
When I received your April 1992 issue and the plan for the bandsaw jig for cutting dovetail pins (page 49), I had to make one. Then, I decided I could use your [tilting-table dovetail jig] plans to make a jig to cut the tails.

I made a base support with a flat surface and placed a pivoting table on top that lets you turn the table (and workpiece) left or right, like a mitre gauge. Using this jig system, I can cut the tails the same way as the joining pins by angling the table as needed, and sliding the workpiece back and forth to clean out the waste. It works great!

—Marvin Hall, Edwardsville, Ill.

Marvin, we built your jig in the shop and found it does a fine job cutting tails. We include it below so our other readers can give it a try.

continued on page 10
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TALKING BACK

Continued from page 8

Rolling benches take his breath away

When I came to your “Home Workshops that Work” article in issue 60, page 65, my breathing almost stopped when I read the proud declaration, “I eliminated the wide-spread legs that were furnished with the tablesaw, 6” sander, and radial-arm saw. Now, I have wheels under all those machines.” Wheels! This gives me the horrible vision of an operator wrestling with an ungainly work-piece atop a tipsy, rolling machine with whirring blades and cutters!

It seems irresponsible to neglect the potential for disaster. Shouldn’t some safety warning be made on this subject?

—Herb Tutherly, Windsor, Conn.

Good point, Herb. However, we do mention that all of Ivan James’ mobile bases have locking casters.

Furnace fans help fight bad air

I had a bad dust problem and decided to do something about it. I studied all of your dust-control systems and came up with an idea. I found some squirrel-cage furnace fans that worked well and mounted them at two locations on joining walls. I then placed air filters in the walls at two separate locations away from the fans.

The furnace fans continually “charge” the room with fresh air forcing the old air through the filters, trapping all that fine dust. It works great, and the cost is minimal.

—Carvel Metz, Delphos, Ohio.

Carvel, you bit upon a pretty practical idea. Depending on room size, you should also get satisfactory results using just one wall-mounted squirrel-cage fan and one 4”-thick air filter. See below.
"Darkhouse Decoys" draws cheers

Until your excellent article on carver Ray Zelinski (issue 60, page 35), I thought we fish decoy carvers were the poor relation of the better-known duck makers. Now everyone can appreciate their beauty, craft, and utility. William Hopkins and Jerry Irwin did a super job. More, more, more!

One point: To avoid having my decoys "aged" and resold as antiques, I carve or burn my mark on the underside of each fish I make. I know fish decoy collectors appreciate this. It also helps to identify my style and it enhances sales of my fish to folk art collectors and decorators who like things "signed by the artist."

—R.L. Frankenberger, Ph. D., Macomb, Ill.

Improved bench clamp

I came up with an improvement to a bench clamp you published in your December 1992 issue (page 20). I felt your clamp anchored the bench stop in an awkward manner. My design eliminates the clamp by using dowels to anchor both ends of the stop rather than only one end as yours did.

This method makes moving the stop much quicker and easier by always maintaining a 90° base to work from.

—Leonard Flowers, St. Louis, Mo.
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TALKING BACK

Continued from page 11

Cutting coves on a radial-arm saw
I want to thank you for the clear, concise plans for the walnut bookcase in issue 50. It turned out beautifully, but I was faced with a problem in cutting the cove molding for the top. Since my table-saw blade rises on an eccentric and moves forward as it rises, this prevented me from setting a fence that would stay in a given relationship with the saw. So, I turned to my radial-arm saw.

I placed the saw in the “cut-off” position, and then, moving the saw’s radial arm 33” to the left, I used the existing rip fence and simply lowered the saw in small increments. I relied on the same procedure in making bookends for the bookcase.

—Raymond Babcock, San Angelo, Texas.

Not quite picture perfect
I guess by now the world has inundated you with blasts on the reversed photographs in the “Home workshops that work” article in April 1993 issue [no. 60]. WOODs magazine always provides a special education and is an open window for an eager woodworker to dream, plan, and create—mistakes or no mistakes.

—Don Yahi, Bellflower, Calif.

“Da' Scrollers” welcome here
Many thanks for the introduction to “Da’ Scrollers” (issue 59, page 25). They are really a class operation. The patterns are sharp-lined and come with comprehensive instructions and scrollsaw information. However, to avoid frustration, the novice scrollsawer should read your article carefully to understand the equipment he needs to achieve “artistic” results. Keep up the good work.

—Harold Cator, Rochester, N.Y.

Reader solves snipe problem
In your February issue, I was surprised that you missed a real simple way to take care of snipe when planing lumber. If a series of boards being planed are butted against each other as they are fed through the planer, snipping will occur only on the leading edge of the first board and the trailing edge of the last board. That’s where scrap lumber comes in handy. Butt scrap pieces at each end and the snipe will occur on these pieces, not on your expensive lumber. But do not use plywood as the grain does not all lie in one direction.

—“Red” Babcock, San Angelo, Texas.
TIPS FROM YOUR SHOP (AND OURS)

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We try not to use shop tips that have appeared in other magazines, so please send yours to only one. We do not return shop tips. Mail your tip(s), address, and daytime phone number to:
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Tablesaw outfeed roller glides on drawer slides
You can't always find a helper when you want to rip long stock on your tablesaw. A floor-standing roller? That works great unless you have material stacked behind the saw or something else blocking the floor back there. There must be another answer.

TIP: Equip your tablesaw with a slide-away outfeed roller mounted on heavy-duty drawer slides. Choose side-mount slides that will extend far enough to place the ends about 36° behind the saw blade. Then, mount one slide on each side of the saw base, locating them so they don't interfere with the rip fence or the saw's controls or adjustments.

Now, screw a plywood bracket to the end of each slide, with the upper edges at table level or slightly below. Locate them to clear the rip fence when retracted. Add spacers as necessary to fit a standard outfeed roller (available from woodworking-supply dealers). Attach a spreader bar across the end for stability.

—Ron Salmon, Kamloops, B.C.

Hardboard cleans up portable
Rather than wrestle a big sheet of plywood across your tablesaw, you decide to cut it with a portable circular saw. The only problem: a splintered edge.

TIP: For splinter-free sawing, equip your portable saw with a zero-clearance base. Cut a piece of ¼" tempered hardboard to fit your saw's sole plate. Raise the blade, and fasten the hardboard to the sole plate with countersunk flathead machine screws and nuts.

Next, clamp the saw to a sawhorse, keeping the area below the blade clear. Plug the saw in, turn it on, and slowly lower the blade through the hardboard to make the zero-clearance blade slot.

When using a portable saw, cut with the good face of your material down. With this base installed, remember: the lower blade guard will be inoperative. Don't set the saw down until the blade has stopped turning.

—Jon Grasson, Olney, Md.

Continued on page 17

WOOD MAGAZINE  SEPTEMBER 1993
Wanna' hear the latest in saw blades?
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You can't, because these new blades are absolutely quiet and vibration-free. All other blades vibrate. If you don't believe us, take the blade you're currently using, hold it by the arbor and tap it with a pen or pencil. Hear the ringing noise? That's the vibration, the same thing that happens when you make a cut. Now, tap the blade on this page. No really — try it! That's what our new blade sounds like.

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TIP: Set your fence more precisely with this easy-to-build jig. Construct the fixture shown, sizing part B to fit the miter-gauge slots on your tablesaw. Cut the notch through part B so that the bottom lies flush with the saw table when part B sits in the miter-gauge slot. Match the width of the notch to a wooden yardstick or ruler.

Slide the ruler or yardstick into the completed fixture. With part B in the miter-gauge slot and the fence in position, slide the ruler over until the end touches the rip fence. Tighten the thumb-screw (the dowel inside the fixture clamps the ruler tightly without denting it). Move the jig to gauge the slot-to-fence distance at other points.

Bar clamps contribute to upstanding storage plan

Cutting sheets of plywood into large project parts can severely strain shop space. By the time you stack the uncut sheets and find a place to stack the cut pieces, you may not have much room left to do the sawing.

TIP: In a workshop with open ceiling joists, such as a garage, there's a quick answer to your storage problem. Just attach a long pipe clamp to a joist, with the pipe hanging down. Set the distance between the wall and the clamp to accommodate the material you're storing. Now you can stack the pieces on end, straight and close to the wall. When you've completed the project, take down the clamp.

Angie Inciong, Laguna Niguel, Calif.

Table saw jig chamfers small stock safely

You want to chamfer the corners of some pieces of stock using the table saw. Your fingers end up uncomfortably close to the blade, though.

TIP: Construct the jig shown from 3/4" plywood and scrapwood. Size the base according to the stock you'll be cutting and the distance between the saw's miter gauge and blade. Square one end to one side, and then attach cleats to the square corner with glue and brads. Be careful not to put metal fasteners into the cutting line. Clamp the jig to the miter gauge. Cut the corner off the jig, adjusting the position to achieve the desired angle on test stock. Then, cut your project parts safely.

Alan R. Holtz, Torrance, Calif.

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18 WOOD MAGAZINE SEPTEMBER 1993
A few feet or so from a 1940 Delta Bench Drill Press stands another “sure-to-be” Delta heirloom. The new Delta Sanding Center™ Belt/Disc Sander.

George Reid, master craftsman and furniture historian, admits he’s never seen anything quite like it. A machine capable of precision edge-sanding a 24” diameter circle. (48” with accessory extension.) With a 6” x 48” belt and 12” disc, accompanied by a power take-off shaft that handles dozens of accessories. Like pneumatic drums, flap wheels, buffing wheels and a flexible shaft, just to name a few. And a hefty cast iron base that incorporates single port dust collection.

In his 51 years of working with wood, Mr. Reid has created scores of perfect historical reproductions and original heirlooms, both full size and miniature, using his old Delta machines. And at age 78, George isn’t about to back away from a new idea like the Delta Sanding Center. He points out, “This time Delta’s put everything into one machine.”

For more information on the Sanding Center or the name of your nearest Delta dealer, call toll free: Delta International Machinery Corp., Pittsburgh, PA, 800-438-2486. In Canada, 519-836-2840.

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TIPS FROM YOUR SHOP (AND OURS)
Continued from page 18

Important shop papers need organization, too
You'd like to refresh your memory on a couple of points before changing your jointer's knives. But the instruction book doesn't seem to be in the drawer where you remember seeing it last.

TIP: Keep instructions and other important information for your tools and equipment in a binder for ready reference. Place the papers for each tool or piece of equipment into plastic document protectors (available from your local office-supply dealer) and insert them into a loose-leaf binder. Separate the sections for your various tools with tabbed divider pages. Then, label the binder and keep it on a shelf in your shop.

~Alan Sawyer, South Portland, Maine

MORE TIPS FROM OUR WOODWORKING PROS
• For a dust cover that allows easy access to the back of a free-standing cabinet, check out the one we used on the mission-style clock. It's part K, shown on page 34.
• Take a look at our V-block jig on page 36 for an alternative method of machining tenons to fit round mortises.
• Try our bird feeder design on pages 46-49, or design and build your own using the tips from Pat Schlarbaum, songbird specialist with Iowa's Department of Natural Resources.
• Even if coat racks don't top your building priority list, see the three full-sized wildlife patterns on pages 56 and 57. They make great decorations for other projects.
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Exploded view of fold-out work supports.

Short on work space? Try this compact project. Spread the legs for a stable support when cutting bulky pieces of sheet goods. Or, position a piece of plywood on its top, and use it as a temporary worktable. Then, when you're done, just fold it up and hang the support on two ladder hooks. 🦁

Project Design: Marvin Hoppenworth, Cedar Rapids, Iowa
Illustration: Jamie Dowling
Photography: John Hetherington
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HE MAKES OLD TOOLS SING AGAIN
In the Ozark foothills, Jim Price harmonizes with yesteryear
Settled by Scotch-Irish immigrants in the early 1800s, Ripley County, Missouri, claims a sparse population of 12,500 people. In the southeastern corner of its timber-covered hills lies tiny Naylor (pop. 600). Here, time doesn’t exactly stand still, but it sure does drag its feet.

At Lola’s Drug Store, the only cafe on Naylor’s main street, you can’t get chili or soup in the summer nor iced tea and ice cream after Labor Day. The regulars, who make Lola’s a part of their daily routine, know not to order items out of season.

And the regulars represent quite a range of interests, too. There’s David, an expert at turning plain picture frames into elegant gilded ones. Then there’s George, who fancies saddlery, and Bernard, a school principal who makes fiddles. Doug also drops in when he isn’t out cutting pecker poles, the local name for post-and-pole timber. And it would be an off-day if Jim Price didn’t come by for breakfast, lunch, and mid-afternoon coffee.

James E. (Jim) Price, Ph.D., may be—at one time or another—either Naylor’s mayor, chief of police, fire chief, or councilman. Beyond his civic duties, Jim, 48, holds down a research associateship in anthropology with the University of Missouri and heads the institution’s Southeast Missouri Archeological Research Center, a one-man office handily headquartered in Naylor. Oh, Jim also collects old woodworking tools—nearly 25,000 of them at present!

He knows how to use them, too, and does so nearly every day. In fact, the state of Missouri officially recognizes Jim as a master craftsman and makes it possible for him to take on an apprentice every once in awhile just to pass along the old hand ways. We met Jim at a Midwest Tool Collectors’ convention in Illinois. “Come on down to Naylor,” he suggested, “and I’ll show you a thing or two about old tools.” We did.

“I’ll bet that maybe, uh... seven out of 10 tool collectors wouldn’t know which end of a plane to pick up,” Jim Price says firmly. “Not many work with them, that’s for sure.” That statement made, he digs deeper into his tool chest.

Jim’s at work in his shop, a reconstructed carriage house that sits only a few steps from the vintage Victorian (it’s on the National Register of Historic Places) that he and Cynthia, his wife, call home. Both buildings date to 1892, when a timber company built them as models to increase sales of their forest products.

With a cache of tools that matches the age of his surroundings and skills that prove his mastery of them, Jim has an appreciation for the past that approaches reverence. In fact, he makes the past come alive in secluded Naylor. In his hands, tools again sing the praises of all-but-forgotten craftsmanship.

**A case for hand tools**

In Ripley County, the name Price goes back to the first settlers of

With the board locked in the miter jack, Jim trims it with a special miter plane that’s made to cut end grain.
1814. And according to Jim, he would have broken tradition if he hadn't returned to the county after college. "No Price has ever moved away," Jim says.

From his grandfather, father, uncles, and neighbors, Jim learned how to use hand tools to work wood. He's still amazed at his father's dexterity with traditional Ozark implements.

"He's an old Ozark hillbilly," Jim says, his voice conveying both fondness and respect. "And he can make a boat paddle from a sassafras board with nothing but a double-bitted ax—shaving it down and whittling with it just as slick as can be. He's good."

Like father, like son, for Jim's command of bench tools leaves nothing to desire. "I use everything from very primitive tools to those of the Colonial period, to the tools of the 1880s—and love every minute of it," he comments.

What Jim doesn't say is that he's infatuated with their history, too. Grasping a brass-bound brace from its place in his wooden chest, Jim holds it up for inspection. "An apprentice would make his tool chest as the final test of his joinery," he explains. "Then, the master would give him a tool or two—usually something of high quality—like this.

"Of course, that tool was intended to be [an] advertisement," Jim continues, turning the gleaming brace, "because there is no utilitarian reason to make a tool like this. But, you see, most people couldn't see the actual shop, and there were guild secrets to hide, so craftsmen would display a fancy tool where it could be seen. It was just flash, just [an] advertisement."

Replacing the brace in the chest, Jim picks up the plane he originally sought. He then secures a pine board in place with bench dogs, looks up, and comments. "Most of your modern woodworkers think these hand tools are slow—they are not. I can take this dado plane and have the doggone thing [the dado] done while a guy is still doing all the setup for a router."

He makes a few passes on the board with the plane, then pauses. "If you are doing one-of-a-kind things, hand tools are faster than power tools," he sums up. Then he adds in a softer voice, "but, if I'm going to rip an 8' board, I'll do it on the tablesaw."

**Listen to the song of the saw**

Walking over to a no-less-than-antique workbench and its repository of handsaws, Jim picks one, then positions a hand near its handle and the other close to its tip. A flip of his wrists and the blade responds with an eerie, vibrating eeeeeeeeeeeeb. "What's that tell you?" he asks.

"The quality of the steel," he quickly answers. "You can tell how good the saw is by how it sings—the higher and louder the pitch, the better," he explains.

Finished with the saw lesson, Jim wanders the length of his long workbench. He stops, puts his finger to his forehead, and announces: "There's lots of tricks like that with hand tools, but what's important is using them. I'm going to show you one of the first things that an apprentice learns—how to unwind a board."

Rummaging through a pile of lumber for just the right board, Jim relates his preference in wood. "I like the old air-dried stuff. The difference, as I see it, is that the air-dried wood isn't as brittle as kiln-dried. It still has some flex to it. Kiln-dried wood is caved in. The cells shrink and collapse so that it splits."

After selecting a length of walnut sufficiently bowed to use as an example, Jim says, "Unwinding means straightening or squaring a warp. And with hand tools, there's a definite procedure."

According to this hand-tool craftsman, unwinding a board by

Continued

Each bench plane has a purpose and is used in order when straightening a board. Left to right: scrub plane, try plane, fore plane, and smoothing plane.
hand rather than with a power planer results in wood that's more stable in service. "By the time you get it in line—with two planed surfaces and dimensioned—there's no stress left."

So, where do you start? Jim's piece of walnut has a slight hump and twist, so he must flatten it by removing wood at both ends of the bottom side and at the corner of the top side. But first, he sights down the board's length to calculate his corrections to the defect. Next, he sets his marking gauge to the board's intended thickness. Then, he picks up a scrub plane.

"A scrub plane literally scrubs the surface of the wood," says Jim, as he plows into the board at a slight angle to the grain. Finished with one end, he turns the board around and repeats the planing. Finally, he shifts the action to the center of the board. Finished with the scrub plane, Jim brings out his winding sticks, as shown in the photo below. "These tell me if the board is in line. The ivory targets help me determine where it's high," he notes. Once he pinpoints the high spots, Jim goes after them with his Stanley Bedrock fore plane, cutting at a 45° angle across the grain to level the board.

When the board appears flat, Jim turns to a long-bedded try plane that once belonged to his grandfather. "When I can get a shaving with this of a long continuous length and consistent width, I know I have a true [flat] surface," he notes. After a final peck down the board to the winding sticks, Jim switches to another plane, as shown below. "This smooth plane finishes. Absolutely no sanding required!"

Substitute shapers
In his collection, the Missouri master craftsman has a multitude of molding planes—thin, wooden-bodied tools, each with its iron

"With hand tools, you cut wood to shape rather than grind it, so it's more stable," says Jim, as he sights down a warped board that he'll unwind.

Jim cleans up the board with his Scottish smoothing plane. When he's done, the board will be finish-ready to the touch without sanding.

Winding sticks help Jim survey a board's unevenness. Like sights on a rifle, the ivory inlays help him focus.

Written by Peter J. Stephano  Photographs: Bob Hawks
ground to produce a unique profile. Before the introduction of combination planes, woodworkers found it necessary to keep many molding planes on hand to satisfy their customers' preferences for trim patterns.

Jim's research has, however, unearthed a simpler tool for making custom accents. It's called a scratch stock. Jim explains:

"Basically, a furniture- or cabinetmaker would take a short length of soft steel about 1" wide and file a profile on one end. Secure in a wooden handle by a pair of thumbscrews, the blade could then be pushed and pulled across the wood again and again, like a scraper, to scratch out the profile [see photo below]. That's how many of the details in Victorian furniture were created."

"To make a scratch stock," Jim advises, "go buy a cheap saw kit—the kind that has three blades for the same handle—at a discount store. Then, with a file, score a line on the blade where you want to cut it. Next, clamp the blade into a vise and bend it back and forth along the scored line. It'll soon snap off clean. All you have to do from there is file a profile on one end and make a handle. Surprisingly, they last a long time."

And not surprisingly, so do most old tools, even in frequent use. Jim has a philosophy regarding that and his collecting, "I never buy a tool I can't use," he says.

"And I never buy a tool that I won't use. After all, they weren't new when they came to me. So using them won't hurt 'em none."

**Interested in old tools? Drop Jim a line**

Jim often has observed folks who went out and bought an old tool, such as a plane, and then got discouraged because they didn't know how to sharpen or set it. His advice: "The best thing is to consult someone who knows old tools before you buy," he says. "There are certainly enough members of the Midwest Tool Collectors Association [M-WTCA]." For information, write: James E. Price, M-WTCA Treasurer, Box 6, Naylor, MO 63953. ♠

To create a profile on a scratch-stock blade, Jim clamps it in a vise, and then attacks the soft metal with a file to get the desired pattern.

The scratch stock's wooden handle has an adjustable fence that guides it straight along the board. Pushing and pulling quickly cuts a profile.

With his scribing knife, Jim marks a miter for sawing. "Lay the knife in place first, then bring the straightedge up to it."
Be ready to field a lot of questions when your friends spot this different-looking desk clock. Turned from the seed pod of an Australian tree, it’s sure to draw long looks, even from people who already know what time it is.

What about this odd pod?
A banksia seed pod doesn’t look like something you’d even want to pick up, let alone use for woodturning stock. But looks can deceive. Inside the nubby, grayish pod, which slightly resembles a multimouthed creature out of science fiction, you’ll discover extraordinary textures and patterns set off by random oval openings.

The otherworldly pods grow on banksia trees, a group of evergreens native to western Australia. Some are shrublike, but bull banksias, the largest, grow to about 30’ tall. Their foot-long leaves, shown in the photo above left, feel like holly and look like coarse, double-edged saw blades.

The trees bear yellow bottlebrush flowers that mature into seed pods as big around as a pop can and half again as long. Years ago, Australian woodturners decided to give the pods a whirl, figuring they would be an intriguing material for decorative turnings. And how right they were.

Now, American turners have discovered this Australian oddity. One of the pioneers of banksia-pod turning in the U.S. is Jerry Brownrigg, professor of technology at Northwestern Oklahoma State University in Alva. His banksia-pod goblets, urns, bowls, bud vases, and desk clocks never fail to fascinate visitors at woodturning exhibitions.

Turning one of Jerry’s banksia-pod desk clocks makes a great introduction to this unusual material. And you’d be hard pressed to come up with a better conversation piece.
Cut the pod apart

Start by cutting the tapered ends off the pod. Use a bandsaw, or mount the pod between centers on your lathe and remove the ends with your parting tool. Cut as close to the ends as possible.

Pick one of the clock profiles, right, and divide the pod into shorter pieces—about 3–3½" long for the conical clock, 2–2½" for the flat-back clock. Cut and sand one end flat on each piece.

"Most projects—especially the clocks—look better if you center the pod's distinctive markings in your turning," Jerry comments. To do that, place the pod with the flat end up. Then centerpunch or drill a shallow ⅛"-diameter hole at the pod's core. (Don't worry, you'll know it when you see it.)

A nail through a hole in the center of the auxiliary faceplate acts as temporary index for mounting the pod.

Next, attach a 1-2"-thick scrapwood auxiliary faceplate to a 3–4"-diameter latex faceplate. With the faceplate assembly mounted and the lathe running, find and mark the center. Remove the assembly and drill a ⅛" hole through the mark.

Now, slip a 6d box nail through the hole from the back as shown above. Apply cyanoacrylate adhesive to the end of the pod with the hole drilled in it. Then, place the hole in the pod over the end of the nail and bring the pod and faceplate together.

Remove the nail, let the glue cure, and install the mounted workpiece on the lathe. Bring the tailstock up to support the pod.

It's time to turn a clock

Turn the front of the body (the tailstock end of the pod) to shape. With the lathe running at 1,100–1,400 rpm, Jerry turns the clock body with a ½" bowl gouge, but a spindle gouge would work, too.

You'll encounter a variety of textures, from fuzz (which makes messy dust) to the hard secced)_pocket linings. All in all, though, turning the pod isn't much different from turning hardwood. As always, keep your tools sharp.

Turn the side and back profile, leaving a supporting tenon of about ¼ of the pod's diameter at the back. Don't cut too deeply into the sides—leave some of the unusual surfaces showing. "I like to leave some natural outside texture in the turning," Jerry says. "And exposed fuzz, if the pod and design permit, adds interest."

Slide the tailstock back, and replace the tail center with a Jacobs chuck to drill the hole for the clock insert. Reduce the lathe speed to 400–500 rpm. Then, with a 1⅛" Forstner bit in the chuck, bore the hole ¼" deep into the front of the clock body.

If you don't have a Jacobs chuck for your lathe, remove the faceplate and turning from the lathe. Then, center it under a 1⅛" Forstner bit chucked into your drill press. Grip the faceplate with a handscrew clamp, and bore the hole. Remount. Running the lathe at 1,100–1,400 rpm, sand the turning with 150-, 220-, and 320-grit sandpaper. Slide the tailstock up to support the turning while you complete the back profile. Cut to a small supporting tenon (⅛" or so), and then sand the back.

Separate the turning from the waste with a backsaw or coping saw. Sand to match the contour and remove the saw marks.

With a disc sander, sand a flat area 1–1⅛" wide on the bottom of the clock. Slant the flat-back clock about 10° back from vertical.

Finish the turning with a thin, transparent finish (Jerry uses Waterlox, a tung-oil product available from Craft Supplies USA, 801/373-0917). Brush it on with a small artist's brush, but don't put it directly on fuzzy areas. Press the clock insert into place to complete the project.
Turn-of-the-century TALL

Charles Rennie Mackintosh, a Scottish architect and designer of furniture and interiors from 1897 through 1918, first introduced his tall clock at a Berlin, Germany, design exhibit in 1905. The design you see here is my interpretation of the so-called "Mackintosh clock."

Although the original appeared to be about 8' tall, our version stands 6', a more appropriate scale for today's homes. I also designed a custom clock face that mirrors the original. Our clock-parts source (see the Buying Guide) worked with us to develop copies of the face for WOOD® magazine readers. The inexpensive but reliable electronic movement keeps the price of this clock hundreds under a store-bought unit.

Start with the clock case
1. From 1¼"-thick oak, cut the case sides (A) ¾" wider and 1" longer than the size listed in the Bill of Materials. (We edge-joined narrower stock to form the wide side panels.) Later, scrape off the excess glue and trim the case sides (A) to finished size.
2. Cut the case-side fronts (B) to size plus 1" in length. Cut the top and bottom panels (C), top panel front (D), and bottom front rail (E) to size.
3. Cut the rabbets and dadoes in the case sides (A) and top and bottom (C) where shown and to the sizes shown on the Base and Case drawing.
4. With the surfaces flush and an even overhang on both ends, glue and clamp a case-side front (B) to the front edge of each case side (A). Later, trim the ends of the front pieces (B) flush with the ends of the side pieces. Sand the side panels (A, B) smooth on both surfaces.
5. Center, glue, and clamp the top panel front (D) to the front edge of the top panel. (Verify that the front piece sits in ½" from the ends of the top panel.)
6. To house the clock-face pin later, drill a 1" finger access hole ½" into the top panel where shown on the Case and Base drawing.
7. Glue and clamp the case (A, B, C, D, E), using a framing square to check for square.

Next, let's add the base
1. Cut the base front and back (F) and sides (G) to size, miter-cutting both ends of each.
2 Glue and clamp the base frame (F, G) together, checking for square.
3 Sand a 1/8" chamfer along the top edges of the base and along the bottom edge of the clock case sides (A, B). See the Base Mounting detail for reference.
4 Cut the base cleats (H, I) to size. Drill and countersink the mounting holes, and glue and screw the front cleat (H) to the back surface of the front base piece (F). Then, drill the mounting holes through the side cleats (I). With the bottom edges flush, glue and screw the side cleats to the base sides (G).
5 Fit the base onto the bottom of the clock case, and screw (but do not glue) the base assembly to the bottom of the clock case.

And now for the back and dust cover
1 Measure the rabbeted opening, and cut the back (J) to size from 3/4" oak plywood.
2 Drill countersunk mounting holes through the back piece and into the case sides (A) and top and bottom panels (C) to the hole sizes shown on the Exploded View drawing. Using the same drawing for location, mark the location and cut a 6"-diameter access hole in the back piece (J).
3 Using the dimensions on the Dust Cover detail accompanying the Exploded View drawing, lay out the dust cover shape (K) and mounting-hole centerpoint on a piece of 3/4" oak plywood. Cut the dust cover to shape, drill the mounting hole, and fasten the dust cover to the clock back (J).

Continued
TALL CLOCK

Bill of Materials

<table>
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<tr>
<th>Part</th>
<th>Finished Size</th>
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<tbody>
<tr>
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<tr>
<td>A sides</td>
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<td>3 1/2&quot;</td>
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<tr>
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<td>3 1/2&quot;</td>
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<td></td>
<td></td>
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<tr>
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<td>3/4&quot;</td>
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<tr>
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<td>T rails</td>
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<td>8&quot;</td>
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<td>16&quot;</td>
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<td>16&quot;</td>
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<tr>
<td>X stops</td>
<td>3/4&quot;</td>
<td>1 1/2&quot;</td>
<td>16&quot;</td>
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*Initially cut parts oversized. Trim each to finished size according to the how-to instructions.

Materials Key: EO-edge-pinned oak, O-oak, OP-oak plywood.

Supplies: #6 x 1 flathead brass wood screws, #8 x 1/2 flathead brass wood screws, 6 x 1/4 flathead wood screws, #8 x 3/4 flathead wood screws, 10 x 1 flathead wood screws, 10 x 2 1/2 flathead wood screws, #8 x 1 machine screw with nut, #10 x 1 1/4 brass machine screw, 3/4 dowel stock, single-strength glass, stain, finish.
**The cleats and clock face come next**

1. From 3/4"-square oak stock, cut the cleats (L, M, N) to lengths listed in the Bill of Materials.
2. Drill countersunk mounting holes through the cleats. (We did this on our drill press, and used a fence to keep the holes centered on the cleats.)
3. Clamp the cleats in place where shown on the Exploded View and Side Section drawings, and use the mounting holes already drilled in the cleats as guides to drill 3/64" pilot holes in the inside face of the case sides (A) and top and bottom panels (C). Screw (do not glue) the cleats in place.
4. With the top cleats (I, N) in place, measure the opening, and cut the clock face backboard (O) to size from 1/4" oak plywood.
5. Cut the front cleat (P) to size. For housing the large glass panel later, cut a 1/8" rabbet 1/4" deep along the bottom front edge where shown on the Section View detail accompanying the Side Section drawing at left. Then, glue the cleat to the bottom front edge of the clock face backboard (O) where shown on the drawing.

**Next, machine the parts for the grille**

1. From 3/4"-thick stock, cut 5 pieces 78" long by 3/4" wide for the grille parts (Q, R, S, T, U).
2. Crosscut the stiles (Q, S), rails (R, T), and the rails and mullions (U) to length. For consistent lengths, which are critical, use a stop when crosscutting the pieces. (We clamped a block of wood to our radial-arm saw fence to act as a stop.) Note that the rail, stile, and mullion lengths include the tenons.

*Continued*
TALL CLOCK

3 As shown at right, use a square to mark the centerpoints for the 3/16" mortises (3/16" holes 3/8" deep) on the stiles (Q, S) where dimensioned on Assembling the Grille drawing. Clamping the pieces together as shown helps ensure alignment for a square assembly.

4 Clamp a fence to your drill press and chuck a 3/16" brad-point bit in place. Position the fence so the bit's centerpoint is centered on the 3/4"-wide stock. Drill holes in Q and S where marked. Don't forget to drill the 3/8" holes at each end of the longer stiles (Q).

5 Cut a piece of 1 1/2"-thick stock to 2 x 20". Tilt your tablesaw blade 45° from vertical and cut a V-groove in the stock like that shown on the V-Block drawing. Mount the V-block to your miter gauge where shown on Step 1 of the three-step drawing below.

6 As shown in Step 1 of the three-step drawing below, cut 3/8" shoulders across all four ends of each rail (U, T) and inner stiles (S).

FORMING THE OCTAGONAL TENONS

V-BLOCK

FULL-SIZED END VIEW

ADJUST DADO BLADE HEIGHT TO TRIM OFF CORNERS OF TENON AS SHOWN

DADO BLADE

29/32"

Screw V-Block to miter gauge

STEP 1: CUTTING TENON SHOULDERS

Fence in same position as Step 1

3/8" dado blade set 29/32" above saw table

V-block

Miter gauge

STEP 2: CHAMFERING THE TENONS

3/8" dado blade set 3/16" above table

Miter gauge screwed to V-block

Auxiliary wooden fence

Table saw
Using the V-block jig secured to your miter gauge for support, chamfer the edges of the square tenons.

7 Now, as shown in Step 2 and the drawing titled Chamfering the Tenons, place the pieces in the groove in the V-block. Raise the blade 29\(\frac{3}{4}\)" above the saw table, and chamfer each corner of the square tenon. See photo A for reference. Check that the octagonal tenons fit snugly into the 7 1/2" holes. If the fit is too tight, lightly sand the corners of the tenons.

Let's assemble the oak grille
1 To assemble the grille, start by gluing and clamping 11 rails (U) between one stile Q and one stile S. Check closely that the assembly clamps square and flat. Repeat for the other Q, S, U assembly. Immediately wipe off the excess glue with a damp cloth.
2 Glue and clamp the remaining pieces (R, T, U) between the two long outer grille assemblies as shown in photo B. Again, check that the assembly clamps square and flat.
3 As shown in photo B, use the previously drilled holes in the ends of the stiles (Q) as guides. Drill 3/8 holes 3/4" deep into the ends of the rails (R).
4 Inject a couple drops of glue into the holes, and drive 3/8" dowel stock through the stiles (Q) and into the ends of the rails (R). Trim the ends of the dowels flush with the outside edge of the stiles.
5 Later, remove the clamps, and sand both surfaces of the completed grille smooth.

Now, let's construct the oak-framed door
1 Cut the door frame pieces (V, W) to size. Drill the mortises and machine the tenons using the process used for grille members. Glue the door frame together, checking for square.
2 Next, cut two pieces of stock to 36 X 1/2 X 35" for the glass stops (X). Then, cut a 1/8" rabbot 3/4" deep the length of both pieces where shown on the Clock Face Door drawing and Side Section View drawing and Side Section detail. Miter-cut two 16 1/4"-long glass stops (X) from each 35"-long piece.
3 Clamp the stops in place to the back side of the door. Drill a trio of mounting holes through each stop and into the door.
4 Have a piece of single strength glass cut to fit in the door. Fit the door (without the glass) in place in the case top, and lightly clamp in place. Have a second piece of glass cut to fit against the front of the cleats (I, M). Tape the glass in place. Now, check the fit of the grille between the side assemblies (A, B) and against the front of the glass. If the grille is too wide, joint the edges slightly for a snug fit.

Making the door removable
Note: For access to the clock face and hands, it's necessary to make the door removable. To do this, as described below, we devised a simple pinning method using brass wood screws.
1 Mark the location of the grille on the case sides (A). Remove the grille, and large glass panel. Rein-
TALL CLOCK

stall the grille and clamp in place where marked. Now, glue the grille assembly to the case. Remove the cleats (I, M) from behind the glued-in-place grille. Remove excess glue with a damp cloth.

2 Clamp the door to the top edge of the grille with the front edges flush. As shown in photo C, drill \( \frac{1}{16} \)" holes through the door bottom rail (V) and \( \frac{1}{2} \)" into the top edge of the grille top rail (R). (Also, as shown in the photo, we attached four temporary feet to the clock base to prevent marring the bottom edge during final construction and finishing.)

3 Remove the door from the case. Using the \( \frac{1}{16} \)" holes in the bottom door rail (V) as guides, drill \( \frac{3}{64} \)" holes \( \frac{1}{2} \)" deep into the bottoms of the door rail. Drive a pair of #8 \( \times \frac{3}{4} \)" brass wood screws into the holes until \( \frac{1}{4} \)" (plus the head) protrudes out the bottom of the rail where shown in the Screw detail accompanying the Clock Face Door drawing. Cut or grind the heads off the screws where shown in the detail. File the cut ends smooth.

4 Change bits, and enlarge the \( \frac{1}{16} \)" holes in the top edge of R to \( \frac{3}{16} \)".

5 Fit the door into the opening. The trimmed screw shanks should fit into the \( \frac{3}{16} \)" holes in the top edge of the grille rail (R). With the door in place, center a \( \frac{1}{2} \)" bit in the previously drilled 1" finger access hole drilled in the case top (C, D), and drill through the top panel and \( \frac{3}{8} \)" into the door top rail (V).

6 Later you'll use a #10 \( \times \frac{1}{4} \)" roundhead brass machine screw to pin the top of the door in place.

Apply the stain and finish, then add the face and movement

1 Finish-sand all the pieces. Then, stain all the parts except the front surface of the clock face backboard (O). We'll attach the paper face to this area later.

2 Apply finish to all surfaces except the clock face.

3 Apply spray-on adhesive to the back surface of the paper clock face supplied with the kit described in the Buying Guide. With the edges flush, carefully apply the paper face to the front of the clock face (O). Rub out any bubbles. Using a brad-point or Forstner bit, drill a \( \frac{3}{8} \)" shank hole through the marked center of the paper pattern and plywood clock face backboard (O).

4 Position the large piece of glass against the backside of the grille. Reinstall the cleats to hold the glass in place.

5 Attach the clock movement to the back of the clock face backboard. Fasten the hands to the movement shaft. Install the clock face/movement assembly in the clock case. Hang the pendulum.

6 Add the glass to the door. Next, working from the back side of the clock, install the clock battery and set the time. (See the instructions supplied with the movement.) Screw the back panel (J) in place. Attach the dust cover (K).

Drill the pin holes through the door frame and into the top edge of the grille.

Buying Guide

- Tall clock kit. Quartz movement, 40" pendulum 16\( \frac{3}{4} \)"-square paper face. Kit no. 71190, $50.40 ppd. Klockit, N3209 Country Road H North, Lake Geneva, WI 53147. Call 800/556-2548 to order. ♦

CLEAN-AS-CAN-BE
SCREW PLUGS

Like any well-camouflaged object, a wooden plug should closely match the color and grain of the wood surrounding it, with a nearly invisible rim. Sound challenging? It’s not really, if you follow these simple steps.

Good-looking plugged surfaces start with perfectly round holes with clean, chip-free rims. For best results, we suggest using a sharp Forstner bit mounted in a drill press.

If you must use a hand-held drill, hold the tool steady and perpendicular to the work surface. If the drill wavers side to side, you’ll wind up with a hole that’s more of an oval than a circle.

To cut the plugs, we strongly recommend you use Snug Plug Cutters (see the Buying Guide at the end of this story). These cutters produce plugs with slightly tapered walls, so the plugs fit like a cork in a bottle.

Sort through the plugs and find ones that most closely match the color and grain surrounding each hole. Lightly coat the walls of the plugs and holes with glue, and then carefully position each plug with an X-acto knife as shown below. Tap the plug into the hole.

Now, remove the plugs by sawing through the stock with a bandsaw. Note that we marked a sawing guideline along the side of our plug stock.

After the glue dries, cut a hole slightly bigger than your plugs in the center of a piece of sandpaper. Place the sandpaper abrasive-side-down over the plug. The sandpaper stays in position and protects your workpiece as you saw the excess from the plug.

To saw off the plugs, we advise using a saw with fine teeth—one that has little or no set, such as the Japanese-style saw below. Remove the protective paper, and sand the plug flush with the surface using 100-grit abrasive around a hardwood block.

Buying Guide

• Snug-plug cutters, sold separately or in a set of three for $29.95 plus shipping from Garrett Wade. Call 800/221-2942.

Written by Bill Krier with Jim Downing  Illustrations: Jim Stevenson
A WOOD® magazine cutting-edge report

10" CARBIDE-TIPPED

Note: In this article, we focus on 10" blades—the most common size for workshop saws. All of the manufacturers included in this review make blades identical to our tested versions in smaller and larger sizes with varying numbers of teeth. We also concentrated on blades intended for cutting solid woods and plywood (and not those used on nonferrous metals and plastic-laminated particleboard). For this reason, we conducted our tests cutting into ¾"-thick solid oak, ¾" oak-veneer plywood, and 1¼"-thick birch.

Because of the technical jargon used to describe saw blades, shopping for the right model can be a confusing process. Actually, you just need to know the basics covered in this article to make an informed buying decision.

Biting points to consider: number of teeth on a blade
The 10" blades in our test had as few as 20, and as many as 80, total teeth. Manufacturers refer to blades with 30-or-less teeth as ripping blades, models with 40 or 50 teeth as general-purpose blades, and those with 60 or 80 teeth as crosscutting blades. (Some manufacturers further classify the 80-tooth models as finishing blades.)

Generally, ripping blades cut faster with less heat buildup than blades with more teeth. But, they also make rougher cuts. In our tests we found these blades only marginally useful. With a properly aligned, fairly powerful (3-hp) tablesaw, we achieved our best ripping cuts in ¾" oak and 1¼"-thick birch with general-purpose blades. We recommend you use ripping blades only if your saw tends to bog down when ripping dense or thick stock with general-purpose blades.

At the other end of the spectrum, crosscutting blades require slower feed rates but yield smoother cuts. Crosscutting blades will also work for most ripping tasks, but you must be careful not to burn stock that's ¾" thick or thicker.

As their name implies, general-purpose blades handle a variety of sawing tasks. Although we expected that these blades would offer a compromise in terms of cutting accuracy and smoothness, we found that several general-purpose blades handle ripping and crosscutting tasks as well or even better than blades especially made for these jobs.

Saw-blade tooth grind: what you need to know
After brazing carbide teeth (tips) onto a steel-plate body, manufacturers grind the tops of the carbide teeth to various shapes and angles. The blades tested for this article have four types of grind, as shown in the drawing below.

- Flat top (FT)
- Triple chip (TC)
SAW BLADES

With the most common type of grind, called *alternate top bevel (ATB)*, manufacturers machine the tops of the teeth at angles from 10° to 40°, with the teeth angled in alternating directions. (Manufacturers refer to the angle of the top of the teeth as *bevel.* To understand this term and others, see the drawing below.) These angles? Because the higher the bevel, the quicker the blade dulls. And, the sharp tips of highly beveled teeth chip easily if you mishandle the blade while changing it. So, if you want the cleanest possible cuts, and don’t mind giving your blades a little extra maintenance, choose a model with a bevel angle of 20° or more.

*Flat-top (FT)* teeth have no bevel at all, so they don’t cut as cleanly as ATB teeth, but they maintain their cutting edges better. And, FT teeth have less tendency to follow wood grain, so they produce straighter cuts in thick, hard woods with strong grain patterns such as oak that’s more than 1 1/2” thick. You’ll find this grind on ripping blades only.

By mixing ATB and FT teeth, manufacturers come up with a so-called *combination* grind. Blades with this grind have 10 sets of five teeth. Each set of teeth has four ATB teeth preceded by a slightly lower FT tooth (referred to as a *raker*) and a large gullet as shown in the "Combination-blade anatomy" right.

In theory, this combination or *alternate top bevel/raker (ATB/R)* grind results in a blade that cuts as smoothly as crosscutting blades, and as quickly as ripping blades. We found little use for these blades since 40- and 60-tooth ATB blades outperformed them in all of the tasks in our tests. One manufacturer agreed with our assessment, but said that his company continues to supply these combination blades because of public demand for them.

*Triple-chip (TC)* blades have flat-top teeth where every other tooth has its corners ground off to a bevel. Typically, the beveled teeth are slightly higher than the FT teeth.

**Hook angle of the teeth: the key to a blade's aggressiveness**

Carbide teeth pitch either forward (*positive hook*), backward (*negative hook*), or in-line (*no hook*) with a line that runs through the blade center. (See the drawing of a positive-hooked tooth, page 42.) The blades in our test varied in hook from -6° to 22°.

Manufacturers build negative hooks into blades especially intended for sliding mitersaws and radial-arm saws, because the...
CARBIDE-TIPPED SAW BLADES

negative hook helps the blade push the stock down and against the machine's fence. Blades with positive hook cut more aggressively, making them more appropriate for saws with stationary blade carriages such as tablesaws.

Kerf width: how it affects your saw's cutting power

Most of the saw blades in our test cut a kerf about 1.25" (or 1/4") wide. But for comparison purposes we included a small sampling of thin-kerf blades with tooth widths less than 0.1". Because these thin-kerf blades plow through less stock to make a cut, they require less horsepower from your saw. So, you may consider purchasing one if you make cuts in hard stock thicker than 3/4" and have a saw with a motor of 1 1/2-hp or less, or if you routinely make cuts in expensive exotic woods and want to keep waste to a minimum. (For additional information on these thin-kerf blades, see the article "Thin-Kerf Showdown" on pages 44-45 in the April 1990 issue of WOOD magazine.)

If you do opt for a thin-kerf blade, and want cuts as smooth as those produced by a full-kerf model, we suggest you stabilize the blade. This requires adding a flat plate (or plates depending on the producer) onto the saw's arbor next to the blade. Various manufacturers refer to these plates as stiffeners, stabilizers, or dampeners. Forrest sells single-plate stiffeners (4-7" in diameter), Freud markets two-plate stabilizers (3 1/2" diameter), and CMT sells two-plate dampeners (5" diameter). All three systems work well. But remember, these stabilizers will limit your depth of cut.

Note: Most saw-blade packages list the tooth number and type of grind, but few packages mention kerf width, or hook and bevel angles. In the chart at the end of this article you'll find all of this information for the blades tested here.

What you need to know about saw-blade bodies

As you'll see in the chart on pages 44 and 45, manufacturers cut saw-blade bodies from large sheets of steel in one of two ways: stamping or laser cutting. Generally, the highest-quality blades have laser-cut bodies. This process takes longer and costs more than stamping, but it produces a plate with less built-in stress. And, laser-cutting machines can slice through harder steels than stamping machines. For this reason, laser-cut saw bodies are stiffer and less prone to distorting under stress. Laser-cut bodies also have smaller, quieter expansion slots.

Resharpening: all

No matter how good a blade you buy, it will continue to perform well only if you have it properly resharpened by a knowledgeable person with high-quality sharpening equipment. How do you find such a person? Most manufacturers do not provide resharpening service, but several of them passed along these suggestions:

- Find out if the individual or saw shop has a good reputation. If the operator does a large volume of repeat business with professional woodworkers, then he probably provides good service.
More points to consider

- **Noise levels.** In the chart on page 45, we list the noise levels of all the blades. Two tested blades—identical-looking 60-tooth ATB models from DML and Sears Excalibur—developed a high-pitched noise as high as 110 decibels after running under no load for several seconds. (Although the blades appear identical except for labeling, Fred Garms of DML told us that Vermont-American, the parent company of DML, manufactures the Excalibur blades in a different plant than the DML blades.)

  In response to the high-pitched-noise problem, Garms replied that the blade we tested was not properly tensioned for our 4,000 rpm tablesaw. He said that DML will re-tension any blade free of charge for a consumer that experiences the same noise problem.

- **If possible, inspect a blade before you purchase it.** As we opened the packages of our test blades, we found chipped teeth on several of them. Even the most expensive blades were not immune from this defect. Our advice: carefully inspect any new blade. Choose another blade or return it if you find chipped teeth.

- **Blade packaging.** Some blades in our test come in throwaway containers, and a few of them come in cardboard boxes suitable for shipping to a resharpening machine. Of all of the brands, we liked the CMT, Delta, and Sears Excalibur packages the best because they double as wall-hung, plastic blade carriers. (See photo on the next page.)

Continued

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**important**

- **Take a look at the resharpening equipment.** The best carbide-grinding equipment has completely automated, computerized controls. For optimum results, the tips should be ground to at least 400 grit with abrasive wheels (better yet if ground to 600 grit). The machine should grind both the face and the tips of the teeth in separate steps.

- **Call or write the manufacturer.** Although most manufacturers do not recommend specific sharpening services in their packaging, you may get a referral if you contact the manufacturer. Of the companies represented in this article, only Forrest advertises that it will resharpen its blades to original specifications if you mail the blade back to the factory. (Forrest also sharpens competing blades.)

  Among the tested blades, only the Black & Decker Ultra Piranha blade has teeth with curved faces as shown in the photo above. We’ve spoken with resharpening professionals who say they can sharpen the teeth on these blades by grinding down their tops, but the cutting geometry of the teeth changes slightly after resharpening. By lowering the top of the teeth with grinding, the hook angle of the curved face decreases.
CARBIDE-TIPPED SAW BLADES

Delta Industrial blades come in reusable plastic cases for easy storage, display, or transport. CMT and Sears Excalibur blades have similar packaging.

• A misaligned saw will nullify the benefits of high-quality blades. No matter how perfect a blade may be, if your saw's not adjusted properly, the blade will not perform up to its potential. So, carefully adjust your saw according to the machine's manual.

Recommendations
As you can see in the chart right, all of the blades tested for this article performed well. Choosing clear favorites presented us with quite a challenge, but here it goes.

Given the impressive showing of most of the 40- and 60-tooth, general-purpose blades with ATB grinds, we think it makes good sense to put one of these versatile blades in your tablesaw and leave it there for most tasks in plywood and solid woods under 1 1/2” thick.

If price doesn’t matter to you, no general-purpose blade produced better results than the Forrest 40-tooth Woodworker II. But, for less than half the money, you can buy several blades that perform nearly as well, including the Amana 610600, Freud LU72, Freud LU88, and Oldham/U.S. Saw Wizard Elite 1007740T. The Wizard Elite represents a good value because it comes with a coupon for a free resharpening (at press time). You need to send the blade to either Burt, N.Y. or Chicago, at the company's discretion.

For velvety-smooth, chip-free crosscuts and miters, the Freud LU85 has no equal among blades costing less than $100. It was also the quietest blade we tested.

If you use your tablesaw primarily for ripping, take a look at the 30-tooth Systi Matic 10GR30. Unlike most ripping blades with FT grinds, the 10GR30 has a TC grind and produced good or excellent rip cuts in all tested solid woods and plywood.

And, if you’re looking for blades with an iron-clad warranty, check out the Delta Industrial models. You can return these blades to your Delta dealer at any time, for any reason, no questions asked. ♦

Written by Bill Krier
Technical consultant: Bob McFarlin
Photographs: Hopkins Associates
Illustrations: Kim Downing

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NOTES:
1. (ATB) Alternate top bevel
   (ATB/R) Alternate top bevel with rakers
   (FT) Flat top
   (TC) Triple chip
2. Hook angles are positive except for those with minus (-) symbol which are negative.
3. Bevel angles for ATB/R blades are for the beveled teeth. Raker teeth have flat (DF) tops.
4. (NR) Blade not recommended or intended for this operation.

E Excellent  G Good  F Fair
## Let's Cut to the Core: Evaluations of 36 Premium Saw Blades

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5. Amount of visible line at joint of two edge-joined boards.
   - E: Barely noticeable line on top and bottom of joint.
   - G: Barely noticeable line on top of joint; minor line visible on bottom of joint.
   - F: Minor lines visible on top and bottom of joint.

6. Degree of scratching (blade marks) on edge of stock.
   - E: No visible scratches.
   - F: Fine scratches that remove with hand sanding.
   - G: Medium scratches that require a finishing sanding or jointer for removal.

7. E: Minor chipping; edge is suitable for edge-planing or edge-trimming.
   - F: Slight chipping; edge is suitable for most applications.
   - G: Chipped edge which requires repair.

Note: Results in plywood vary greatly according to quality of plywood being used. Test results based on high-quality, plain-sliced, oak veneer plywood.

8. Measured in decibels from a distance of 3', with blade turning at 4,000 rpm, without cutting load. * Blades developed a high-pitched noise reaching up to 110 decibels after running without load for several seconds.

9. (C) Canada  (G) Germany  (U) Israel  (T) Italy  (U) United States
FOR BIRDS ON THE MOVE

SEEDS & SUCH

When Pat Schlarbaum, songbird specialist with Iowa's Department of Natural Resources, stopped by WOOD® magazine with this feeder, we saw some new concepts that needed explaining. We have run bird feeders before, but none quite like this. It didn't take long, however, for Pat to quickly put our concerns to rest with his thorough knowledge of birds and their feeding habits. Now, we believe this may be our best-ever feeder. See the information at right for Pat's sensible approach to this outdoor project.

All feeders are not created (or constructed) equal

This bird feeder design appeals to a variety of birds and their feeding habits. In designing it, I wanted to provide a healthy, durable structure that both people and birds could enjoy for a lifetime.

When songbirds feed from a seed supply that's damp and sometimes infested with Aspergillus (a fungal disease), it can kill them. For this reason, I've designed a feeder that specifically keeps seed dry and minimizes the threat of this disease.

The proportions of the feeder include an overhang that aids in keeping the feeding area dry. The recessed trough controls seed waste. An attached screen underneath allows for aeration. I designed this cedar feeder to be large enough to let birds of different species, particularly territorial ones like the nuthatch, feed at the same time without bothering one another.

To hold seed between their toes while eating, songbirds such as chickadees and tufted titmice require perches or a branch. However, birds that typically feed on the ground, like cardinals and juncos, use a crevice in tree bark to hold their seed while they peck it open. To accommodate both types of birds, I use tree branches for perches on my feeders. I've found that oil (black) sunflower seeds are preferred by the most desirable species. They're widely available at home centers, hardware stores, and garden shops.

Pat Schlarbaum

Continued
**SEEDS & SUCH SNACK SHOP**

*Note:* For the construction of this feeder, we purchased 1 X 10" cedar boards at a local home center. Then, we selected areas between the splits and knots for the pieces. Our stock came 5/8" thick and planed on one side. We planed the rough opposite side for a 3/4" finished thickness.

**Start with the base**

1. Cut the feeder base (A) to size. Lay out and mark the centerpoints for the 1/2" drain holes where dimensioned on the Parts View drawing. Drill the holes.
2. Cut the two perch strips (B) to size. Lay out, then drill and countersink three mounting holes in each strip where located on the Base Assembly drawing.

*Note: So it can stand up to the elements, construct your feeder using Titebond II water-resistant glue, slow-set epoxy, or resorcinol.*

3. Glue and screw the perch strips (B) to the base (A).
4. Cut a piece of metal screen wire to 1 1/2 X 12". Use masking tape or duct tape to hold the screen in position where shown on the Base Assembly drawing. Then, secure the screen with #18 X 1/2" nails. Remove the tape.

**Add the feeding platform**

1. Cut the platform ends (C) to size. Then, cut the platform pieces (D, E, F) to size, bevel-ripping the edges where shown on the Base Assembly drawing. For safety, we started with a 5"-wide piece of stock, and bevel-ripped part F from one edge.
2. Dry-clamp the pieces together in the configuration shown on the drawing. Mark the centerpoints, and drill and countersink mounting holes through the C parts and into the ends of D, E, and F where shown.
3. Glue and screw the platform (C, D, E, F) together. Mark the radii, and cut or sand the two rounded corners of the platform to shape where shown on the Base Assembly drawing.
4. Drill mounting holes, and then glue and screw the platform to the base where shown on the Exploded View and Base drawings.

**Next, let's add the hopper and roof assemblies**

1. Using the dimensions on the Parts View drawing, lay out the hopper ends (G), drill the countersunk mounting holes, and cut these pieces to shape.
2. Cut or rout a 1/4" groove 3/4" deep 3/8" in from the the edges where shown on the Parts View.
3. Cut the cross member (H) to size, bevel-ripping the top edges. (See the Bevel Detail on the Exploded View drawing.)
4. Cut the roof pieces (I, J) to size. (See the Parts View and Exploded View drawing for reference.)
5. Drill the mounting holes, and then glue and screw the hopper ends (G) to the base and platform assembly. Secure the cross member (H) between the end pieces.
6. Assembly the roof (I, J).
7. Cut the pipe flange bracket pieces (K, L). Drill the holes, and glue and screw them to the bottom of the base, being careful not to cover the drainage holes.
8. Have two pieces of 1/8" clear acrylic cut to fit the hopper grooves. Secure a pipe flange to the bottom of bracket (K, L).

**Natural perches are for the birds**

1. Cut or prune straight branches about 3/4" in diameter to the lengths shown on the Exploded View drawing. Seal the ends of the branches to prevent cracking.
2. Drill the mounting holes through the branches and secure them to the perch strips (B) and platform ends (C) where shown on the Exploded View drawing. Mount the branches so they come in contact where they cross.
3. Mount the feeder to 1 1/2" pipe that has the top end threaded to mate with the flange. If possible, position your feeder near bushes or evergreens for shelter and in an area protected from strong winds. Lift the roof assembly off the feeder, fill with bird feed, and watch the birds come home to feed.

Project Design: Pat Schlarbaum
Photographs: Bill Hopkins
Illustrations: Kim Downing
BASE ASSEMBLY

SAND a 1/16" round-over on all edges

#8 x 1 1/4" F.H. brass wood screws

Position bottom A and B so drainage holes are centered between C and D

SAND a 1/16" round-over on all edges

5/32" hole, countersunk on bottom side

4 1/4" x 12" screen nailed on all four corners to A

Drainage holes

7/64" pilot hole 1/2" deep

5/32" hole, countersunk

Edge of B and C are flush

#8 x 1 1/4" F.H. brass wood screws

HOPPER END

1/8" grooves 1/8" deep on inside face

5/32" holes, countersunk

ROOF END

ROOF J

WOOD MAGAZINE  SEPTEMBER 1993
When some of the nation's foremost carvers convene, chips fly, but so do...

TIPS from the TOP

"My wife used to grumble about my leaving chips and shavings around the house—until I taught her to carve," quips Bob Travis, a carver from Davis, California. Bob's advice, although light-hearted, flushed a covey of carving tips from other members of the Caricature Carvers of America. The group assembled in Des Moines last October for their annual meeting, hosted by WOOD® magazine.

The carvers in the two-year-old Caricature Carvers of America organization (see box, page 53) talked association business, planned activities, and took in the sights of Iowa's capital city. But for the greater part of a three-day weekend, the 13 attendees carved, compared notes, and shared techniques. Naturally, we jumped at the opportunity to gather their suggestions for helping carvers at all levels. And member to member, each was eager to help out, even taking time out to provide a sketch as needed.

From tool touchups to chip-tested alternatives

When it comes to carving tools, CCA members have nearly two centuries of combined experience. Take Harold Enlow of Dogpatch (yes, folks, there is such a place), Arkansas, for instance. He's been turning out hillbilly figures from his home in the Ozark mountains for more than 20 years. And like most accomplished carvers, he's prone to making or modifying a tool to suit his purposes. Here's an example:

"During the last couple of years, I started using skew chisels," comments Harold. "And because they have a sharp angle on them, they tend to slip in the wood a lot. A flat chisel, on the other hand, won't slip, but it doesn't have enough angle to remove much wood. So, I compromised and filed all my skew chisels to an angle of 20–25 degrees [as shown in the drawing, left]."

CCA treasurer Jack Price, Cleburne, Texas, apparently has a penchant for adaptation. "I found out that Speedball linoleum-block cutting tools make good, small gouges for woodcarving," he says. "They're disposable—just wear them out and throw them away; they only cost around $1 each. The no. 2, for example, makes a
nice, tiny V-gouge [Speedball linoleum cutters, available at art supply stores, come in five configurations]. But first you have to sharpen them a little. A buffing wheel works best because they're made of thin steel. After that, they cut real well."

Rich Wetherbee, a carver from Colorado Springs, Colorado, has found a good substitute for the traditional sharpening stone to hone edges. "I've replaced my sharpening stones with emery cloth," he says. "It doesn't cost as much as stones, and it's handier." Dave uses a coarse-gritted strip for shaping a tool's cutting edge, and a fine-gritted strip to finish the edge. He adheres the strips to the sides of a flat stick with double-faced tape for easy use.

Carvers, like other woodworkers, believe in caring for their tools. Not so their investments will just last longer, but also to keep them sharp. And CCA members had some suggestions.

**TOOL TIP PROTECTORS**

Slice slabs off two sides of dried wine corks to protect carving tool tips

Gary Batte does most of his carving in his home at Stephenville, Texas, but when he hits the road to teach a woodcarving seminar, he makes sure his tools don't lose their edges along the way. "I put short lengths of clear-plastic, flexible tubing over my blades and gouges," he comments. "Just cut lengths ¼" longer than the blade or gouge tip, and slip them on." Gary buys the ½" o.d., ¾" i.d. tubing at hardware stores for about 30 cents per running foot.

To protect the edges of his knives' blades, Dave Stetson of Phoenix, Arizona, looks to wine-bottle corks. "Let them dry out," he says. "Then, if you don't like them [the corks] round, you can carve them flat on two sides."

Texan Steve Prescott, a carver from Fort Worth, protects his tools' cutting edges another way. "When tools knock around in a tool box, uncovered edges get beat up. I found that little pieces of dense plastic foam—the kind used to make picnic coolers—can be shaped on a bandsaw for cases to cover the whole tool," Steve says. "All you have to do is press the tool into the plastic foam to form it to shape. Then, label the case with a marking pen. This works so well that I even cut plastic foam to fit inside my knife sheath so that the blade doesn't cut the leather."

WOOD magazine's carving consultant and founding CCA member, Harley Refsal, of Decorah, Iowa, teaches a lot, too, and has found that students often get their tools mixed up at carving classes. He suggests making tools easy to identify. "Take a can of bright spray paint and just dust the end of the handle on all your tools," he says. "It won't hurt the tools, and you'll sure be able to spot yours at the end of class."

Claude Bolton, another Texas carver who calls Fort Worth home, agrees with Harley when it comes to tool identification. But he takes the advice a step further. "When I carve, I wear single-focus prescription eyeglasses, ground so that I can see clearly to Continued
about 12" away. But that used to mean picking up a gouge and bringing it closer to see exactly what it was. Now, though, all my gouges are color and number coded," notes Claude. "That is, I choose a color for each type of gouge and then paint dots on the end of the handle to correspond to its size—kind of like the dots on dominoes [see drawing, preceding page]. I can pick them out from afar."

For example, Desiree learned this nifty tip from a married couple that frequently attend her classes. "Bob and Irene Barel, from Reed Springs, Missouri, manage to carve as they travel," she says. "They do it by cutting two slits in a plastic dishpan and running a leather belt through them. That way, they can hang it around the waist as a portable chip receptacle [see illustration, left]. With it, one of them can carve while sitting in the car, and they empty the chips once they reach their destination. This also applies to lounging in your easy chair."

Marv Kaisersatt, of Faribault, Minnesota, has found "another hand" to assist him with carving. "It's a holder that I slip onto my workbench [see illustration, left]. I taped the jaws so that it's a friction fit. When I'm doing a figure and need both hands, I just lay the carving in there."

Jack Price, who offered the Speedball carving tool tip, offers a tidy means of finger protection. "I buy rubber finger pads at office supply stores. They can be cut and trimmed as needed to slip over your finger or thumb [as shown left] to keep from getting sore spots or callouses."

Dave Dunham, a Cleburne, Texas, orthodontist, says, "I patch up small minor finger cuts with Super Glue. First stop the bleeding, then apply the glue right on the cut. Then, don't remove it before the cut heals."

Desiree Hajney has made a name for herself in the carving world with her realistic wildlife pieces. But an artist adept at cartooning as well, the Columbus, Nebraska, carver flavors her work with dashes of caricature and occasional sprinkles of humor. And at her carving seminars, she keeps open ears for snippets of wisdom.

**Chip away in a carving station**

In Cokato, Minnesota, Dave Rasmussen programs computers. He
was on the job when the idea came to him for what he calls his "carving cubicle."

"I sit at my computer terminal in a cubicle made of half-height partition walls," Dave explains. "It occurred to me that what I was sitting in was the perfect carving place. So I built one."

Dave's carving cubicle, like the one below, meets all his carving needs. "In it, I have an area for carving, one for painting, and another for sharpening," he says.

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**Fun deserves some respect**

Formed in 1990, the Caricature Carvers of America (CCA) presently numbers 15 carvers, each recognized for their special style of caricature. Winners of ribbons in carving competitions across the nation, CCA members have one goal: To heighten the appreciation of caricature carving. Says founding member Harold Enlow: "This type of carving is the most popular of all, but even in carving competitions, it isn't given the special place that it deserves. As an example, a lady asked me one time what it was that I carved. When I told her 'caricatures,' she said, 'That's what you do when you don't have any talent.'"

CCA members hope to change that image by encouraging greater creativity in caricature carving, pursuing higher degrees of excellence, and educating the general public through exhibitions and competitions. For more information on CCA activities, write: Dave Dunham, corresponding secretary, Caricature Carvers of America, 301 N. Ridgeway, Cleburne, TX 76031.
You can't help but love at least one of these wildlife-accented coatracks. Larry Clayton, our editor and an avid hunter, went bonkers over the duck; Darlene Reynolds, our production manager, picked the hummingbird; and I, with lots of prodding from my three children, opted for the panda bear. Regardless of the critter you build, you better plan on making several. Demand is running high.

Marlen Kemmet
Marlen Kemmet, How-To Editor
Start with the backboard

1. To enlarge the Backboard Grid pattern, cut a piece of heavy paper to 7 x 24", and draw a grid having 1" squares on the paper. Use a straightedge to lay out the straight lines. To lay out the arched top, transfer points where the pattern outline crosses each grid line. Next, draw lines to connect the points (we used a French curve for a smooth flowing line to form the arch). Mark the ¼" and ⅛" radii and cut the paper pattern/template to shape.

2. From ⅜" oak, cut a piece 7" wide by 25" long for the backboard. If you don't have stock this wide, edge-join narrower stock.

3. Joint the bottom edge of the backboard. Now, position the backboard paper template on the oak stock, making the bottom edges flush. Trace the template's outline onto the oak stock.

4. Bandsaw the backboard to shape. (When cutting the arched top, we cut just outside the marked outline. Then, we sanded to the line for an even, continuous arch with no flat spots.)

5. Rout a ¼" bead along the front edge of the backboard. See the Exploded View and accompanying Bead detail for reference.

Continued
6 Using the dimensions on the Exploded View drawing, position the coat hooks on the backboard. Mark the mounting-hole centerpoints. Remove the hooks, and mark centerpoints for mounting the backboard to the wall.

7 Drill the mounting holes where marked. (See the Buying Guide at the end of the article for our source of brass coat hooks and thin stock.) For ease in driving the softer brass screws later, drive #6 x ½" steel screws into the hook mounting holes to prethread the holes. Remove the steel screws.

8 Finish-sand the backboard smooth and set it aside for now.

Cut the wildlife and background to shape

1 Make two photocopies of your favorite pattern.

2 Plane or resaw one piece of walnut, oak, cherry, and maple to ¼" thick by 5 x 9" for the hummingbird or duck. Or, see the Buying Guide for our source of thin stock. One piece of maple and another piece of walnut is all that's necessary for the panda bear.

3 Temporarily join the four layers of ¼"-thick stock face-to-face with double-faced tape.

4 Using spray adhesive, adhere one of the full-sized photocopied patterns onto the top piece of ¼" stock. Scrollsaw the parts to shape. We used a #8 (0.047 x 0.017" w/11.5 TPI) blade as shown in the photo on the opposite page.

5 Separate the parts. Now, using the wood key, temporarily assemble the design of your choice on the second pattern copy, or choose pieces that match to your liking. You'll have enough pieces for four separate hummingbird or duck patterns, or two panda bears. Hand-sand a ¾" roundover along the front edges of the
parts. See the Section View drawing for reference. Be sure to wear a dust mask. We also wore rubber finger pads (sold at office supply stores) to protect our fingers when rounding-over the edges. Do not sand all the way to the back surface. Doing so creates voids between the parts when gluing them together.

6 Position the body parts (not the background pieces) on a piece of ⅛" plywood or other thin stock. Trace around the perimeter of the figure. Remove the parts and cut the pattern to shape, cutting slightly inside the marked outline.

7 Apply woodworker's glue or epoxy to the backing, and lay the parts into position. If using woodworker's glue, weight the parts with a flat heavy object such as a clothes iron or scrap plywood weighted with a paint can.

8 After the glue dries, round-over the edges of the backing by sanding to make it even less visible.

Add the walnut oval
Note: If you're crafting the panda bear, you can skip steps 1, 2, 3, and 4 below. The bear doesn't require the walnut oval.

1 Cut a piece of ¼" walnut to 5½" wide by 9" long. Adhere the second photocopy to it.

2 Cut the walnut oval to shape, cutting slightly outside the marked outline and sand it.

3 Sand a ⅛" round-over along the entire front edge of the oval. Next, finish-sand the oval.

4 Position the pieces, and glue and clamp the pattern and background pieces to the walnut oval. Leave an even ¼" of the walnut exposed along all edges.

5 Center and glue the oval/pattern assembly to the backboard where shown on the Exploded View drawing.

6 Apply a clear finish (we used aerosol lacquer). Fasten the backboard to the wall with wood screws if you can hit studs. Or use toggle bolts if you can't. Screw the coat hooks to the backboard.

**Buying Guide**

- Thin stock and coat hooks. One piece of walnut, oak, cherry, and maple ¼" thick by 5 x 9" (enough for the wildlife pattern lamination), one piece of ¼" walnut 5½" wide by 10" long for the oval, and two coat hooks needed per coatrack, stock no. 88163, $25.95, plus $5.50 postage and handling per order. The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374-9514. Or call 612/428-3200 to order.

Produced by Marlen Kemmer
Project Designs: James R. Downing
Photographs: Wm. Hopkins
Illustrations: Kim Downing
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A backboard with protruding dowels does the job for supporting 4", 6", and 9"-long spring clamps. If you've got a similar assortment of these clamps, the rack shown here should suffice. If you've got quite a collection, extend the board or make two or more holders as needed.

We don't recommend extending the dowels longer than dimensioned on the drawing at right. Extended too far, they can get bumped and broken.
**CLAMP STORAGE**

2 A home for sliding-head and Quick-Grip clamps

The slots in this quick-and-easy holder allow you to store your sliding-head clamps in perfect order by simply resting the head on the horizontal support. Without the slots, you’d have to tighten the jaws to hold a clamp in place, and then loosen the jaws when you want to remove the clamp from the holder.

To make the slots, cut the horizontal support to shape, rout the edges and corners, and mark the notches 1½” on center. Mount a 3¼” dado blade to your tablesaw, and raise the blade 2” above the saw table. Mount a wood extension to your miter gauge, and make the cuts where needed. As shown in the opening photo, we built and placed three racks end to end. You could also lengthen the two parts and cut the number of slots needed to match your supply of clamps.

For Quick-Grip clamps, we found that an extended version (2¾” more from front to back) of the rack used to support our sliding-head clamps works wonderfully. The front support with its numerous slots holds the clamps upright and keeps them from dinging the wall.

3 Nifty support for locking C-clamps

Projects often require clamping pressure applied several inches in from the outside edges for a good bond. When this happens, we turn to our locking C-clamps, the largest of which has a throat depth of over 15”. To hang our collection of locking C-clamps, we found this screw-together support an organizer’s dream.

4 All-in-a-row C-clamp rack

When the job calls for plenty of clamping pressure, no-nonsense C-clamps provide the answer. To hang and organize this type of clamp, build our four-piece wall-mounted hanger with its notched front support. The notches allow you to hang the clamps on the rack without having to tighten them.
Handscrew clamp hangout

If there was ever a simpler organizer for handscrew clamps, we haven’t seen it. Just cut the support extension (A) to fit between the threaded rods of the clamp, chamfer the outside end of the support, and securely mount it to the backboard (B). We’ve found that about four clamps per support is a full load.

Width of clamp when hung on A

HANDSCREW CLAMP ORGANIZER

Produced by Marlen Kemmet
Project Designs: Richard Tollefsen; Jim Boelting; James R. Downing
Photographs: Wm. Hopkins
Illustrations: Roxanne LeMoine
If you think of epoxy only as a tough, all-purpose adhesive for joining, let woodturner David Lory set you straight. In his Platteville, Wisconsin, studio he's been applying epoxy to his bowls for a finish since 1978. In fact, he's so confident of his product's durability that he offers customers a lifetime guarantee.

"In normal use, my epoxy-finished bowls will last even longer than a lifetime," says David. "So far, I've had very few returned. In one case, the customer left some fruit in the bowl and went on vacation. The fruit rotted and the acid ate through the finish. In another, a sharp knife was used to cut salad and it sliced the finish. But both bowls were easily resanded and refinished."

Laboratory-rated toughness
The epoxy finish wasn't discovered by David. As he tells it, the finish goes back a long way. "There was a well-known Mineral Point, Wisconsin, woodturner by the name of Harry Nohr who picked up on it in the 1950s," says David. "Apparently, the U.S. Forest Products Laboratory [in Madison] had done some research that rated epoxy as the most durable of finishes. Nohr used it for two decades. I learned about his work at the University of Wisconsin-Platteville, and adopted it."

Although his utilitarian epoxy finish can stand everything from ice cream to hot stir-fried vegetables (it's even USDA-FDA approved as food-safe and can take sterilization temperature of 150°F, but with only soap-and-water handwashing) David admits that it's not the easiest to apply. Yet so far, he hasn't discovered another way to rival epoxy's ruggedness.

Like all skilled craftsmen, though, David has his preference of epoxy. "I've tried several brands, but the type that works best for me is manufactured by Torginal, of Sheboygan Falls, Wisconsin," he says. "It's made to stand up as a protective finish in industrial situations, such as creamery walls."

David buys the company's 100 Clear Gloss in gallon quantity for about $60. "The Clear Gloss dries clear, while their satin looks a little milky," he notes. "And the consistency is varnish-like." (100 Clear Gloss epoxy finish is available as a two-component mix that makes a pint. It sells for $12 plus shipping from Torginal, Inc., 710 Forest Ave., P.O. Box 102, Sheboygan Falls, WI 53085-0101, or call 800/558-7596.)

Begin with dry wood
David turns his bowls from green wood that he harvests from the hilly woodlands that surround Platteville. But before he applies the finish, he makes sure that the bowl is thoroughly dry (by oven-baking it for 5-7 hours at 150°F-200°F) and sanded smooth on the lathe with grits up to 240. "The epoxy reacts—clouds up—if there's moisture in the wood," he says. "And, it can't penetrate as well. I also have to round off any sharp edges on the lip because the finish will wear faster there."

David mixes his finish from two equal parts, just like the adhe-
Nearly as tough as nails and beautiful, too

sive-type epoxy. Then he lets the mix stand for about half an hour so that it can "react." And experience proves that certain conditions work best.

"I do all of my application in a room temperature of about 75°," says David. "If it's colder, it will go on too thick and sag. When it's warmer, it dries too fast and leaves brush marks, which are hard to sand out."

Yes, David does use a brush to apply the epoxy finish. For best results, he suggests a natural-bristle one 1½" wide, and the cheaper the better, because the finish won't rinse out. The turner wears a mask to block out noxious fumes. (Although David doesn't wear gloves, we recommend them to keep the hard-to-remove epoxy off your hands.)

Sand the shine away
Each of the 600 bowls that David makes each year receives the same treatment: five coats of epoxy with sanding after each. Suella, David's wife, does all the finish-sanding.

Suella hand-sands between each of the four layering coats with 180-grit aluminum oxide paper. The hand-sanding reduces irregularities in the epoxy and leaves a scratched surface for the next coat to bite into. Then, for the final touch, she goes over the fifth, or last, coat with a progression of 00 to 0000 steel wool. Lastly, Suella rubs the entire bowl down with 0000 steel wool dabbed in rottenstone. "It only takes me about 30 minutes of sanding—total—to do a 7"-diameter salad bowl," Suella notes.

Says David: "Epoxy dries to the touch in about one-half hour, and takes 24 hours to dry for sanding. But never let it dry as long as a week, though, between coats," he warns. "It will cure hard as a rock and become nearly impossible to sand!" ♠

According to David, epoxy deeply penetrates the wood and strengthens it.
PLANT
With a cockatoo

Cut three pieces of Baltic birch plywood $\frac{3}{8} \times 10 \times 10\text{"}$. Temporarily laminate two of them, good sides out, with double-faced tape.

Enlarge the pattern, opposite page, with a photocopying machine set to 141 percent. With spray adhesive, affix the pattern to the laminated stock.

Drill $\frac{3}{8}\text{"}$ blade start holes where indicated. Starting with the small triangular area on the left side, insert the scroll saw blade through each hole to cut along the red pattern lines. (We used a #7 scroll saw blade, .045 x .017" with 11.5 teeth per inch.)

After you complete the interior cuts, separate the two pieces. Leave the pattern attached. Sandwich the remaining piece of stock between the two cutouts, with the patterned piece on top. Glue the three together, aligning the edges, and clamp. When dry, cut the outside shape, following the purple pattern line.

Cut a $\frac{3}{4} \times 1\frac{1}{2} \times 12\text{"}$ top arm and a $\frac{3}{4} \times 1\frac{1}{2} \times 11\text{"}$ back for the hanger. Starting from one end, rout a $\frac{3}{8} \times \frac{3}{8}\text{"}$ groove $\frac{9}{16}\text{"}$ long centered on one side of each. Miter-cut the grooved end, making the grooved side the short face. On the other end, mark and saw a $1\frac{1}{4}\text{"}$ radius.

Drill a $\frac{1}{4}\text{"}$ hole where shown on the top arm. Drill a $\frac{1}{4}\text{"}$ counterbore $\frac{1}{4}\text{"}$ deep on the un-grooved side. Dry-assemble the parts to test their fit. Finish-sand all parts.

Paint with acrylic artist's colors, following the color scheme shown or your own. When painting the foliage, go a little way onto the tongue that fits into the grooved top arm and back; this prevents bare wood from showing along the edges. For the bird, we painted the front view on both sides.

Glue the parts together and clamp. Finish the top arm and back with clear polyurethane.
HANGER FROM PARADISE
that caws attention to it

Bolt a swag hook to the top arm, placing the nut in the counterbore. Solidly attach the hanger to the wall with #8 x 3" screws driven into a stud, one angled down from the top back corner and another straight through the lower end of the back. Predrill the holes through the bracket for easier installation.

Project Design: ©Bill Z aun
Illustrations: Bill Z aun; Kim Downing
Photograph: John Heberington
You'll need stock 3/4" thick for the duck's body and base, 3/8" thick for the wings. (We used pine.) Plane or resaw thicker material for the wings. A 1x4x36" (nominal) board will provide plenty of stock.
If something's ruffled your feathers, turn to our decorator duck for help. Just let the cares of the day head south while you saw and sand this graceful tabletop merganser to shape.

Trace the full-sized pattern for the body onto a $3/4 \times 2\frac{1}{2} \times 13$" piece of pine. Trace the wing pattern onto two pieces $3/8 \times 3\frac{1}{2} \times 7$".

On the bottom edge of the body stock, lay out the location for a centered $1/4$"-diameter hole 5" from the tip of the duck's tail. With a drill press and a brad-point bit, drill the hole about $3/8$" deep.

Mark a center where shown on each side of the head for the $1/4$" eye hole. Drill those holes about $1/8$" deep.

Bandsaw or scrollsaw the body. Then, cut out the wings. Now, sand round-overs along the top edge of each wing. Sand to the cross-section shown on the full-sized pattern. After rounding over the edge of one wing, make sure you round over the opposite side of the remaining one so you'll have left and right wings. (A pneumatic sanding drum works great for this project. If you don't have one, use your stationary belt sander or a flap sander.)

Sand the body to the cross-sections shown. Note on the top view that the duck narrows to $3/4$" at the neck. Make the head $5/8$" thick. Taper the tail and beak. For the base, cut a piece $3/4 \times 2\frac{3}{4} \times 6$". Center a $1/4$" hole on the top side, and drill it $5/8$" deep.

Round over the top edges of the base. Glue a 6½"-long piece of $1/4$" dowel rod into the hole on the bottom of the body.

Finish-sand, and paint as shown with acrylic artist colors. Glue the eyes (available from crafts shops) into place. Then, glue the wings on where shown, aligning their edges. Apply a clear oil finish overall, and insert the dowel into the base hole.

Project Design: ©Jolart, Howard and Marianne Eggleson
Illustrations: Mike Henry, Kim Downing
Photograph: Wm. Hopkins
We think that collective spoons deserve better treatment than being stashed in some drawer. Here's an easy-to-build display rack that puts teaspoons or demitasse spoons where you—and everyone else—can enjoy them.

Cut stock to the dimensions shown in the Bill of Materials. (We resawed and planed thicker material for the thin stock. For the 9”-wide part A, we glued up two narrower pieces.)

Photocopy the half-patterns for the top and bottom profiles of the back, opposite page. Make full patterns, and trace them onto the stock for part A, using carbon paper or transfer paper. Bandsaw or scrollsaw Part A. Rout a keyhole hanging slot near the top center on the back face.

Transfer the full-sized patterns for the sides’ top and bottom curves onto one 1¼”-wide face of one side (B). Stack the two parts B with double-faced tape between them, placing the patterned piece on top. Bandsaw the two sides, and sand them.

Lay out the spoon holders (C) on your stock. Make two to display teaspoons, three for demitasse spoons. Stack the parts, and then bandsaw or scrollsaw them.

To form the bowl depressions, drill a ¼” hole (or one to fit your spoons, if different) in the center of each. Bandsaw or scrollsaw a ¼”-wide slot straight in from the edge to each drilled hole. Sand the parts.

Mark the spoon-holder locations where shown on part A, depending on your spoon size. Rout a ¼” dado ¼” deep across part A at each location. Glue the holders into place with the bowl depressions facing up. Glue on the sides (B), placing the back edge of each flush with the back face of part A. Sand the assembly.

Scrollsaw the decoration from ⅜” stock. Sand, and glue it to the back piece where shown. Apply a clear finish overall.

Project Design: Workshop Blueprint Co.
David Ashe
Illustrations: Mike Henry
Photographs: Wm. Hopkins
Bill of Materials

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<tr>
<th>Part</th>
<th>Finished Size</th>
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Material Key: C-cherry

TOP OF BACK (FULL-SIZED HALF PATTERN)

DECORATION (FULL-SIZED HALF PATTERN)

SHELF (FULL-SIZED PATTERN)

SIDE VIEW

1/2" stock for sides

3/4" stock for back

1/4" stock for shelves

1/4" dado 1/4" deep cut in back for shelves to fit into

1/8" stock for decoration

Shelf locations for teaspoons

6"

17/6"

4 1/2"

Shelf locations for demitasse

3 1/6"

8 1/2"

5 3/4"

WOOD MAGAZINE SEPTEMBER 1993
GREECE. New York, hosts a sizable population of very small characters. They're the Little Guys and Gals, created by Keith Randich. Keith designed this Little Guy woodcarver just for you. Here's how to carve him:

On one square end of a 1 x 1 x 2¼” block of carving wood, letter the corners clockwise A to D. Turn the other end up, and carve away the corners and edges to form a dome that starts ½” from the top.

Next, draw the chin line on the block. On corner A, which will become the front of your Little Guy's face, make a mark 1” from the top of the block. Diagonally opposite on corner C, place a dot ⅜” from the top. Mark corners B and D ⅛” from the top, and then draw a line around the block, connecting the points. Your block should look like the one in the background of the photo.

An uppercut to the chin
With the blade of your carving knife perpendicular to the wood surface, stop-cut the chin line about ⅛” deep. (A stop cut, an incision along a pattern line, allows you to carve to the line without chipping out wood beyond it.)

Then, start about ¼” below the line and carve up to it, forming an edge around the bottom of the head about ⅛” deep. In carving the Little Guy, think small; a series of small cuts will always work better than one big one.

Round the top corners and edges of the body down from the
chin line about ¼". Round the head down to the chin line on the sides and back, but leave the front (corner A) alone, for now.

Now, draw a horizontal line on the body ¼" from the bottom between corners A and D. This marks the height of the Little Guy's shoes. On the same side, which is the front of the body, draw two centered parallel vertical lines ¼" apart. Also draw a vertical line down the center of each side. Your block should now look like the second one from the back in the photo.

**Stand him on his own 2 feet**

Stop-cut the shoe line. From ¼" above it, carve down and inward to cut out a wedge straight across the body. Stop-cut and carve until the notch reaches ¼" deep at the shoe line. This will be the front of the legs.

You may be worried by now that you've gone wrong; your carving begins to look as if it's going to be all head and feet. But you're okay, Little Guys, Keith notes, "are conspicuous by their big heads and shoes."

Slice the corners from the front of the body. Round the torso between the lines on the front and each side. Slope the front from the waist (that's right at the top of the notch) to the top of the body. Leave the back flat, for now.

You've carved the front of the legs, now do the back. Draw a horizontal line ¾" from the bottom edge between corners B and C. Then, with a rolling motion of your wrist, carve an arc down and in from the line to the bottom of the block. Cut to about ¼" deep at the heels, shown on the side view, drawing right.

Make a vertical stop cut down the center of the arc. Then, deepen it and widen it to a V cut, and round the edges until you see two separate legs.

Don't actually divide the legs; just carve deep enough so that they appear divided. A sharp stop cut in the bottom of the V will add to the impression.

Round the outside edges at the back of the legs. Then, making stop cuts, V cuts, and rounding the edges, carve the front of the legs and the shoes.

And when you carve the shoes, remember: Little Guys love big, clophopper shoes. Separate the shoes about ⅓" back, and leave about ¾" between them at the toes. Then, round the corners and edges about halfway down.

**Square those shoulders**

You'll see that one shoulder has ended up higher than the other when you look at the figure from the back. Slice away the higher shoulder until they look even.

Now, carve one arm on the body. Later, you'll carve and attach the other one.

Little Guys always look away from the carved-in arm—that's just one of their traits. So, sketch an arm on the right side of the body (left side, looking from head-on). Draw it about ½" wide at the shoulder, about ¾" below the elbow, with a mitten-shaped hand. (See the illustration left.)

Stop-cut, and then carve away the side of the body to set the arm out about ¼". Taper it into the shoulder, and round over the edges. The body looks lopsided after carving the arm, so pare away the left side above the waist to bring it into balance.

Your carving should now look like the one right behind the Little Guy in the photograph, the one that seems to be wearing an astronaut's helmet. Turning that helmet into a face will give your carving personality.

**Now, make this guy look like someone**

"I like to carve faces on my guys and gals as soon as I've roughed out the body," Keith says. "Since the face is the most prominent part, I let it dictate what the rest of the character will look like." When he carves a gruff-looking face, Keith will more likely finish the body as a cowboy rather than, say, a minister.

As you carve the face, remember: Little Guys are caricatures. You want to exaggerate features as much as possible. Sharpen your knife before you start the face, and keep it sharp for best success with the tiny details.

Study the six illustrations of the head on the next page before you begin carving. Then, place a pencil mark midway up the head on its front corner (A).

Continued
LITTLE GUY

Starting from that point, slice upward and inward to form the bridge of the nose. Don’t pay too much attention to the height of the forehead; most Little Guys don’t have one. Just slope the bridge of the nose right up to the top of the head.

Next, make a stop cut just beneath the mark. Cut away the area beneath the nose to a depth of about \( \frac{1}{4} \). Be careful not to break off the nose at this stage. Slice a bevel at the bottom of the head to form the lower lip and chin. Now, your carving should resemble the one shown in step 1.

Draw the side of the nose and the eyebrows where shown in step 2. Stop-cut the lines. Then, carefully carve out shallow chips with the tip of your blade to form the sides of the nose and the eye sockets. Cut about \( \frac{1}{8} \) deep, sloping in near the side of the nose, shown in step 3.

Don’t scrimp on the nose

Next, shape the nose. And don’t aim for a dainty, well-proportioned one; give the guy a real honker. Round over the sides a little at a time. You’ll find that a small chip makes a big difference at this stage (step 4).

A bulbous end on the nose will give your Little Guy an entirely different personality than a pointy one. You’ll create a much different look if you carve the bridge of the nose slightly concave instead of convex, too.

Starting at the lower outside edge of the nose on each side, draw the smile lines downward and outward, where shown in step 5. Stop-cut each line, and then round over the mouth area.

Pencil in the biggest mouth that will fit, following the general shape of the one shown in step 5. Leave \( \frac{1}{8} \) above and below the mouth for an upper lip and chin.

Stop-cut the mouth about \( \frac{1}{8} \) deep, and cut away the inside of the mouth with the tip of your knife. (Keith switches to a smaller X-acto #16 blade at this point.) Draw in two, three, or four upper teeth, and stop-cut them. Model the teeth with shallow V-cuts, and shave the surface down slightly so the teeth will appear to be farther inside the mouth at the top, but flaring out. Deepen the mouth opening around the teeth.

About \( \frac{1}{8} \) below the mouth, slice downward toward the chin to form the lower lip. Don’t make it too deep; just enough to let the mouth stand out from the chin. Then, round the chin and jaw into the neck (step 6).

Sketch a \( \frac{3}{16} \) circle on each side of the head, about in the middle. These will be ears. Stop-cut and carve to set them out about \( \frac{1}{8} \). Then cautiously carve a slight hollow in the center. (You also could use a spherical bit in a hand-held rotary tool.)

Before you tackle final detailing, give the carving a once-over. Round over the arm, smooth any rough or fuzzy areas, and stop-cut the bottoms of V-cuts to clean and define them. From an arm’s length, check for symmetry.

Draw fingers on the hand, and carve them with the tip of a sharp knife. They’ll be wrapped around a carving knife, so keep them short. Then, whittle the other hand and arm from stock about \( \frac{1}{8} \times \frac{3}{4} \times 3 \), following the full-sized drawings on page 71.

Add your special touches

Detail the Little Guy’s clothing with shallow stop-cuts and V-cuts. Add a belt, cuffs, pockets, shoe soles, shirt collar, necktie—whatever you’d like your little woodcarver to wear. Whittle a miniature carving, such as the little Little Guy our Little Guy’s holding or the duck on page 71.

Draw a vertical line on the Little Guy’s left side, running approximately from his ear to his shoe heel. Hold the arm in position, and move it around until it looks right.

When you determine the proper position for the arm (ours angles down slightly), draw a line on the arm to match up with the line on the body. File or sand tight mating surfaces on the body and arm, and join them with woodworker’s glue. When dry, carve away the excess length and blend the arm into the shoulder.

Woodburn lines for the hair and eyebrows. Add sideburns or a mustache, if you like. V-cuts or shallow, closely spaced knife cuts also represent hair well.

Paint the Little Guy with acrylic artist colors. For his eyes, paint a white oval in each eye area. Put a blue or brown dot in each, and then dab on a white highlight. Dress your Little Guy in colors you like. Finally, glue the carving to the left hand and a silver-painted toothpick end to the right hand to represent a knife.

Project Design: Keith Randich  Photograph: Wm. Hopkins  Illustrations: Mike Henry  Written by Larry Johnston

WOOD MAGAZINE  SEPTEMBER 1993
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WOOD MAGAZINE  SEPTEMBER 1993
RUST REMOVAL
MADE EASY
A TOOL COLLECTOR SHARES HIS LABOR OF LOVE

As a professor of archaeology, and an active tool collector, Missourian Jim Price sometimes manages to apply academic skills to his hobby—like removing rust with electrolysis. "For decades, archaeologists have employed the method to clean specimens without damage," says Jim. (Read more about Jim Price in "He Makes Tools Sing Again" on pages 25–29.)

Charging up for rust
According to Jim, his rust-removal technique depends on producing a chemical change (removing rust) by passing an electric current through a non-metallic conductor. To translate that into application, you'll need a common battery charger (about $20 at auto-supply stores) to supply the direct current. Then—for the conductor—mix a can of lye (about $2 for 12 oz. at grocery stores) to three gallons of cold water.

For the terminals—the negative cathode and the positive anode—of the electrolytic cell you're creating, use ferrous (derived from iron) metal rods, such as concrete-reinforcing rod. The container must be made of plastic or glass. Gather up some flexible iron wire, a scrap board long enough to rest on the container, and you're ready to start.

Zap away corrosion
Jim recommends operating your rust remover outdoors. "Not because the fumes are toxic," he says, "but because they really smell bad." And be sure that the tool(s) you're going to clean do not have a zinc plating or brass parts. Zinc will dissipate through the solution and cover everything, and brass gets discolored. Also, remove wooden parts.

To support the metal terminals in the bucket, drill two holes in the board the same diameter as the terminals, one near each end. Then insert the terminals.

With a wrap of wire, attach the rusted tool or parts of a tool to the bottom of the terminal you designate as negative. Next, place the terminals and attachments into the bucket containing the lye/water mixture.

Start the process by connecting the negative (bar) lead of the battery charger to the negative terminal and the positive (red) lead to the opposite one. Set the charger to low-amp charge (2 amp or "trickle" on a 12-volt instrument). Next, plug the charger cord into an outlet.

"When the solution bubbles like a Coke in a glass, it's working properly," Jim advises. "If it doesn't bubble, there's a bad connection."

Jim has found that the degreasing process takes about 35 minutes. "When all the rust has turned to what looks like a black powder, it's done," he notes.

After stopping the electric flow and removing the charger leads, Jim pulls the still-attached tool from the solution and rinses it quickly with a garden hose (gloves keep the weak but caustic solution off his hands). "Then, rinse it real good with boiling water," he says. "You also can wire-brush the metal very lightly. If there are any stains left on the metal where the rust was, remove them with a buffing wheel and jewelers rouge. Then, rub with oil."

Illustration: Brian Jensen
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BUYING A BASIC COMMONSENSE TOOL KIT

Perhaps you've just completed a beginning woodworking course, or maybe you've assembled your first kit project. You thoroughly enjoyed this taste of woodworking, and now you're ready for bigger challenges. But one obstacle blocks your way: you don't own the proper tools.

What tools does a beginning woodworker need, and how should he or she acquire them? In an unscientific poll of WOOD magazine staff members, we assembled a basic tool kit for woodworkers, tools we think should be part of any shop.

With this equipment—and skill—you can perform most woodworking operations.

As you read the list, you'll notice we don't mention stationary power tools—the tablesaws, drill presses, bandsaws, and jointers that professional woodworkers and serious amateurs depend on. We left them out because this is a basic tool kit.

When assembling our kit, we kept the beginning woodworker in mind. All of us would have liked to have included a tablesaw in the package, but we omitted it for economy.

Even without the tablesaw, if you walk into your local tool shop and ask for everything on our list, the clerk might ask you to turn over $1,000 or more. How can you get a start in this hobby without robbing a bank? We believe the answer is to plan carefully and buy wisely.

Plan Ahead

Equip your shop a few tools at a time. As your skills improve, so will your tool inventory. In the basic kit on the opposite page, we list the tools that we find indispensable in bold-face type. They're the items you're likely to find most useful and use most often, so think about purchasing them first.

Can you sidestep any processes for which you're not well equipped? Some retail wood outlets will joint, rip, plane, and crosscut lumber to requested dimensions. You pay for this service, of course, but in the short run it's less expensive than buying tools you'd need to do the work yourself.

As you budget each project, try to figure in the purchase of one new and necessary tool. You'll spread out the cost of equipping your shop, and you'll be able to enjoy a new tool with each project you undertake.

Finally, remember that there are woodworkers who make exceptional pieces with only hand tools (and a little perspiration). We are addicted to the power tools in our shop, but we know that life can go on without them.

Be a Smart Tool Shopper

When you're ready to buy tools, shop carefully. Check more than one store, read all the catalogs you can obtain (the information in them will save you substantially more than the few dollars they may cost), and always look for sales and specials. Don't rush yourself.

Mail-order advertisements in magazines such as WOOD regularly offer substantial price reductions on top-quality tools. And tool sales are such a normal marketing practice at several nationwide retail chains that it sometimes seems difficult to pay full retail price.

Many manufacturers offer at least two product lines: inexpensive tools for "hobbyists," and more elaborate heavy-duty models for commercial and professional use. Which type do you need?

In general, it makes sense to buy the best equipment you can afford, particularly when you're purchasing hand tools. It's unlikely that a good saw or plane will become obsolete, and with basic maintenance, there's no reason why these tools can't last a lifetime. The thought that a great-grandchild might one day enjoy using your combination square could make spending extra dollars seem like a wise investment.

When it comes to power tools, however, it gets easier to fall into the "overkill" trap. If a 1-hp router will be entirely adequate for your needs, don't buy a 3-hp model.

Good tools don't go out of style. A 100-year-old hand plane or wood chisel looks pretty much the same as a brand-new one, and some woodworkers insist that the older the tool, the higher the quality. In fact, some classic models of old tools can actually be more expensive than new models. But auctions and newspaper classifieds are often good sources for low-cost, high-quality items, so think about buying your tools used. You might even find a great deal on that tablesaw we'd so much like you to have.

Photograph: Bob Calmer
Illustrations: Jim Stevenson
Measuring tools:
- Combination square
- Sliding bevel
- Marking gauge
- Framing square
- Steel tape (10' or 12')
- Folding rule
- Compass
- Scratch awl

Cutting tools:
- Crosscut saw (12 pt.)
- Rip saw (6½ or 7½ pt.)
- Backsaw or dovetail saw (15 pitch)
- Coping saw
- Hacksaw
- Slip-joint pliers
- Needle-nose pliers
- Diagonal cutters

Shaping tools:
- Smooth plane
- Low-angle block plane
- Wood chisels (¼", ½", ¾", 1")
- Single-cut mill bastard file
- Round rasp
- Flat rasp
- Cabinet scraper and hand scrapers
- Utility knife

Joining tools:
- Claw hammer (16 oz.)
- Finish hammer (8 oz.)
- Nail set
- Wooden mallet
- Screwdrivers (straight, Phillips)
- Doweling jig
- Bench vise or clamping system
- Bar or pipe clamps (2-3' and 2-5' min.)
- Handscrews
- C-clamps

Safety and maintenance:
- Face shield or safety glasses
- Hearing protector
- Dust mask or respirator
- Sharpening stone (dual-purpose, coarse/fine)

Portable power tools:
- Router (1 hp, ¼" collet)
  (Purchase bits as needed; bead, chamfer, cove, straight, round-over, rabbet)
- Circular saw (7½"
- Drill (3½" variable speed)
- Twist drills (½"-3"
- Spade-shaped drill bits
- Brad-point drill bits
- Jigsaw
- Dual-action pad sander (straight-line & orbital)
- Belt sander (3" x 21" with dust collection)
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If you occasionally design your own projects with compound angles or multiple sides, I've come across a handy scale that you should know about. The Angle Ease Saw Scale works like a circular slide rule. One side has a compound-angle scale for determining the saw settings for 4-, 6-, or 8-sided miters, or 4-sided butt joints. You only need to adjust the scale to the angle at which your workpieces incline from vertical (from 5° to 55°), and the scale tells you the necessary miter-gauge and blade-tilt settings.

The other side of the scale helps you calculate tool settings for multisided assemblies such as an 8-sided top on a picnic table. To use it, you first dial in the number of sides from 3 to 20. The scale tells you the necessary blade-tilt and miter-gauge setting. Two other windows in the scale give you a decimal factor for calculating the length of your workpieces.

I found the Angle Ease accurate and surprisingly simple to use. Its paperboard construction should survive most workshop settings.

Tested by Bob McFarlin

Angle Ease Saw Scale, $9.95 ppd. from J.K. Jenner, 2294 Stringer Gap Road, Grants Pass, OR 97527.

Continued on page 80
Saw-alignment system with surefire precision

You can buy gadgets galore for aligning the cutting angles of your tablesaw or radial-arm saw, and I've tried many of them with mixed results. I recently tested the Woodhaven Saw Alignment System, and rated it a cut above other alignment aids because of its flexibility, ease-of-use, solid construction, and dead-on accuracy.

The system consists of several components that you buy individually or as a set. At the heart of this lineup is an aluminum Registration Fence with a straight, milled edge. Two powerful magnets hold the edge parallel to your blade and away from its teeth.

With the Registration Fence in place, you need to adjust the angle between it and the face of your miter gauge. You could use a try square or adjustable triangle, but I found Woodhaven's Setup Squares a better choice. These 1/4"-thick acrylic squares have the most commonly used angles precisely machined into them. The 11" x 11" White Setup Square has one 90° angle and two 45° angles. The Red Setup Square measures 9" x 5" and has these angles: 90° (two), 135°, and 45°. The Yellow Setup Square, with 8"-9" long edges, has 60° and 120° angles used in making six-sided project pieces, and 67½° and 121½° angles for eight-sided projects.

To test the accuracy of the squares I built several multi-sided boxes. The joints fit together tightly, telling me the squares were precisely manufactured.

—Tested by Chuck Hedlund

Woodhaven Saw Alignment System, $69.98 for these items (individual prices in parentheses):

Registration Fence ($29.99); White Setup Square ($14.99); Red Setup Square ($11.99); and Yellow Setup Square ($15.99). Prices do not include shipping charges. Call 800/344-6657.

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THE SHOOT BOARD AND PLANE

Earlier in this century, woodworkers turned to Stanley's no. 51/52 shoot board and plane combination to trim end grain precisely. The sets are rare today.

Equipped with a handsaw we would consider dreadfully dull today and a mitrebox that was crude at best, a craftsman of past centuries had only the slimmest chance of sawing a tight-fitting miter joint. And he knew it. That's why he kept a plane and shooting board handy.

A shooting board incorporates a groove or rail to guide a plane in a straight line. Holding the workpiece at the desired angle to the guide allows precise trimming.

Well into the 19th century, craftsmen built their own shooting boards. But around mid-century, commercial wooden ones arrived on the scene. (The variety barely exceeded the many versions of the name: it variously appears as shuteing, schutting, shoot, and shute, among others.)

Then, as the Industrial Revolution took hold, iron woodworking tools gained favor. The late 19th century saw a flurry of patents issued for miter-planing tools. Though none sold well, many represented “beautiful examples of the Victorian synthesis of form, function, and art,” notes antique-tool dealer Martin Donnelly of Bath, New York.

One that met with commercial success came along in 1905. The Stanley no. 51/52 chute board and plane (called “shoot board and plane” from 1912 until production ended in 1943) was a practical end-grain planer.

The cast-iron no. 52 shoot board features a pivoting fence at one end. The fence sets the desired angle in relation to a groove running the length of the board. Stanley's unusual-looking no. 51 plane fits into the groove.

The no. 51's cast-iron body resembles a length of angle iron. One side slides in the baseboard groove, the other extends upward on the fence side of the groove. The plane iron protrudes through the vertical face. The plane was sold separately from 1909 on.

A sliding back on the fence adjusts to support the workpiece within a fraction of an inch of the cutting edge. An adjustable foot (the sliding back clamp) helps hold the work as the plane slices the wood cleanly and accurately.

The 51/52 combination would be handy to have today. Finding one could be a problem, though. Collector Donnelly says that complete examples rarely show up on the market. "Few were likely sold new," he explains, because of their cost and specialized nature. At $17 in 1905, it would have been a tool for commercial shops, not home or farm shops.

Bulky and breakable, "they were likely to deteriorate, or be discarded," Martin says. "Many now show evidence of neglect."

Even a marginal set missing the sliding back clamp (a common fault) sells for $700-900. A collector-quality example as shown commands $1,600 or more.

Tool from the collection of Martin J. Donnelly, Bath, N.Y.
Written by Larry Johnson
Photograph: John Betherington
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ASK WOOD

Whether your woodworker's license reads "Beginner," "Intermediate," or "Advanced," you're bound to have a few questions about your favorite hobby. We can help by consulting our staff and outside experts. Send questions to:

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WOOD keeps computers busy

Your illustrations in WOOD magazine interest me. The diagrams and the exploded views are clean and clear to understand. Do you use a computer program for the design and drafting of these projects? If so: 1) What software program is used? 2) Is this a 3-D package? 3) Will it automatically calculate the cutting diagram and bill of materials? 4) Does it include a library of predrawn symbols such as screws, nails, brackets, etc.?

—John Steinmaus, Fremont, Calif.

John, we use Design CAD, a Computer Aided Drafting program from American Small Business Computers, Pryor, Oklahoma 918/825-4844. It comes in either 2-D or 3-D and a library of symbols is available. It does not calculate the cutting diagram. However, a program called Casper by Roger and Ryan Drummond, Hennicke, Pennsylvania 412/446-0159, will form the optimal cutting diagram after you enter the bill of materials.

Making wooden rings

My daughter has asked me to make her a wooden ring 1 1/4" thick with an outside diameter of 5 1/2" and an inside diameter of 4" (3/4" wall thickness). I've tried using my wheel/hoile cutting tool in the drill press, but the stress forces the chuck to pull free from the spindle after a few revolutions even running at the lowest rpm possible. Is there a safe and simple way of making this kind of ring?

—Barney Brady, Houston, Texas.

Barney, our project builder Jim Boelling suggests two possible ways to make the ring safely and efficiently. Begin with a 6" square, 3/4"-thick workpiece with the ring's pattern drawn on it. Drill a start hole in your workpiece. Then, scroll saw or jigsaw the inside circle to size, cutting just inside the line. Next, drum sand to the scribed line to complete the ring's inside circle. Cut the outside circle and sand.
Old glue likes to stick around

Some time ago, someone leaned back a little too far in a dining room chair, and the rear leg broke away from a cross member. To make matters worse, someone tried to glue it back and did a rather messy job. The problem now is removing the old glue so I can disassemble the leg parts and reglue them. But I want my repair to look as though the chair was never broken.

I read that white vinegar will melt out old glue. Is that really so, or do you have a better idea? I have applied vinegar, but there seems to be no reaction. Any suggestions?

—George Mitro, El Paso, Texas.

George, some glues, regardless of age, don’t want to let go. And though warm white vinegar will occasionally soften up old glue, usually you must remove it with a chisel or knife.

If the existing glue in the joint remains stubborn, just remove the unsightly exposed glue around it. If, on the other hand, the joint is weak, use a wood or rubber mallet to tap the leg pieces apart. Then, scrape and sand the joining parts down to bare wood and rejoin. If the joints fit too loosely after cleaning, glue thin strips of wood in the openings, and before the glue sets, apply more glue in the openings and insert the mating pieces. Clamp until dry with a strap clamp or two, and remove any squeeze-out with a damp cloth. Touch up to match with stain and finish.

Figuring angles for many-sided objects

How do you figure the angle for each piece of a seven-sided object?

—John Elliott, Harkers Island, N.C.

We asked project builder Jim Boelling to respond, John. “This formula works on any multiple-sided object. First, divide 360 by the number of sides. Then divide that number by two. This gives you the angle per edge per piece.” For example, you want a seven-sided object. The equation right shows bow we got an angle per edge of 25.7 degrees.

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<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
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<tbody>
<tr>
<td>Adirondack Chair</td>
<td>Sleek and comfortable, here's a classic chair that's easy to build in just a weekend!</td>
</tr>
<tr>
<td>Oak Dry Sink</td>
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<tr>
<td>High Chair</td>
<td>Designed for safety and durability, this chair will retain its good looks through loads of messy mealtimes.</td>
</tr>
<tr>
<td>Rocking Horse</td>
<td>Lightweight and sturdy, this rocking horse will please a favorite little one and be passed on for generations.</td>
</tr>
<tr>
<td>Dollhouse</td>
<td>This regal fold-up dollhouse packs away in its own handy case when playtime's finished.</td>
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<tr>
<td>Earth Movers</td>
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Three-wheel vs. two-wheel bandsaws

I do my woodworking from a wheelchair and see the advantage of the three-wheel benchtop bandsaws. I understand that the three-wheel saws allow for a lower profile machine and a deeper throat. Plus, they cost less than the two-wheel bandsaws. Are there disadvantages I’m overlooking? What are the primary differences other than the obvious additional wheel?

—Allan Ludvigson, Truman, Minn.

You’ve hit on the main advantages, Allan. But we’ll add to that. Three-wheel bandsaws are cheaper because the additional wheel allows for a deeper throat with less cost in frame construction than a two-wheel bandsaw with the same depth. (See the drawing right.) So, for someone who’s looking for depth, the three-wheeler may be the ticket.

The primary drawback, lies in increased blade fatigue which leads to breakage. Lou Brickner, vice president of Delta International Machinery, says, “A blade on a three-wheel saw has to bend 50% more often than the blade on a two-wheel saw, plus the wheels themselves are smaller on the three wheel. The more bending, the more fatigue.”

Brickner advises using thinner blades on saws with wheels under 8” diameter—the size that most three-wheel bandsaws have. “Most standard two-wheel blades are between .018- and .020-inch thick. We recommend going down to .012- or .014-inch thick for three-wheel saws,” he says.

In our testing at WOOD® magazine, we’ve found thinner blades tend to wobble. For this reason, don’t expect the same performance as with a two-wheel bandsaw and a standard blade.
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What tree in all the world could dare challenge the North American giant sequoia as the king of trees? In sheer size, sequoias can amass a girth at their base exceeding 100' and rise to the height of a 25-story building with the first branch more than 100' above the earth. New Zealanders bow to these awesome statistics, but believe their favorite son, the kauri (Agathis australis), a pine, deserves royal recognition, too.

The kauri can never equal the sequoia in height or girth, but in the combined attributes of size, timber content, and wood quality, they say the tree rates monarch status. Because, unlike sequoias, kauris do not taper as they increase in height. Instead, their trunks frequently increase in girth where the branches begin, resulting in 28' diameters 100' above the ground!

The kauri thus produces vast quantities of millable heartwood (with no taper, little wood is lost), and the species was marked for lumber production as far back as the early 1800s. Its wood was used for boatbuilding as well as frame-house construction and furniture. And for some time, the sap of the kauri was collected in gum form as the hardening ingredient in paints and varnishes.

Unfortunately, the kauri was truly exploited. Trees died from slashes made in their bark by gum collectors. Kauri forests were leveled for more agricultural land. And vast fires decimated still more standing timber. That's why today most of the country's large kauri trees grow on protected government preserves. Yet, kauri fans still search for the largest tree while old bushmen point to the stumps of past giants. ✹

Illustration: Jim Stevenson

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WORTH WRITING FOR...

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 affirmed.
FINISHING TOUCHES

NORM ABRAM SCHEDULES DES MOINES WOOD SHOW

Midwest fans of public television's *The New Yankee Workshop*, pick up a pencil right now and mark Saturday, September 18 on your calendars. That's when Norm Abram, the show's star, pays Des Moines a visit.

From 9 a.m. to 4:30 p.m. he'll be lecturing, answering questions, or signing autographs at his booth in the Construction, Remodeling, and Woodworking Fair, to be held at the Des Moines Convention Center. The show begins Friday, September 17 and runs through Sunday, September 19, but Abram has only scheduled the one-day appearance. Show admission costs $5 each day. For more information, call 515/278-2126.

Norm Abram, of *This Old House and The New Yankee Workshop* television fame, comes to Des Moines this fall.

The microwave:
Woodworkers used it first

When the Ford Motor Company's Iron Mountain plant in Kingsford, Michigan, began producing bodies for the 1949 woody station wagon, factory woodworkers faced a complex problem. How could they laminate ash and maple and at the same time shape it into a curve to match the car's cowl?

According to Keith Ashley, writing in *WOODIE TIMES*, engineers came up with the forerunner to today's microwave oven. With high-frequency electromagnetic waves generating heat in an enclosure, it glued, pressed, then softened 12 layers of wood for shaping into the complicated, compound curve.

New research says:
Finish redwood right away

A common belief among redwood users is to let it "age" a month or so before applying a finish. Doing this supposedly allows extractives to dry or escape so that they won't ruin any applied coating. But new research by the Forest Products Laboratory in Madison, Wisconsin, shows that redwood need not be left unfinished for any length of time.

For answers concerning redwood, contact *The California Redwood Assoc., 405 Enfrente Dr., Suite 200, Novato, CA 94949 (415/382-0662).*

Illustrations: Jim Stevenson
Photograph: Richard Howard

A GRITTY ATTRACTION

Believe it or not, there's an entire museum devoted to sandpaper! It's in Two Harbors, Minnesota, an hour's drive north of Duluth along Lake Superior's ruggedly beautiful shoreline.

Dedicated to the important role that sandpaper plays in an industrialized society, the museum was the original office of the Minnesota Mining and Manufacturing Company, now known as 3-M. In it, you'll discover the story of how the company struggled to become the world's leading supplier of coated abrasives. Also on display: a 12"x12" quilt made of different sandpaper types, a huge roll of Werordry sandpaper large enough to cover 18 football fields, and displays of early abrasives. For more information, and museum hours, call the Lake County Historical Society, 218/834-4898. ♣
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Shop Test Results—"It does an excellent job of planing, on a par with more expensive machines, and even better than some commercial models."

Editor, Workbench Magazine

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