STATIONARY PLANERS We size up six popular models *See page 50*

Better Homes and Gardens®

WOOD®

THE WORLD'S LEADING WOODWORKING MAGAZINE
ISSUE 115 JUNE 1999

Just in time for summer!

FOLDING ADIRONDACK CHAIR

(See page 72)

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This issue's cover wood grain: western red cedar

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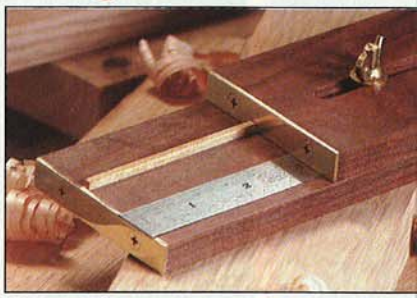
Page 42

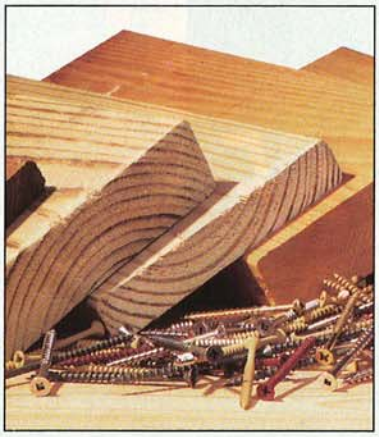
CONTENTS

Page 72

Page 50



Page 64



Page 66

Woodworking projects

Page 59

SHORT-SUBJECT FEATURES

Cover photograph: Hetherington Photography

Two tips of the hat for jobs well done

At *WOOD*® magazine we aim to inform, entertain, and inspire you in all that we do. Hopefully, in most instances, we succeed. And while research, fact-finding, and carefully written words are at the core of our efforts, there is more, much more, to our publication.

That's why I'd like to say a great big "Thank You" to all of the photographers, illustrators, and graphic designers who work so hard to present our ideas attractively in the magazine. Their job is to entice you into reading each and every article and to make the information as easy as possible for you to find and use.

It requires lots of planning and execution to create the beautiful photos and other graphics you see in each issue of our magazine.

As an example of one of the many things we do to provide you with great-looking visuals and graphics, take a look at the photo *above*. It shows a photographer, photo stylist, and an editor setting up the photo for the collapsible adirondack chair that's on the cover of this issue.

You might be interested to know that we took this summertime photo in November, long after the summer foliage had died out. Fortunately, we were able to set up in the cozy confines of a glass dome at the Des Moines Botanical Center. In total, the photograph took almost half a day to make. And that doesn't count the planning and preparation time before the shoot.

Multiply this effort many times over, and you will have a sense as to how much effort goes into the making of each issue of *WOOD* magazine. Thanks, everyone!

My congratulations go out also to Mike Jagielo, who walked away with the Grand Prize in this year's Build-A-Gift™ contest. (Watch for the winning projects in the October issue.)

Mike, who hails from Almond, Wisconsin, has won several other prizes in previous *WOOD* magazine contests. This time, though, he really outdid himself. He entered "Grandpa's Old Tractor," a wonderfully creative battery-operated vehicle whose various parts rock, flap, move up and down, and rotate when set in motion by the switch behind the driver.

Mike, thanks for putting so much of your woodworking skill into this project. And do enjoy the Dodge Dakota Pickup you won. You deserve it.

Photographs: Hetherington Photography; Tom Kujawski

Mike Jagielo (center) earned a new Dodge Dakota pickup with his Grand-Prize-winning "Grandpa's Old Tractor" shown *right*. WOW!

Larry Clayton

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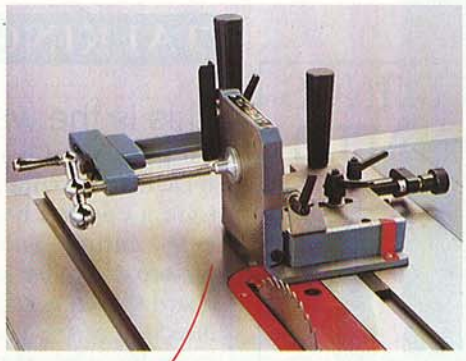

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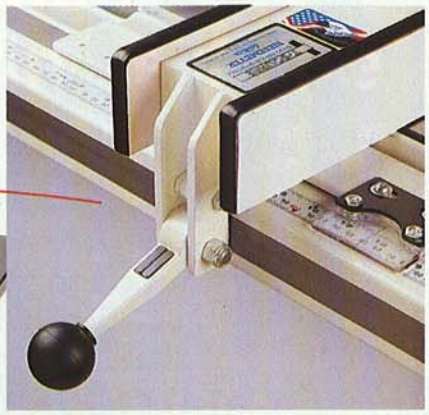

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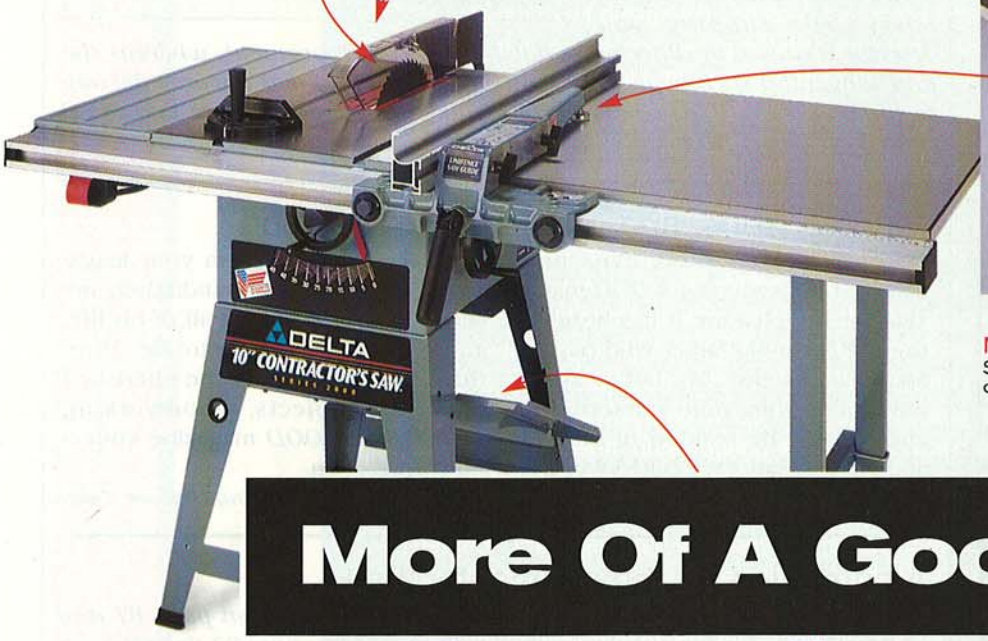

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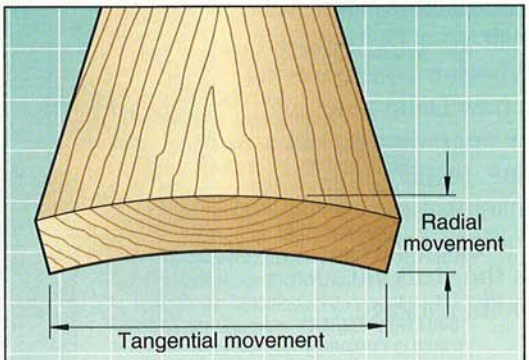
TALKING BACK

This is the way a board really cups

On page 32 of issue #110 of *WOOD®* magazine, you illustrate a cupped board before face-jointing. You have this picture drawn backwards. The board shown is cupped in the direction of the growth rings. In reality a board will always cup in the opposite direction of the growth rings.

—Larry Hicks, Columbus, Ohio



A plainsawn board cups away from the center of the tree as it dries.

You're absolutely right, Larry. The cupping you describe is caused by differing radial and tangential shrinkage—the face of the board that was closer to the center of the tree has more radial grain and movement, whereas the other face that was towards the outside of the tree has more tangential grain which moves less.

Fathers, sons, and a shared love of wood

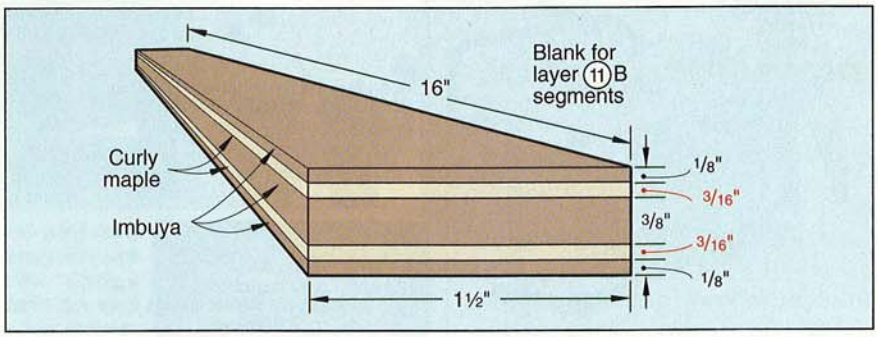
I would like to thank everyone involved in producing *WOOD* magazine for the pleasure it has brought to my 82-year-old father who passed away last August. My father and I have been long-time subscribers, and though he resided in Florida and I in Colorado, we talked weekly, sharing woodworking stories and discussing articles from your magazine. Taught by my grandfather, my dad worked with wood all of his life, and passed the bug on to me. More than anything, I know he cherished his tools, projects, woodworking books, and *WOOD* magazine collection. Thank you.

—Rick Brochu, Littleton, Colo.

A correction for the segmented bowl

We goofed in the story in issue #112 of WOOD® magazine titled, "Lathe Artistry." The 1½" × 16" pieces of curly maple in layer 11B should have been 3/16" thick, not 1/8" as the top cutting chart on page 81 and illustration on page 82 showed.

T	W	L	Number	Layer
3/16"	1½"	16"	2	11B



Speak your mind

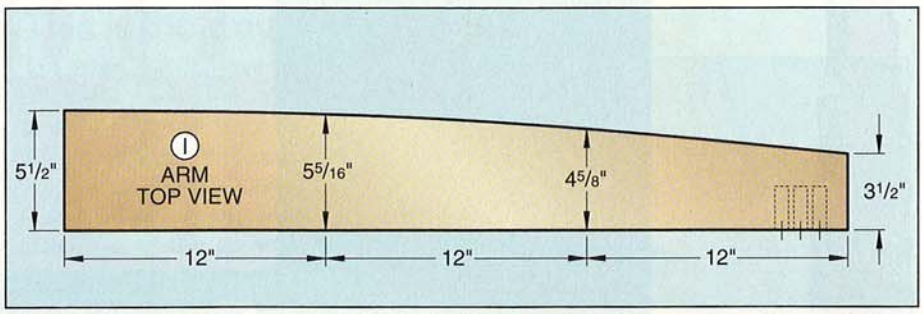
We welcome your comments, criticisms, suggestions, and yes, even compliments. We'll publish letters of the greatest benefit to our readers. Write to: Talking Back, *WOOD* Magazine, 1716 Locust St., GA310, Des Moines, IA 50309-3023

Continued on page 8

Continued from page 6

Added dimensions for the Morris chair

In issue #112 of *WOOD*® magazine we featured a Morris chair on pages 52-58. In the top view of the armrest in the *WOOD* PATTERNS® insert, we would like to add the dimensions as shown *right*. Also, please delete the 3" dimension in the upper left hand corner of the template form.



An accurate way to drill pen blanks

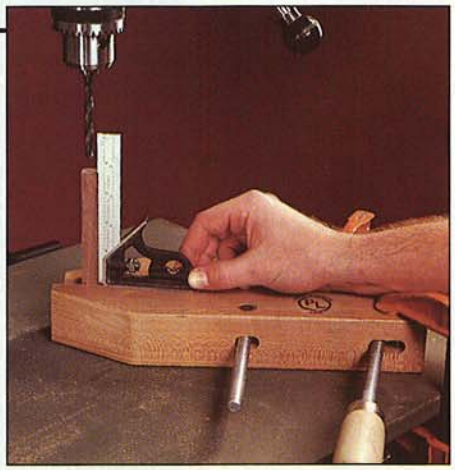
I would like to add to the information from page 92, issue #109 of *WOOD* magazine regarding drilling holes in pen blanks.

I've tried jigs like the one you suggest, but found that the off-centering problems persist. I attribute this to the possible movement you get with these hand-held jigs.

Here's a better way: I clamp the blank in a hand screw clamp and check for verticality with a square. Then, I bring the drill bit down so it is centered on the blank and hold it. Next, I clamp the hand screw clamp down to the drill-press table with another clamp, and drill. This is simple, fast, and works every time.

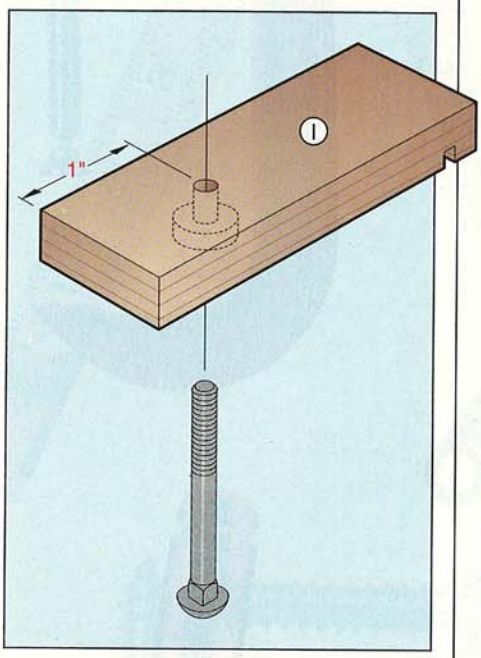
—Bruce Long, Westfield, N.J.

Good tip, Bruce. Readers already owning a jig for drilling pen blanks also can use a fence and a stop to hold the jig steady.



Oops! Off by an inch!

Several readers called us on an incorrect dimension on the box-joint jig plan in issue #108, which shows a 13⁄32" hole bored 2" from the end of the indexing blocks, Part I. The correct dimension is 1" from the end.



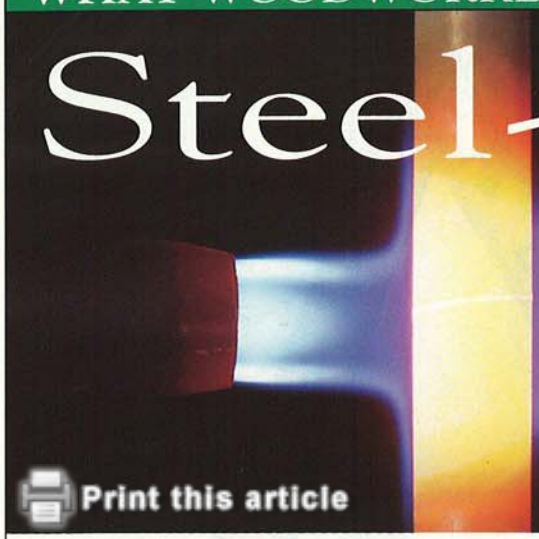
Poly-V belts improve performance

The new Ridgid line of power tools has arrived, and there is one thing I wish to commend the manufacturer for: poly-V drive belts on its 10" tablesaws. I have replaced all of the solid and stiff V-belts on my power tools with notched or segmented V-belts because they flex better and provide more grip on the pulley surfaces. I am currently running eight such belts, and have never had to replace any of them (one is 15 years old). If poly-V belts can run for thousands of hours on an automobile engine in severe conditions, they'll certainly hold up in woodworking equipment.

Also: Why do manufacturers still market drill presses with round machinist's tables to woodworkers? Square or rectangular tables are much better for woodworking because they work so much better with woodworking jigs.

—James T. Rucker, Houston

Steel-Bending Basics



Superman can bend steel with his bare hands. We woodworkers, though, need to rely on tools—a torch, a vise, and a piece of pipe. Here's how to use them to form the crank for the Irish mail on *page 59*.

Print this article

Heat holds the answer for bending thick steel rod

Sure, you can bend steel cold. But for making 90° angles in ⅜"-diameter steel rod for the Irish mail's crank, heat is the only answer. Heated to a dull red glow (about 1,000 degrees F), the ⅜" steel becomes plastic enough to bend by hand force, as shown *below*, though not quite with your bare hands.

You'll need a propane torch to heat the steel. The heating will go quicker if you fuel your torch with MAPP gas, which burns with a 5,300-degree flame, nearly 16 percent hotter than propane. Standard propane torches usually will burn MAPP gas, and it's readily available from most hardware retailers in 1-lb. bottles that look like propane containers.

In addition to the torch, you'll need an 18" length of ¾" black or galvanized pipe and a bench-mounted vise. We used a woodworking vise, but a machinist's vise would be best.

You may be tempted to don a pair of leather gloves for working with hot metal. But a blacksmith once warned us that leather gloves pose a danger because they hold heat. If you grab hot metal with your leather-gloved hand you won't immediately feel the heat. By the time you do feel it and drop the metal, the glove itself will have become hot enough to burn you. He suggests cotton (not polyester) work gloves (just to keep from getting too dirty and to shield your skin from radiant heat) or even bare hands. Either way, you'll sense instantly that the metal you're reaching for is too hot to grab by hand.

Measure and mark the metal before you light the torch

Mark the center of each bend on the steel rod with ordinary blackboard chalk or a welder's soapstone. Either will make a line that glows to remain visible as you heat the metal, as shown in the photo *above*.

For the crank, we decided to make the bend farthest from the end first, as shown in the illustration. In general, this is a good rule to follow because it lets you make each bend on a straight section. Grip the rod in the vise, placing the mark for the first bend about 6" above the vise jaws.

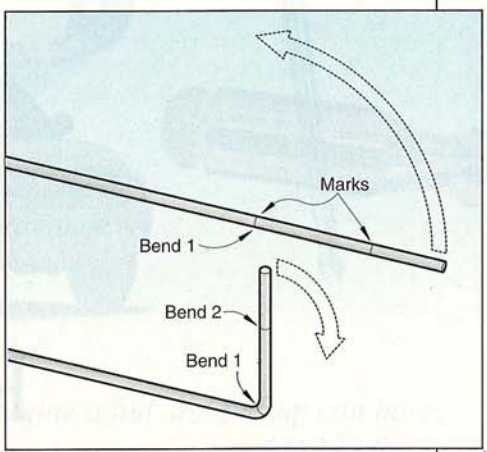
Now, it's time to bring some fire to your work

Play the torch flame over the rod, moving about 1" each way from the mark. When the rod glows red, slip the pipe over the end, placing the lip of the pipe at the mark. Bend the rod away from you, as shown *below left*.

Keep the metal hot as you make the bend. You could end up with a wrinkly bend if you allow the metal to cool too much while bending it. Slide the pipe off the rod to check the 90° angle with a try square.

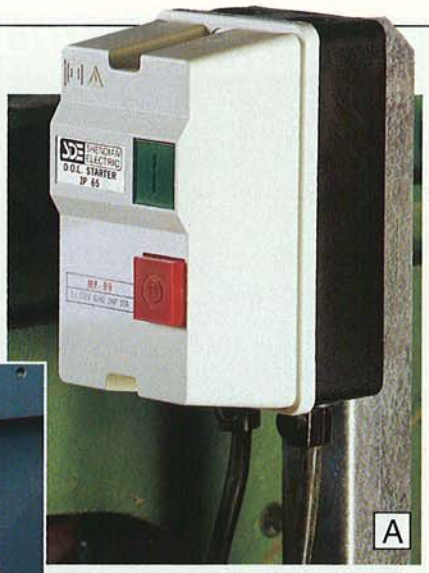
Photographs: Hetherington Photography
Illustration: Roxanne LeMoine; Lorna Johnson

Heat the rod until it glows red. Unplated steel is the best choice for hot bending; if you heat bright-plated steel, be sure there is adequate ventilation.

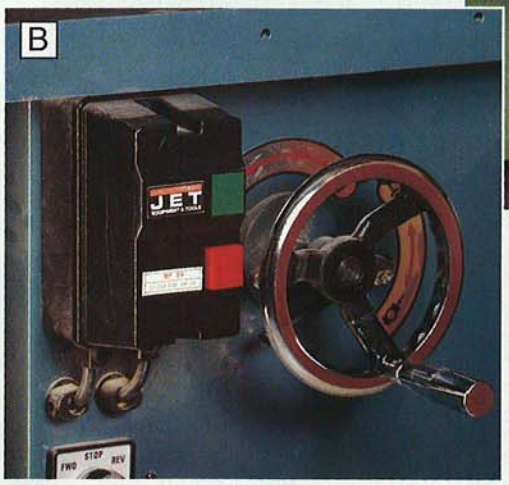


Magnetic starters

How foolproof are they?



A. This retrofitted magnetic starter—on a jointer—clicked on following a sharp rap on its plastic case. The lightweight, galvanized-steel angle it's mounted on proves much too flexible.



B. A magnetic starter solidly mounted to the base, as on this shaper, can't be accidently jarred into sudden action.

Most of the large planers reviewed in this issue (see *page 50*) have a device called a magnetic starter mounted to them. You'll also find these starters on some industrial-grade tablesaws, shapers, and other stationary machines. Unlike the typical on-off push switch, magnetic starters protect you from a machine's unexpected start-up after a power outage. They do this with a set of spring-loaded contacts, which only separate to the "off" position through physical manipulation or loss of electric power. What you may not know is that these switches can start your tool when you least expect it, a fact that was brought to our attention in our internet discussion group (*WOOD* ONLINE® at www.woodmagazine.com) by contributor craftsman Rick Christopherson.

A good bump can start up a machine

Depending on how the switch is mounted on the machine, it might be activated by unintentional bumping or jarring of the power tool. That's because inside the starter you'll find a relay that's controlled by magnets and springs. A strong enough bump can overcome the springs, letting the contacts close and the current flow to the motor for an unexpected machine start-up.

How does the mounting affect the switch? Manufacturers sometimes use thin metal brackets to mount the starters to the machine's body or stand (see *Photo A,* which shows a dangerous home-made retrofit of original equipment). A bracket like that can flex on impact, causing the starter to jump enough to jar the springs and start the machine. The safest mounting spot for a magnetic starter is on the most solid, non-flexible part of the machine or its stand (as shown in *Photo B*).

How to check for a magnetic starter

It's easy enough to check your machines to find out which ones have magnetic starters. Simply switch on each tool in turn, then unplug it from the electrical source. Then, plug it back in. If the tool runs, it doesn't have a magnetic starter.

If you find that you have a tool with a magnetic starter, give it a good rap on the side of the switch housing (not so hard that you damage the switch) or bump the tool with a large workpiece. If it starts up, at least you know what to expect.

What should you do? Well, manufacturers put magnetic starters on machines as safety devices (and they add to the cost), so you don't want to replace them with standard on-off switches. But you might want to remount the starter in a more solid position on the machine, if that's possible. In lieu of that, make it your policy to always unplug machines with magnetic starters (all machines, for that matter) before adjusting them, performing maintenance, changing blades, and the like. You should also get in the habit of unplugging all electric tools immediately after use.

A little more on switches, the foot-operated kind

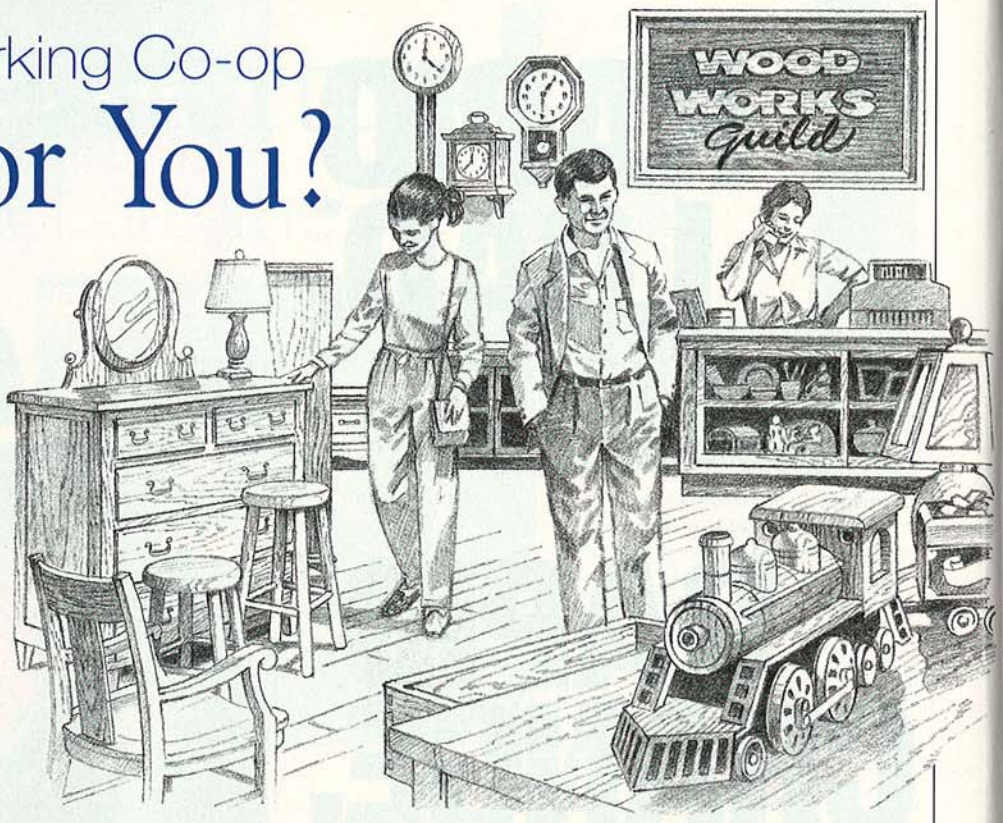
You may have at one time or another considered replacing a manufacturer's on-off switch with one that's foot-operated. Well, there's a good side and a bad side to foot switches. The good side is that they let you keep your hands busy with the workpiece. And that's fine for woodworking machines such as a scrollsaw or a power carver. But for other woodworking tools, there's too much of a bad side. First, it's just too easy to accidentally step on them and unexpectedly start the tool. Second, unless you buy quite an expensive industrial-grade foot switch, it may not be able to handle the current drawn by the tool. That can cause the electric motor to overheat.

Photographs: Hetherington Photography

"Where Safety Begins" is written by Mike Gililland, a safety consultant and lifelong woodworker. If you have a safety-related question, send it with an SASE to: The Safety Man, *WOOD*® Magazine, 1716 Locust St., GA310, Des Moines, IA 50309-3023. Not all questions will be published, but all will receive an answer.

Can A Woodworking Co-op Work For You?

If you're just starting out or simply tired of going it alone, teaming up with other woodworkers might be the answer.



Woodworking—for money or enjoyment—often becomes a solitary craft, but it doesn't have to be. Cooperatives (sometimes called guilds) provide a means for woodworkers to socialize and pool their resources for mutual benefit. You'll discover two different types of cooperative arrangements that can help you reduce costs, improve your marketing efforts, or both.

Find common ground in a shop cooperative

Shop cooperatives, in which woodworkers jointly own and use a common shop and tools, are relatively rare. Some retirement communities have them, but you must be a resident. Easier to find are informal arrangements through woodworking clubs or networks of woodworkers to share shop time or tools you haven't yet acquired.

You also can create sharing arrangements by finding established woodworkers willing to let you use their shops during off hours for a fee. Or you can rent space from woodworking supply stores that offer such deals. The Woodcraft stores, based in Parkersburg, West Virginia (304/464-5211), is one chain that offers this.

The down side? You don't have access whenever you want, and what you pay doesn't get you any closer to owning anything. Buying tools on credit may be a better option if you're sure you're going to be in woodworking for the long haul.

Join other woodworkers to market your wares

You'll find a more common and durable cooperative solution on the marketing side. Marketing cooperatives fill the role of retailers—but at less cost than the full wholesale cut of 50 percent or more that retailers typically demand.

Northwest Fine Woodworking, Seattle, Washington (206/625-0542), makes one of the better examples of how a marketing cooperative can work. The co-op was founded in 1979 by a group of woodworkers who pooled their money to open a small, inexpensive retail space in Pioneer Square, then a run-down section of Seattle. Both the woodworking co-op store, called the Northwest Gallery of Fine Woodworking, and the neighborhood soon became trendy. Today, Northwest Fine Woodworking has 28 members, dozens more nonmember exhibitors, and a second store in suburban Kirkland.

Beginning members pay a $500 initiation fee and monthly dues of $30 for the first three years, then they're waived. All members also pay a 32-percent sales commission to cover co-op expenses. That's up from 25 percent in the early days. But the co-op now has a professional director and sales staff so members don't have to maintain and man the store as was required in the beginning.

The initiation fees may be steep for beginners or part-timers. But nonmembers also can sell through the co-op, if their work is approved by a jury of co-op members. They do, though, pay a 40-percent commission for items priced $1,500 or above and 45 percent for lower-priced items. In fact, most woodworkers who join the co-op start as nonmembers before they're considered for membership by the co-op's board.

Details vary a lot among co-ops, but they're almost always a better deal than ordinary retailing. And they provide camaraderie along with marketing power.

"A lot of people join for the community aspect of it," says Bob Spangler, an eight-year member of Northwest Fine Woodworking. "It's also one of the best places I've ever seen to market woodworking items. I sell 75 to 85 percent of my work through the co-op gallery."

Written by Jack Neff, a Batavia, Ohio, business writer and author of *Make Your Woodworking Pay for Itself.*
Illustration: Brian Jensen

Stick it to Ugly Burns And Dents

A scratch left by a toy tractor, an edge chipped by some forgotten mishap, a cigarette burn . . . Over time, even the best-cared-for furniture suffers a few wounds. Some might add character, but most are just plain ugly. Here's how to fix them without refinishing.

An almond stick or fill stick, available from many paint or hardware stores, will hide shallow scratches. Simply rub one of the right color across the damaged area. For deeper marring, turn to the venerable furniture-repairer's art, burning-in.

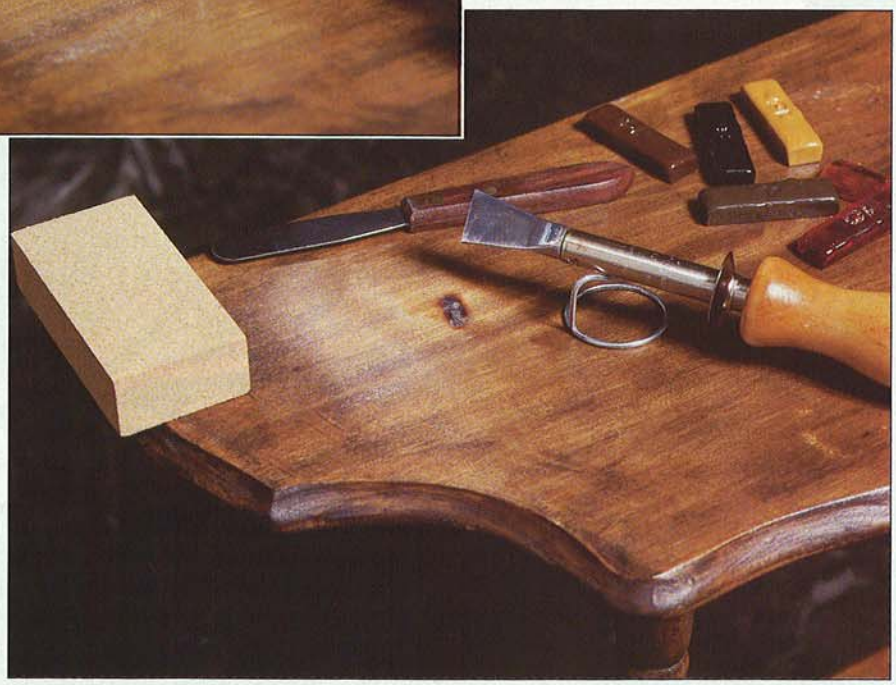
Burning-in calls for melting solid finishing material—called lacquer stick or shellac stick—into the damaged spot. This makes a permanent repair that's often hard to detect. Here's how to do it. (Hint: You'll want to practice before you try your hand at repairing the grand piano.)

- Scrape away any splinters or charred wood with an X-Acto knife or the point of an awl. Blow or brush away the residue.
- Select a burn-in stick that matches (or is close to) the color of the existing finish. You can mix colors by melting more than one stick, too.
- Heat your burning-in tool. An electric burning-in iron, like the one shown at *right*, is handy, but you can do the job just as well with a small, thin knife or spatula (shown in the background of the photo) heated over an alcohol lamp or can of sterno. If you heat a blade over a flame, give it a quick wipe to remove soot before melting the stick against it.
- Hold the heated tool above the depression, and press the stick against the side. Flow the melted finish into the damaged area, as shown *below*. Then, press it in with the heated blade. Be careful not to burn the existing finish around the repair with the tool. (Burning balm, included with the burning-in kit we used, helps prevent heat damage.) The repair should stand slightly above the surface. (Build up several applications, if necessary.)
- Level the repair after it cools. You can do this by block-sanding with 320- or 400-grit wet-or-dry sandpaper lubricated with an oil. (Water might mark the existing finish.) Use a resilient block, and hold it flat against the surface to prevent cutting through the finish near the repair.
- If necessary, draw grain lines to blend the repaired area into the surrounding area. Dealers who sell burning-in materials also sell marker-like graining pens to do this.
- Polish the leveled surface and the surrounding area.

Where to buy it

If you can't find fill sticks or burning-in tools and supplies locally, Constantine's (800/223-8087) sells the materials through mail-order.

◄ Press a burning-in stick against the heated tool to melt the solid finishing material. Move the tool and the stick to flow the material into the damaged area. Smooth the repair with the heated tool.

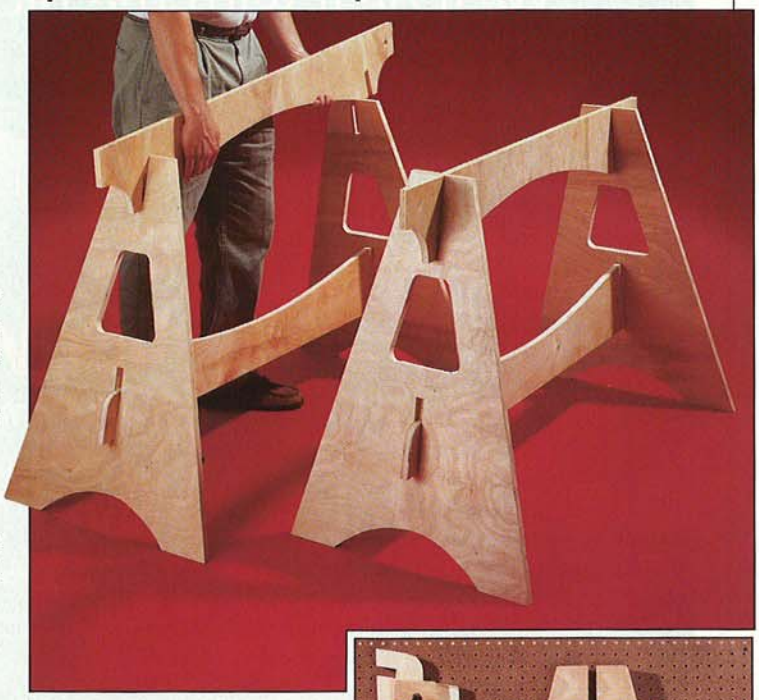


▼A cigarette burn mars this small table. You can repair the damage by melting solid finish into it. Supplies shown include a cork sanding block, electric burning-in tool, a spatula for heating over a flame, and burning-in sticks.

Photographs: Hetherington Photography

Ride 'em hard, then put 'em up

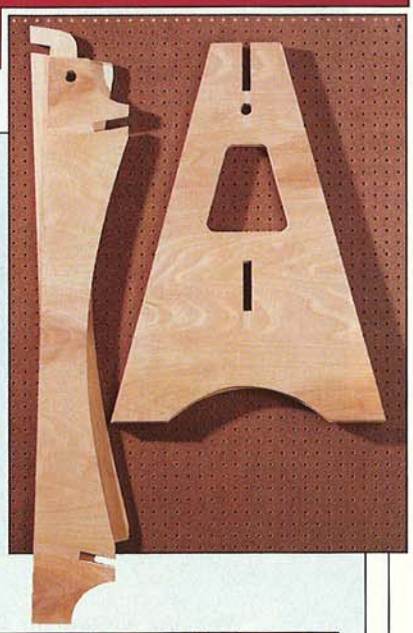
Knockdown Sawhorses

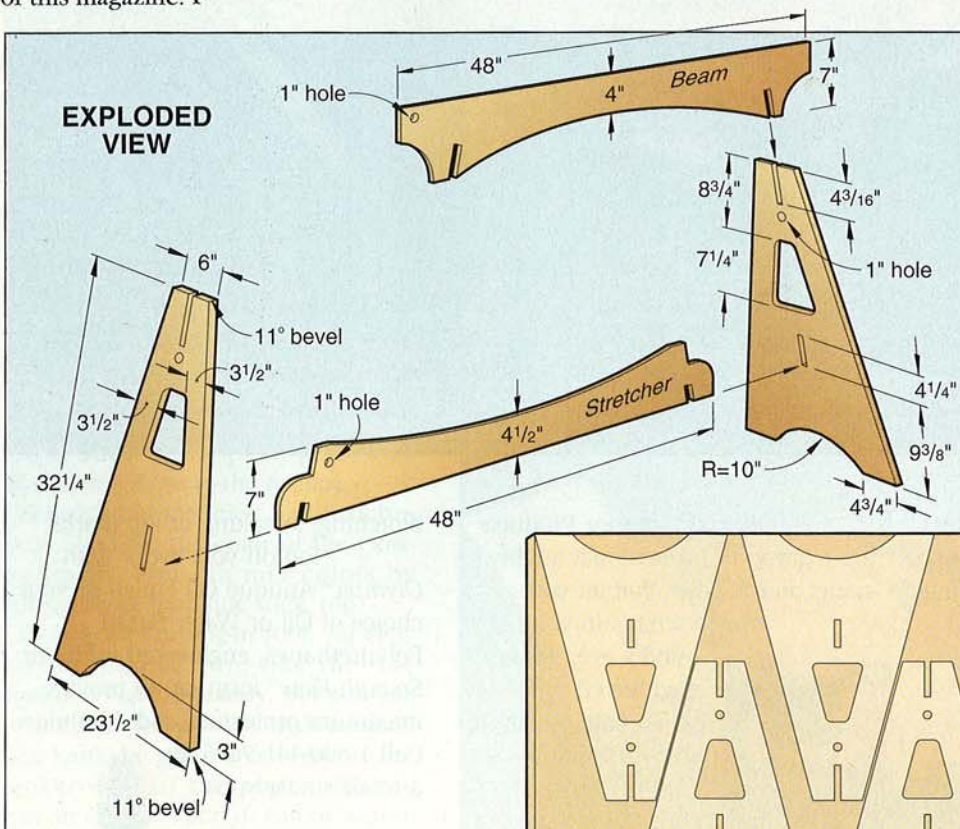


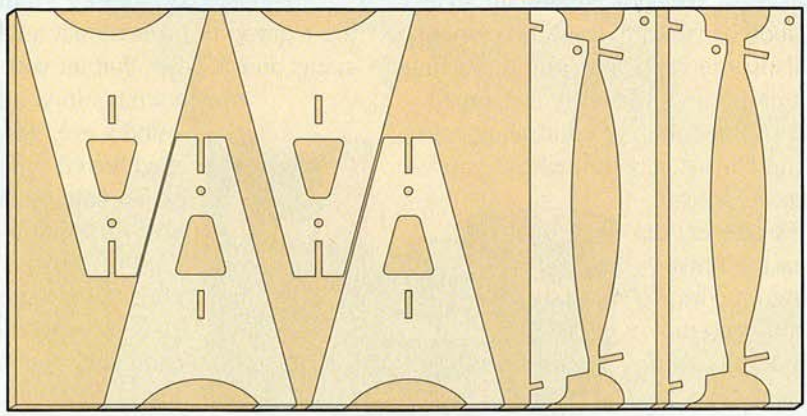
A pair of sawhorses come in mighty handy when you cut sheet goods or need to set up a temporary work area. But where do you corral them when you're not using them? If you build these sturdy horses, designed by *WOOD*® magazine reader Wade Olson, you simply break them down and hang them flat against the wall.

With no hardware to fuss with, you can assemble and disassemble the pieces in just a few seconds. Plus, because they're made completely of wood, you'll never have to worry about catching a saw blade on a metal bracket or fastener.

One full sheet of ¾" plywood yields a pair of sawhorses. You'll find full-size patterns for the ends of the beam and stretcher in the *WOOD PATTERNS*® insert in the middle of this magazine.







CUTTING DIAGRAM (For 2 sawhorses) ¾ x 48 x 96" Plywood

Project design: Wade A. Olson, Colfax, Wash.
Photographs: Baldwin Photography
Illustration: Roxanne LeMoine

WOODWORKERS TO THE RESCUE

Comments, answers, and ideas from our *WOOD ONLINE*® discussion groups

Note: If you would like more information on the woodworking-related subjects featured here, visit our *WOOD ONLINE*® discussion groups at www.woodmagazine.com

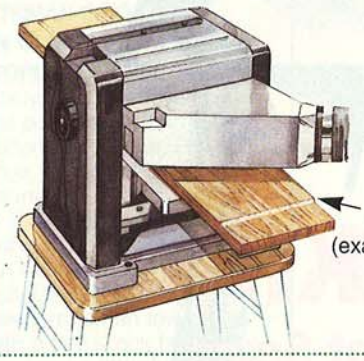
Note, too, that we have edited all entries in the interest of brevity and clarity while preserving the message. Opinions expressed here are those of our online participants.

GENERAL WOODWORKING

Take a swipe at snipe

I have a Makita 12" thickness planer and am having a problem with snipe. [Snipe is the depression found at the ends of a board's surface made by a planer's cutters.] What causes this in a thickness planer?

—Bruce Drew, Kalispell, Mont.



● I also own a Makita 12" planer and found it does not work like most portable thickness planers. Most planers have a fixed table and a movable cutterhead. These units suffer from the cutterhead moving. That is why Delta and DeWalt came out with a locking cutterhead. Since the Makita has a fixed cutterhead, this is not an issue.

The first thing to do is to lay a straightedge through the machine contacting the full lengths of the infeed and outfeed tables. Adjust the tables (using the adjusting screws) to make sure the infeed table, the outfeed table, and the planer table are aligned with each other.

Also, make sure your blades are in good shape. If planing a long board, try to support it when feeding it in and out so the weight of the board does not press against the cutterhead. Doing this I get very little end snipe.

To reduce snipe to almost zero, take very light cuts on the last couple of passes through the planer.

—Glenn Strome, London, Ont.

● Bruce, you can also reduce snipe if you build a long flat infeed and outfeed support table.

—John Harden, Rancho Cucamonga, Calif.

FINISHING AND REFINISHING

When water makes its mark

We have solid maple end tables that have been stained over the years with water from coasters that have leaked. How can I remove the stains and get the old shine back?

—Frank Marano, Buchanan, Va.

● Most likely the finish is a lacquer-based product. If you have ever sprayed a clear coat in humid weather, you'll see it turn milky. This is what happened to your table. I very carefully have taken lacquer thinner on a rag, wiped the area, paused, and then wiped again. The trick is not to cut through the finish. You will slowly see the area clear up. The last time it took me 5 or 6 wipes to clear up the area.

—James K. Thrash, Wetumpka, Ala.

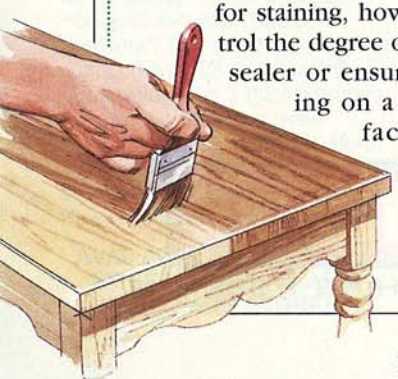
● If the markings are white or milky colored, it's probably just damage to the finish. If the stains are darker, it's likely to be damage to the wood, and some more serious repairing will be needed, such as removing the old finish.

—Dave Haas, Laramie, Wyo.

Even-Steven staining

After sealing end grain in preparation for staining, how do you control the degree of stain on the sealer or ensure even staining on a project with face grain and end grain?

—John Hibbs Grand Falls, Windsor, Newf.



● I have had good results maintaining color consistency between end grain and the main body by using 2-lb cut blond shellac thinned 50 percent [with denatured alcohol] making it 1-lb cut for sealing end grain rather than using a ready-mixed sealer. As there can be some variation between different woods, I suggest trying a 1- or 2-lb cut on a piece of scrap. I find modifying the sealer much easier than matching colors.

—Robert Schaub, Salem, Ore.

● Give the sealed end grain a light sanding prior to staining. This will give the stain something to stick to. The coarser the paper, the more stain will adhere.

—Wayne Conrad, Orlando, Fla.

If necessity is the mother of invention, then Jim Gyorko's need for blade guides gave birth to our Top Shop Tip.

Since age eight, when he apprenticed under his grandfather (a woodworking guildmaster), Jim Gyorko has enjoyed his craft. These days, he passes his skills on to developmentally disabled adults at a private school in West Virginia. In the school's woodshop, Jim and his trainees customize bargain-basement furniture and resell it to help support the school.

Jim finds his work extremely rewarding. "When you see someone who has spent a long time working out a problem with a project, and suddenly the light comes on, that's payday," he says. Jim's pretty bright around the shop, too, as you can see from his Top Shop Tip, *above right*. He plans to keep his tool prize in the school's shop so everyone can use it.

Send us a tip or trick from your shop and we'll send you $40 if we publish it. And, if your tip is judged the best of the issue, you'll also win a tool prize valued at over $250. We need a photo or drawing of the tip, along with a letter explaining it, and your daytime telephone number. Mail it to:

Tips From Your Shop (and Ours)
WOOD Magazine
1716 Locust St., GA310
Des Moines, IA 50309-3023

We publish only original shop tips, so please send your idea only to *WOOD*® magazine. And remember, we can't return your submission. Thanks!

Dave Campbell
GENERAL-INTEREST EDITOR

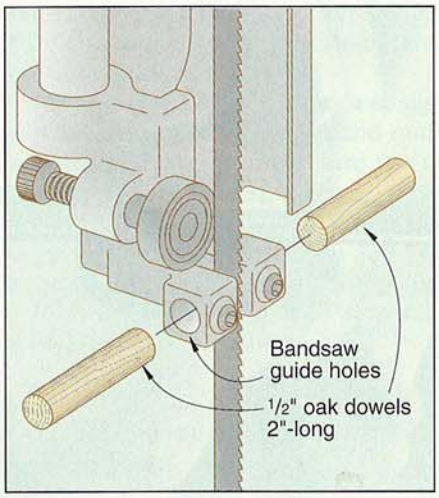
Why buy commercial blade guides when wood ones will do?

TOP SHOP TIP

While working on a project that required precision sawing, I discovered that the fiber blade guides on my bandsaw were shot. Unable to find new guides locally and unwilling to wait a week for mail-order delivery, I looked for a temporary solution in my shop. The answer was in my dowel stock.

I cut two pieces of ½" red oak dowel, each about 2" long, slipped them into the guide holes, and tightened them to the blade. The temporary fix has become permanent—I've been using the wooden guides nearly every day for over 6 months, and they show virtually no wear.

—Jim Gyorko, Winchester, Va.



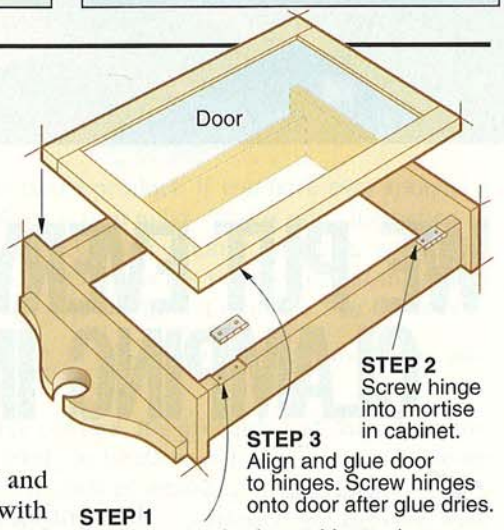
For submitting the Top Shop Tip, Jim Gyorko wins a Craftsman 18-volt cordless drill and trim saw kit. Thanks, Jim!

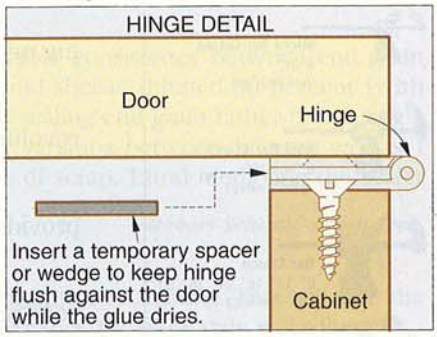
Sometimes, you want hinges to stick

Recently, I made a clock with a door that required mortising hinges into the case, but not the door. However, I had difficulty figuring out how to precisely position the hinge on the door to drive the screws. Finally, it occurred to me to glue the door to the hinge until I could permanently attach it.

First, I cut mortises in the case and attached one leaf of each hinge with screws. After applying a tiny spot of polyurethane glue to the unattached leaves, I put a small piece of cardstock between the leaves of each hinge (to keep them snug against the door). Then, I carefully set the door in place and left it overnight. The next day, when I opened the door I found the glue held the hinges right where they needed to be while I drilled holes and screwed the hinges in place.

—Jack Young, Saegertown, Pa.





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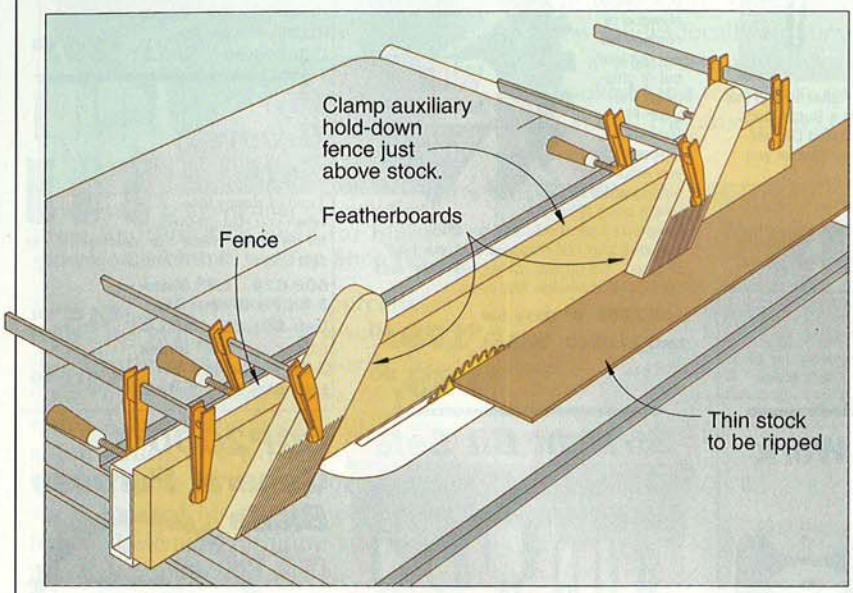
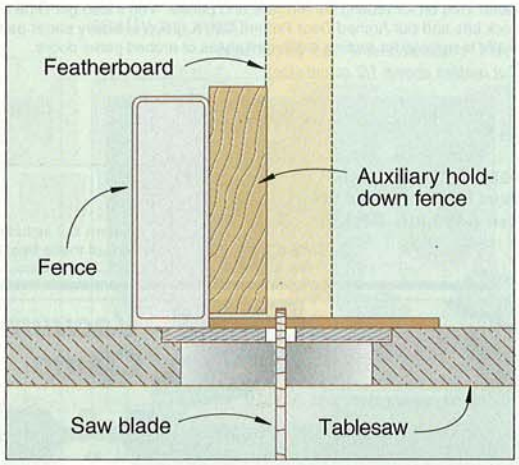
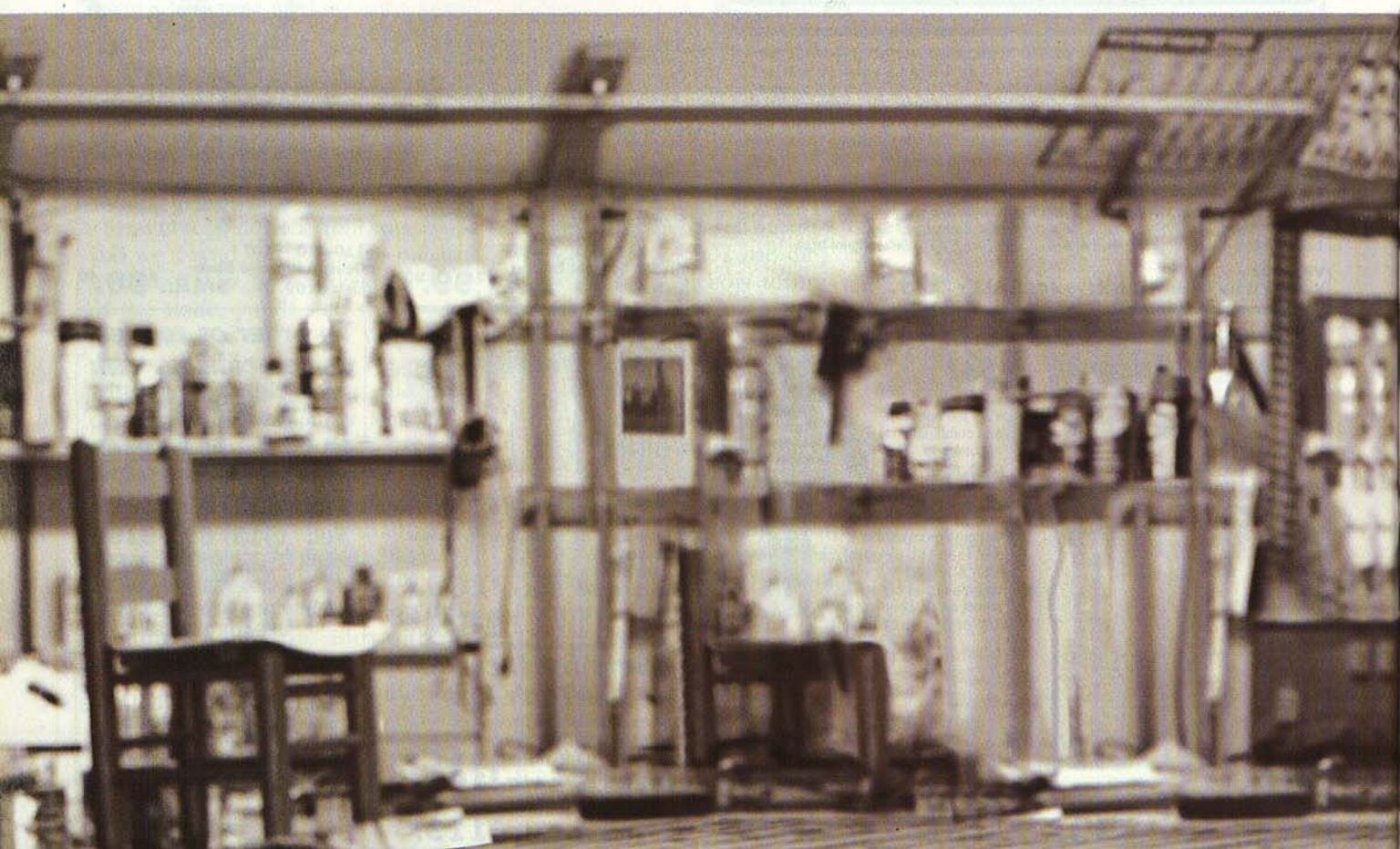
How to safely rip thin material

Here's a good way to rip thin, whippy material, such as a strip of laminate for self-edging a counter or tabletop. Clamp an auxiliary hold-down fence against your tablesaw's rip fence just high enough to let the material pass under it. Push the work against the tablesaw fence as you slide it through. (If your material slides under the tablesaw fence you will need to add an auxiliary zero-clearance fence that contacts the tablesaw top. This piece goes between the tablesaw fence and auxiliary hold-down fence.) You may want to also use finger-boards or rip-guide wheels (mine came from Leichtung, 800/321-6840) to hold down the material.

—Barney Howard, Sisters, Ore.





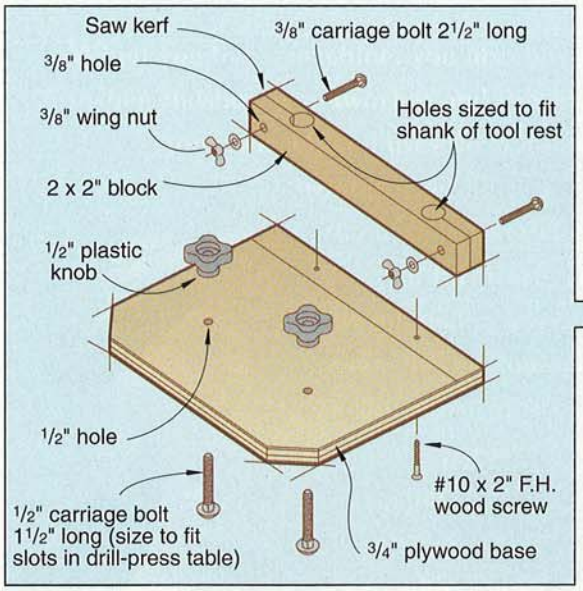


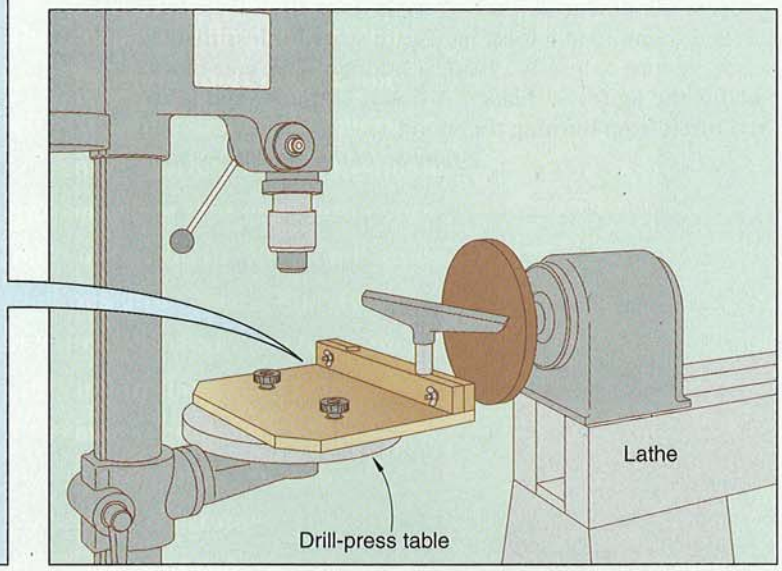
Turn your drill press into a great lathe accessory

I needed to turn a 14"-diameter plate, but my lathe has only an 11" capacity. Manufactured steady rests for outboard turning are quite expensive, so I improvised my own by pressing the table from my floor-standing drill press into service.

To do this, I made the jig shown *below.* A pair of threaded plastic knobs and carriage bolts lock the jig into the table's slot. Loosening the knobs lets me move the rest in or out. This jig also works well for turning bowls and stool tops.

—Edward Gudmundson, Moorhead, Minn.





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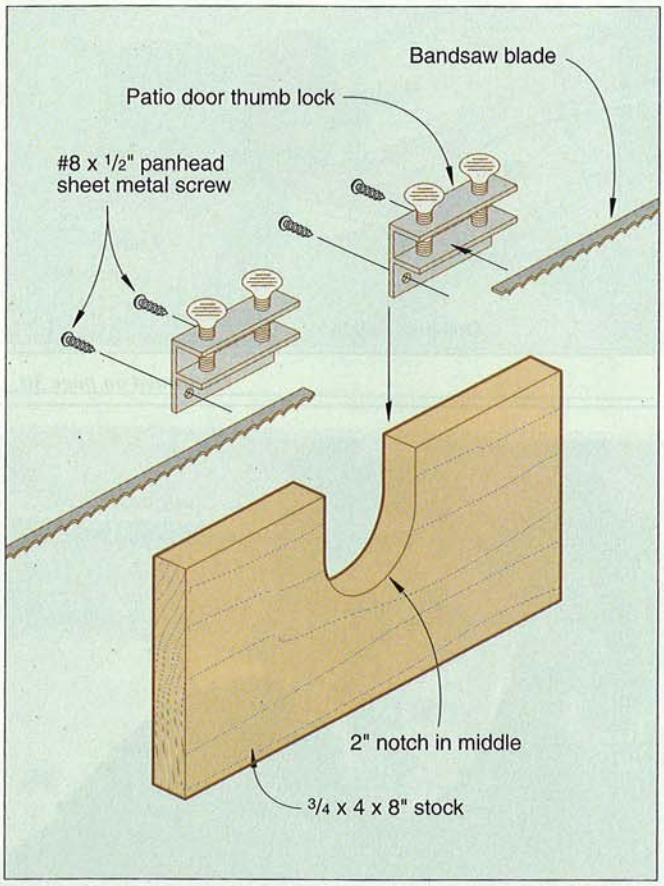
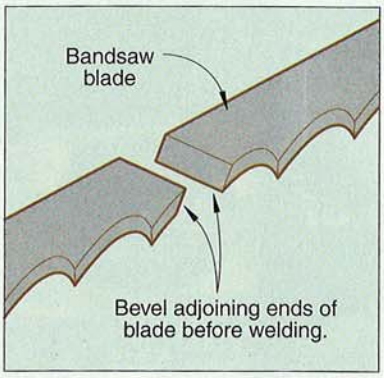
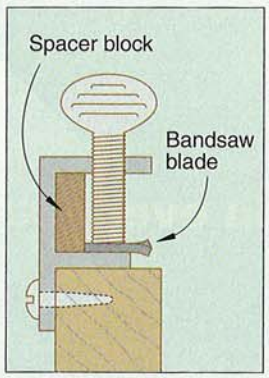
Low-cost bandsaw-blade welding jig

Bandsaw users can save significantly on blades if they weld their own from a bulk roll of blade material. To do this, you need to create a jig that holds the blade material straight and true while you braze it. My inexpensive design, shown *below*, holds both the back and sides in perfect alignment. A pair of patio-door thumb locks (I picked them up at a local hardware store for less than $2 each) secure ⅜ and ½" blades. Adding ⅛" spacer blocks adapts the jig for ¼" blades. A notch in the middle keeps the torch from burning the wood.

—John St. Pierre, Pinckney, Mich.







A sticky situation

To make pressure-sensitive-adhesive (PSA) pads stick better, preheat the sander's pad with friction by running it against a nonmarring surface such as a scrap of carpet. PSA pads that won't stick to a cold pad adhere readily to one that's warm.

—Johannes Michelsen, Manchester Center, Vt.

A solution for cleaning filters that's in the bag

When fine dust clogs the pleated filter in my shop vacuum, I put the filter in a garbage bag and shake it up and down a few times. The dust settles in a minute or two, and 95 percent of it ends up in the bottom of the bag.

—Redmond Blair, Burnaby, B.C.

Continued on page 32

TIPS FROM YOUR SHOP (AND OURS)

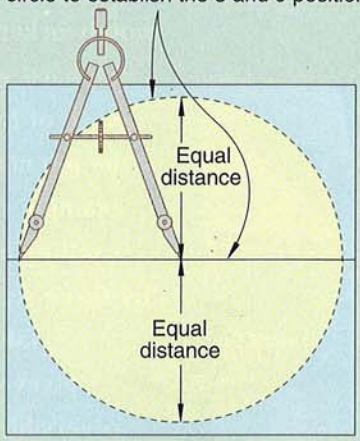
Continued from page 30

Time-saving tip for laying out a clock face

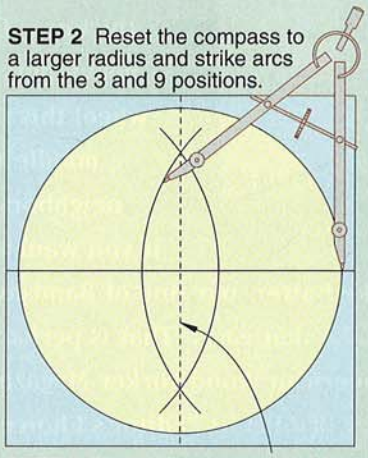
I've seen many methods of marking out a time ring, but I never was impressed with their accuracy. Here's the foolproof method I use to divide a circle into 12 equal sections for making a clock face.

— Thomas E. Karkos, Medinah, Ill.

STEP 1 Draw the time ring with a compass. Draw a horizontal line through the center of the circle to establish the 3 and 9 positions.

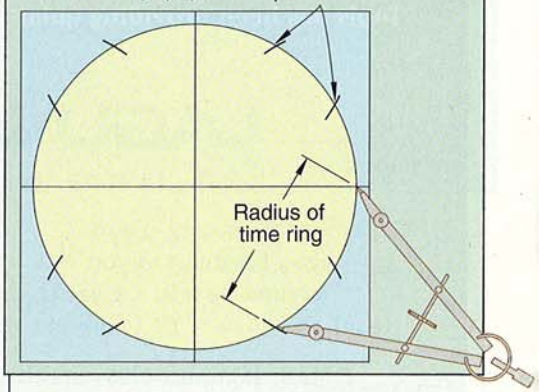


STEP 2 Reset the compass to a larger radius and strike arcs from the 3 and 9 positions.



STEP 3 Mark a line through the intersections of the arcs to establish the 6 and 12 positions.

STEP 4 With the compass set at the radius of the time ring, mark off divisions on either side of the 3, 6, 9, and 12 positions.

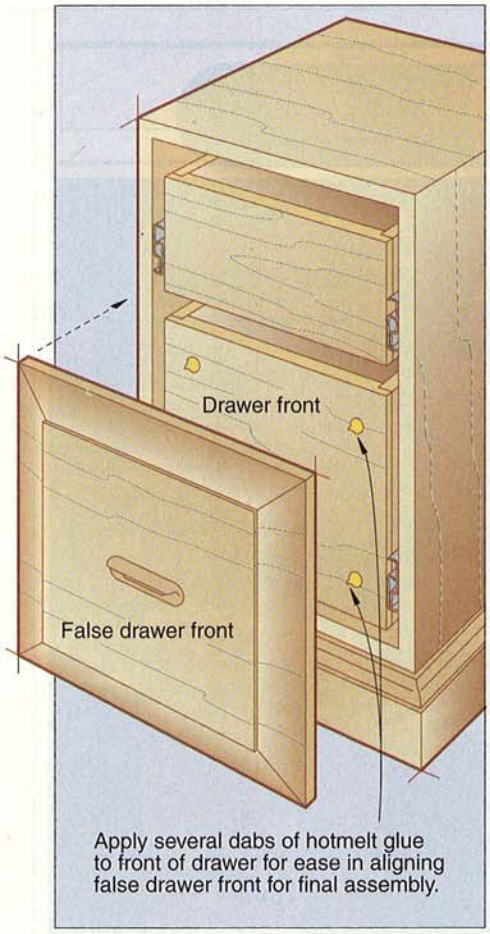


Tips from a glue gunslinger

Hotmelt glue makes a strong, quick bond for joints that won't get a lot of stress, but it's also great for holding temporary joints while drilling or matching things up. Because it allows for some play before the glue dries, I've used it for positioning drawer glides. I glue them in place first, then move the drawer in and out to get a good fit.

Hotmelt glue also works great for aligning drawer fronts in a cabinet. After completing the cabinet and installing the drawer boxes, I apply small dabs of hotmelt glue on the fronts and press them onto the boxes. Because the glue is soft until it cools, I have time to adjust the fronts for an even gap around them. Once I'm happy with the look, I remove the drawers from the cabinet and permanently attach their fronts by drilling and screwing from the inside of the box fronts.

—Aleso Gourhan, Oakland, Calif.



Apply several dabs of hotmelt glue to front of drawer for ease in aligning false drawer front for final assembly.

Continued on page 34

Continued from page 33

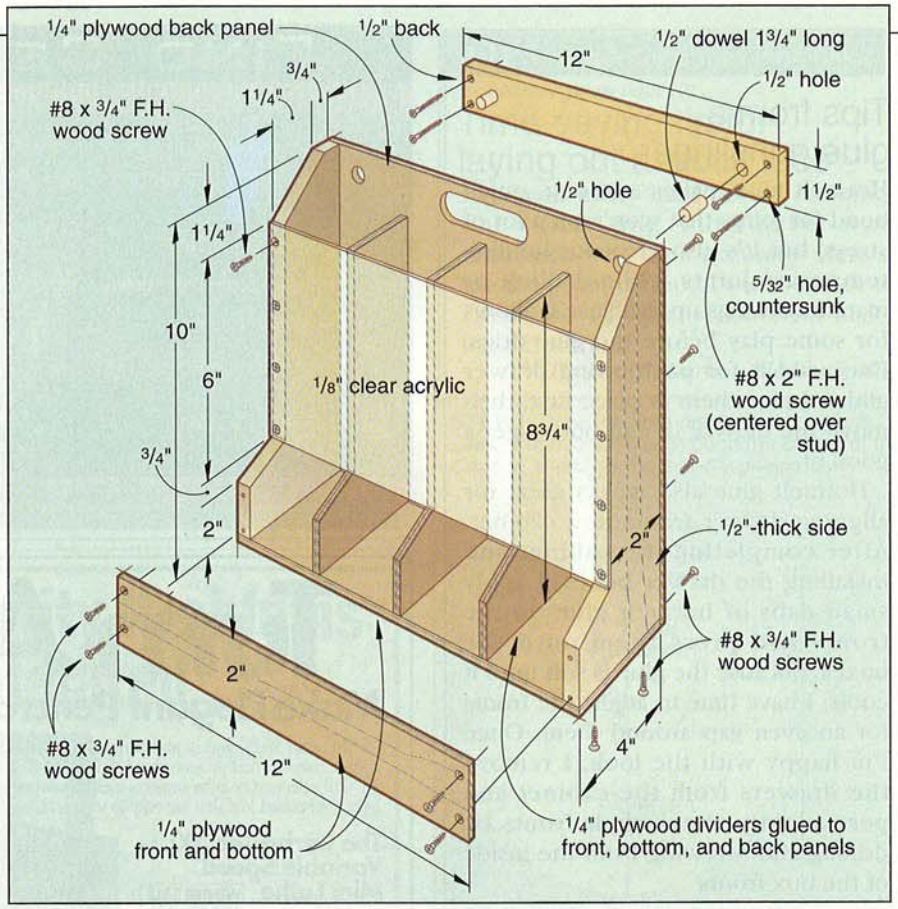
A nifty system for dispensing fasteners

I use drywall screws extensively in my projects. Rather than store them in their flimsy plastic packages, clunky coffee cans, or breakable jars, I designed the storage/dispenser system shown at *right.*

I put screws into the top of each bin and select what I need from the self-feeding tray at the bottom. The acrylic front panel lets me keep an eye on my supply. Holes in the back panel allow me to hang the unit on the wall, and a cut-out handle lets me tote it with me to job locations. I can also double my selection of screws by carrying two units back-to-back.

While I use my dispensers for various size drywall screws, this design would work just as well with other types of screws, nails, or other fasteners. You could make a scaled-down version to handle brads and tacks.

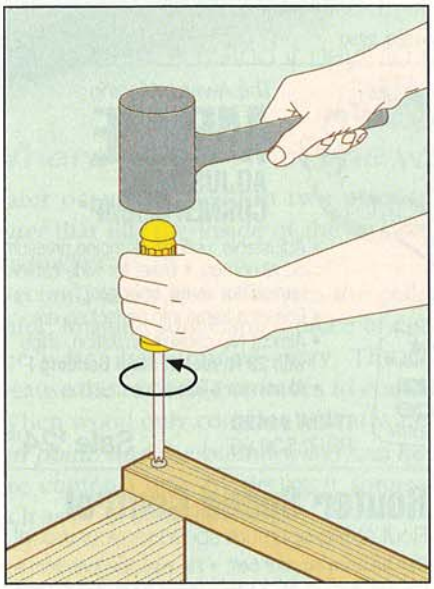
—R.B. Himes, Vienna, Ohio



Sorry, stuck screw, you're all tapped out

I read a tip in *WOOD®* magazine about loosening frozen screws using a soldering iron and ice. When I encounter a stuck screw, I first put the screwdriver tip in the slot, apply turning pressure, and gently tap the screwdriver with a mallet as shown *below*. If that doesn't work, I'll try the iron, but I've had good luck using this method.

— Will Christen, Elgin, Iowa

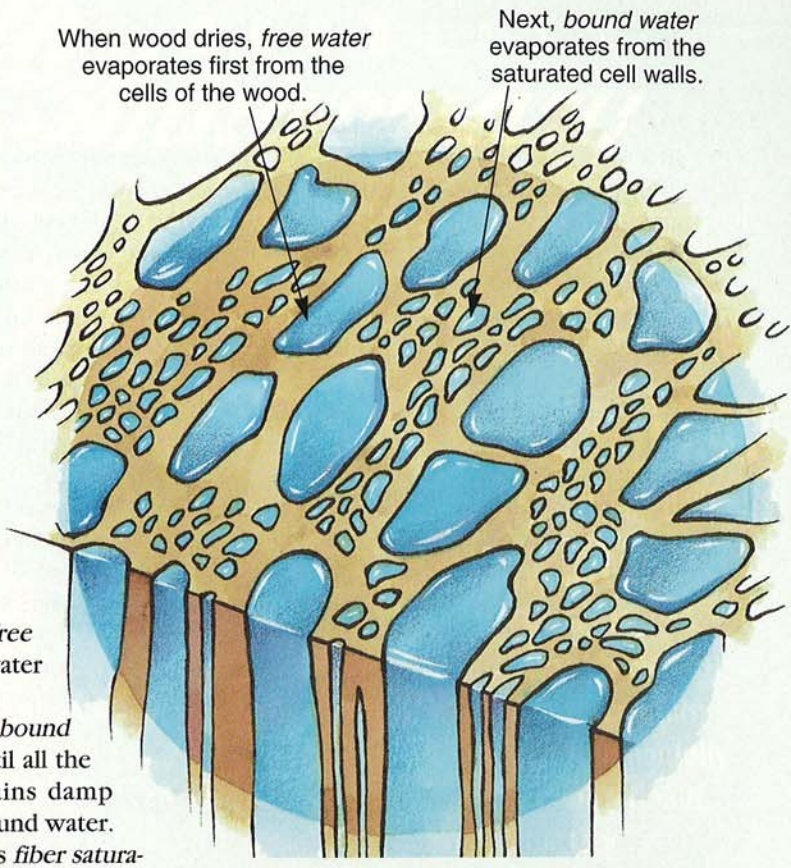


A FEW MORE TIPS FROM OUR WOODWORKING PROS

- Miter-cutting crown molding can be a challenge. On *page 42*, see the supports we used on our mitersaw table for holding the molding flush against both the table and fence when cutting.
- For shop jigs and fixtures that need an accurate measuring scale, check out *page 64*. See how we employed magnets to hold a steel rule in place on our marking gauge.
- Are you handling your pressure-treated lumber with the respect it deserves? Find out on *page 66*.
- How can you look at boards and determine if one will hold paint or a clear finish better than another in the great outdoors? See our stock-selection tips on *page 67*.

How Dry is Dry?

Woodworkers work with dry wood. But as you'll find out, it never remains completely so. And it pays to discover why.



Where you'll find the water

Water occurs in wood in two places. First, there's the *free water* that fills the inside of the wood's cells. That's like water in a bucket.

Second, water also infiltrates the cell walls. That's called *bound water.* Imagine squeezing a piece of cotton cheesecloth until all the free water has drained away. The cloth, though, remains damp because the material continues to contain moisture—the bound water.

When wood only contains bound water, it's said to be at its *fiber saturation point.* And the bound water can be eliminated completely (0% moisture content) only by drying it somewhere with no relative humidity, such as in an air-tight oven.

Wood likes water

Wood rates as a *hygroscopic* substance. That is, it has an affinity for water and readily absorbs it as liquid and vapor. This ability directly depends on the humidity of the surrounding atmosphere. Therefore, the amount of moisture in wood changes as the humidity changes.

How much moisture is in wood?

The total amount of water in any given piece of wood is called its *moisture content* (MC). And technically, it's expressed as a percentage of the *oven-dry weight* of the wood.

A piece of green wood is weighed, then dried, then weighed again. Suppose the wood weighed 40 pounds when green and only 30 pounds after drying. The 10 pounds of water lost represents one-third of its oven-dry weight, so the wood would have had a 33⅓ percent moisture content. If the piece of wood had weighed 80 pounds when green, the 50 pounds of water lost would have reflected a moisture content of 167 percent. The heartwood of black cottonwood, for instance, frequently has a moisture content of 162 percent, and ax blows produce sprays of water!

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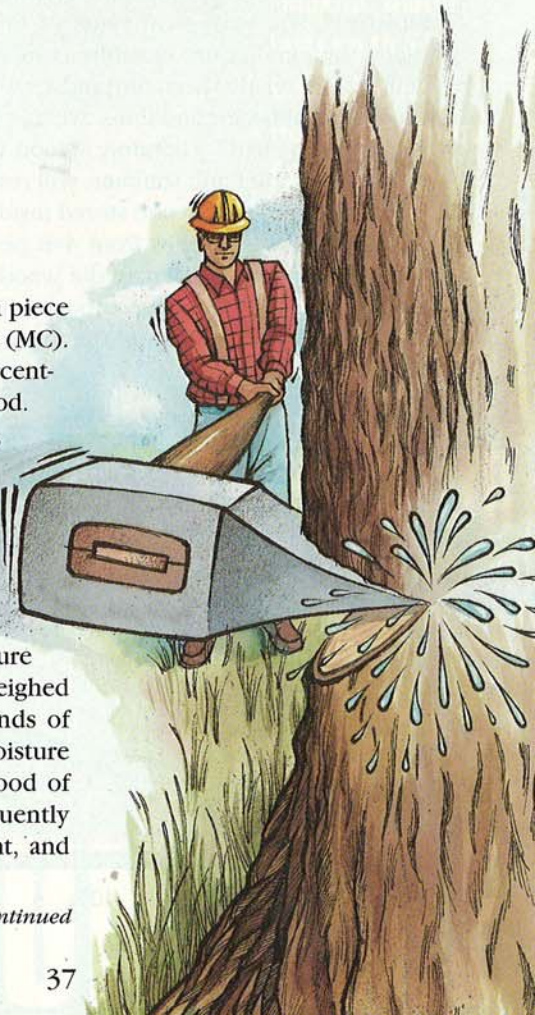
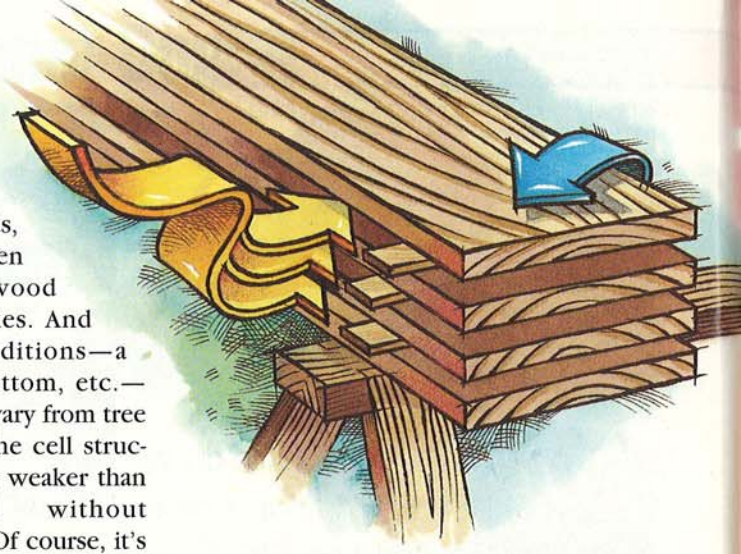




Why dry wood and finish it?

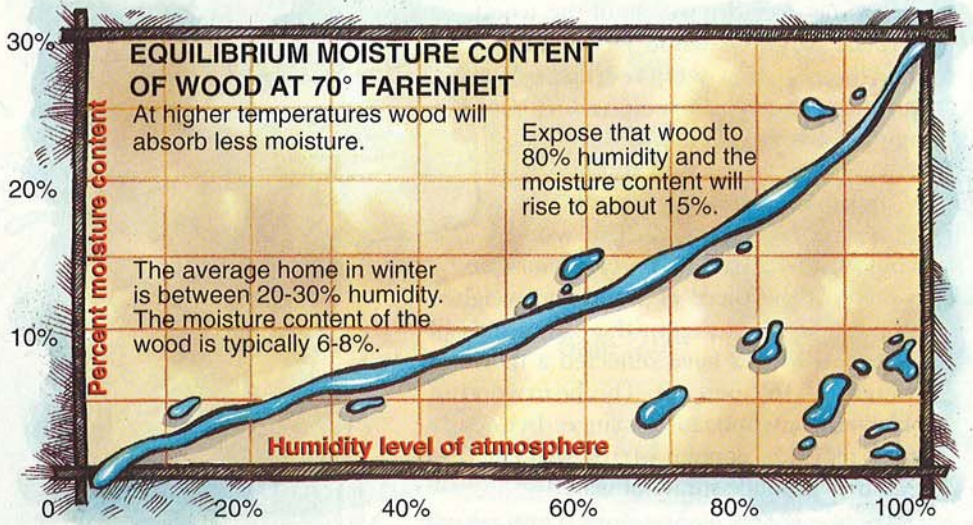
In a tree, a liquid called sap (primarily water) carries dissolved minerals and food that's manufactured by the leaves throughout the tree. *Green* wood refers to boards sawn from logs that had much of the original sap still in them. But it can describe rewetted wood as well. *Dry* or *seasoned* wood has had most of the sap removed.

Generally, there's a higher moisture content in the sapwood than in the heartwood of softwoods. That's because the sapwood is "living" wood that carries nutrients. In hardwoods, the difference between sapwood and heartwood varies with the species. And due to growing conditions—a north slope, river bottom, etc.—moisture content can vary from tree to tree. Moisture in the cell structure of wood makes it weaker than wood without water. Of course, it's impossible to keep moisture completely out of wood—finishes only serve to slow its movement and the reaction of the wood.

Equilibrium moisture content—it's about humidity

Wood exposed to an atmosphere containing constant humidity will, in time, reach a steady moisture-content condition—it doesn't gain or lose moisture. The numerical value of this stabile moisture content (MC) is called the *equilibrium moisture content* (EMC) of the wood, and is dependent on the relative humidity and air temperature. Over much of the United States, the outside conditions average 65 percent relative humidity, which is 12 percent EMC. Therefore, wood under cover, yet exposed to outside conditions winter and summer, will reach a 12 percent MC.

On the other hand, wood stored inside heated buildings in mid-winter can reach an MC that ranges from 4-8 percent. If you know the atmospheric conditions, you can estimate the wood's moisture content with a chart like the one *below*. Remember, though, that changes in wood's MC are a function of time, too, with rapid fluctuations on the wood's surface at first and very slow changes inside.



Softwoods often take to the air

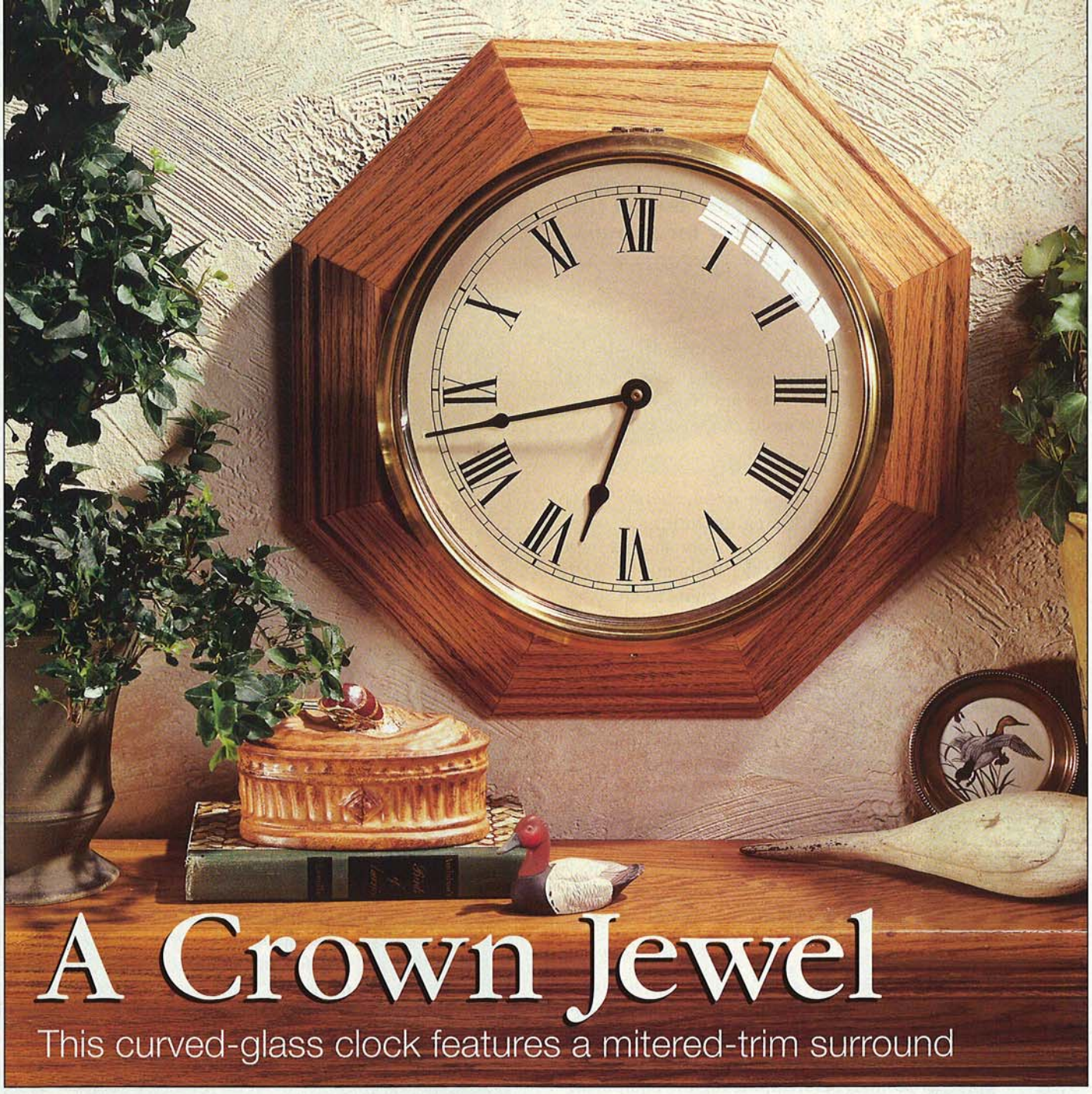
Because softwoods generally end up being used for building construction in higher relative humidity conditions than hardwoods, it's not necessary for suppliers to get their moisture content lower than 12-15 percent, and that can be done with air-drying. Softwoods used in interior locations, though, are dried to about 8 percent MC. More drying than that tends to cause brittleness and other problems in machining.

The term *kiln-dried* means that wood moisture was removed in a chamber where air circulation, humidity, and temperature were controlled. It also implies a moisture content lower than that in softwood construction lumber. For softwood lumber of 1" thicknesss, it means a MC under 12 percent. Softwoods also may be kiln-dried to make them dry faster, lighten them for shipping, or kill wood-born organisms.

Hardwoods get the kiln treatment

Hardwoods sold for furniture, cabinets, and other interior uses are traditionally kiln-dried following a schedule that limits loss from drying defects. Kiln-drying lowers moisture content to somewhere between 6-8 percent. That's because the average indoor humidity in most of North America's homes ranges from 6-8 percent EMC.

Illustrations: Brian Jensen



A Crown Jewel

This curved-glass clock features a mitered-trim surround

Whether you build one for yourself or several for friends and family, this wall-hung timekeeper goes together quickly. We've made construction easy, too, by specifying store-bought cove molding. And for help getting the joints tight as they can be, we've designed a simple-to-make clamping jig. Are you ready?

Get off to a fast start by machining the crown molding

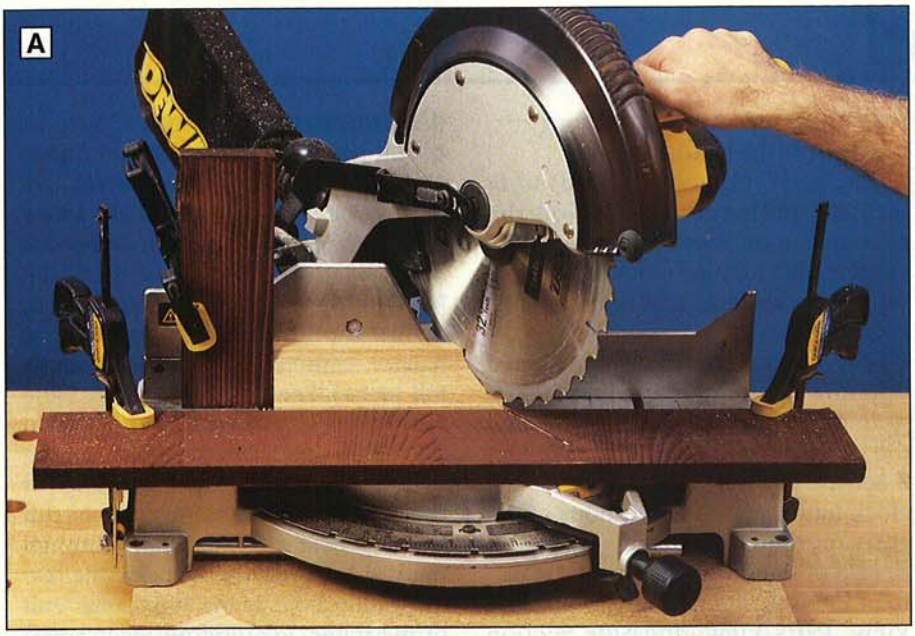
1 Select a piece of oak crown molding (WP-50) 3½" wide by 72" long. (In our area this molding costs $2 per foot.)

2 Fit your tablesaw with a miter gauge, and tilt the blade to 38° from vertical. Attach an auxiliary wood fence to your tablesaw's rip fence, and cut a ¼" rabbet along the edge of the stock where shown on the Cutting the Rabbet drawing. As shown in the Side Section View drawing, the rabbet will house the plywood back (B) later.

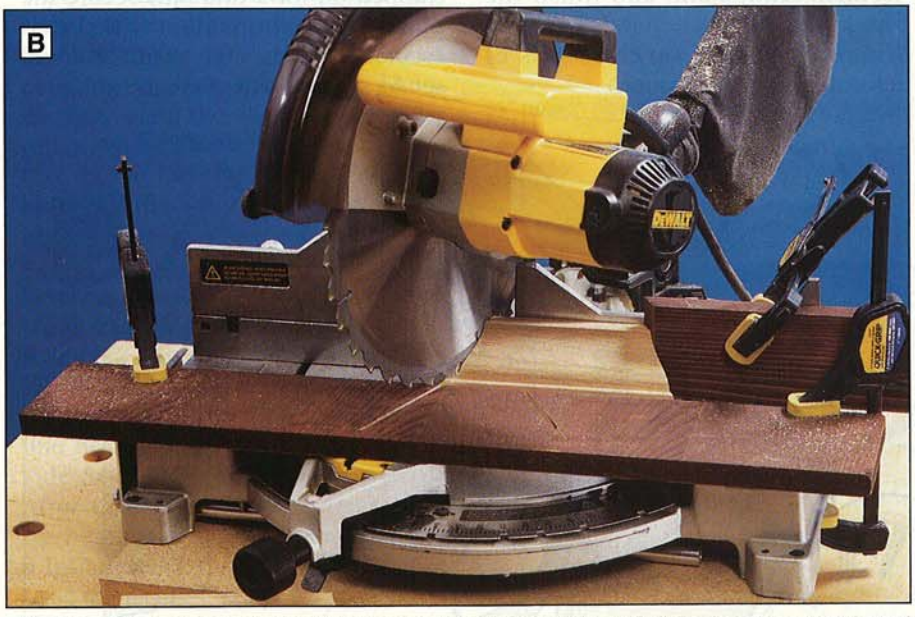
3 Crosscut a minimum of eight pieces of the molding, each measuring 7½" long, for the clock frame pieces (A). (We cut several extra pieces to have on hand when test-mitering the pieces in the following steps.)

4 As shown in *Photo A,* clamp or nail a guide strip of wood to your miter-saw or radial-arm saw table to hold the molding flush against the saw table and fence where shown on the Mitersaw Table Section View.

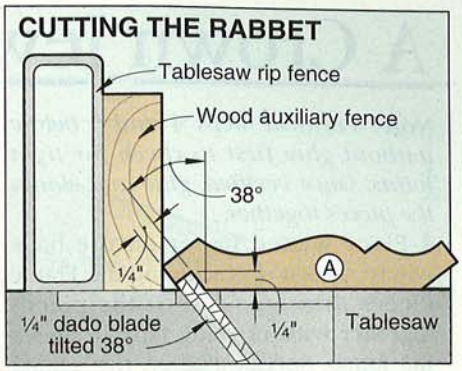
5 Angle the blade on your saw to 22½° to the right of center. Then, add

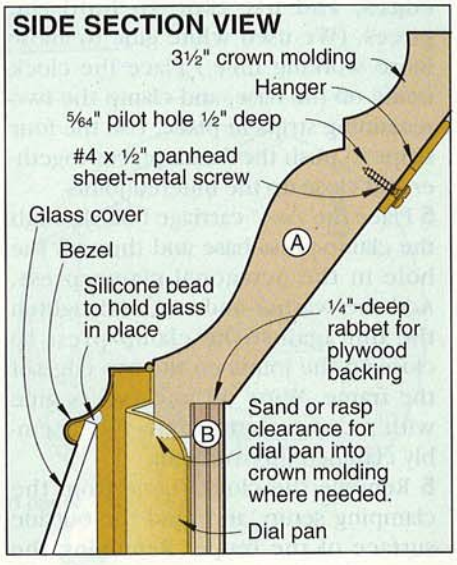


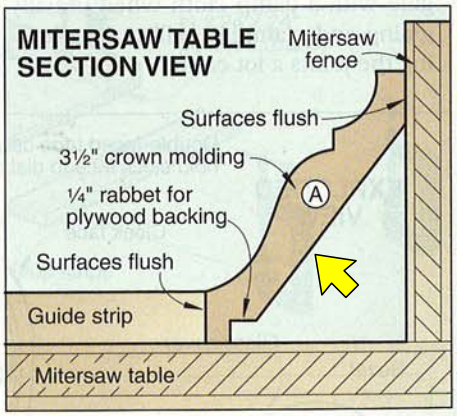
Using a guide strip on the table and a stopblock against the fence for support, miter-cut one end of each piece of cove molding.



Using a mitered stop on the right-hand side of the blade, miter-cut the opposite end of each piece of molding at 22½°.







a stopblock to the left side of the blade. Miter-cut one end of each piece of the molding as shown in *Photo A*.

6 Angle-cut one end of the stopblock at 22½°, and clamp the stopblock to the right-hand side of the blade so the miter-cut molding pieces will measure exactly 4 13/16" long along the *short side* where shown on the Parts View drawing on the *WOOD PATTERNS®* insert in the center of the magazine. (We test-cut scrap stock first to verify the length. Also, because crown molding widths may vary, go by the *inside* length when miter-cutting the pieces.) Miter-cut the opposite end of each molding frame piece (A) as shown in *Photo B* at 22½°.

Assemble the cove molding into a handsome frame

1 To clamp the frame pieces together with tight-fitting joints, cut the plywood base and four stop strips to the sizes listed on the Clamping the Frame Pieces drawing. Mark diagonals to find center, and drill a ⅜" hole through the center of the plywood base.

2 Using the Parts View drawing on the insert for reference, cut the octagonal clamp press to size and shape. The edges on the clamp press are slightly radiused so you can visually check for tight miters when gluing and clamping the frame pieces (A) together. Drill a ⅜" hole in the center of the clamp press.

3 Clamp two strips adjacent to each other on one corner of the base. Keep the two strips square to each other on the inside corner where shown on the Clamp Press Base drawing.

Continued

A Crown Jewel

Note: *Perform Steps 4 and 5 below without glue first to check for tight joints. Once verified, glue and clamp the pieces together.*

4 Place waxed paper on the base where shown on Clamping the Frame Pieces drawing. Test-fit the pieces together with masking tape to check the joints. Spread glue on the mating edges, and use tape to hold the pieces. (We used white glue to allow more working time.) Place the clock frame on the base, and clamp the two remaining strips in place. Use the four strips to push the frame pieces together and close-up the mitered joints.

5 Place the ⅜×4" carriage bolt through the clamp-press base and through the hole in the octagonal clamp press. Add the washer and nut, and tighten the nut against the clamp press to close-up the joints on the top edge of the frame. Wipe off any excess glue with a damp cloth. Leave the assembly clamped up overnight.

6 Remove the clock frame from the clamping setup, and sand the outside surface of the frame. Removing the glue with a damp cloth when initially gluing and clamping will make cleaning the joints a lot easier.

Add the back and clock components to the frame

1 Cut the ¼" plywood back (B) to fit into the rabbeted opening on the back side of the clock frame. Mark the centerpoint for the clock shaft hole on the back piece, and drill the hole where marked.

2 Glue the back (B) into the rabbeted opening in the clock frame. Use a weight to hold the back in place until the glue dries.

3 Set the dial pan on the front of the clock frame. Mark the locations of the areas on the clock frame you'll need to rasp or sand to shape to get the pan to fit into the frame. See the Exploded View, Parts View, and Side Section View drawings for reference.

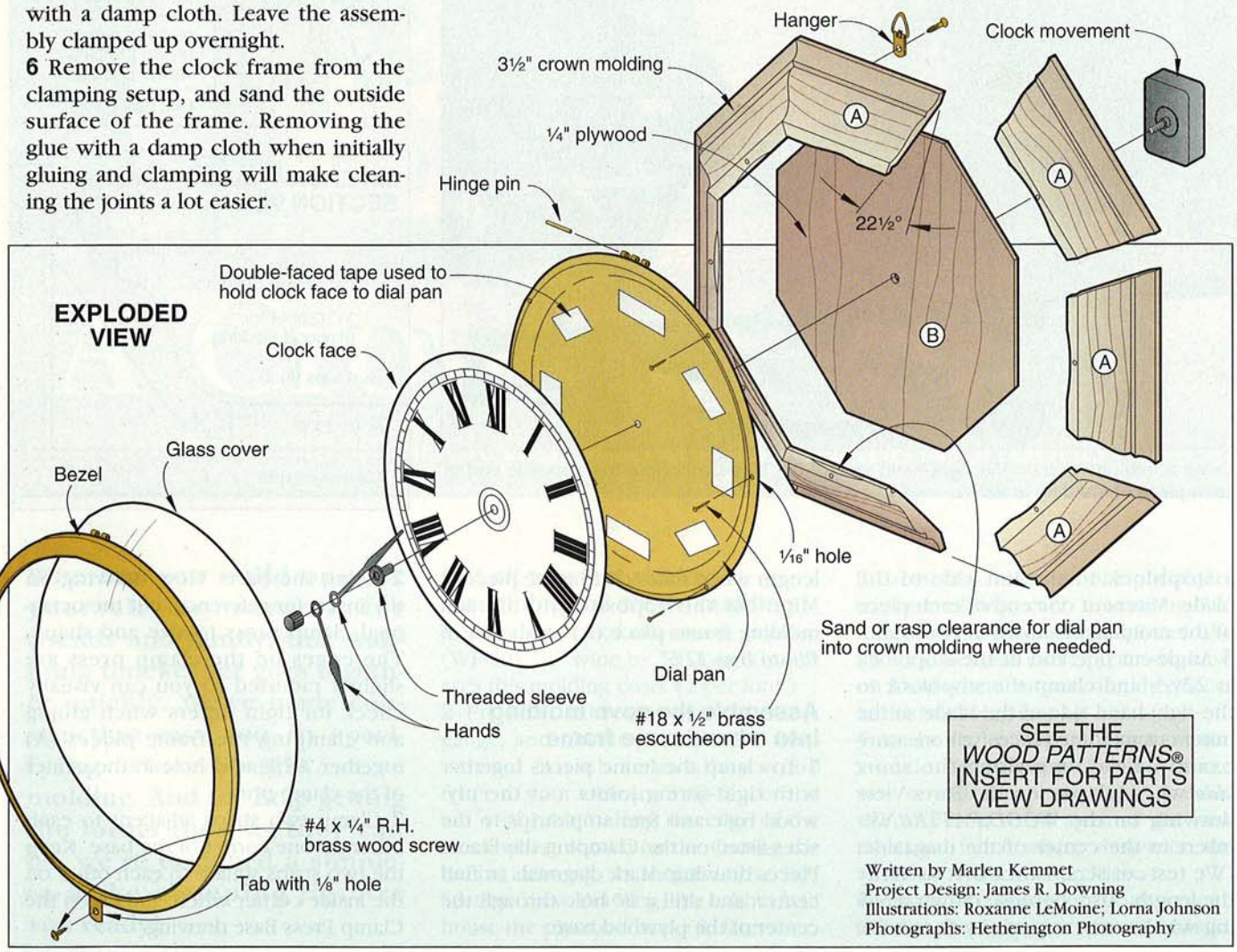
4 Finish-sand, stain, and finish the clock frame. (We used Zar 111 Walnut stain and several coats of aerosol semi-gloss lacquer.)

It's time to attach the clock parts to the frame

Note: *Before attaching the hardware to the clock frame, remove the hinge pin separating the bezel from the dial pan.*

1 Turn the clock frame face down, drill the pilot hole, and mount the hanger, centered on one of the molding pieces. See the Side Section View for reference.

2 Position the dial pan centered in the clock-frame opening with the hinge at the top end (the same end as the hanger). Drill seven 1/16" holes through the dial pan into the wood frame. *Do not* drill a hole at the top, hinge end of the frame. (To drill the pilot holes, we used a #18×1" brad with the head snipped off for a drill bit.) Secure the dial pan to the frame with brass escutcheon pins. (We used a 3/32" nail set to set the pins. Be careful not to



SEE THE *WOOD PATTERNS®* INSERT FOR PARTS VIEW DRAWINGS

Written by Marlen Kemmet
Project Design: James R. Downing
Illustrations: Roxanne LeMoine; Lorna Johnson
Photographs: Hetherington Photography

dent or bend the dial pan when pinning it in place.)

3 Place double-faced tape on the outer surface of the dial pan where shown on the Exploded View drawing. Stick the clock face to the pan, placing the XII at the top, hinge end of the frame. Remove the protective covering from the clock face.

4 Secure the clock movement to the plywood back (B). Add the hands to the protruding clock shaft.

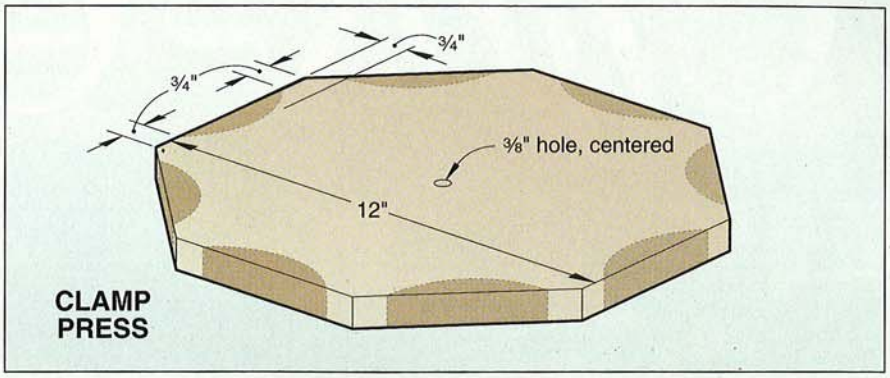
5 The bezel comes with a long tab on the edge opposite the hinge. Trim the tab to ¾" long and file or sand a ½" radius on the tab. Then, drill a ⅛" hole through the tab.

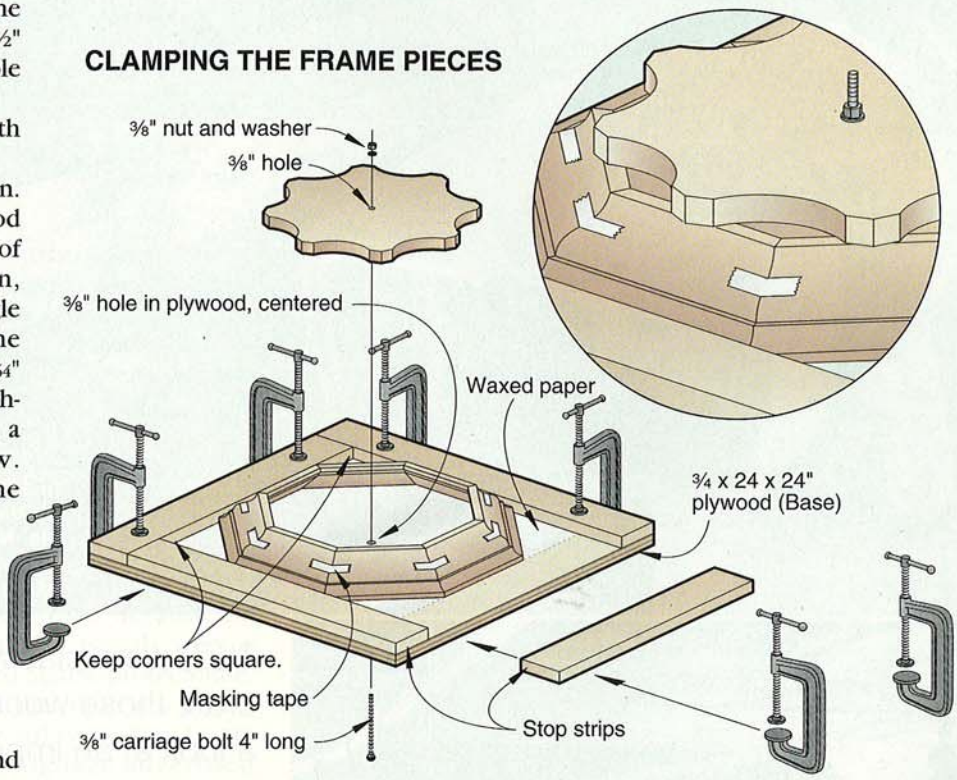
6 Mount the bezel to the dial pan with the hinge pin.

7 Center the bezel over the dial pan. Now, so as not to scratch the wood frame with the tab, place a piece of masking tape on the frame. Then, carefully bend the tab to fit the angle of the wood frame. Next, using the hole in the tab as a guide, drill a 5/64" hole into the wood frame for attaching the tab/bezel to the frame with a #4×¼" roundhead wood screw. Remove the masking tape from the wood frame.

8 Remove the hinge pin to separate the bezel from the dial pan. Adhere the glass cover to the bezel with a fine bead of clear silicone. See the Side Section View for reference. After the silicone cures, reattach the bezel/glass to the dial pan.

9 Install the battery, set the time, and hang the clock.

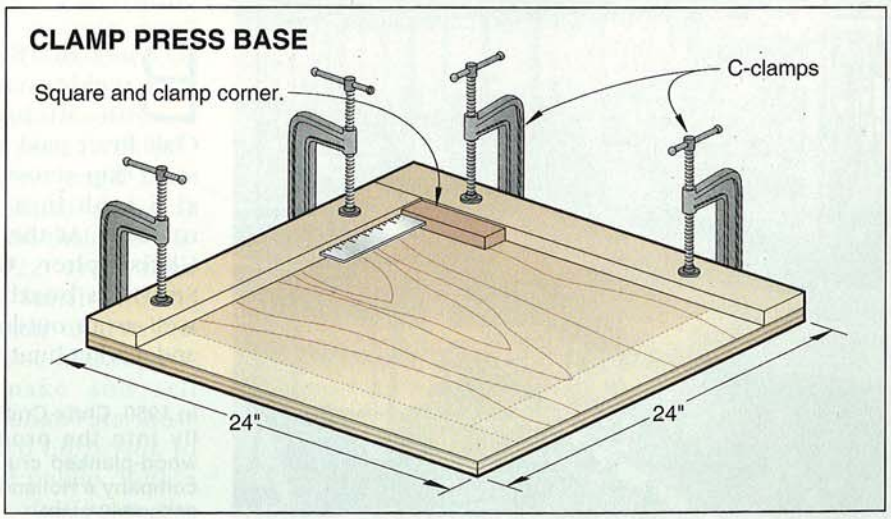




Supplies: Hanger with #4×½" panhead brass wood screw, #18×½" brass escutcheon pins, #4×¼" roundhead brass wood screw, clear finish.

Buying Guide

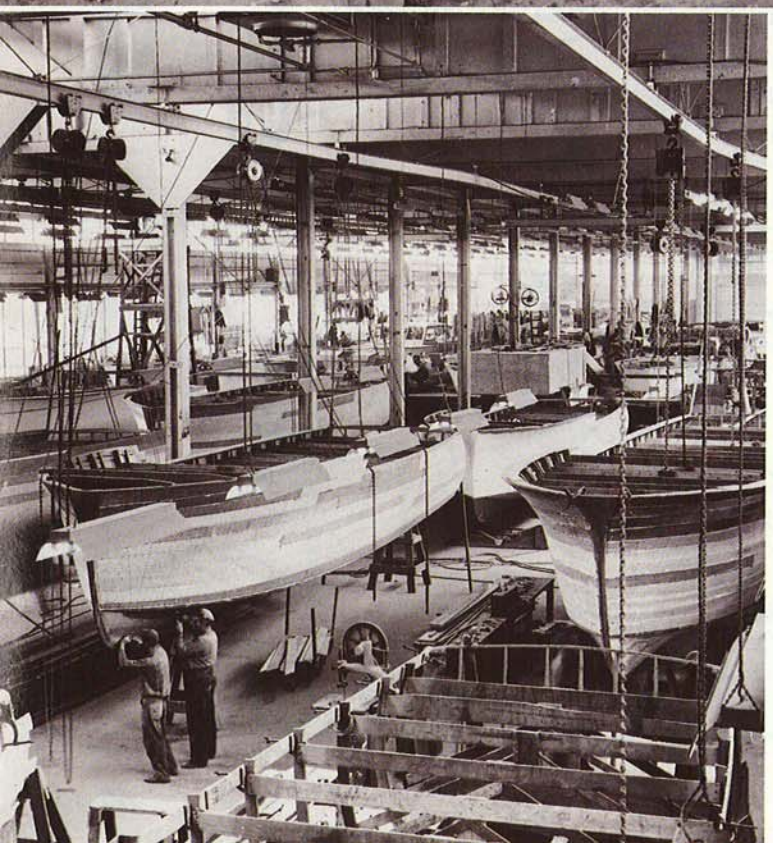
Clock hardware kit. Quartz clock movement, part no. 812002; one pair of black 11" hands, part no. 816022; 11" ivory dial with Roman numerals, part no. 082563, 12½" glass cover, part no. 091208; 12⅝"-diam. bezel with dial plate, part no. 087164. Kit no. 084558, $79.65 ppd. S. LaRose, Inc., 3223 Yanceyville St., P.O. Box 21208, Greensboro, NC 27420. Or call 336/621-1936 to order.



THE BOATS OF

Chris-Craft®

In 1926, Chris-Craft was the only boatmaker utilizing in-line production of standard models. Note the canvas between layers of bottom planking and the electric screwdrivers being used by the workers.



In 1950, Chris-Craft was heavily into the production of wood-planked cruisers at the company's Holland, Michigan, assembly plant.

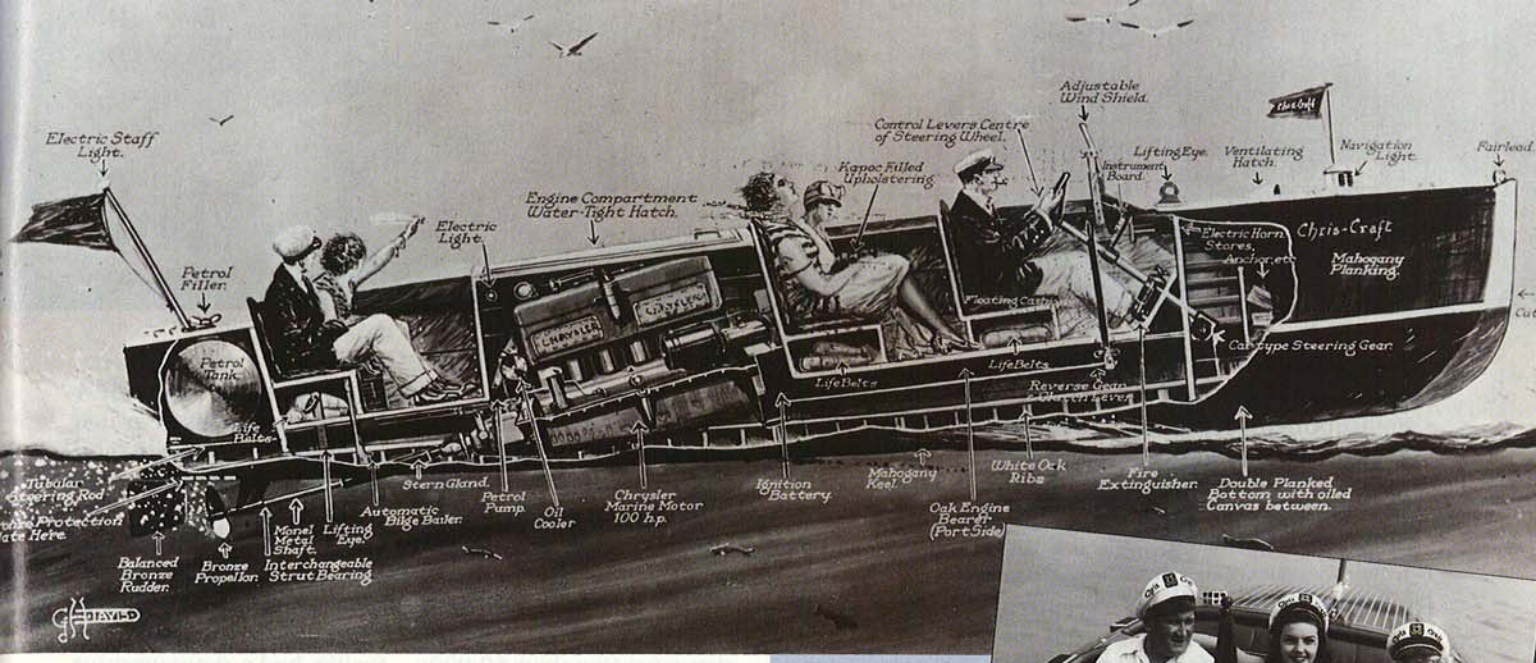
They were classy, comfortable, quick craft, those wooden boats of old. Here's a look at an important chapter in powerboating history.

Back in 1894, thrill-seeking vacationers on Michigan's St. Clair River paid a nickel or so to skip across the water at 5 mph in a powered rowboat. At the helm was Christopher Columbus Smith, a boatbuilder as well as an outdoors guide and market hunter.

He and his older brother Hank had joined up to build boats in Algonac, Michigan, some 10 years earlier. What they began there eventually became a company name synonymous with powerboating worldwide—Chris-Craft.

Speeding into the 20th century

The engine the brothers had adapted to their rowboat was like a small steam engine. But instead of



A cutaway illustration of a 1930, 22' runabout showed customers the construction features of a Chris-Craft all-wood boat.

water heated in its boiler, it heated naptha. It wasn't many years later, though, that the gasoline engine came along. And Chris Smith jumped on it.

As then sole proprietor of the "Chris Smith & Co., Boat Builders and Boat Livery," he began powering his wooden boats with the gasoline engines. The "runabouts" he created added the thrill of speed to boating. By 1910 one of his mahogany-planked boats with its 100-hp engine was clocked at 33 mph. Two years later, the Chris Smith-built *Baby Reliance II* set a record of 53.7 mph over a measured mile—the first time that any boat had passed the 50-mph mark.

Into the 1920s, Chris Smith's boats, driven by racer Gar Wood, set speed records everywhere they went. One race even defined the materials that were to become a Chris-Craft trademark.

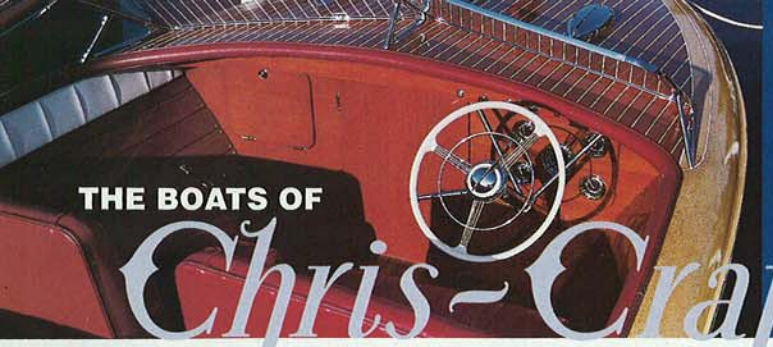
To qualify for the 1920 international Harmsworth Trophy speedboat race, held in England, all boat and engine materials must have originated in the country of the entrant. Smith's boats had always been planked with Honduras mahogany, but Honduras was a protectorate of Great Britain. So the boat that Gar Wood was to pilot to victory was constructed of Philippine mahogany (actually not a mahogany at all), which met the rules because the Philippine Islands were a United States' protectorate. From that time on, practically all wooden boats from Algonac advertised as "solid mahogany" were made from Philippine mahogany, with structural members of native woods such as white oak.

Following more than a decade of racing achievements and technical innovations, Smith and Gar Wood ended their association in 1922. From then on, Chris Smith & Sons Boat Company used its racing expertise and reputation to make and sell wooden runabouts, now brand-named *Chriscraft,* to the general public. With a workforce of 30 men, the

Continued

In the early 1940s through the 1950s, advertising and product photos featured the "Girls of Chris-Craft." Pictured is a 1941, 19' custom runabout.

Prohibited from building pleasure boats during World War II, Chris-Craft advertising touted what might be available when the war was finally over.



THE BOATS OF Chris-Craft

company built and shipped a boat about every week from spring through fall that year. That number, though, was soon to change dramatically.

Runabouts come of fashion

The Roaring Twenties produced more than a rage for the Charleston. Buyers were becoming more and more interested in powerboating for fun and sociability. It was a boon to boatbuilders, and none more so than Chris Smith & Sons.

The Algonac boatbuilders took advantage of the nation's new appetite for powerboating, and by 1929 could produce over 900 units annually. But Chris Smith & Sons did something no other boatbuilders had tried: It standardized construction.

All boatbuilders, including the Smiths, had always built boats one by one. But realizing that they could sell more *Chris-Crafts* (as their runabouts were then officially called) than they could build, the Smiths began experimenting with standardizing models in 1924. They began to cut parts from templates and divide the work into specialized crews that performed only one operation on a hull instead of building the entire boat. The changeover resulted in the company producing some models at the rate of a boat-and-a-half a day.

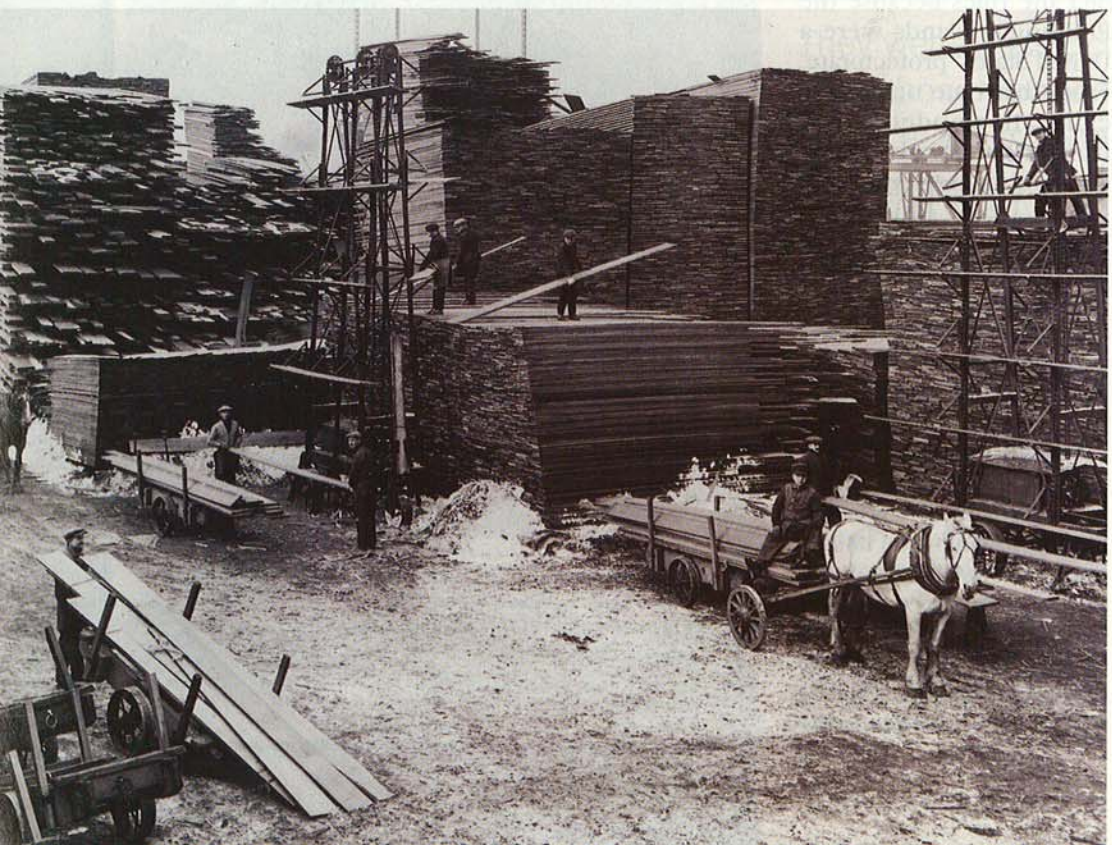
In 1926, the Smiths once again tried something new—selling through franchised dealers, just as cars were sold. Previously, all boats had been sold direct from factory to customer. That year, you could buy a 22' inboard Chris-Craft runabout for less than $2,000. And that included electric start and reverse as standard equipment items. (Today, that same boat, in excellent original or restored condition, would cost you about $20,000.)

With increased production and a growing dealer network, the "World's Largest Builder of All Mahogany Runabouts" was using a lot of wood. In 1927, for instance, Chris Smith & Sons Boat Company contracted for 1 million board feet of Philippine mahogany—at a cost of about 15 cents per board foot.

The building of a Chris-Craft

The boats built by the Smiths had a reputation for quality construction (see the cutaway illustration on *page 47*), even though they were more or less mass-produced. Chris-Crafts of the 1920s and 1930s and for years to come featured double-planked bottoms of solid Philippine mahogany. In between was a water-repellent layer of oil-soaked canvas. The keels were either Philippine mahogany or white oak. The oak, steam-bent, was used for the ribs. Bolts and screws were bronze (later, silicon bronze), and the screw holes were plugged with Philippine mahogany "bungs," a name picked up from beer barrels.

Inside, hulls were coated with linseed oil below the water line, then covered



Top left. **The cockpit of this 1940, 27' racing runabout displays the attention to finish that Chris-Craft paid to the wood trim or "brightwork."**

Top. **A 23', 1951 Chris-Craft Holiday provides the fun of family powerboating that the company promoted.**

Left. **Busy New York lumberyards like this one provided the Philippine mahogany that Chris-Craft used in the 1920s.**

"Chris-Craft is dry, comfortable to ride in, very seaworthy and thoroughly reliable. Our guarantee covers both the boat and the engine."

—Chris Smith & Sons Boat Co.

Chris Smith

with two coats of Valspar marine varnish, followed by paint. Outside, the hull bottoms received a heavy coat of green or gray paint.

All visible natural wood—the Philippine mahogany—on the hull, decks, cowls, etc., was rubbed with grain filler, sanded, and covered with four coats of marine varnish. When the boat was completed, upholstery and all, mechanics fitted it with an inboard engine. All boats then were tested for speed and handling along a measured course on the St. Clair River.

Only for a few years following World War II, when wood shortages were widespread, did Chris-Craft depart from its quality construction. The boat company substituted white cedar—or any other suitable wood it could find—for the then-scarce Philippine mahogany it had so long relied on. But when substitutions were made, management insisted that the hulls be painted rather than stained and varnished as was traditional.

The end of an era

Chris-Craft survived the Great Depression of the 1930s—barely—by introducing utility craft, which cost less. By the early 1940s, the company was up and running full speed again, featuring nearly 100 models. During World War II, Chris-Craft devoted much of its production to the war effort. (As with all boat manufacturers, the company was prohibited from making pleasure craft from 1943-45.) It built landing craft, target boats, aircraft rescue boats, and command boats (resembling PT boats). These required a switch to plywood, a foreign material to the company, but one to which it easily adapted.

The 1950s and 1960s saw Chris-Craft embark in new directions—kit boats (even kit furniture), outboard motors, mahogany-and-fir plywood boats, steel boats, fiberglassed plywood boats, and molded fiberglass boats. It was a period of experimentation and great expansion.

Eventually, Chris-Craft Industries—a publicly held company—emerged when the Smith family decided to yield ownership. The 1960s also marked the end of an era as Chris-Craft Industries completed the transition from mahogany to completely fiberglass construction of its boats.

By the 1980s, not only had the wooden boat long left the scene, but so did Chris-Craft as an independent boat manufacturer. The company and the name were acquired by Outboard Marine Corporation (OMC) in 1989.

Editor's note: The complete company archives of the Chris-Craft boat division were donated by Chris-Craft Industries, Inc. to the Mariners' Museum in Newport News, Virginia, in 1987. Also donated were two early Chris-Craft boats, a 26' runabout and a 38' commuter, both of which have been restored to original condition.

For more information about Chris-Craft, see *The Legend of Chris-Craft* by Jeffrey L. Rodengen, Write Stuff Syndicate, Inc., Fort Lauderdale, FL, 272 pages with photographs, $49.95.

Written by Peter J. Stephano
Color photos of restored Chris-Craft courtesy of Norm Wangard, *Classic Boating*; Historical photos courtesy of The Mariners' Museum, Newport News, Virginia.

Chris-Craft keep getting more popular

According to Mike O'Brien, senior editor of *Wooden Boat* magazine, Chris-Craft collectors represent a subculture among wooden boat fanciers. "Chris-Crafts have the same allure as Ford Model-A's or Mustangs," says Wilson Wright, director of the 2,600-member Chris-Craft Antique Boat Club. "There were more Chris-Crafts made than any other boat; consequently there are more of them left. There's a common thread. A person with a one-of-a-kind boat by another manufacturer has nothing to compare it with."

The club's web site and magazine provide boating experiences, restoration how-to, and classified ads for Chris-Craft boats and parts. Anyone with an interest in antique Chris-Craft boats (30 years old and older) can join, but there's special status if you own one. Dues are $25 annually. For information, write Chris-Craft Antique Boat Club, Inc., 217 So. Adams St., Tallahassee, FL 32301-1708. Or visit its web site at www.chris-craft.org/.

High-octane Planers

We test six stationary models with at least 15" of capacity

Print this article

No matter how much tool you have, it seems like you always need just a little bit more. Well, if you feel that way about your portable planer, consider stepping up to a powerful stationary model. We raced broad boards through six machines priced under $1,400 to help you pick a thickness planer.

FAST FACTS

- The lowest-priced stationary planers in our test cost about the same as the highest-priced portable units.
- Compared to their portable cousins, stationary models easily handle deep cuts in stock that's wider and thicker. Plus, their powerful induction motors are designed to be on the job all day, every day.
- Plan on spending some time changing and setting the knives. The best machines took about 30 minutes, the others took around 45.
- These big machines offer two feed rates: high speed for rapid stock removal and low speed for smoother surfacing.

A bit about our testing procedures

Before putting any wood under the knives, we performed a thorough tune-up, setting infeed and outfeed rollers, chip-breakers, and belt tension according to the directions in the owner's manual. We then removed and replaced the knives and timed how long it took to set them to within .001" of parallel to the cutterhead and each other. To measure snipe (see definiton on *next page*), we ran a 4×24" piece of poplar through each planer, making cuts at depths of 1/16" and 1/8", then measured snipe on both ends of the board with a dial caliper.

Finally, to test power, we ran a 15" cherry plank through each planer at its full cutting depth (1/8") and fastest feed rate, and observed any change in cutterhead speed.

Thicknessing quickness, snipe, and other key considerations

Quality of cut and feed rate. Planers spin a cutterhead and knives that cut a series of small scallops to smooth the wood. Given equally sharp knives, the machines that make the most cuts per inch of board give the silkiest surface.

Three factors combine to figure the cuts per inch: the number of knives, the speed of the cutterhead, and the feed rate. A slower feed-speed generally results in a smoother cut, while the fast rate allows you to knock a board down to near-finished thickness more quickly.

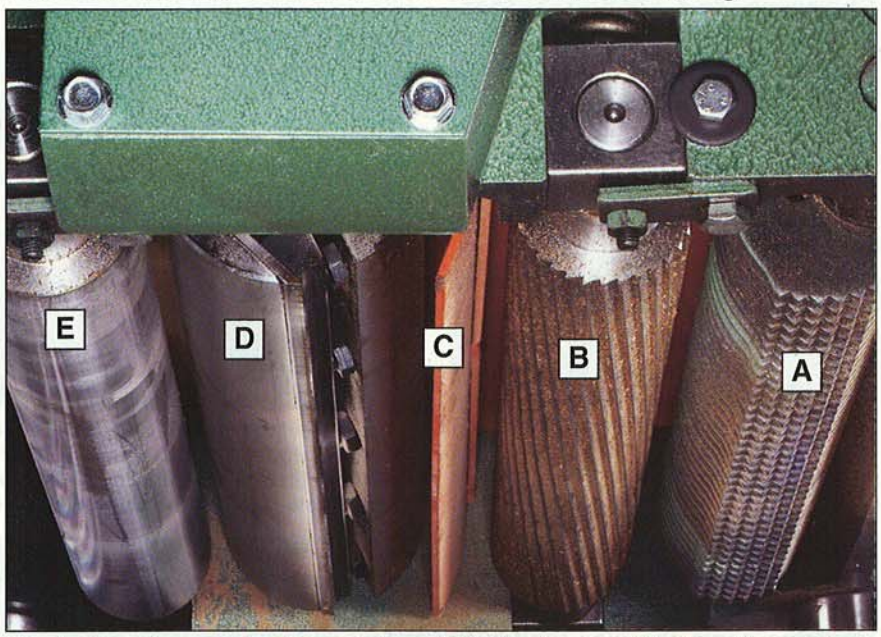
All of the planers earned an excellent rating for the quality of their cut at the slowest feed rate. The Grizzly G1033 is the only planer in our survey with four knives (the others have three), and it gave us excellent results, even at its 20 feet per minute (fpm) rate.

Delta nearly doubles the feed speed on its machine from low (16 fpm) to high (30 fpm), which gave us a rougher cut than the others at high speed. However, boards moved through this machine so fast we found ourselves going back to it again and again when we needed to remove a lot of material from a board.

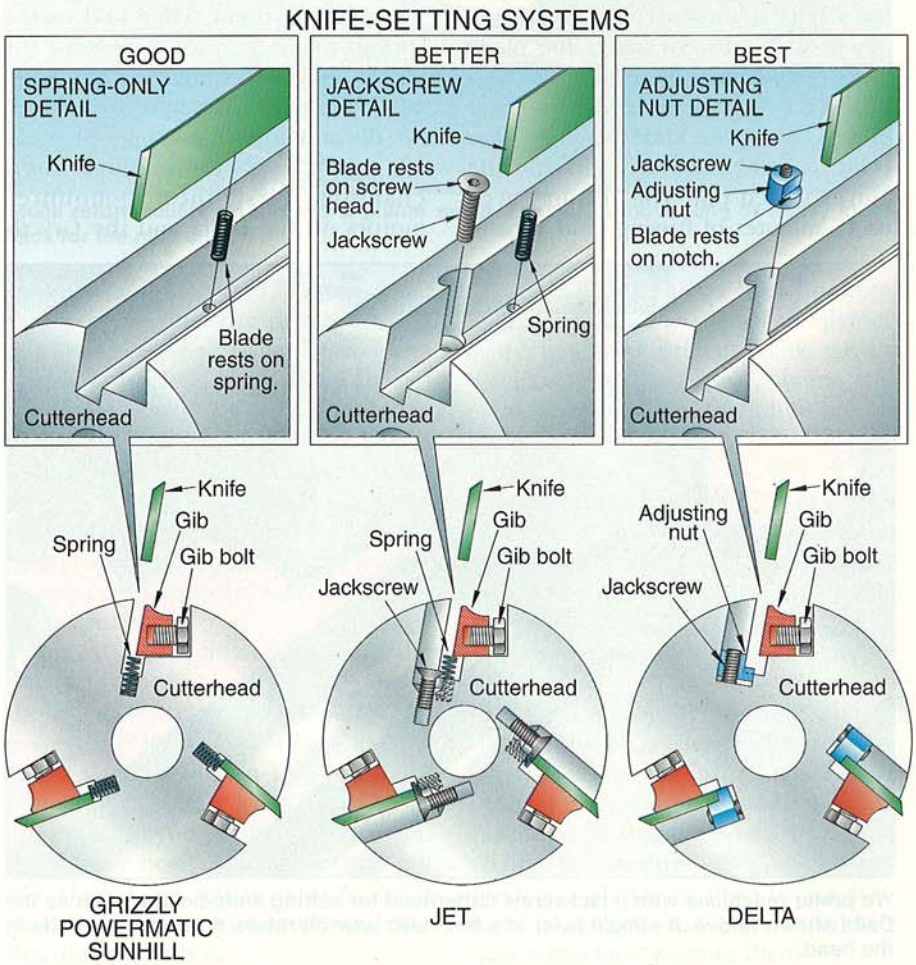
Snipe. As you move stock into a planer, the infeed roller and cutterhead allow the incoming board to raise higher into the cutterhead until the outfeed roller can press it back down against the table (see photo *above right*). The same thing happens at the opposite end of the board when it clears the infeed roller. The deeper cuts near each end of the board are called *snipe*. Until someone designs a planer that magically supports stock right up to the knives, snipe will always be with us.

No matter how we adjusted the machines or supported the stock, we ended up with snipe about 3" from each end of the board. Even the top performer in this area, the Delta, gouged an average of .003" (3/1000") from three boards. Snipe this shallow (about the thickness of a human hair) will be apparent in your projects, so our best advice when using these models is to plane longer pieces than you need and cut off the snipe.

How these machines do their thickness thing



Wood enters the machine through the anti-kickback pawls (A). Then the serrated infeed roller (B) pushes the stock flat against the table, under the chip breaker (C), and into the cutterhead (D). The planed lumber then continues through the machine, pressed flat by the smooth outfeed roller (E).



Continued

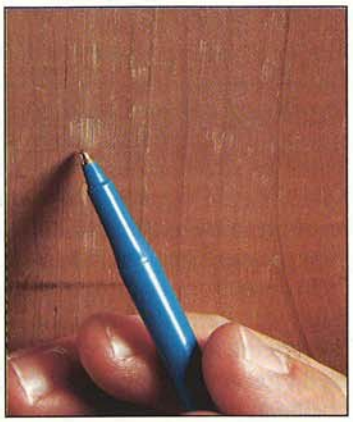
Changing and setting knives. Keeping your planer cutting smoothly requires frequent blade sharpening, especially if you run mountains of hardwoods through it. Knife removal is pretty straightforward: Remove the cutterhead access panel, loosen the gib bolts and remove the knives. Replacing and setting the knives, however, is time-consuming and critical to cutting performance.

Four of the machines have spring-loaded knife slots (see drawing *on previous page*)—slip the razor-sharp knives into the slot, press them down with the included setting gauge, and secure the gib bolts. It sounds simple, but keeping the cutting edge parallel to the cutterhead while holding the gauge and tightening the gib bolts would be easier with four hands. And snugging down the gibs tended to pull the knives out of alignment.

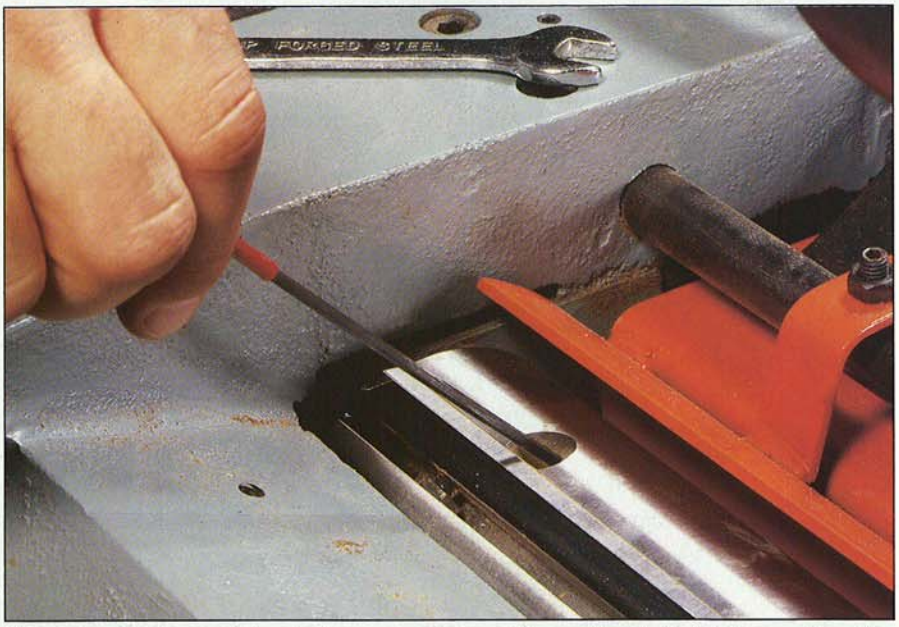
Delta and Jet simplify the process by using jackscrews to adjust the knife height. Though their mechanisms differ slightly, on both machines we could easily raise or lower the blade .001" (1/1000th") just by turning the hex-head screw, as shown in the photo *below*. When the knife paralleled the head, we tightened the gibs and the knives stayed put. This feature saved us 15 minutes of fussing (and a lot of grey hairs) when compared to spring-loaded cutterheads.

Jet's cutterhead came equipped with both jackscrews and springs. The springs seemed to defeat the purpose of the screws, so we asked officials at Jet Equipment what might happen if we removed them. They told us the springs make it easier to remove the knives, and discarding them shouldn't affect the performance of the planer. We did and noticed no consequence.

A couple of footnotes about knife-changing: First, the top-mounted motors on the Delta and the Grizzly G1033 crowded us when replacing the knives, so we rotated them out of the way before making crucial adjustments. Secondly, the Powermatic is the only unit that comes with double-sided knives, an addition we loved. You'll still want to keep a spare set of knives on hand, but you'll go twice as long between sharpenings.



After removing the dust-collection hose, chips remained inside the Jet's dust hood, as shown *above left*. Other uncollected chips bounced back down into the cutterhead while we planed. These recycled chips, when caught by the knives, scooped out small divots, such as those shown in the photo *above right*, in our workpiece.



We prefer machines with a jackscrew cutterhead for setting knife-height, such as the Delta shown *above*. A simple twist of a hex-head wrench raises or lowers the knife in the head.

Dust collection. These gape-mouth critters create mountains of chips in just a few minutes, so you need a dust collector to handle the waste. That's why we were surprised to find that Delta offers its dust hood—standard equipment on all of the other models we tested—only as an option.

The folks at Jet redesigned their dust hood to eject debris to one side of the machine, which kept the dust hose nicely out of the way of the planed lumber. However, chips from the left side of the machine had a hard time making the right-angle turn into the hose. The resulting backup sent some chips back under the knives to leave small comet-shaped divots (shown *above*) in the wood. A Jet official told us they were working on improvements to the hood, but nothing was available for us to test at press time.

If you want the extra capacity of the Grizzly G1033, you may have to upgrade your collector as well. The manufacturer recommends a collector that moves at least 1,000 cubic feet per minute (cfm) of air to carry the chips out through its 5" port.

A few more things to weigh before you buy

Going up, going down. Next to keeping your planer well-fed with boards, the most common operation you'll perform is changing the cutting depth. On most of the machines in our test, the cutterhead remains fixed in place while the table raises and lowers. Delta differs by keeping the table fixed; the head cranks up and down. This design allows you to build permanent infeed and outfeed tables to support long stock, but the cutterhead's weight makes it somewhat harder to raise.

Tightening the head lock on the Delta proved to be a knuckle-buster. We jammed our fingers between the locking knob and the belt housing.

Powermatic's off switch is located within easy reach of the operator's knee, so we didn't have to reach across the planer to power it down.

Mobility. These brutes weigh from 340 to 800 pounds, so most require a burly mobile base or a permanent location in your shop. However, the Jet JWP15-CSW and Powermatic both have locking casters built into their enclosed stands. We especially liked the wheel-locking mechanism on the Jet—a simple foot pedal that holds two wheels fast to prevent shifting. Unless you get a package deal as we did, you'll have to buy Delta's non-mobile stand separately.

A foot-operated lever quickly and easily locks the wheels on the Jet JWP15-CSW's built-in mobile base.

Power. Except for the 2-hp. Delta and Grizzly G1021, all of the planers we tested come equipped with 220-volt, 3-hp. motors. Delta's fast 30 fpm feed rate and less-powerful motor caused it to stall mid-board during our torturous full-width, full-depth, top feed-speed test. Still, Delta held its own at top speed for shallower cuts and when making full-depth cuts at its slower feed rate.

Stock return rollers on top of the planer make it easier to move long or heavy stock back for the next cut.

Locks and controls. On most of the units in our test, the power switch and depth-adjustment crank are located on opposite sides of the infeed table. That means we had to reach across the machine to shut it off, which could be dangerous in an emergency. Powermatic, however, puts their power switch on the same side as the crank and about at knee level—so we could shut the machine down hands-free.

The cutting-depth locks on all of the planers in our test held solidly, but we have a couple of issues with the accessibility of the locking knobs. Delta uses knobs on two diagonal posts to secure its head height. But plan to bang your knuckles when you lock-in the head: As you can see *top left*, there's not much room for your fingers between the knob and the machine's gear box.

Grizzly's G1033 has both locking knobs on the same side of the planer as the height-adjustment crank, which we liked. On the other planers, the crank is on one side; the knobs are on the opposite.

Stock return rollers. So you've just taken ⅛" off that 12'-long board and you're ready take it down another ⅛". Where do you put that plank while you turn the crank? The Grizzly G1033, Jet, Powermatic, and Sunhill planers have a pair of stock return rollers on top of the machine (shown *above, bottom*). These rollers make it easier to move the planed wood from outfeed back to infeed, and provide a place to rest that big board while you change the cutting depth. If we were buying a planer to thickness extra-long or heavy stock, we wouldn't have a machine without them.

Continued

High-octane Planers

Presenting the heavyweight champions

Because all of these beefy planers gave us excellent results, our decision came down to features and price. If we were getting one for our shop, we'd buy the Jet JWP-15CSW. We like its jackscrew cutterheads, stock-return rollers, and its easy-locking closed mobile base. (This base is currently available only on this special anniversary edition.) But, until Jet fixes its dust hood, we'd replace it with a shop-built hood or buy the hood for the G1021 from Grizzly.

If your dust collector can handle it (or if you can afford to upgrade), the Grizzly G1033 delivers an extra 5" of capacity for only about $100 more. For value, the Sunhill planer reigns. It performs as well as any of the others and is easy on your wallet with its $889 price tag.

Written by Dave Campbell
Technical consultant: Dave Henderson
Illustration: Kim Downing
Photographs: Baldwin Photography

Sunhill CT-38B

WOOD MAGAZINE EDITORS' CHOICE TOP VALUE

Delta 22-675Y

Grizzly G1033

WOOD MAGAZINE EDITORS' CHOICE TOP VALUE

Powermatic 15

Grizzly G1021

Jet JWP-15CSW

WOOD MAGAZINE EDITORS' CHOICE TOP TOOL

LET'S LOOK AT THESE PLANERS UNDER THE MAGNIFYING GLASS

MANUFACTURER	MODEL	HORSEPOWER	SPEED: CUTTERHEAD (RPM)	SPEED: FEED RATES (LOW/HIGH) (FEET PER MINUTE)	SPEED: CUTS PER INCH (LOW/HIGH)	CAPACITIES: MAX. WIDTH (INCHES)	CAPACITIES: MIN.-MAX. STOCK THICKNESS (INCHES) (1)	CAPACITIES: MAX. DEPTH OF CUT (INCHES) (2)	CAPACITIES: DUST INLET SIZE (INCHES) (3)	CUTTERHEAD: CRANK TURNS PER 1" ELEVATION	CUTTERHEAD: NUMBER OF KNIVES	CUTTERHEAD: KNIFE-ADJUSTING MECHANISM (4)	CUTTERHEAD: OBSERVED POWER	PERFORMANCE RATINGS (5): SNIPE DEPTH (INCHES) (6)	PERFORMANCE RATINGS (5): SNIPE LENGTH (INCHES) (6)	PERFORMANCE RATINGS (5): CUT QUALITY, LOW FEED RATE	PERFORMANCE RATINGS (5): CUT QUALITY, HIGH FEED RATE	PERFORMANCE RATINGS (5): KNIFE ACCESSIBILITY	PERFORMANCE RATINGS (5): KNIFE ADJUSTMENT	PERFORMANCE RATINGS (5): DUST COLLECTION (7)	WARRANTY (YEARS)	COUNTRY OF ASSEMBLY (8)	WEIGHT (POUNDS)	SELLING PRICE (9)	COMMENTS
DELTA	22-675Y	2	5000	16/30	78/41	15	1/8"-6 1/2	1/8	*	6.5	3	JS	G	.003	3	E	F	G	E	*	2	T	340	1,200*	Fastest feed rate and best knife adjustments, but motor must be moved and belts retensioned to access knives. Dust hood not included.
GRIZZLY	G1021	2	5000	16/20	78/63	15	1/4-6	1/8	4	6.5	3	S	E	.004	3	E	G	G	G	E	1	T	475	795**	Motor must be moved and belts retensioned to access knives. A good value.
	G1033	3	5000	16/20	104/83	20	1/4-8 1/2	1/8	5	17	4	S	G	.006	3 1/4	E	E	E	G	G**	1	T	800	1,295**	Large capacity machine for about the same price as Delta, Jet, and Powermatic. Requires 5" dust-collection system.
JET	JWP-15 CSW	3	4500	16/20	70/56	15	1/4-6	1/8	4	13	3	JS	E	.004	3	E	G	E	E	G	2	T	480	1,199	Best combination of knife access and adjusting. Also available with open stand as JWP-15HO for $1,099.
POWERMATIC	15	3	4500	16/20	70/56	15	3/16"-6	1/8	4	13	3	S	E	.005	3	E	G	E	G	E	1	T	484	1,199	Cabinet-mounted switch can be shut off easily without letting go of workpiece.
SUNHILL	CT-38B	3	4500	16/20	70/56	15	1/4-6	1/8	4	13	3	S	E	.004	3	E	G	E	G	E	1	T	506	889**	Very good basic machine that delivers the performance of higher-priced planers. The best value in our test.

NOTES:

1. (*) Per manufacturer. We don't recommend planing stock less than 1/4" thick.
2. Under depth gauge.
3. (*) Dust hood not standard with Delta planer.
4. (JS) Jackscrew (S) Spring
5. E Excellent, G Good, F Fair
6. 1/16" depth of cut, with bed rollers set .002 higher than table. Average of three boards.
7. (*) Dust hood not standard. (**) Requires 5" dust-collection system.
8. (T) Taiwan
9. Prices current at time of article's production and may change. (*) At time of article's production, the planer and stand were sold as a package at this price. Model DC-380 planer and stand are also available separately. (**) Shipping charges additional.

For more information, call:

Delta 800/223-7278
Grizzly 800/523-4777
Jet 800/274-6848
Powermatic 800/248-0144
Sunhill 800/929-4321

Sidewalk Speedster

The old Irish Mail zooms back with a new look

Back in the 1960s (and even before then), youngsters whizzed along sidewalks on hand-powered speedsters called Irish Mails. Here's an updated version of the classic rider you can build for some lucky boy or girl.

Get off to a good start with body-building activities

1 Cut the body sides (A) and spacers (B) to shape. You'll find the full-size pattern for the spacers (B) in the *WOOD PATTERNS®* insert in the middle of the magazine. The same pattern serves for the front end of the body sides (A). Refer to the Body Side drawing for its placement.

2 Glue and clamp the two sides and three spacers together, referring to the Exploded View drawing. Keep the bottom edges flush.

3 Drill a ⅜" hole through the body where shown. Center the hole from top to bottom on the body.

4 Sand the edges of the body assembly (A/B) flush, and rout ⅜" round-overs on both sides where shown.

5 Make the fin (C) and seat (D). To make them, lay out the cutting lines on ½"-thick plywood, referring to the Parts View drawings. Cut out the parts with a jigsaw, staying outside the line. Sand to the line, using a belt or disc sander. Rout ⅜" round-overs along the edge on the top face of each part where shown.

6 Attach the fin to the body. To do this, lay the body assembly (A/B) upside down on your benchtop. Lay the fin on it, routed face down. Align it flush with the body at the back end, and center it from side to side. Clamp

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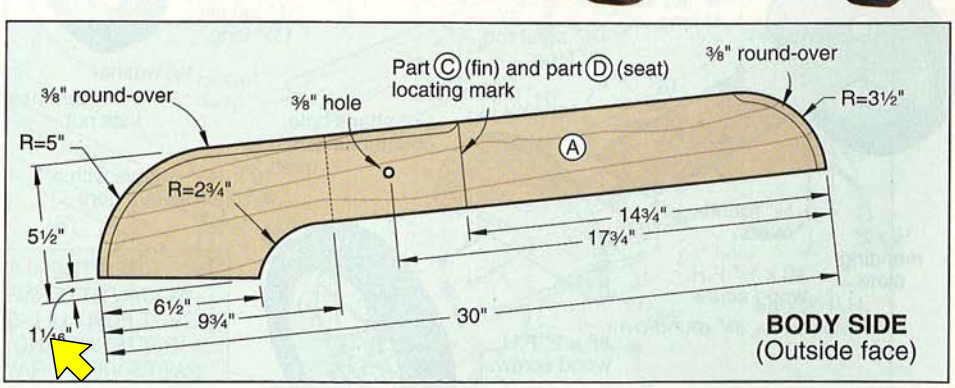
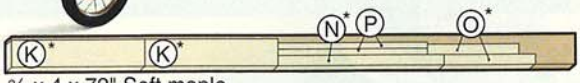


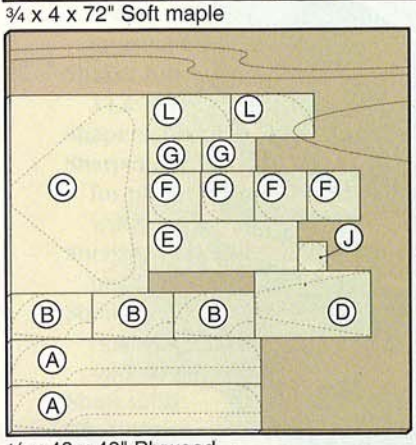
Sidewalk Speedster



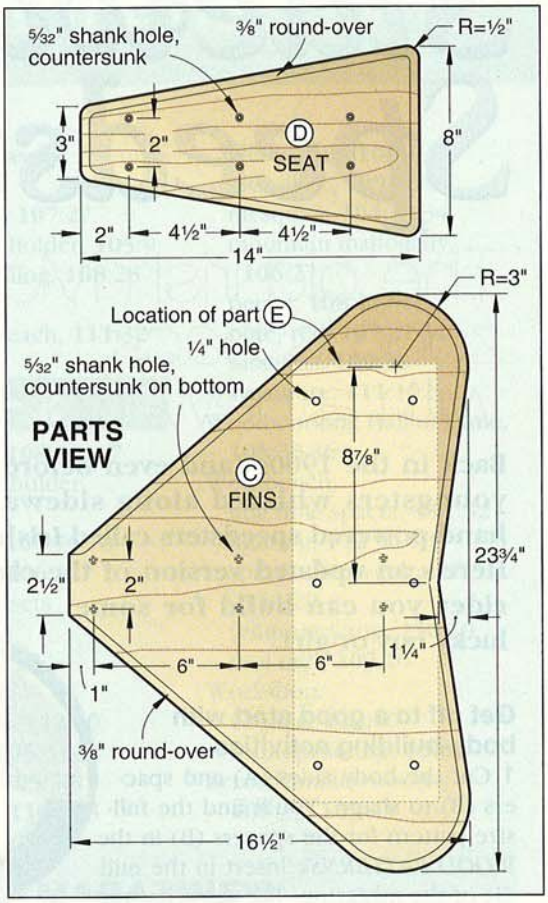
¾ x 4 x 72" Soft maple

CUTTING DIAGRAM

*Plane or resaw to the thicknesses listed in the Bill of Materials.



½ x 48 x 48" Plywood



SEE THE *WOOD PATTERNS*® INSERT FOR FULL-SIZE PATTERNS AND PARTS VIEW DRAW-

Bill of Materials

Part	Finished Size T	W	L	Matl.	Qty.
A body side	½"	5½"	30"	P	2
B body spacer	½"	5½"	9¾"	P	3
C fin	½"	23¾"	16½"	P	1
D seat	½"	8"	14"	P	1
E panel	½"	6"	18"	P	1
F axle support	½"	6"	6⅜"	P	4
G brace	½"	4"	6½"	P	2
H rear axle crank	⅜" dia.		18"	SR	1
I rear axle	⅜" dia.		10⅜"	SR	1
J spacer disc	½"	3½" dia.		P	1
K steering bar	1¼"	3¼"	16"	LM	1
L fender	½"	5⅜16"	10"	P	2
M front axle	⅜" dia.		21½"	SR	1
N handle	⅝"	1¼"	20"	M	1
O yoke	5/16"	1¼"	11"	M	2
P rod top/bottom	¾"	⅝"	18"	M	2

Materials Key: M–maple, P–plywood, LM–laminated maple, SR–steel rod.

Supplies: 10x1¾" wheels with ⅜" plain bore (no bearing), ⅜" steel rod, ⅛x1½" roll pin, ⅜" ID shaft collars, ⅜" flat washers, ⅜" axle caps, ⅜" nylon-insert lock nut, ⅜x½" nylon bushings, ⅜x4" lag screw, ½x2" mending plates, ¼x1½" carriage bolts, ¼" washers, ¼" lock washers, ¼" nuts, #8x¾" flathead wood screws, #8x1" flathead wood screws, #8x2" flathead wood screws.

the fin to the body. Draw a centerline for each body side (A) along the bottom of the fin, and drill six mounting holes where shown. First, drill 7/64" holes 2" deep. Then, remove the fin, and enlarge the holes through it to 5/32". Countersink them on the bottom. Glue and screw the fin to the body.

7 Similarly, attach the seat to the top of the body where shown on the Body Side drawing.

Line up solid support for the rear axle assembly

1 Cut the panel (E) to size.

2 Form ½" rabbets at both ends of the panel and ½" dadoes where shown. (We cut them on the tablesaw.)

3 Make the four axle supports (F), shown in the *WOOD PATTERNS®* insert. To make them, lay out the cutting lines on ½" plywood. Cut out the parts, and sand the edges smooth. Drill a ½" hole through each where shown. For accurate alignment, stack the parts and drill the holes through all four at once on the drill press.

4 Cut the braces (G) to size.

5 Without gluing, assemble parts E, F, and G, referring to the Lower Assembly drawing. Clamp parts F and G together into two assemblies, and lift them off the panel.

6 Drill pilot holes through parts F into parts G. Enlarge the holes through parts F and countersink them on the outer faces.

7 Assemble both F/G assemblies with screws and glue. Place them on the panel (E) to ensure proper positioning of the braces (G).

8 Glue and screw one F/G assembly in position on part E. (Which end of the panel you glue it to doesn't matter.) Set the other F/G assembly aside.

Bend the steel crank, and put the rear axle together

1 Cut an 18" length of 3/8"-diameter steel rod. (We bought cold-rolled, low-carbon steel rod at a hardware store.) Mark it 2" and 5" from one end with chalk or soapstone.

2 Bend the rod 90° at each mark to form a crank, as shown in the Rear Axle drawing in the *WOOD PATTERNS* insert. For information on bending the steel rod, see *page12*.

3 Press a nylon bushing into the ½" hole in each axle support (F). (We found suitable bushings, ½" outside diameter with a 3/8" bore, in the hardware store.) Trim the bushings flush with the faces of part F. For good axle fit, you may have to ream out the bushings with a 3/8" twist drill after driving them into position.

4 Drive an axle cap onto the short arm of the axle crank.

5 Cut the long arm of the axle crank to length. To determine the correct length, first slide the crank into its supports. Position it so the crank end can turn between the axle-support assemblies. Then, slide two 3/8" flat washers, a wheel, and another flat washer onto the axle end. (For wheels, we bought four 10"-diameter tricycle rear wheels from a hardware store.) Mark the axle 7/8" from the outer face of the last washer. Remove the axle from the supports, and cut it to length.

6 Mark the axle for threading and drilling. Measuring from the end, make the first mark at 3/4" and the second at 2 5/8", as shown on the Rear Axle Assembly drawing.

(The location of the second mark depends on the face-to-face dimension of the wheel hub. Ours measured about 1¾". If yours differs,

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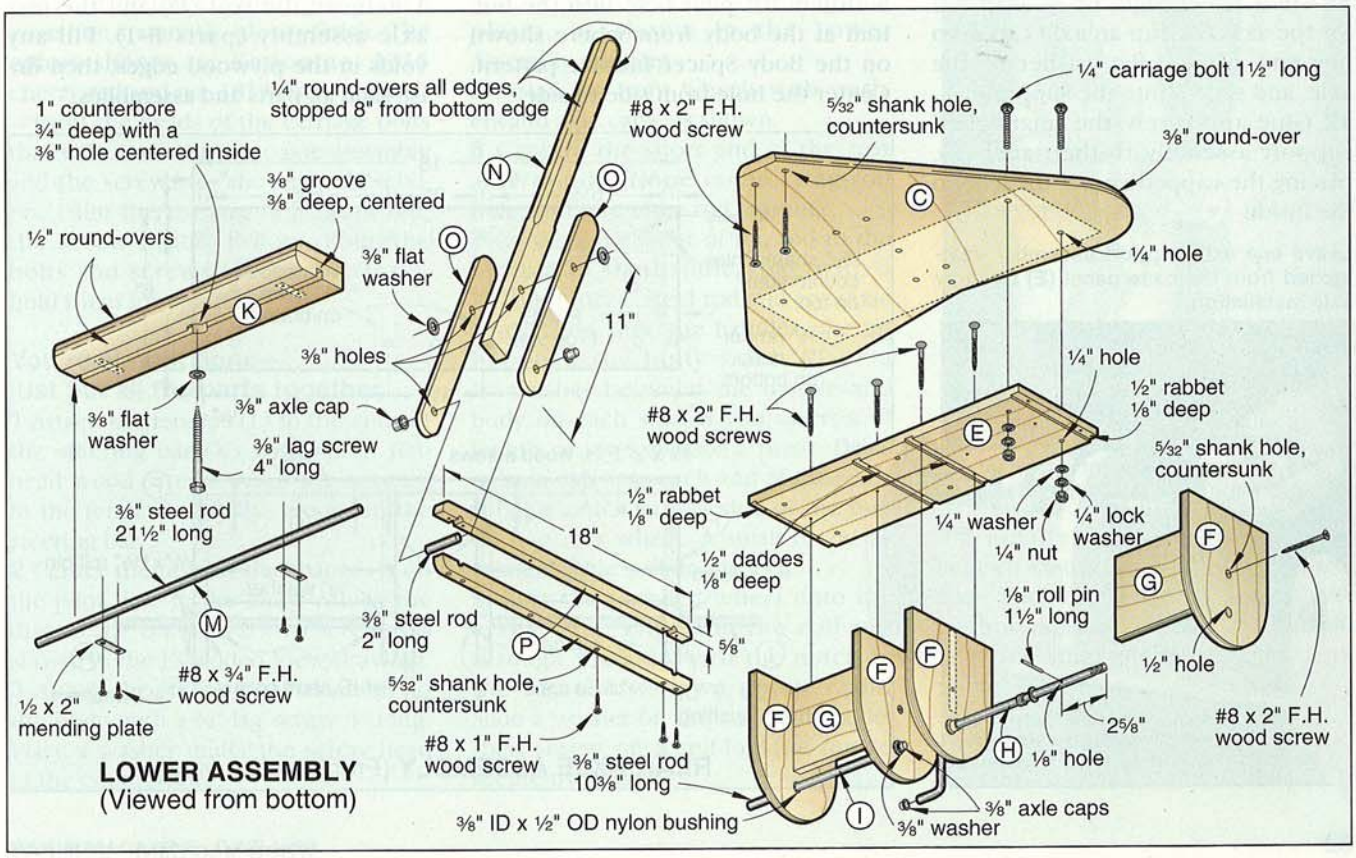


Sidewalk Speedster

make the distance between the first and second mark slightly less than your wheel's face-to-face measurement.)

7 Thread the axle from the end to the first mark with a ⅜"-16 die. First, chamfer the end of the axle slightly (filing will do the trick) to make the die easier to start. Then, turn the die onto the axle to form the threads. Be careful to start the die straight. For easier, cleaner threading, lubricate the axle and die. Thread-cutting oil works best, but motor oil will do.

Drill a ⅛" hole through the axle at the second mark. For accuracy, use a drill press, and support the axle with a V-block centered under the bit.

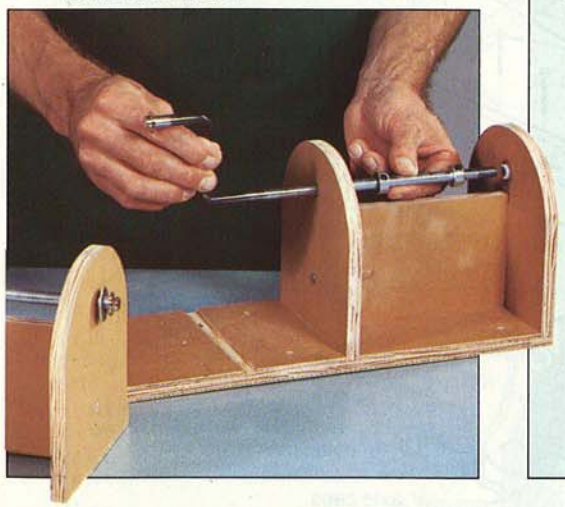
9 Slide the axle into the support assembly (F/G), as shown *below*. After pushing the threaded end through the first support, slide onto the axle a washer, two shaft collars, and another washer. Slide the end through the other support, and slip two flat washers onto it.

10 Drive a ⅛×1½" roll pin into the axle hole, centering the pin in the axle. Tighten the shaft collars against the supports' inside faces, as shown in the Rear Axle Assembly drawing.

11 Cut a 10⅜" length of ⅜" steel rod for the axle (I). Tap an axle cap onto one end, place a flat washer on the axle, and slide it into the supports.

12 Glue and screw the unattached support assembly to the panel (E), placing the capped end of the axle to the inside.

Leave one axle support assembly unattached from the base panel (E) to allow axle installation.



13 Clamp the rear axle assembly (parts E-I) to the underside of the fin where shown on the Lower Assembly drawing. (We oriented ours to place the crank axle on the left side of the vehicle.) Drill ¼" holes in the approximate locations shown, and attach the axle assembly with six ¼" carriage bolts and nuts.

Now, turn your attention to the steerable front axle

1 Lay out and bandsaw the spacer disc (J). Sand the edge smooth. Drill a ⅜" hole through the center.

2 Cut the steering bar (K) to size. (Laminate thinner stock, if necessary.) Bore a 1" counterbore ¾" deep centered on one face. Drill a ⅜" hole through the center of the counterbore. Then, saw or rout a ⅜" groove ⅜" deep along the center of the counterbored face. Rout ½" round-overs along both faces of the front edge.

3 Cut out the fenders (L), referring to the Fender drawing in the *WOOD PATTERNS®* insert. Round-over the inside face of each. Drill and countersink screw holes where shown. Using the fenders as templates, drill pilot holes in the steering bar ends.

5 Drill a 9/32" pilot hole into the bottom at the body front where shown on the Body Spacer full-size pattern. Center the hole from side to side.

You're right on track to build the power train

1 Cut the handle (N) to size. Round the top, and rout ¼" round-overs around both sides, stopping where shown on the Handle Parts View drawing. Drill a ⅜" hole through the handle where shown.

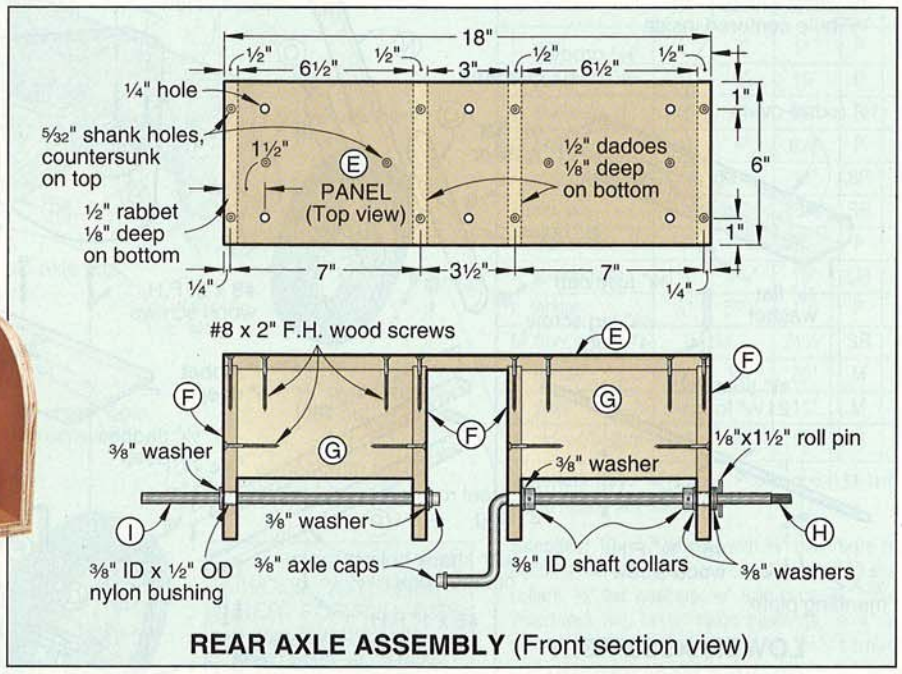
2 Cut the yoke sides to size and shape. Stack the pieces, and drill the two ⅜" holes where shown.

3 Glue the yoke sides to the handle, referring to the Handle Parts View drawing. A ⅜" bolt through the holes in the yoke sides (O) and handle (N) will help align the parts.

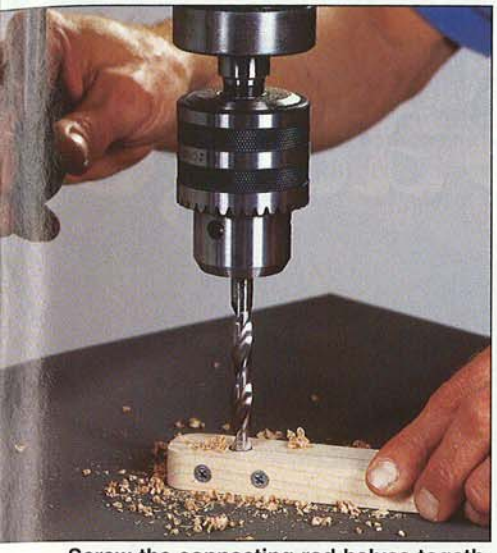
4 Cut the connecting rod top and bottom halves (P) to size and shape. Drill and countersink the screw holes in the bottom half; then drill mating pilot holes in the top half. Temporarily screw the halves together as shown in the photo at *top left* on the *opposite page*, then drill the two ⅜" holes where dimensioned. Separate the parts after drilling, but mark them on the mating faces for correct reassembly.

Paint and finish the parts, now that they're all made

1 Remove the seat (D) and the rear axle assembly (parts E-I). Fill any voids in the plywood edges; then finish-sand all parts and assemblies.



REAR AXLE ASSEMBLY (Front section view)



Screw the connecting rod halves together temporarily while you drill a ⅜" hole near each end.

2 Apply a clear finish to the steering bar (K), handle/yoke assembly (N/O), and both halves of the connecting rod (P). (We used polyurethane.)

3 Spray primer on all remaining wooden parts plus the steel rear axles. (We used Krylon no. 1315 all-purpose white primer.) Double-prime the plywood edges, sanding between coats.

4 Paint the parts with two or three coats of enamel, sanding between coats for a smooth, glossy finish. The colors shown are Krylon no. 1315 cherry red and no. 1813 daisy yellow.

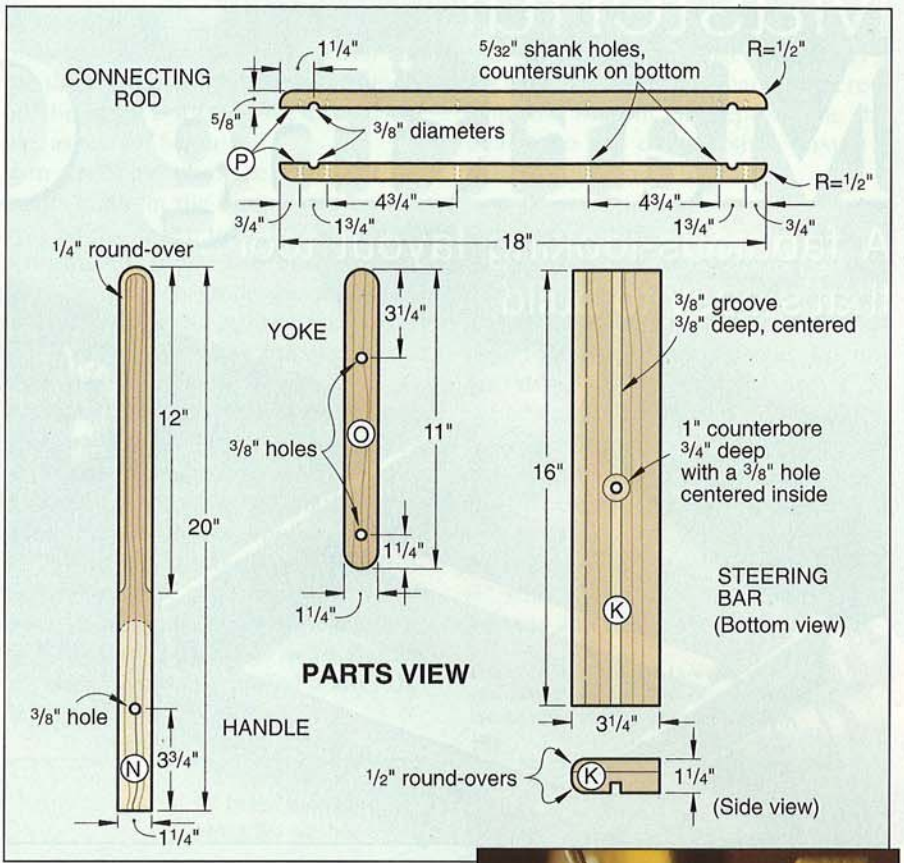
Paint the heads of the carriage bolts that will attach the rear axle assembly and the screws for the seat and fenders. Paint the carriage bolt heads red; the screw heads, yellow. Poke the bolts and screws into cardboard to hold them for painting.

You're almost done—just put all the parts together

1 Attach the fenders (L) to the ends of the steering bar (K) with #8×2" flathead wood screws. Align the notches in the fenders with the groove in the steering bar.

2 Center the hole in the spacer (J) on the pilot hole in the body. Attach the disc to the body with two screws, as shown in the Exploded View drawing.

3 Attach the steering bar assembly to the body with a ⅜" lag screw 4" long. Place a washer under the screw head in the counterbore.



4 Cut the front axle (M) to length. Center it in the groove in the steering bar. Secure the axle with mending plates, as shown in the Lower Assembly drawing.

5 Install the front wheels with washers and axle caps, as shown.

6 Capture the short end of the rear axle crank in one connecting-rod hole, and screw the rod together.

7 Connect the front of the rod to the bottom of the handle/yoke with a 2" length of ⅜" steel rod and two axle caps. Then slide the handle/yoke up between the body sides. Place a ⅜" washer between the handle and body on each side as you insert a 3" length of steel rod for a pivot. Drive an axle cap onto each end of the rod.

8 File a notch in one side of the hub on one rear wheel. A small round or triangular file will do the job.

9 Slide the notched wheel onto the crank axle, engaging the roll pin through the axle with the notch in the wheel, as shown *above right*. Slide a washer on the end of the axle; then screw on a self-locking nut to secure the wheel.

File a notch in one rear-wheel hub to engage with the drive pin in the axle.

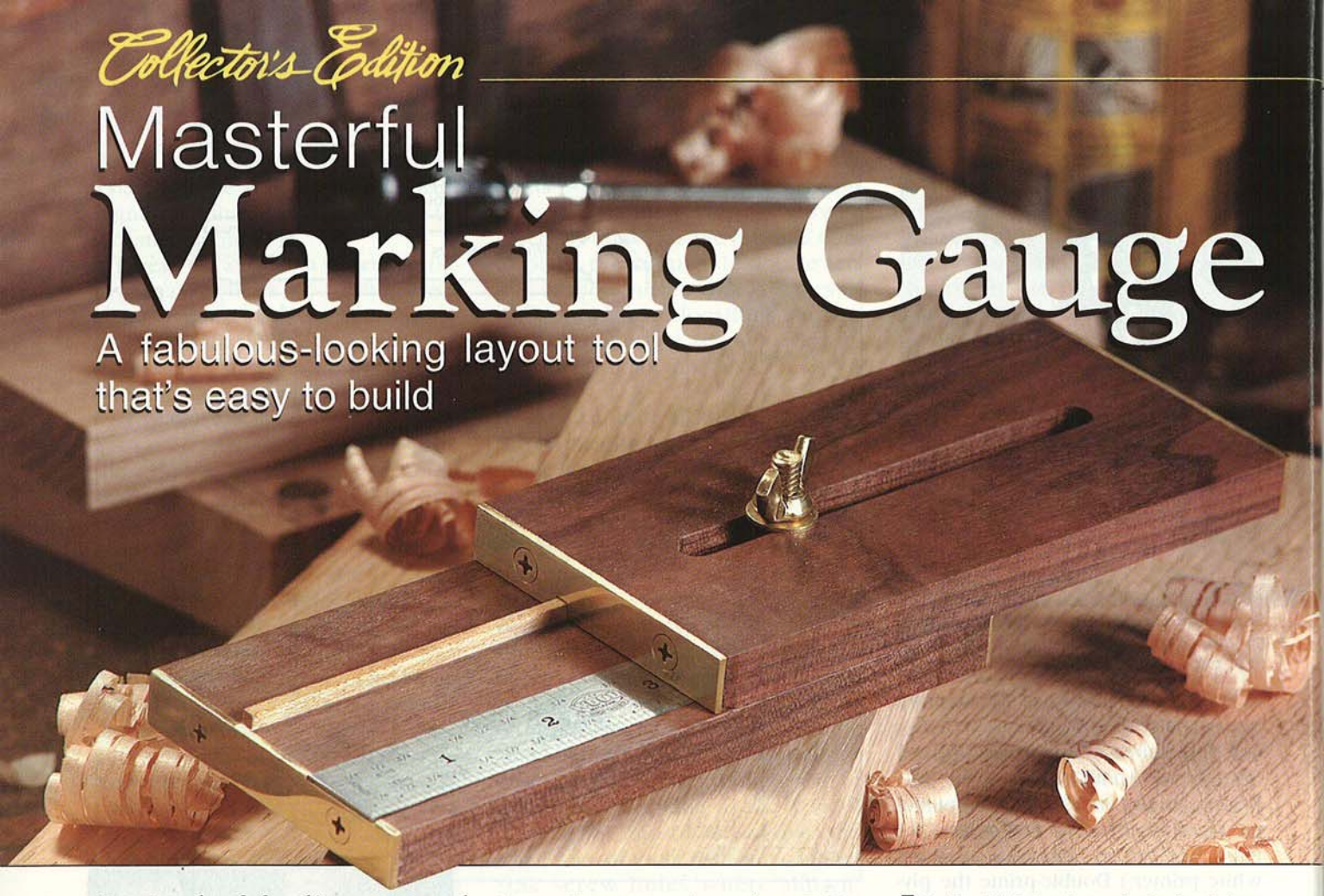
10 Finally, install the other rear wheel, fastening it on with an axle cap. Back the inner end of the axle with a hammer as you drive the cap onto the other end.

Project Design: Jan Svec
Photographs: Hetherington Photography
Illustrations: Roxanne LeMoine; Lorna Johnson

Collector's Edition

Masterful Marking Gauge

A fabulous-looking layout tool that's easy to build



Instead of fooling around with makeshift measuring and marking methods, count on this accurate, easy-to-build gauge for layout help.

Construct the sliding body sections for the gauge

1 Cut and plane stock to size. For each marking gauge, you'll need two ½×2⅞×5⅞" pieces of walnut for the body and one ⅛×¼×5⅞" piece of maple for the guide.

2 Saw or rout a ⅛" groove ⅛" deep where shown in the two walnut pieces. The maple strip should fit snugly in the grooves.

3 Rout a groove for the rule in the gauge body bottom where shown. To do this, first measure the width and thickness of your 6" stainless steel rule. (See the Buying Guide for our source of a rule engraved with the *WOOD*® magazine logo.)

Then, set up your table-mounted router to cut the groove. Install a straight bit that matches the width of your rule, and position a fence to locate the groove where shown. (You could make the cut in multiple passes with a narrower bit, too.) Set the router's cutting depth to match the thickness of your steel rule.

Ideally, the rule's top face will be flush with the body surface. It's okay if the rule face lies a bit below the surface, but it must not stand above it.

4 Drill holes in the rule groove for the three magnets that will hold the rule in place. (We used strong rare-earth magnets, ½" in diameter, purchased from a crafts-supply store.) Drill the holes to a depth equal to the magnets' thickness, setting the top of each magnet flush with the bottom surface of the groove.

5 Glue the three magnets into their holes. Use epoxy or cyanoacrylate adhesive, not woodworker's glue.

6 Glue the maple guide into the slot in the body bottom. After the glue dries, sand the sides of the guide to make it a sliding fit in the groove in the body top. The two body parts should slide face to face. If the guide holds them apart, sand its edge down a bit.

7 Drill a ¼" hole through the body bottom where shown. Countersink the hole on the bottom surface.

8 Form the slot in the body top for the clamp screw. To locate the slot accurately, slide both body parts together, flush at both ends. Place the body on your drill-press table, the body bottom facing up. Then, with a ¼" bit chucked in your drill press, guide through the hole in the bottom to drill through the body top.

The body bottom serves as a template for locating the holes that mark the ends of the clamp-screw slot in the body top.

Next, slide the body bottom 4" along the body top, as shown *opposite page, bottom*. Drill through the body top as you did before. Enlarge the holes through the top to 5/16". Connect the holes with pencil lines; then scrollsaw the slot. Sand or file the inside edge smooth, if necessary.

Dress up the gauge with bright brass fittings

1 Cut four 1/16×1/2×2 7/8" pieces of brass stock for the end plates.

2 Drill and countersink two 9/64" holes in each piece, 5/8" from each end. Center them on the width of the brass.

3 Drill screw holes for #6×3/4" screws in the body top and bottom, using the brass pieces as templates. Drill a 9/64" shank hole 1/4" deep into the body; then drill to 3/4" deep with a 3/32" bit.

To drill the holes, clamp the brass pieces to the ends of the body parts. Use rubber clamp pads or put several layers of masking tape on the brass to protect it.

Then, center the screw holes in the shank holes through the brass. A Vix centering bit, shown beside the body bottom *below*, will help you center the holes accurately.

4 Attach the brass plates to the ends of the body halves with screws. For best appearance, align the screw-head slots. File the screw heads flush with the brass end pieces, if necessary.

Attach the brass ends to the body bottom before filing the notches for the steel rule. We used the countersink, foreground, on the brass ends. The centering bit, lying beside the body, automatically centers the pilot holes inside the countersunk holes.

5 File the edges of the brass end pieces flush with the body parts, and file the rule groove in the brass pieces on the body bottom. (We used a flat file, as shown *below left*.)

6 In the same way, file a slot for the maple guide in the brass piece on one end of the body top. To determine which end, place the body top on your bench, the guide groove facing up and lying to the right of the slot for the clamp screw. File the slot in the end that's facing you.

7 Polish the brass to remove file marks and restore its luster. (We sanded with 320-, 600-, 1800-, and 3600-grit abrasives to remove the marks, then shined it up with metal polish.)

8 Finish-sand the body top and bottom, taking care not to sand the maple guide excessively. Apply a clear finish. (We finished our gauge with Danish oil, then waxed and buffed it after the finish dried.)

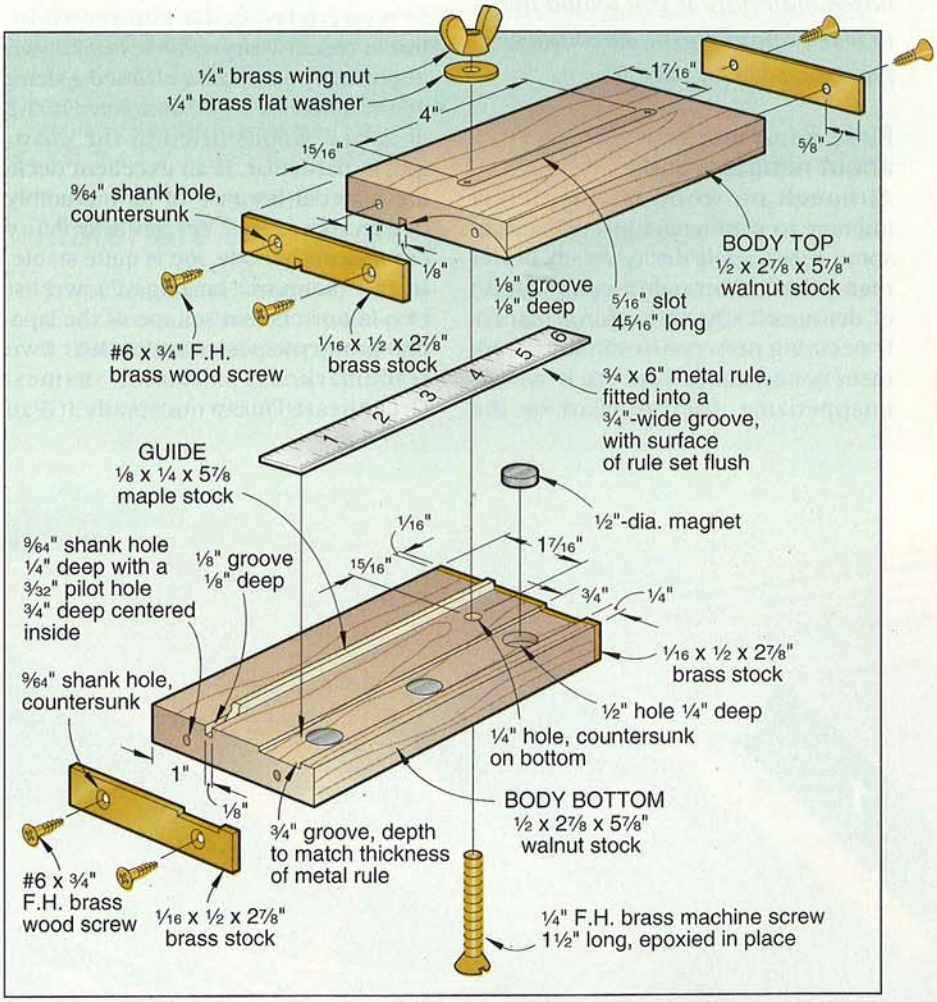
9 Lay the rule in its groove, and put the two body parts together. Insert a 1/4×1 1/2" flathead brass machine screw from the bottom, and epoxy-glue the head into the countersink. Install a brass washer and wing nut.

Buying Guide

Rule and brass. Stainless steel 6" rule with engraved *WOOD* magazine logo, brass stock, brass hardware, and magnets for one marking gauge, kit no. 300MG, $19.95 ppd. in U.S. Schlabaugh and Sons Woodworking, 720 14th St., Kalona, IA 52247. Call 800/346-9663 to order.

Countersink. This 82° countersink makes clean cuts in metal or wood, with a 1/8"-1 1/32" cutting range and a 1/4" shank. Item no. 400905, $8.95. Address and telephone above.

Project Design: James R. Downing
Illustration: Roxanne LeMoine; Lorna Johnson
Photographs: Hetherington Photography



WOOD® magazine's guide to

building exterior projects that last

Mother Nature can be brutal. Put a beautifully crafted woodworking project before her, and she'll do her best to return that wood to the earth. The good news is that she doesn't have to be successful. By using the strategies in this two-part series, you can keep your exterior projects looking great with a minimum of maintenance.

Print this article

avoid wood-rotting woes with woods that don't quickly decompose

Your first decision in building any exterior project is the choice of material. Here, we look at wood-based materials. If you would like to learn about plastic substitutes, see the article on page *96.*

First, a few words about natural woods

Although no wood is completely immune to rotting and insect damage, some resist such decay much better than others. Through a combination of dense cell structure and/or naturally occuring preservatives in the wood, insects and fungi find such woods unappetizing. See the chart on the *next page* for more information about some of your lumber choices.

You're probably familiar with some of the commonly used species, such as western-red cedar and redwood. But in recent years some lesser-known imported species have claimed a share of the exterior-wood market. Of the imported woods listed in the chart, ipe, in particular, is an excellent decking material because of its incredibly dense structure. Yet, unlike many other dense woods, ipe is quite stable. In the "sources" on *page* 71 we list two importers that sell ipe of the lapacho group of species under their own trademarked brand names. Greenheart Durawoods calls it Pau Lope, and Timber Holdings Ltd. calls it Iron Woods.

Lapacho-group ipe is expensive (see the chart on *page* 68), but it has few defects, ¾"-thick deck boards are so rigid they can be supported 24" on center, and suppliers claim it will outlast cedar and redwood 5 to 1.

For greater rot resistance try pressure-treated wood

Any wood placed in contact with the ground or another source of continual moisture will rot. At these times you need to use a pressure-treated (PT) softwood (typically southern pine).

To make this material, producers force a water-based preservative—most commonly chromated copper arsenate (CCA)—deep into the wood under high pressure.

Before you buy PT lumber, make sure the wood has a retention rating that matches or exceeds your use.

PART 1

Selecting the right building materials and fasteners.

Stay tuned for part 2 in the next issue where we cover glues, finishes, and our best construction tips.

Wood treated for above-ground use will have .25 pound of preservative per cubic foot of wood fiber. Wood intended for ground contact or high-moisture areas will have a retention rating of .40 pounds. Lumber treated to .60 pounds finds use in such applications as wood foundations, pole-barn poles, and guard rails.

PT lumber has become quite popular because of its high degree of decay resistance, strength, and economical price. But it does have some drawbacks you should know about.

Because of its green color (you can buy brown-stained PT products for slightly higher cost) and its propensity for checking and warping, we use PT lumber in places where it can't be seen. Examples: inside planter boxes and in the understructure of decks.

Most producers ship PT wood immediately after treatment, so the wood is typically quite water-soaked when

Continued

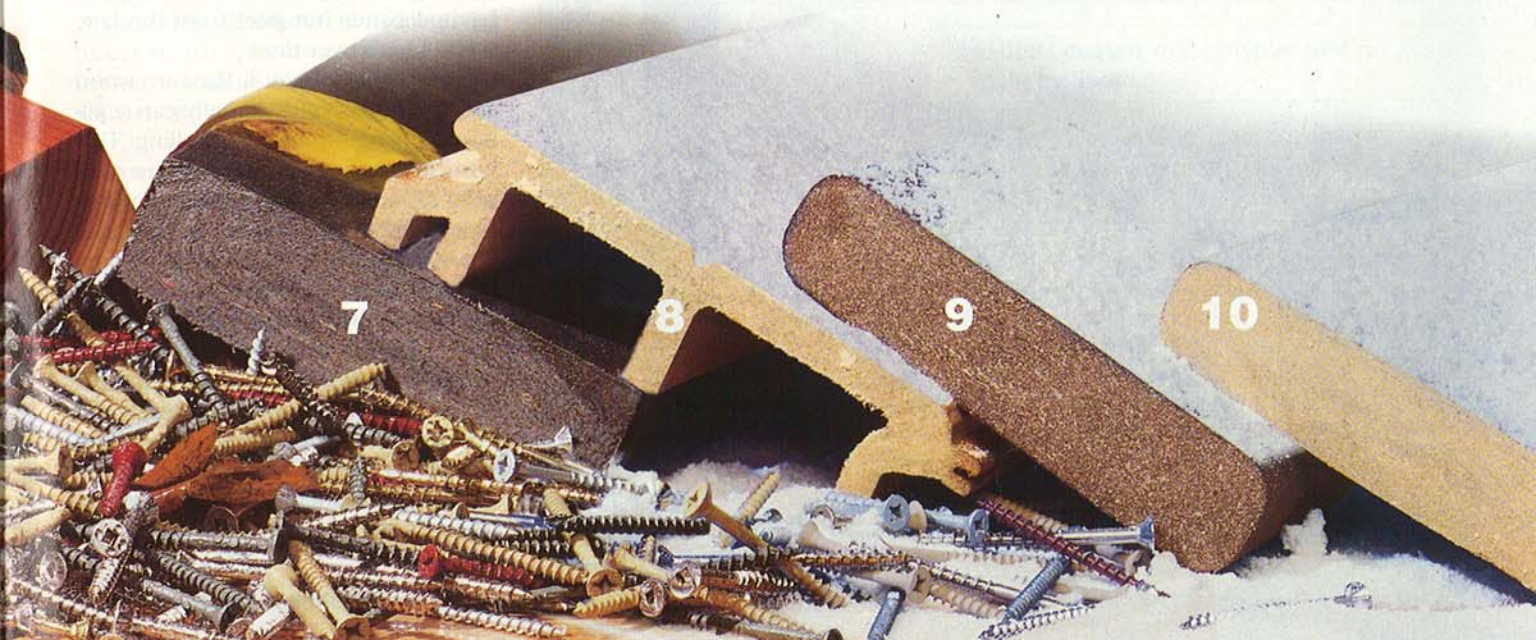
Some woods that hold up to the elements

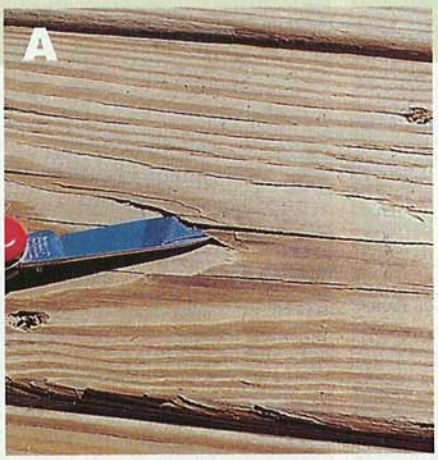
Exceptionally Decay-Resistant Domestic Woods	black locust, red mulberry, Pacific yew, osage orange
Decay-Resistant Domestic Woods	Arizona cypress; bald cypress (old growth); black cherry; black walnut; catalpa, cedars*; chestnut; junipers; mesquite; redwood; sassafras; various oaks, including bur, chestnut gambel, Oregon white, post, and white
Exceptionally Decay-Resistant Imported Woods	greenheart, Honduras mahogany, ipe**, jarrah, lignum vitae, spanish cedar, teak

*Old-growth wood is more decay-resistant than wood from younger trees.
**There are many species of ipe. Make sure you buy ipe of the lapacho group of species.

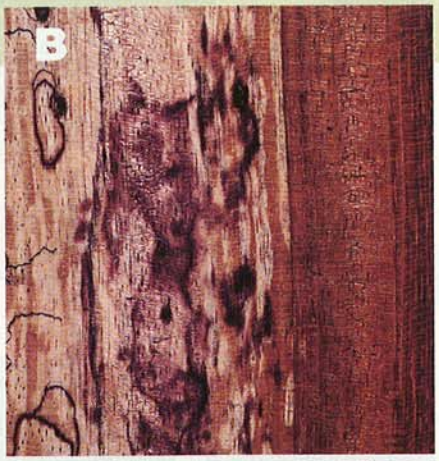
Materials that weather all seasons

1. Ipe (a tropical hardwood)
2. 2× pressure-treated pine
3. 5/4 pressure-treated pine
4. 2× western red cedar
5. 5/4 western red cedar
6. 2× redwood
7. 2× Trex (weathered to grey)
8. TimberTech
9. 5/4 Trex (weathered to grey)
10. 5/4 Trex (brown)

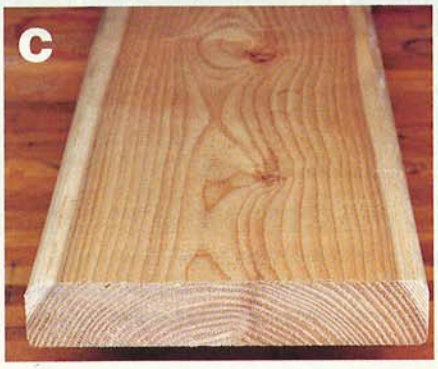




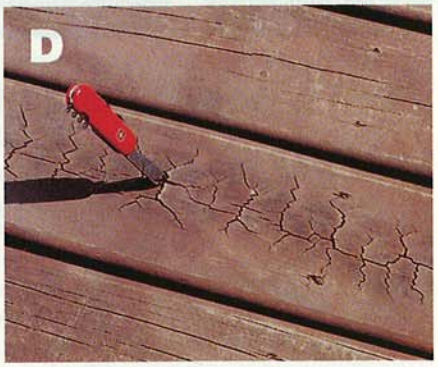
A. Shelling—the separation of earlywood and latewood bands—occurs most often on the pith side of flatsawn lumber.



B. The sapwood of this Honduras mahogany was attacked by fungi and insects. Its heartwood is unscathed.



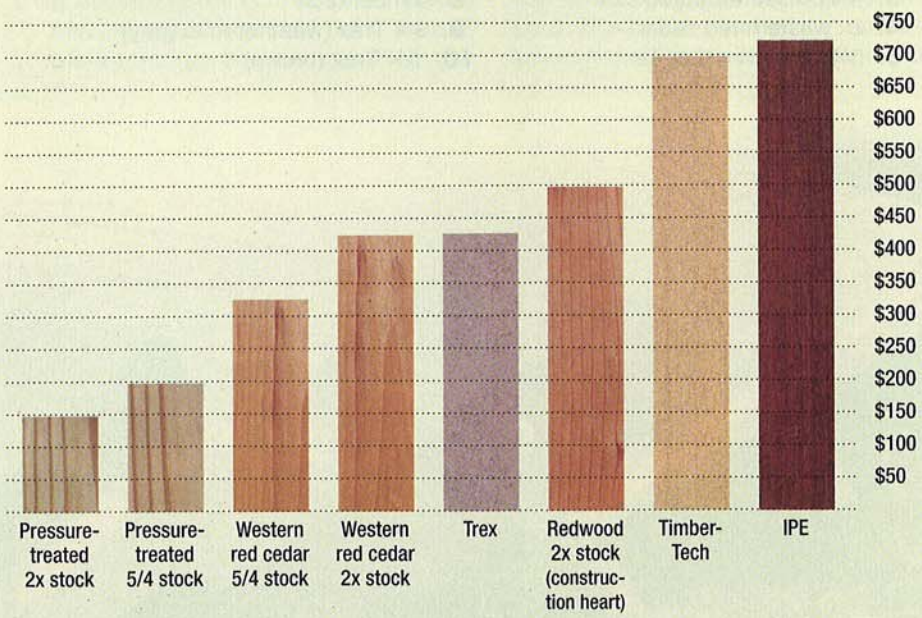
C. A common sight at lumber outlets: a cedar board with sapwood on two edges and one face.



D. Juvenile wood (the innermost rings of a tree) is prone to warping, checking, and splitting.

What you'll spend for various deck materials

(Approximate cost for decking boards only for a 12x12' area)



Note: Prices shown are approximate and based on quotes by local suppliers. Your costs will vary by distributor and quality of materials.

you buy it. That means it will shrink, sometimes substantially, after you bring it home. When building a deck, it is usually best to cut and install the wood while it is wet because of the difficulty of cutting and screwing into dried PT wood. If you do this, just butt the deck boards edge to edge—they will shrink to form gaps in a week or two of dry weather.

The amount of shrinkage can be somewhat unpredictable, however, so allow PT wood to dry for several weeks if you don't want to guess at what its final width will be. Just be prepared to pre-drill your screw holes. Also, PT stock needs to be dry before it will accept a finish well.

Most importantly, always remember to wear gloves (waterproof ones are best) when handling PT stock. When sawing it, wear a dust mask and eye protection. Wash your hands after handling treated wood, and never burn it—the ashes contain poisons and are considered a hazardous waste.

More stock-selection tips for outdoor applications

■ **Although vertical-grained stock can be hard to find,** it will hold up to the effects of weathering better than flat-grained (flatsawn) lumber. That's because it's less likely to warp, and expands and contracts less with changing moisture content.

Also, boards or plywood with wide, flat-grain bands are more susceptible to finish failure. Paint or other film-forming finishes often stick to the earlywood bands but peel from the latewood bands over time.

As shown in *Photo A,* the earlywood and latewood bands actually can separate, a process known as shelling. This is more likely to occur on the pith side, rather than the bark side, of flatsawn lumber.

■ **Even if you like to use every square inch of your lumber,** resist the temptation to use sapwood in exterior applications. Regardless of species, sapwood has virtually no resistance to rot or insects, as shown in *Photo B.* Much of the western red cedar commonly found in lumber outlets has some sapwood—typically

exposed on the edges and one face, as shown in *Photo C.*

***Note:** This rule about sapwood is reversed for PT lumber. Because the preservatives are accepted only by sapwood, the heartwood areas of PT lumber are not decay resistant. Fortunately, most of a southern pine tree is sapwood. Nevertheless, treaters use the whole log, so when shopping for PT lumber, keep an eye out for the heartwood—it's typically tan or pink instead of green.*

■ **Avoid using juvenile wood, the 10-or-so innermost rings.** It's highly susceptible to warping and various forms of degradation, such as checking and splitting as shown in *Photo D.* These defects not only look bad, they provide easy entry into the wood for water, insects, and fungi.

■ **If your project calls for using sheet goods,** be sure to buy an exterior-grade product. Plywood intended for outdoor use is bonded with waterproof glue, so its layers won't delaminate in the presence of moisture. You still will need to apply paint or another finish to protect the sheet from rotting and sun damage. And you can extend its life greatly by sealing its edges with a flexible finish, such as latex paint over a water-repellent preservative. For plywood that will contact soil, such as in a planter box, go with pressure-treated plywood.

Although pricey and hard to find locally, you also can buy marine plywoods that distinguish themselves because they have no voids. One source is Rugby Building Products of Elkhart, Ind. (800/348-7628).

■ **Low-density woods (softwoods, such as cedar and redwood)** have less tendency to warp, check, and change dimensions than high-density domestic woods, such as white oak and southern pine. So low-density woods work better with film-forming finishes, such as paint, because the film is less likely to crack or peel from wood movement. (As noted earlier, some incredibly dense tropical species are quite stable and do not follow this general rule.)

drive screws **that hold but don't corrode**

Lots of screws are labeled appropriate for exterior applications, but it's been our experience that only a few types hold up to the elements.

Among your most-common options are stainless steel (which comes in different grades), silicon bronze, and steel with one of several available coatings. Here, we take a look at each. Although aluminum and brass resist corrosion, we're not including them here because they're too soft for most applications. Also, aluminum will corrode quickly in contact with the chemicals in treated lumber.

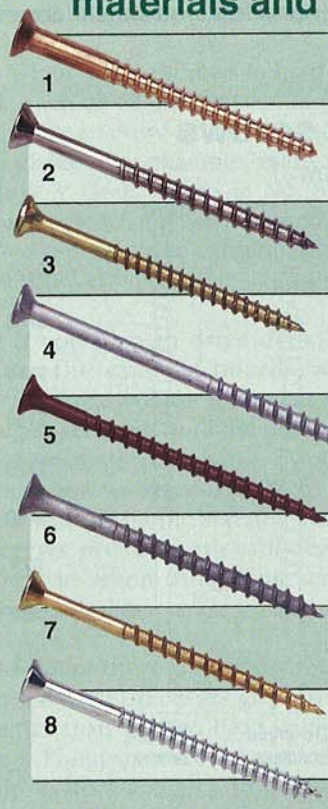
■ **Stainless steel.** Screws made of this material may cost twice as much as coated steel fasteners. But stainless steel is well worth it if you don't want to see any rust or stain marks on your project. Whenever you put considerable time or expensive lumber into a clear-finished project, it just doesn't make sense to use anything but stainless steel.

Most widely available stainless steel fasteners are either 304 or 305 grade. Both are appropriate for general use, although 305-grade fasteners have slightly greater corrosion resistance. For maximum corrosion resistance in extreme environments, say one where salt spray is common, spend the extra money for 316-grade stainless.

■ **Silicon bronze.** This material is the standard in marine fasteners because it resists corrosion and doesn't promote rot in the wood around the fas-

Continued

Some of your options in screw materials and coatings



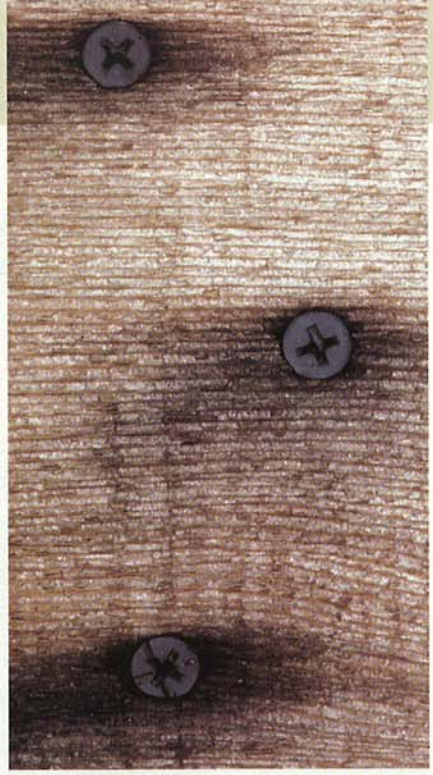
1. Silicon bronze
2. Stainless steel
3. Steel coated with two layers of zinc and two clear coats from GRK Canada
4. Steel coated with polymer and resin by Faspac
5. Steel coated with zinc, chromate coversion coating, and polymer by Elco Textron
6. Steel with mechanically galvanized coating from McFeely's
7. Steel with yellow-zinc coating
8. Steel with electro-plated clear zinc coating

tener. It costs about twice as much as 304-grade stainless steel, so reserve screws made of this material for boat building activities.

■ **Coated steel fasteners.** Because of the many available coatings, and different processes for applying them, this category can be confusing to say the least. Most local hardware outlets still sell the galvanized fastener as their basic exterior-grade fastener. Generally speaking, the thicker the galvanized coating (consisting mostly of zinc) the more durable it will be. You'll find the thickest zinc coatings on hot-dipped nails, but you may have a hard time finding hot-dipped galvanized screws. That's because the thick, globby coating tends to clog the threads and driving recess of the screw, making it hard to drive.

Commonly available galvanized screws are either mechanically galvanized or electro-galvanized. You can quickly tell these two types apart because mechanically galvanized screws have a dull gray surface and electro-galvanized screws have a shiny silver-color surface. We do not recommend electro-galvanized screws (also called clear-zinc coated) for exterior applications. They will corrode quickly in contact with the elements.

Mechanically galvanized screws are generally suitable for decks and other projects made of pressure-treated lumber. Nevertheless, you should not use them with PT lumber in contact with the soil, in high-moisture areas, or in areas with salt content in the air. Also, keep in mind that mechanically applied zinc contains some iron that is susceptible to attack from the tannic acids that naturally occur in redwood and cedar. The acids combine with the iron to form a dark stain around the fastener head.



Iron stains like these occur when wood contacts unprotected iron. You can remove it with oxalic acid.

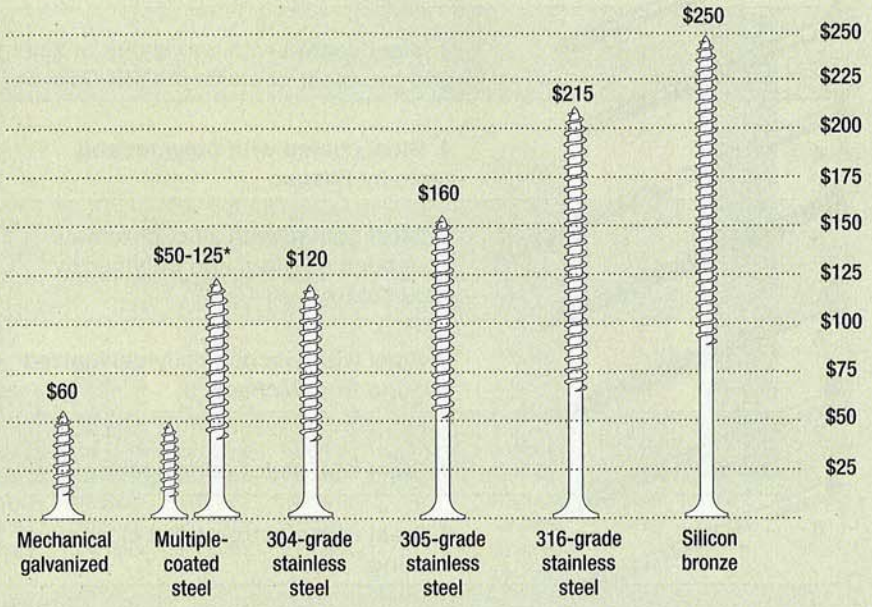
Fasteners open up wood cells that release staining extractives when water soaks the wood.

As you can see in the photos on the *previous page*, manufacturers have improved the basic electro-galvanized fastener by adding a polymer coating (often pigmented) on top of the galvanized coating. Elco Textron's Stalgard coating includes a chromate conversion coating between the electroplated zinc base and the polymer topcoat. Fastap screws by Faspac have several coats of polymer and resin. R4 screws from GRK Canada have two clear proprietary coatings on top of white zinc and yellow zinc coatings. R4 screws look like yellow-zinc screws (see next section), but the manufacturer claims R4 screws outperform yellow-zinc-only screws by a wide margin.

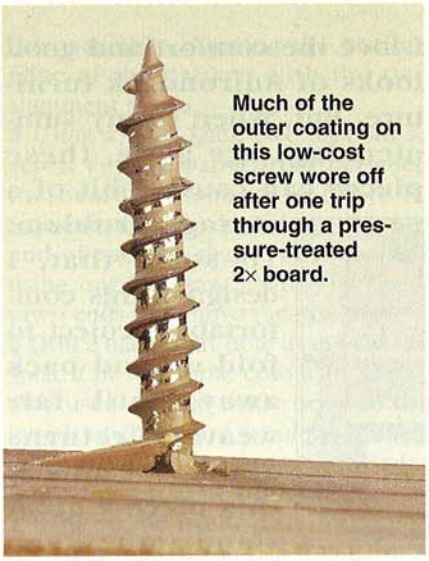
These multiple-coated screws have several advantages. First, some of the coated screws come in colors that help the fastener blend with natural and pressure-treated wood tones. Also, the additional coatings increase

Cost comparison of exterior screws

(Approximate cost for 1,000 #10 x 3" screws)



* Price of multiple-coated steel screws varies tremendously depending on quality and distribution.



Much of the outer coating on this low-cost screw wore off after one trip through a pressure-treated 2× board.

corrosion resistance. For example, the outer coatings resist tannic acids, making them suitable for use with cedar and redwood. These coatings also help prevent iron stain (if the coating remains intact). This type of stain (see photo *opposite page, left*) should not be confused with extractive bleed (see photo *opposite page, right*). The latter condition can occur with any fastener.

Nevertheless, any coating has the potential to wear through and expose the underlying steel to corrosion. This wear typically happens when you drive the fastener. As shown *above*, some low-cost coated screws lose part of the coating covering their threads after one drive through 2× PT lumber.

All of the fasteners we tried showed some wear in the coating covering the driving recess. If you are less than careful and leave the head of the screw slightly above the surface, foot traffic will abrade the coating, too.

Our advice: Buy a few sample screws and test-drive them in the material you intend to use. Also, ask the manufacturer about how well the screw holds up in a salt-spray test; disregard any fastener not rated for at least 1,000 hours.

■ **Yellow-zinc coated steel.** Although fasteners with this electro-plated coating are sometimes labeled as being corrosion resistant, they are not appropriate for exterior applications.

These three tips help prevent splits on board ends that aren't predrilled.

Screws with star- and square-drive recesses resist stripping better than Phillips-drive recesses, and greatly outperform screws with combination Phillips/square-drive recesses.

More fastener-selection recommendations

■ Use screws, not nails, to join your outdoor projects. The additional gripping strength provided by their threads better resists the inevitable and considerable wood movement caused by outdoor exposure.

■ When driving screws in hard materials such as PT lumber or hardwoods, opt for a screw in the largest gauge available. For example, many outlets carry 3" deck screws in No. 8 gauge, but you'll have fewer snapped screws if you spend a few extra bucks for No. 10 screws.

■ If you plan to drive deck screws near the ends of boards without predrilling, look for a fastener with an auger, serrated, or fluted point such as the ones shown *above*. In our tests these screws were less likely to split the wood. And the serrated and fluted screws proved noticeably easier to drive in when using long screws in hard materials.

■ Square-drive and star-drive (also called Torx) recesses grip driver bits better than Phillips head or combination Phillips/square recesses do. (See photo *above right*.) In our tests we found it difficult to strip out a square or star-drive recess or do serious damage to their coatings. Phillips recesses strip out occasionally, and combination recesses, although handy, strip out excessively.

Written by Bill Krier
Photographs: Marty Baldwin, John Hetherington, Forest Products Society

SOURCES

Quality square-drive exterior screws:
- McFeely's
  800/443-7937
- Faspac
  800/847-4714
  www.fastapscrews.com

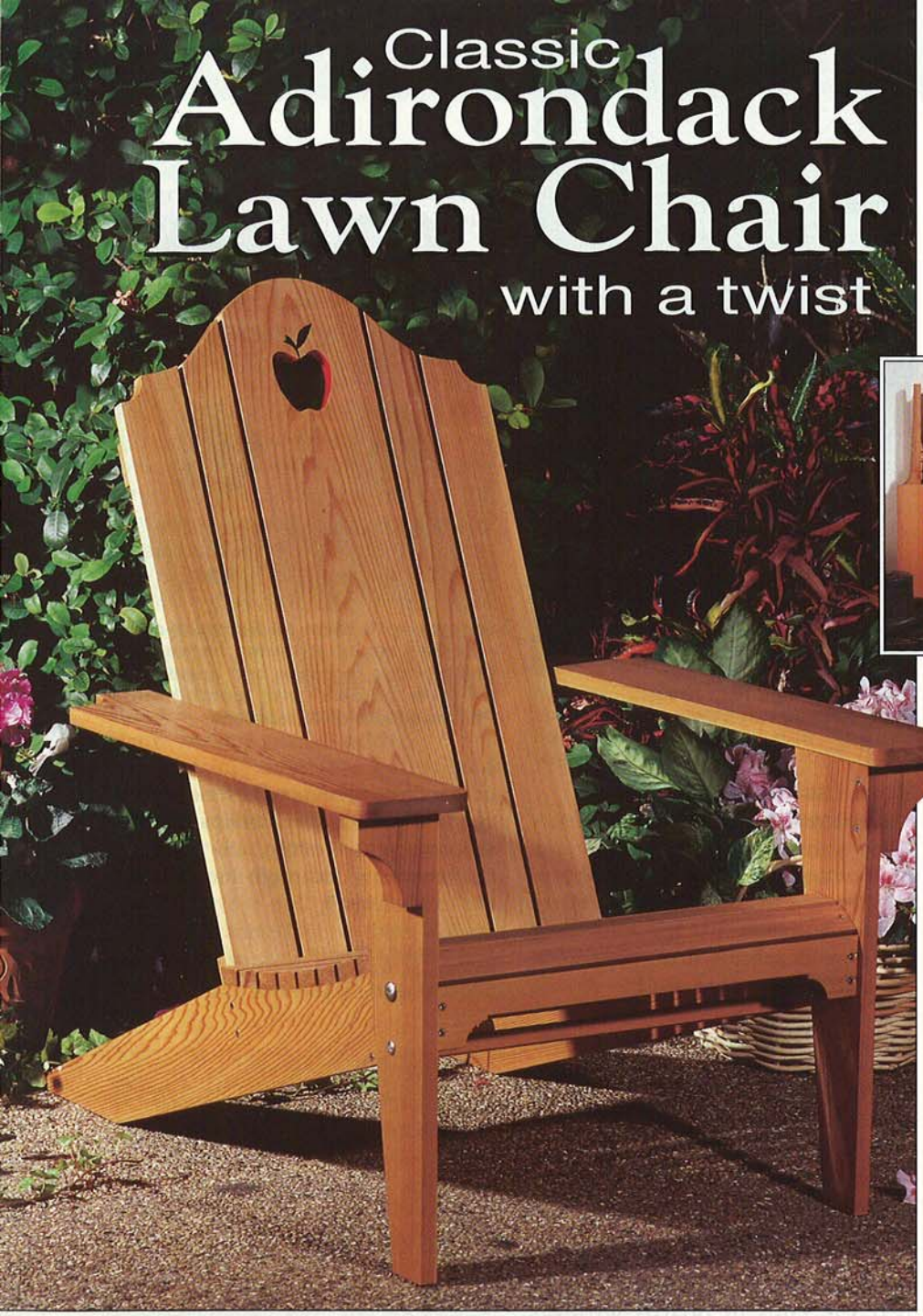
Quality star-drive exterior screws:
- GRK Canada
  800/263-0463
  www.grk-canada.com

Tropical hardwood decking:
- Greenheart Durawoods
  800/783-7220
- Timber Holdings Ltd.
  414/445-8989
  www.ironwoods.com

Detailed books on the use of wood products in exterior applications:
- Forest Products Society
  800/354-7176

Classic Adirondack Lawn Chair with a twist

Foot note: See Talking Back issue 118, page 8, for collapsible adjustment. Click here to view



I love the comfort and good looks of Adirondack furniture. But, when sunny summer days are gone, these pieces can cause a bit of a storage problem. To solve that, I designed this comfortable project to fold up and pack away until fair weather returns again. Not only is this piece a great stand-alone item, but it matches the many other pieces we've done in this design theme over the years.

James R. Downing
Design Editor

Want to build a matched set?

The collapsible Adirondack chair *above* matches the glider from the June 1995 issue of *WOOD*® magazine, the patio table and benches featured in the June 1996 issue, and the chair from the April 1998 issue. If you don't have the plans for these projects, see the box on page 77 for ordering the *WOOD PLANS*® for these projects. Also, take a look in the June 1998 issue of *WOOD* magazine for the matching side table, planter, and birdbath.

Okay furniture builders, let's start with the backrest

1 To form the backrest splats (A, B, C) cut the pieces to the sizes listed in the Bill of Materials plus ½" in length. (We cut ours from ¾" western red cedar.)

2 Cut eight spacers measuring ¼×1×1½" each.

3 On a flat surface, lay out the backrest splats (A–C), as shown on the Backrest drawing and on *Photo A*. Keeping the bottom ends of the splats flush, clamp the spacers between the boards as shown.

4 Measure up from the bottom 24¾", and lightly mark alignment lines on each side of the backrest assembly. (We placed masking tape on our backrest and made the marks on the tape. Cedar is soft, and pencil lines can be hard to erase when made across the grain.) Using spray adhesive, adhere the full-size pattern from the *WOOD PATTERNS*® insert in the center of the magazine to the top of

the assembly, aligning the bottom edge of the pattern with the two alignment marks.

5 Using a craft knife (we used an X-acto), cut the paper from between the boards, as shown in *Photo A*. Separate the boards and cut the top end of each to shape. (We did this using our bandsaw.) Sand the bandsawn ends to remove the saw marks.

6 Drill a blade-start hole in the middle splat. Cut the apple cutout to shape. (We used a spiral blade because the length of the board would not allow us to completely rotate the splat under the scrollsaw arm.)

7 Remove the paper pattern from all the splat tops. If the paper is hard to remove, try a splash of lacquer thinner to weaken the bond.

8 Paint the apple cutout now. To do this, brush the surfaces around and inside of the apple cutout with lacquer. The lacquer minimizes wicking of the paint to the surrounding wood. After the paint has dried, use a palm sander to sand the lacquer off the surrounding surfaces.

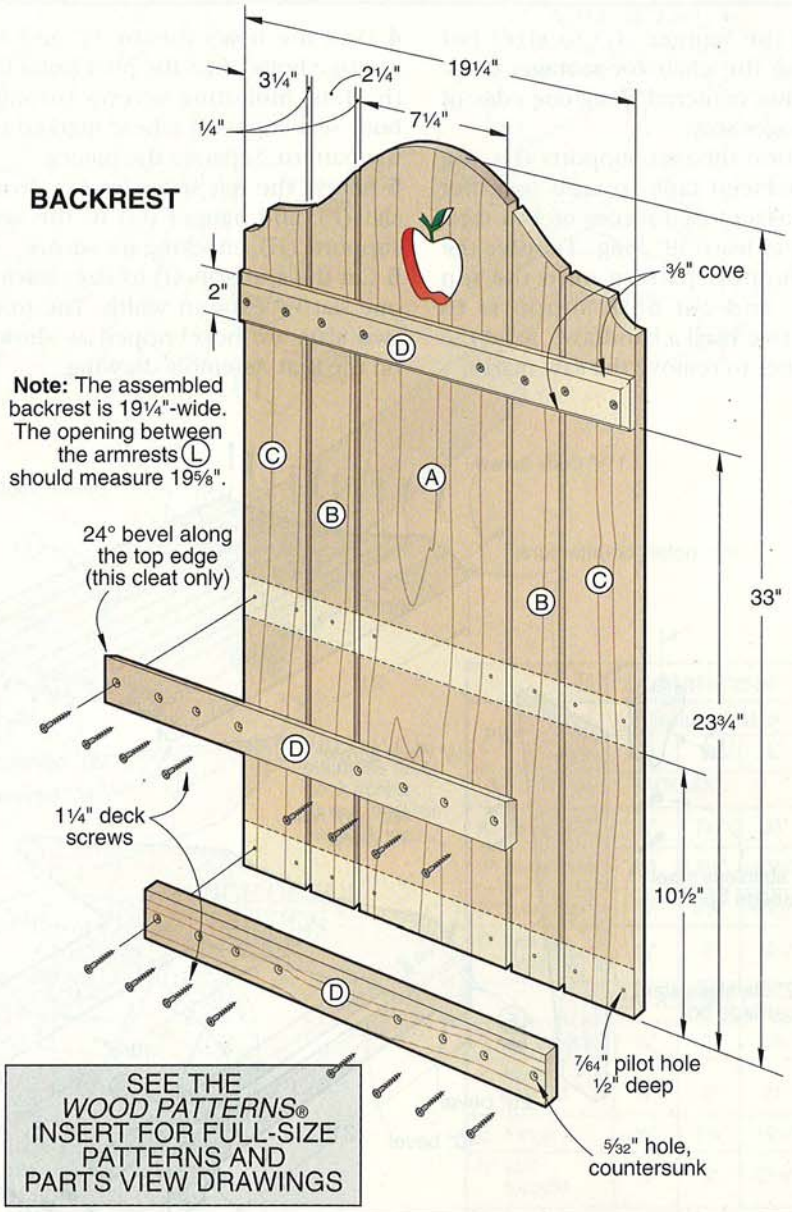
9 Cut the backrest cleats (D) to size, bevel-ripping the top edge of what will be the middle cleat at 24° where shown on the Backrest drawing. Rout a ⅜" cove along the outside face of what will be the top cleat.

10 Lay the splats (A–C) *face down* on your workbench, with the bottom ends flush and a ¼" spacer between each splat as done before. Using the Backrest drawing as reference, drill the mounting holes, and glue and screw the cleats (D) to the splats. Use stainless steel screws and polyurethane glue if available.

The seat assembly comes next–it's easy to build

1 Cut the leg spreader (E) and front slat (F) to size, bevel-ripping the top edge of the leg spreader at 20° where shown on the Exploded View and Parts View drawings. See the pattern insert in the center of the magazine for the Parts View drawing. Then, bevel-rip the bottom edge of the front slat at 20° and the top edge at 40°. Transfer the pattern and cut the bottom of the front slat to shape.

Continued



Clamp the backrest splats and spacers together, adhere the pattern, and cut the paper pattern from between the boards.

Adirondack Lawn Chair

2 Cut the hanger (G) to size. For hanging the chair for storage, cut a ½" radius, centered along one edge of the hanger strip.

3 To form the seat supports (H), use double-faced tape to tape together (face-to-face) two pieces of 1×6 measuring at least 38" long. Transfer the Seat Support pattern onto the top piece, and cut both supports to shape (we used a bandsaw). Sand the cut edges to remove the saw marks.

4 Drill the holes for the ¼" and ⅜" carriage bolts, then the pilot holes for the four mounting screws through both seat supports where marked on the pattern. Separate the pieces.

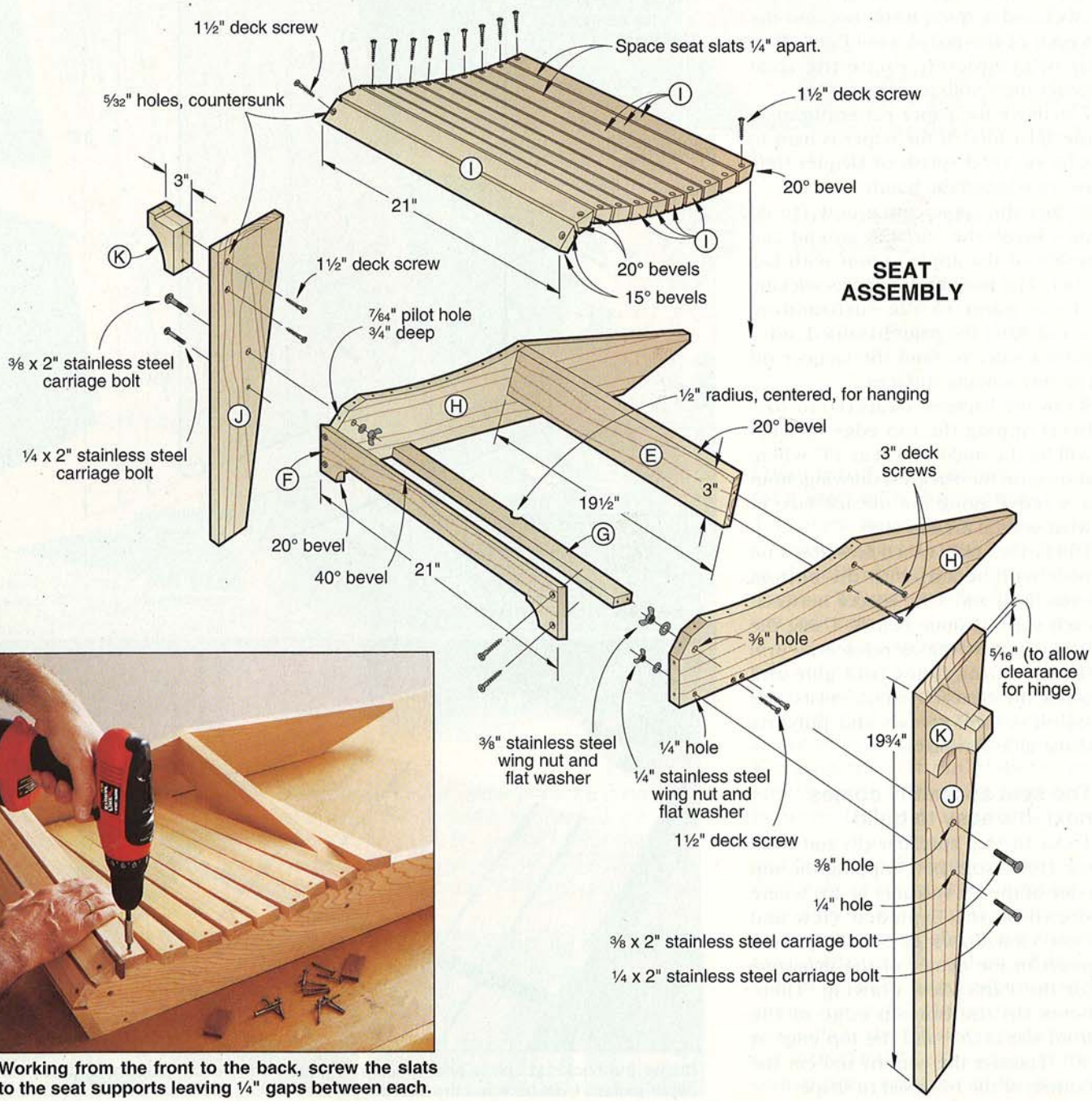
5 Screw the leg spreader (E), front slat (F), and hanger (G) to the seat supports (H), checking for square.

6 Cut the seat slats (I) to size, leaving one slat ½" extra in width. The front two slats are bevel-ripped as shown on the Seat Assembly drawing.

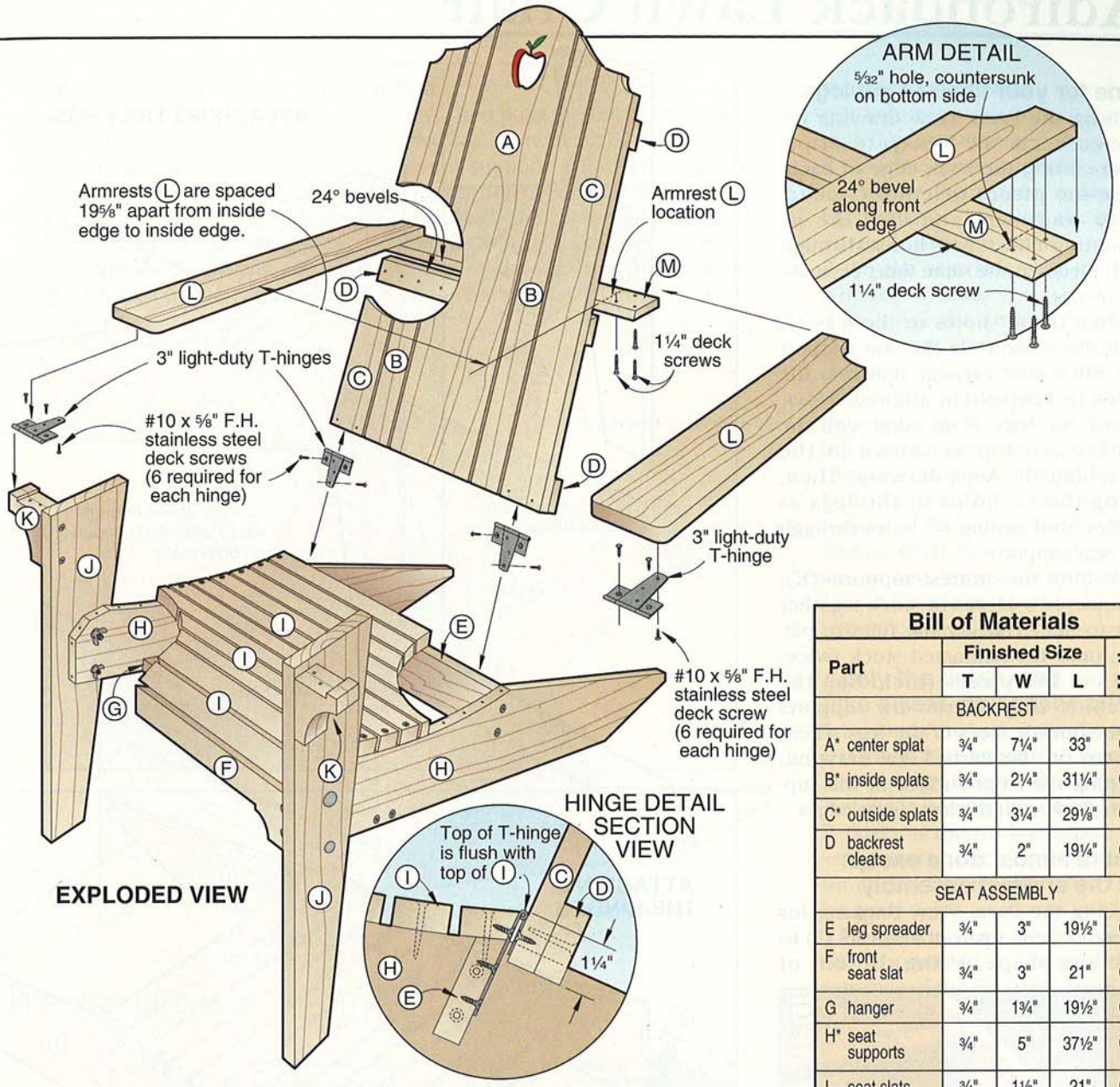
7 Drill a countersunk screw hole centered and ⅜" in from the end of each slat. Working from the front to the rear of the seat assembly, screw the slats to the seat supports as shown in *Photo B*. Use spacers to leave ¼" gaps between the slats where shown on the Parts View drawing.

8 Saving the extra-wide slat for last, bevel-rip its back edge so the beveled edge is flush with the back of the leg spreader (E).

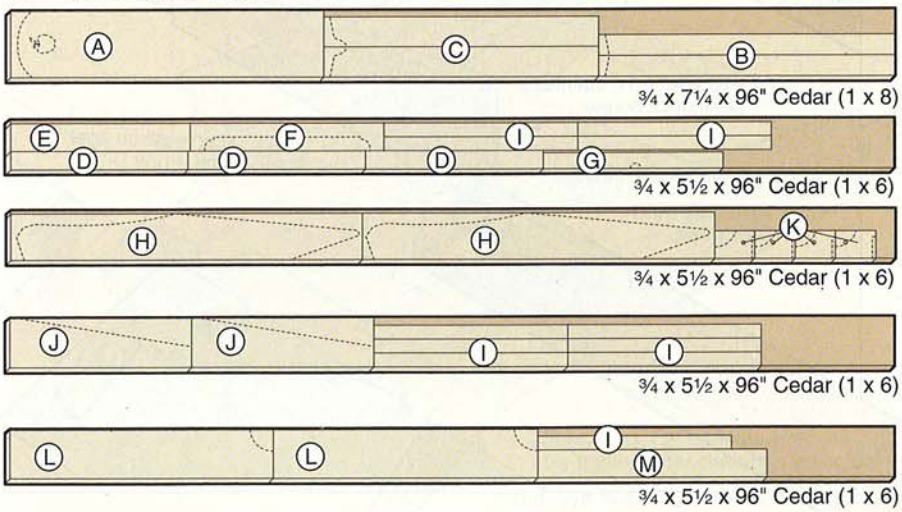
Continued



Working from the front to the back, screw the slats to the seat supports leaving ¼" gaps between each.



CUTTING DIAGRAM



Bill of Materials

Part	Finished Size T	W	L	Matl.	Qty.
BACKREST					
A* center splat	¾"	7¼"	33"	C	1
B* inside splats	¾"	2¼"	31¼"	C	2
C* outside splats	¾"	3¼"	29⅛"	C	2
D backrest cleats	¾"	2"	19¼"	C	3
SEAT ASSEMBLY					
E leg spreader	¾"	3"	19½"	C	1
F front seat slat	¾"	3"	21"	C	1
G hanger	¾"	1¾"	19½"	C	1
H* seat supports	¾"	5"	37½"	C	2
I seat slats	¾"	1½"	21"	C	11
J legs	¾"	5½"	19¾"	C	2
ARMRESTS					
K* armrest supports	1½"	3"	4"	LC	2
L armrests	¾"	5¼"	28⅝"	C	2
M armrest connector	¾"	3	24⅞"	C	1

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

Materials Key: C–cedar, LC–laminated cedar.

Supplies: 2–⅜x2" carriage bolts with flat washers and wing nuts, 2–¼x2" carriage bolts with flat washers and wing nuts, 1¼" deck screws, 1½" deck screws, 3" deck screws, (we used stainless steel screws); two pair of 3" light-duty T-hinges with mounting screws, red and green enamel paint (for apple cutout), exterior finish.

Adirondack Lawn Chair

Time for your chair to get legs

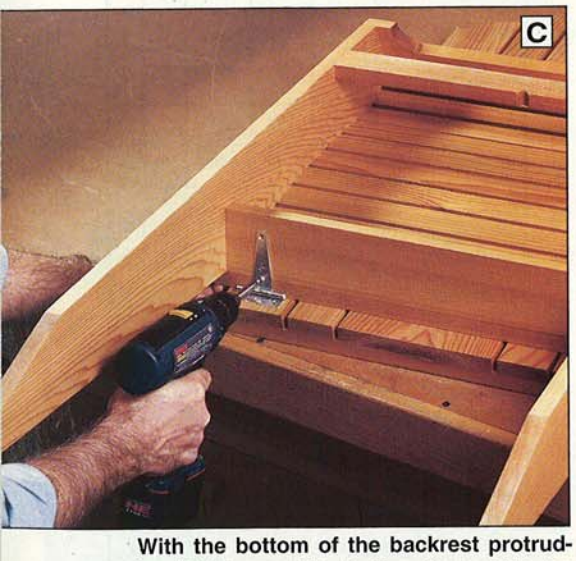
1 Using the Parts View drawing for reference, cut the legs (J) to shape, taper-cutting the back edge of each. Tape the pieces together (face-to-face), and mark and drill the ⅜" mounting and screw holes through both pieces at the same time. Separate the pieces.

2 Align the ⅜" holes in the legs (J) with the ⅜" holes in the seat support (H). Stick a ⅜" carriage bolt into the holes to keep them aligned. Now, square the legs' front edge with the workbench top as shown in the Attaching the Legs drawing. Then, using the ¼" holes in the legs as guides, drill mating ¼" holes through the seat supports.

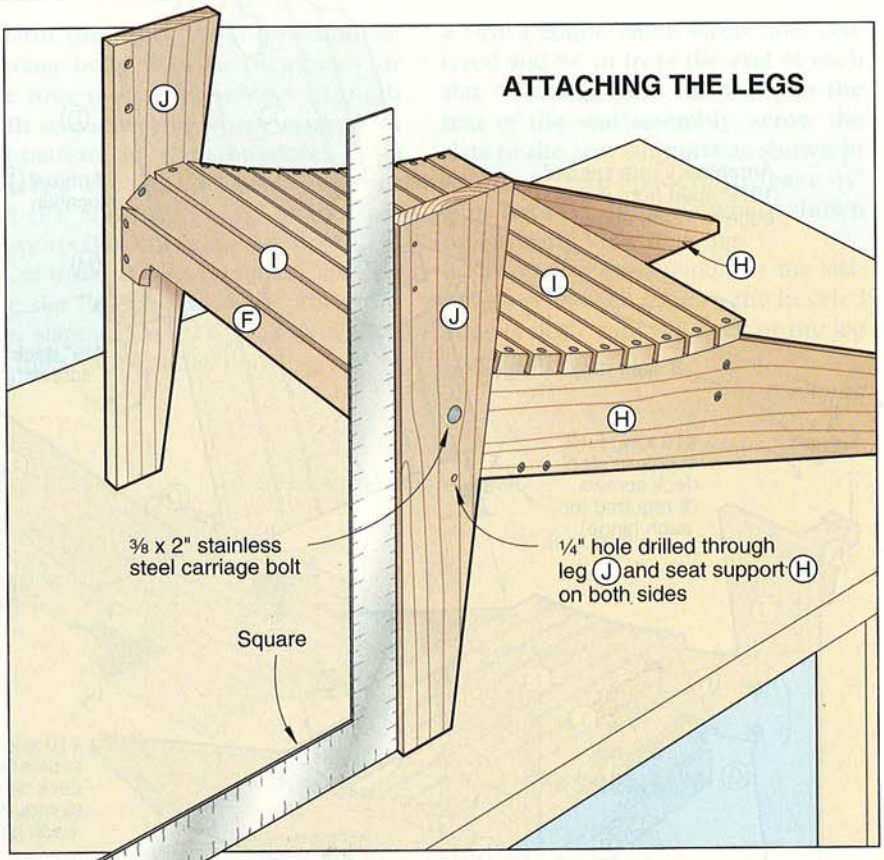
3 To form the armrest supports (K), laminate two pieces of stock together face-to-face. Transfer the full-size pattern onto the laminated stock twice, and cut the pieces (including the notch) to shape. Screw the supports to the outside faces of the legs where shown on the Parts View drawing, keeping the front surface of the supports flush with the legs' front edges.

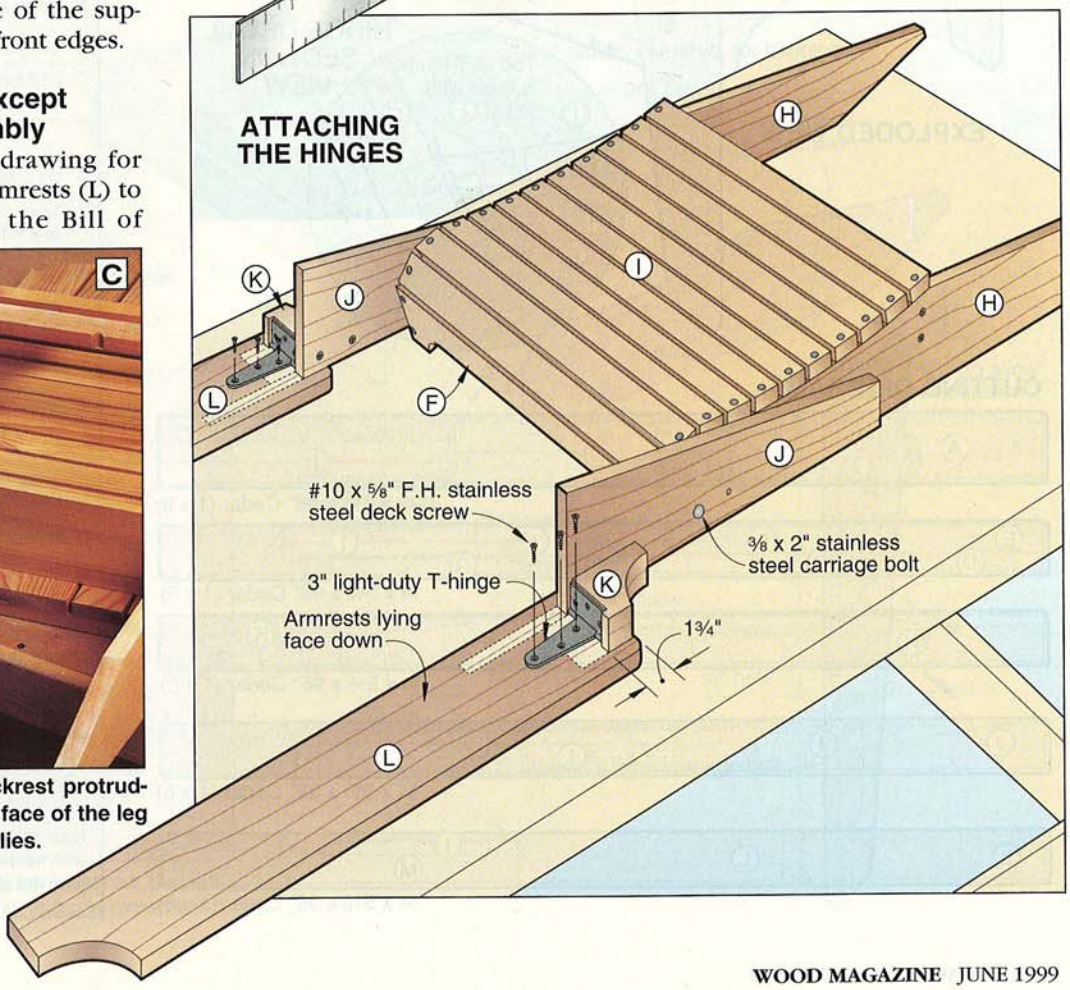
You're almost done except for the armrest assembly

1 Using the Parts View drawing for reference, cut a pair of armrests (L) to size and shape. Using the Bill of



With the bottom of the backrest protruding 1¼" beyond the bottom face of the leg spreader, hinge the assemblies.

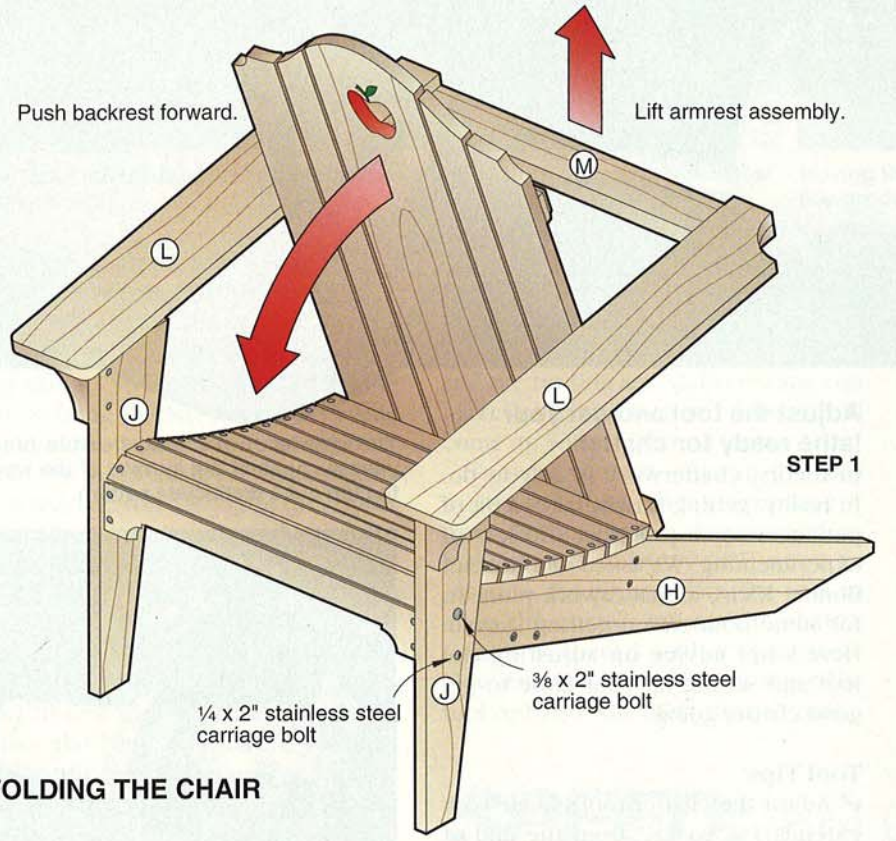




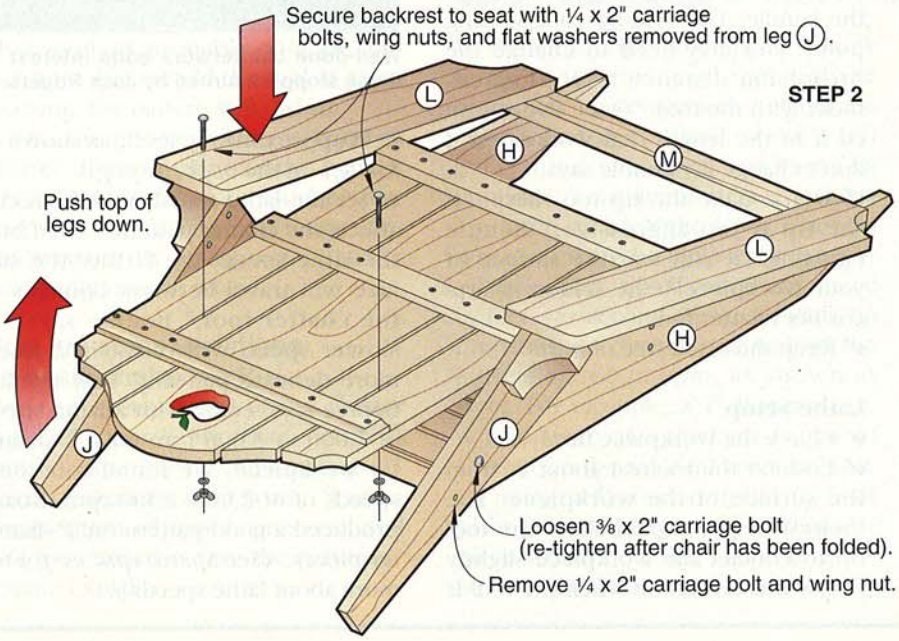
Collapsing the chair for storage

Lift up on the back of the armrest assembly, and push the backrest forward as shown in Step 1 of the drawing until the bsckrest rests on the seat slats.

Remove the ¼" bolts securing the seat supports (H) to the legs (J). Loosen, but don't remove, the wing nuts on the ⅜" bolts. Fold the legs back. Slide the ¼" bolts between the seat slats and backrest splats, and add the washers and wing nuts. Tighten the wing nuts on the ⅜" bolts. This setup will hold the assembly flat for storing, as shown in the photo on *page 36*. Pick up the chair and hang it on the hanger (G).



FOLDING THE CHAIR



Materials for reference, cut the armrest connector (M) to size, bevel-ripping the front edge at 24°.

2 Drill the mounting holes, and glue and screw the armrest connector to the armrests, keeping the armrests square to the connector.

3 Pin the seat assembly to the legs with the ⅜" bolts.

4 To hinge the armrest assembly to the armrest supports (K), position the armrest assembly *good face down* on a flat surface. Then, place the seat in its folded position between the armrests, as shown in the Attaching the Hinges drawing. Drill the pilot holes and screw the hinges to the armrest supports (K). Then, drill the pilot holes and screw the hinges to the armrests (L), 1¾" from the ends where shown on the drawing.

Apply the finish, and take a seat–you deserve it

1 Separate the seat from the armrest assembly. Finish-sand the pieces and add a quality exterior finish (we used Penofin, a penetrating oil finish).

2 Position the backrest, face up on your workbench, and screw the hinges to the leg spreader (E) and backrest splats as shown in *Photo C*. The bottom end of the backrest should protrude 1¼" beyond the bottom face of the leg spreader (E).

3 Hinge the armrests and legs back together. Then, connect the legs to the base with the ⅜" and ¼" carriage bolts.

4 Raise the backrest to lock it in place with the armrest connector.

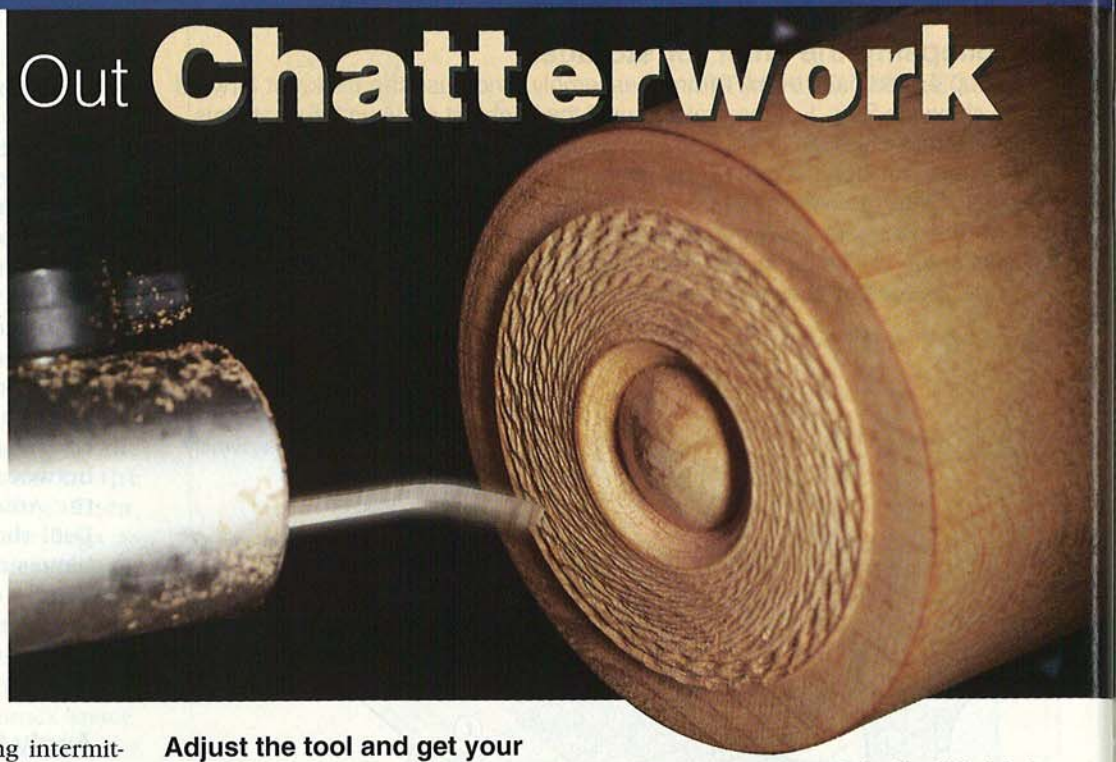
Ordering plans

Our glider and patio table and benches were put together as *WOOD PLANS®*. To order the Apple Glider plan, OFS-1028, $12.95 ppd., or the Patio Table and Benches plan, OFS-1038, $12.95 ppd. call 800/572-9350. These plans are also available through our internet site at http://www.woodmagazine.com See the June 1998 issue of *WOOD* for the matching side table, planter, and birdbath (call the number listed above to order a back issue).

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

Checking Out Chatterwork

From bottle stoppers to yo-yos, small turnings often benefit from a bit of ornamentation. Here's how to decorate turnings with chatterwork. See *page 86* for ways to dress up the chatter itself.



The chatter tool's thin, flexible blade vibrates against the surface of the wood to chip out a distinctive pattern.

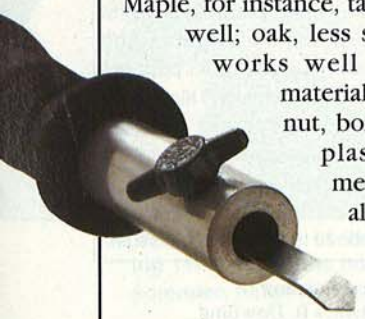
What's this chatter?

If you've ever turned anything on a lathe, you've probably encountered chatter. This phenomenon occurs when either the tool or the workpiece vibrates, causing intermittent contact between the tool's cutting edge and the work. The spiral pattern you sometimes see on a thin spindle or the ripples in the bottom of a deep bowl are examples of chatter.

Chatterwork, a popular technique for decorating woodturnings, is simply chatter that occurs under controlled (or, as you'll find, semicontrolled) conditions. Turners employ a tool like the one *below* to produce chatter patterns on purpose.

The tool, sold by many woodturning retailers, employs a thin steel blade secured in a stout handle. As the blade vibrates against the workpiece, it chatters a pattern into the wood.

But not just any wood. Chatterwork comes out best on the end grain (but not the side grain) of dense, close-grained, evenly textured wood. Maple, for instance, takes chatterwork well; oak, less so. The process works well on non-wood materials, such as tagua nut, bone, antler, some plastics, and soft metals. The material doesn't need to be hard, just dense.



Here's the chatter tool, with the blade installed, ready to go to work.

Adjust the tool and get your lathe ready for chatter

In theory, chatterwork is easy to do. In reality, getting it right takes a bit of patience, some practice, and lots of experimenting. We asked woodturner Bonnie Klein, a chatterwork pioneer, for some pointers on getting started. Here's her advice on adjusting the tool and setting up your lathe to get good chatter going.

Tool Tips

✔ Adjust the chatter tool's blade so it extends 1⅛" to 1¼" from the end of the handle. This will be your starting point; you may need to change the protrusion distance as you experiment with the tool. "Once I've adjusted it to the length that works best, I don't change it," Bonnie says.

✔ Don't make the tip too sharp. "If the tip is too aggressive," Bonnie explains, "it will tear the surface of your workpiece." She seldom sharpens her chatter tool.

✔ Keep the blade free of burrs.

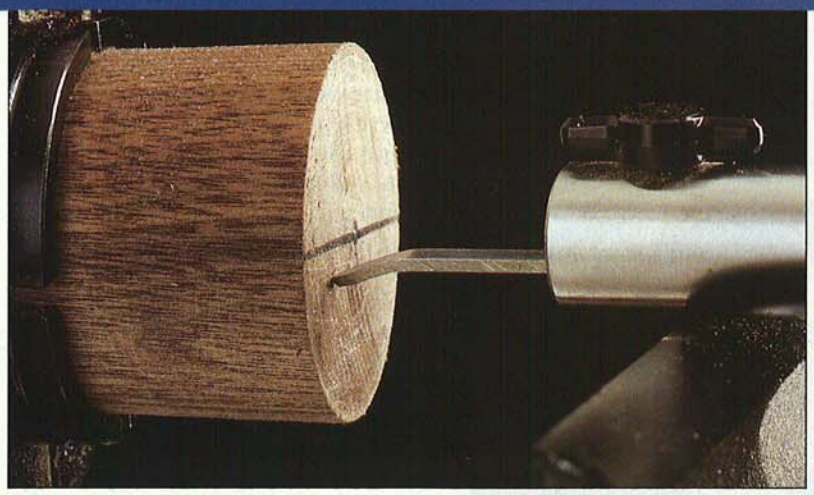
Lathe Setup

✔ Chuck the workpiece firmly.

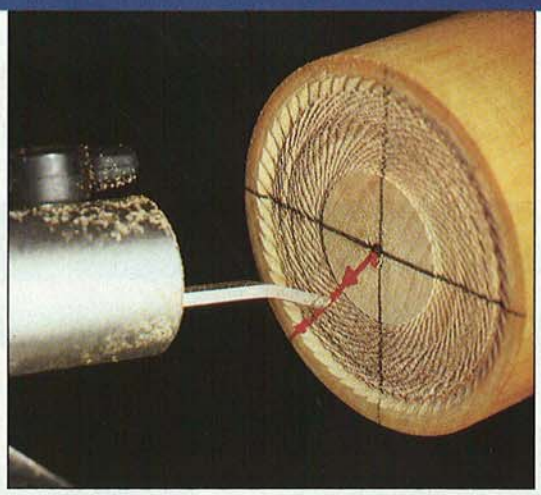
✔ Position the toolrest about 2" from the surface of the workpiece. The toolrest height should allow the tool tip to contact the workpiece slightly below the centerline when the tool is held approximately level, as shown at *top left* on the *opposite page*.

Well-done chatterwork adds interest to these stoppers turned by Jack Rogers.

✔ Set the lathe speed. Speed directly affects the chatter pattern. "The faster the lathe speed, the farther the surface will travel between bounces of the chatter tool," Bonnie says. "A slower speed will result in a finer, more delicate pattern." Best results, Bonnie says, come with a lathe speed of 1,000 to 3,000 rpm for a 2"-diameter workpiece. We found rotational speeds of of 2,000–2,500 rpm usually produced a good pattern on 2"-diameter pieces. (See *Speed: rpm vs. fps* for more about lathe speeds.)



The tip of the blade should point downward and contact the workpiece below the centerline.



Moving the tool along the path indicated by the red line produced this swirling pattern.

Enough chitchat; let's get down to some chattering

Lay the round shank of the tool on the toolrest, with the blade tip pointing down. Swing the handle to the left to bring the left side of the blade tip toward the face of the workpiece. Hold the tool's handle level or slightly upward, and roll the top of the handle slightly toward the workpiece to bring the top face of the blade's tip to an angle of 80° or less with the work surface.

Then, with the lathe running, press the blade against the turning. When you hear a high-pitched chattering noise, the blade has started vibrating and cutting into the surface. As the pitch of the noise increases, pull the blade sharply away from the surface. Depending on the material, a couple of seconds is probably enough contact time. If you hold the tool in place too long, the pattern will distort.

You should see a narrow band of chatter. If you don't like the pattern you've made, scrape the surface flat, and start over. You can't improve chatterwork by going over it again; you'll only make it worse.

Now, try some variations on basic chatterwork

Once you get the feel of the chatter tool and can reliably make a pattern with it, experiment with creating different designs on your work. "I use a combination of speed, pressure, and tool movement to vary the patterns," Bonnie explains.

You can experiment with the angle of the blade to the work, the direction of movement in relation to the tool's edge, the speed of tool movement, and the turning speed. Every time you make a change in procedure, you'll come up with a different look.

Tool movement—sliding the tool outward along the workpiece—extends your pattern. As you move to a larger diameter, you'll need to increase the pressure on the tool to keep the chatter going. The chatter lines will spread farther apart, too. How fast you slide the tool along the tool rest also will affect the outcome.

Moving the tool horizontally will create a more-or-less straight, radial pattern. Moving the tool diagonally, as shown by the red line on the turning in the photo *above,* generates a swirling motif like the one on the end of the turning *opposite page top.*

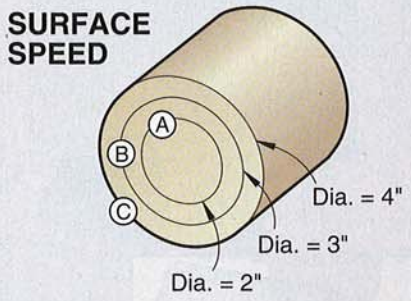
A chattered V-groove offers a subtle form of chatterwork decoration. To make a groove, push the blade tip straight into the workpiece. Pull it back quickly when you hear the chattering noise.

Photographs: Hetherington Photography
Illustration: Roxanne LeMoine; Lorna Johnson
Written by Larry Johnston

SPEED: rpm vs. fps

In woodturning, lathe speed usually refers to the rotational speed of the workpiece in revolutions per minute (rpm). But rpm alone doesn't tell everything you need to know. An important consideration in woodturning is the speed of the wood's surface where it meets the tool's cutting edge.

That surface speed, often expressed in feet per second (fps), depends on the turning's diameter as well as the lathe's speed in rpm, as shown at *right.* For example, a 2"-diameter disc would have at a surface speed of about 17.6 fps at 2,000 rpm (calculated using a factor rounded to four places). At that rpm, a 10"-diameter piece would be going about 88 fps—60 miles per hour—on the surface.



When rotational speed = 2,000 rpm

Surface speed
At Ⓐ = 17.6 fps
At Ⓑ = 26.4 fps
At Ⓒ = 35.2 fps

Surface speed (ft. per second) = .0044 x Dia.(inches) x rpm

TWO-IN-ONE
Seat/Step Stool

In the kitchen or in the shop, this handy seat/step stool provides additional height to get to those hard-to-reach places. After using its ladder-like capability, fold the top half over for additional seating.

Why I used southern yellow pine for this project

When I noticed our local lumber dealer carrying southern yellow pine (also called longleaf pine), I knew I'd just found the right material for this project. Yellow pine boards often exhibit wonderful straight grain, and the 12'-long 1×10s I bought for this project had no knots. In fact, none of the boards I inspected at the lumberyard had any but the slightest defects in grain. This pine also exhibits great strength. A note of caution, though. Yellow pine is notorious for cup and twist, especially in wide boards. My recommendation is to consider edge-joining 4- to 5"-wide boards to make the wide pieces called for in this project.

Jan Siec

Assistant Design Editor

Let's start by forming the sides

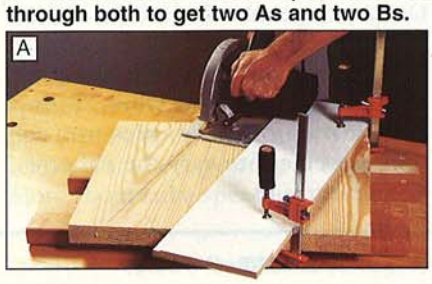
1 To reduce the number of individual glue-ups and for consistent grain patterns on the wide pieces, edge-glue enough ¾" stock for one panel measuring 22×36" and the second 27×32" after trimming. Cut the 22×36" panel into two pieces measuring 22×17⅜". See Step 1 on the Forming the Sides drawing for reference. Mark one end on each 22×17⅜" panel as "bottom."

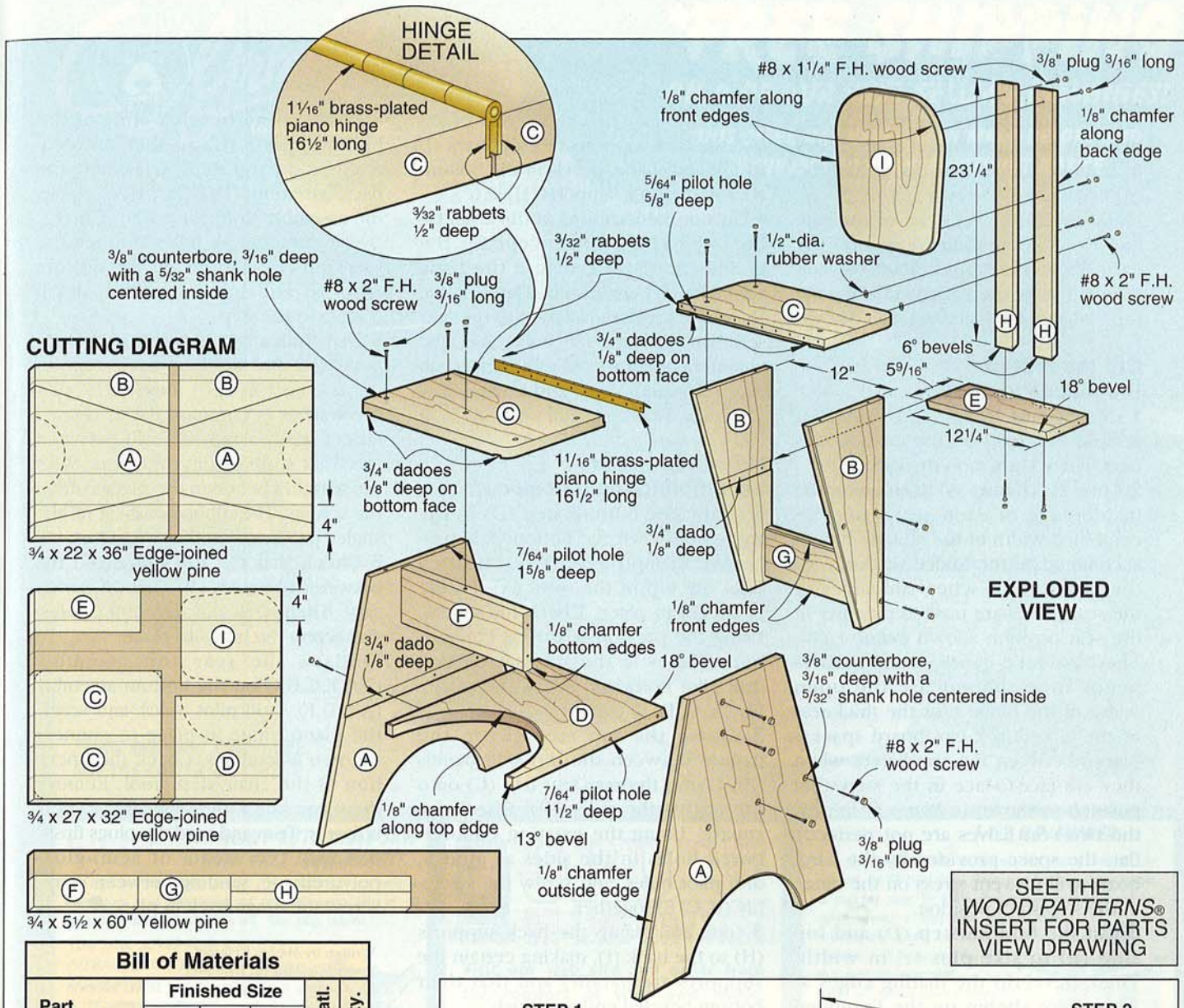
2 Cut a ¾" dado ⅛" deep 8¼" up from the bottom end on the *inside face* of each panel where shown on the Parts View on the *WOOD PATTERNS®* insert in the center of the magazine. Using double-faced tape, adhere the two panels face-to-face, with the edges and ends flush and the dadoes aligned and facing each other where shown on Step 2 of the Forming the Sides drawing. Mark an angled cutline on the top piece, enabling you to get one A and one B from each panel.

3 As shown in *Photo A*, use a straightedge and portable circular saw to cut

Continued

Stick the two edge-joined panels together with double-faced tape, and cut through both to get two As and two Bs.





SEE THE *WOOD PATTERNS®* INSERT FOR PARTS VIEW DRAWING

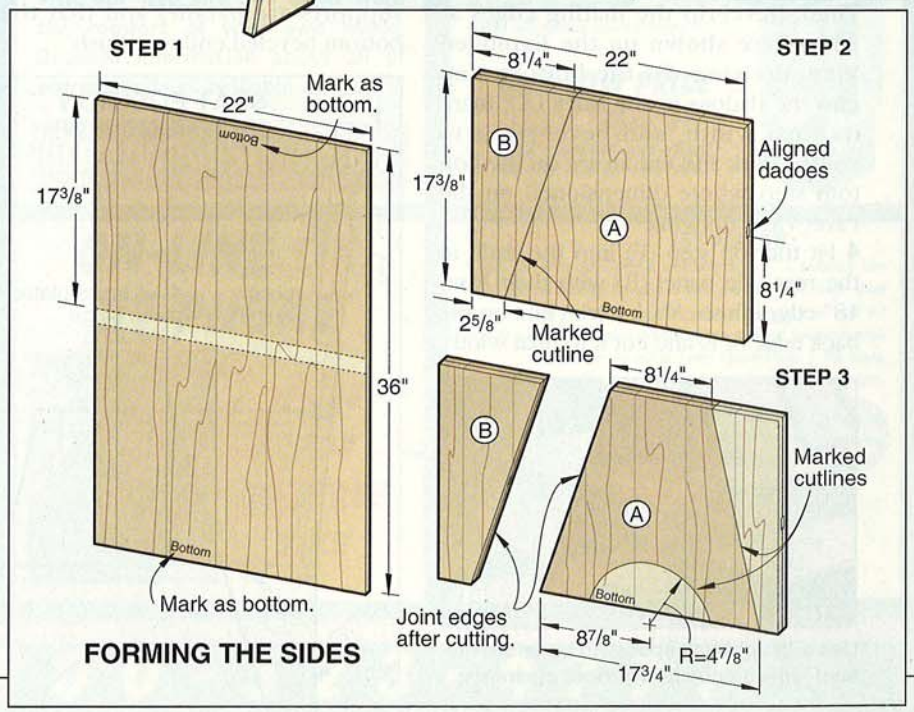
Bill of Materials

Part	Finished Size T	W	L	Matl.	Qty.
A* bottom side panesl	3/4"	17 3/4"	17 3/8"	EC	2
B* top side panels	3/4"	8 1/4"	17 3/8"	EC	2
C seat halves	3/4"	8 1/4"	16 1/2"	EC	2
D* bottom step	3/4"	13 1/4"	13 3/4"	EC	1
E* top step	3/4"	5 9/16"	12 1/4"	EC	1
F seat brace	3/4"	4"	13 1/2"	C	1
G top brace	3/4"	4"	12"	C	1
H back supports	3/4"	2"	23 1/4"	C	2
I* back	3/4"	12 1/2"	13"	EC	1

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

Materials Key: C–choice; yellow pine, poplar, soft maple, EC–edge-joined stock.

Supplies: #8x1 1/4" flathead wood screws, #8x2" flathead wood screws, 1/2"-dia. rubber washers, 1 1/16" (open width) brass-plated piano hinge 16 1/2" long, clear finish.



Seat/Step Stool

through both pieces. Joint the edges that you have just cut on both pieces to remove the saw marks. Leave the pieces taped together. Cut a 4⅞" radius on the bottom end of the side panel (A) where dimensioned on the Parts View and Step 3. Mark the cutline, and make the angled cut along the front edge of the taped-together pieces.

Cut the rest of the pieces to shape

1 Cut the seat halves (C) to size. Cut ¾" and 1½" radii on the outside corners where shown on the Parts View.

2 Cut a 3/32" rabbet ½" deep along the inside edge of each seat half. The combined width of the rabbets should accommodate the folded thickness of the piano hinge when the edges of the seat halves are pushed together in the seat position shown *below right*. The combined depth of the rabbets needs to accommodate the open width of the hinge *plus* the thickness of the tablet-back cardboard spacers placed between the seat halves when they are face-to-face in the step-stool position as shown in *Photo B*. In case the two seat halves are not perfectly flat, the space provided by the cardboard will prevent stress on the hinge in the step-stool position.

3 Cut the bottom step (D) and top step (E) to size plus ½" in width. Then, bevel-rip the mating edges at 18° where shown on the Exploded View drawing. Fit the bottom step into the dadoes in the sides (A), mark its final width, and bevel-rip it to width. Mark and cut an arc on the bottom step where dimensioned on the Parts View drawing.

4 Fit the top step (E) into the dado in the rear side panel (B) with their front 18° edges flush. Mark a trim line on the back edge of E, and cut it to final width.

Use a tablet-back spacer to separate the seat halves and allow proper clearance.

5 Cut the seat brace (F), top brace (G), the back supports (H), and back (I) to size and shape. Bevel-cut the bottom ends of the back supports (H) at 6°.

6 Lay out the locations of the counterbores on all pieces except for the counterbores in E where the back supports (H) are fastened and in the Hs where they are fastened to the rear seat half (C). Drill the holes. Rout ⅛" chamfers on all pieces as indicated on the Exploded View and Parts View drawings. Finish-sand all pieces.

Now the fun part– assembling the pieces

1 Clamp the bottom step (D) in the dadoes between the bottom side panels (A). Clamp the front seat half (C) onto the top of the sides (A). Fit the brace (F) in place. Check for square. Using the previously drilled counterbored holes in the sides as guides, drill pilot holes and screw the assembly (A, C, D, F) together.

2 Clamp the top step (E) in the dadoes between the top side panels (B). Clamp the rear seat half (C) onto the top of the sides (B). Check for square. Using the existing counterbored holes in the sides as guides, drill pilot holes, and screw the assembly (B, C, E) together.

3 Glue and clamp the back supports (H) to the back (I), making certain the supports are parallel and that their bottom beveled ends are flush.

4 Position the beveled ends of the back supports (H) so they are centered on the top step (E). To hold the back assembly (H/I) in place, clamp the assembly to the rear seat half (C). Drill the mounting holes through the top step (E), and fasten the bottom ends of the back supports with screws to the step.

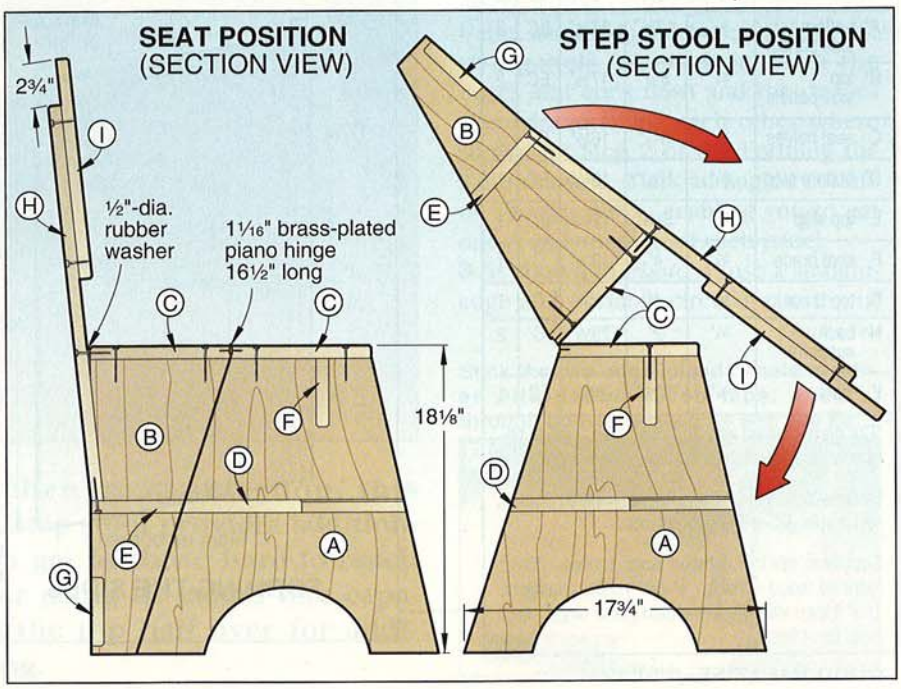
5 Drill holes through the back supports (H) and into the back edge of the rear seat half (C). Insert a ½" rubber washer (a common flat or domed faucet washer works fine) between the back supports and the seat. With the washers between the pieces, drive the screws. The rubber washers fill the angled gap between the two pieces.

6 Check that the top brace (G) fits between the sides (B). Trim if necessary. Then, drill the mounting holes, and screw the brace in place.

7 Place the rear top assembly (B,C,E,G,H,I) on the bottom assembly (A,C,D,F). Drill pilot holes, and screw the piano hinge in place to connect the two assemblies. Check the operation of the chair/step stool. Remove the piano hinge and plug all the counterbores. Trim and sand the plugs flush.

8 Apply two coats of semi-gloss polyurethane, sanding between coats. Screw the hinge back in place.

Written by Marlen Kemmet
Project Design: Jan Hale Svec
Illustrations: Roxanne LeMoine; Lorna Johnson
Photographs: Hetherington Photography



Different things to do with Chatterwork Decoration

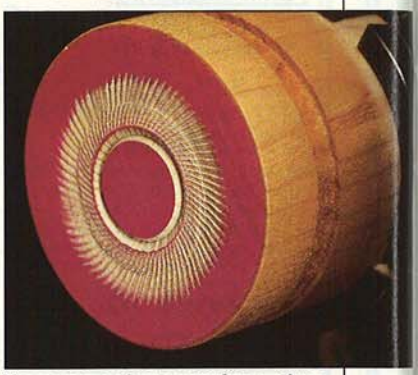
Read about the chatterwork technique on *page 78*. Then try these ideas to give your chatterworked pieces an even more distinctive look.

Friction-burning highlights the pattern. A dowel or a piece of scrapwood will do the trick.

✔ Although you can make the chatter tool work on a slightly curved surface, flat areas take chatterwork best.

✔ Lightly sand over the top of an applied pattern with fine sandpaper (say, 220 grit) for a softer look. Sanding too hard or with coarse sandpaper, though, can cause the design to disappear altogether.

✔ Press a dowel or scrapwood block against the spinning chatterworked surface to friction-burn the pattern, as shown *top right*. Lightly sand the design beforehand for more uniform darkening.



You can color a surface, then cut a design into it. A chattered V-groove surrounds the center.

✔ Set off the pattern with color. You can color the surface with paints, markers, stains, or other colorants before applying the chatterwork (*center right*). Coloring the chatterwork pattern itself lends a different effect (*bottom right*).

Colored markers, such as this transparent highlighter, will accent chatterwork designs.

✔ Add incised lines to border the chatterwork. Or, you could turn down the adjacent surface to raise a band for the decoration, as shown in the photo on *page 78*.

✔ Chatterwork can be overdone. It succeeds best when used sparingly as an accent or highlight.

Print this article

Do I have to buy more machines just to use my planer?

I just bought a new planer from a company that stated, "Save money by purchasing cheaper lumber" in its advertisement. The instructions for the machine notes: "for best results one side of the board should be flat before running it through the planer." Most of the "cheaper" lumber I buy is cupped or twisted. I know I can use a jointer to achieve a flat side on the boards, but I don't want to buy any more expensive machines so I can "save money." Is there another way?

—Dave Spindle, Simi Valley, Calif.

When warped boards are run through a planer, the machine presses them flat, shaving a uniform amount off the top. Then, the pressure releases as the board comes out the back with the same warp it went in with. You can take the cup out of a board with very light cuts on both sides using a portable planer. This will snip off just the high spots by not pressing the board flat as it goes through. This technique simply won't help a board that's twisted though.

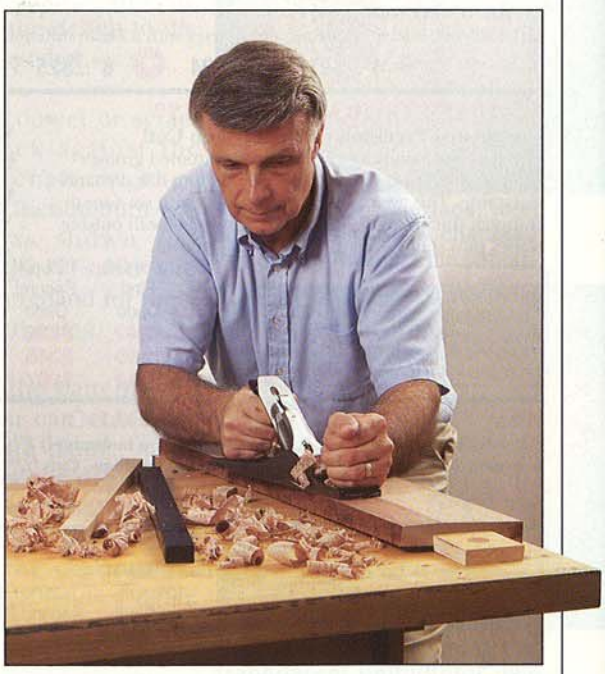
So, as a matter of fact Dave, we'd recommend the addition of one more tool to your shop—a hand plane. When twisted or cupped boards show up in the *WOOD*® magazine shop, we troubleshoot the problem areas with hand planes until they're flat enough to achieve a true running through the planer. Here's how.

First get yourself a nice long jack plane. A scrub plane (a shorter hand plane with a rounded blade) will do the job quicker, but is harder to control and less versatile.

Now build a pair of winding sticks. Make the sticks from stable, straight 1" stock about 2" wide and 2' long. For visual contrast when using the sticks, paint one of them black. Now lay the sticks across the board at opposite ends and sight across the top edge as shown *below left*. This sighting should reveal any twist, cup, or wind in the board.

A plane is designed simply to take off the high spots as it's pushed across the board. If the board needs quite a bit of help, adjust the plane to cut aggressively with the iron set deep and the throat wide to allow for thick shavings to pass through. Run the plane along the surface diagonally. Keep the plane at an angle skewed in comparison to the grain as shown *below right* so you're shaving off the high spots from side-to-side as well as end-to-end.

Occasionally, sight down the board to review your progress. Don't worry that you're scarring up the surface with those hefty cuts, the goal is to cut a flat surface. You'll smooth it up later in the planer. As the board gets flatter, lighten up the cuts with a less-aggressive iron setting. You're done when the plane is spitting out consistently long, thin shavings from all over the board.



Have a question?

If you're looking for an answer to a question that you think would interest lots of other readers, we would like to hear from you. Write to: Ask WOOD, 1716 Locust St., GA310, Des Moines, IA 50309-3023. For an immediate answer to your question, try posting it on one of our internet discussion groups at: www.woodmagazine.com

Continued on page 91

ASK WOOD

Continued from page 88

Am I using dangerous wood?

I'm a newcomer to woodworking, and have been salvaging good pieces of wood from a local pallet company to make small projects. I plan to use this inexpensive oak, maple, poplar, and pine to gain woodworking experience before purchasing higher-grade lumber. But a fellow woodworker told me he'd heard that pallet wood was soaked in harmful chemicals. How safe is it to work with pallet wood?

—J. Diliberto, Elmwood Park, N.J.

We talked with Mark Haller from Iowa Pallets Ltd, who informed us that a small percentage of pallets are chemically treated. According to Mark, some pallets destined to carry food and similar cargo are treated for insects. But most pallets are simply nailed together from green (not dried) boards and sent out for use. If the wood seems discolored, puts off an uncharacteristic odor, or you're simply concerned, ask the pallet company in question about its seasoning practices. Also, beware of pallets that were imported from other countries—trade regulations may require treatment of this wood against harmful beetles.

Mark informed us that most pallet companies do allow woodworkers to pick through their piles for choice pieces of lumber, at a much lower cost than lumberyards charge. A couple of drawbacks: Most of the boards are just 3½" or 5½" wide, and should be dried before use.

Continued on page 92

Continued from page 91

How to keep those green turnings from splitting

I have several trees on my property that I try to use for more than firewood. Trouble is the bowls I turn from the green wood seem to crack or split within a few days. What am I doing wrong?

—Bob Raymond, Nevada City, Calif.

Wood cracks and splits when it dries too fast, Bob. What was a large piece of timber with lots of wet sap is now a thin bowl with plenty of exposed surface for the remaining moisture to rush out. As the moisture leaves, it swells the edges causing internal stress and cracking. So, you need a way to slow the drying process. Sawyers slow the drying of green boards by sealing their ends with paint before air-drying them in a stack.

To slow the drying of bowls, try applying a sealer such as paste wax. Store the bowl away from air movements and extreme temperature variation. Check your piece daily. If cracking starts, apply more wax or sealer and place the bowl in a plastic bag.

Monitor the drying by weighing your bowls daily. Once the weight remains stable for several days, your project shouldn't crack in the open air. This process may take 2-4 months. Experienced turners also have found that they can avoid cracks by turning the bowl to ⅛" thickness. Bowls this thin emerge dry from the lathe.

Branch out with other woods

Like a lot of woodworkers, I've never strayed too far from using only pine in my projects. After all, it's cheap and easy to work. But it's time to branch out, and I do have access to most major woodworking woods. I know that, over the years, you've featured different woods in the WOOD® *Profile section of the magazine. But, could you offer a comparison of the biggies all in one place? That would simplify my decision-making process.*

—George Schumacher, Houston, Minn.

You've got it, George. Shown *right* is a chart that compares 11 of the most popular woodworking woods. You'll find that most woods have their share of ups and downs.

	Western Red Cedar	White Pine	Yellow Poplar	Soft Maple	Cherry	Yellow Birch	White Ash	Black Walnut	Sugar (hard) Maple	White Oak	Red Oak
Weight lbs. per board foot	2.3	2.8	3.2	3.2	3.3	3.6	3.7	3.8	4.0	4.2	4.3
Density (hardness rating) 0/soft (balsa) 5/hard (ironwood)	1	1½	2	2½	2½	3	3½	3	4	4	3½
Strength 0/weak 5/very strong	3	2	2	3	4	3	4	4	4	4	4
Stability (movement and warpage) 0/warps, moves readily 5/no movement	4	4	4	4	4	3	3	4	3	3	3
Durability (resistance to wear) 0/wears easily 5/resists wear	4	2	3	3	4	4	4	4	4	4	4
Workability 0/works very easy 5/hope your blades are carbide	1	1	1	2	2	3	4	2	4	4	3
Toxicity 0/virtually non-toxic 5/extremely toxic	1	0	1	1	0	1	0	2	1	1	1
Cost $4S/per board foot	$3.00	$2.00	$2.75	$3.90	$6.40	$3.60	$3.60	$6.45	$6.00	$4.25	$4.40
Look-alike	Red-wood	Fir	Yellow Birch	Sugar Maple	Red Alder	Sugar Maple	Red Oak	Willow	Yellow Birch	White Ask	White Ash

Western Red Cedar—great durability on outdoor projects
White Pine—versatile uses for everything from house construction to interior furniture
Yellow Poplar—versatile interior wood with limitless applications—easy to carve
Soft Maple—used for cabinets and unseen furniture parts such as drawer sides
Cherry—used for fine furniture—easy to turn
Yellow Birch—used for furniture and interiors esp. chair parts—easy to turn and bends well
White Ash—used for furniture, tools, implement handles, and baseball bats—bends well
Black Walnut—used for fine furniture, musical instruments, and carving—high resistance to shock makes it perfect for gun stocks
Sugar (hard) Maple—takes a pounding—uses includes flooring, butcher blocks, cutting boards, "Early American" furniture, and stringed instruments
White Oak—a durable outdoor wood—used also for furniture, floors, and baskets
Red Oak—a favorite for cabinets, furniture, millwork and flooring—carves well

Continued on page 94

ASK WOOD

Continued from page 93

Overspray really roughs my drawers

I like to spray most of my finishes. From time to time, I find that overspray from the polyurethane I use will frost up on the surface to look and feel rough. Sometimes, the finish sprays perfectly, but other times, like on the set of drawers I just finished, the texture is completely bumpy. What can I do?

—Albert Smith, Brandon, Fla.

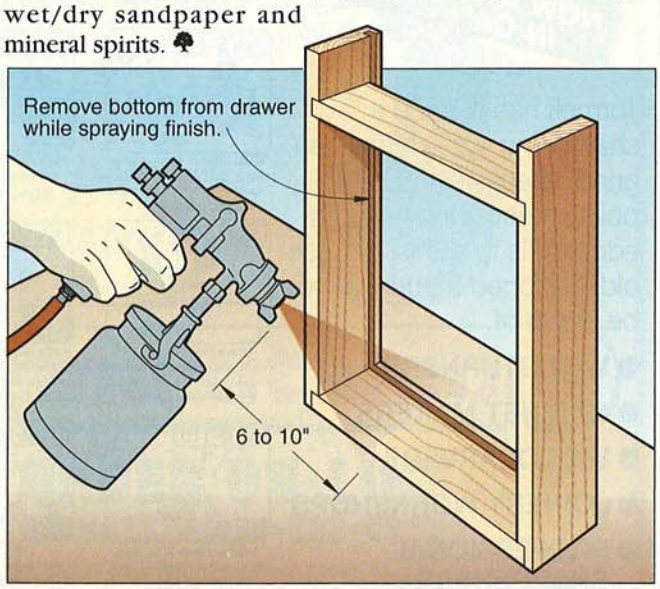
Al, the effects of overspray have been driving painters and finishers mad since the technique of spraying was invented. But overspray doesn't just include the stuff that missed the target. It's also material that bounced off the surface and landed somewhere else. For instance, imagine spraying a barn wall with a water nozzle. The wall can accept only a small percentage of the moisture while the rest bounces off or runs down the surface.

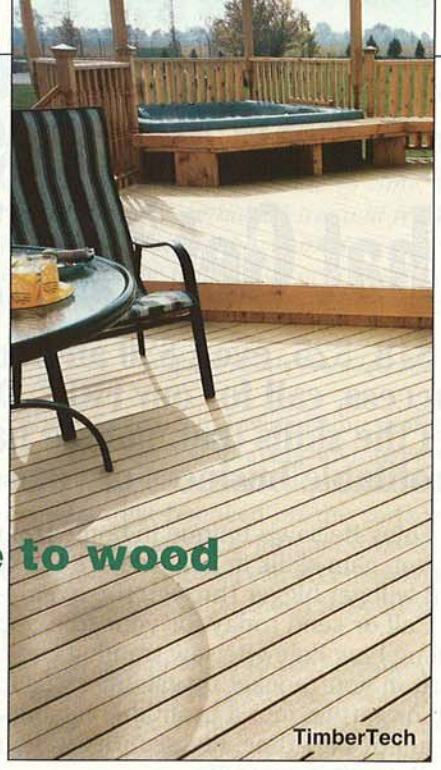
Something similar to that is happening to your finish, Al. Some of the finish bounces off the intended target, and the leftover polyurethane floats to new surfaces (especially in enclosed projects such as drawers). The finish particles begin to solidify while floating in the air. Overspray lands in the form of hardened droplets that don't mix evenly with the liquid finish on the project surface.

In the *WOOD®* magazine shop, we practice a few precautions that help us achieve the sprayed finish we're looking for. First, we leave the backs off cabinets and the bottoms off drawers until the finishing is done. This makes accessibility easier, and lessens the chances of the finish bouncing off one surface and landing on another. We also reduce the air pressure on our gun. You can tell if something is wrong when, from a 6-10" spraying distance, the air pressure is causing great amounts of bounce-off.

Additional thinning of the the finish will allow the droplets to mix together instead of drying independently. Lower air-pressure and thinner finish will result in thinner coats, so be prepared to tack on a couple more coats to your finishing schedule.

When overspray does occur, we wait for the finish to cure and then smooth it by lightly sanding with 400-grit wet/dry sandpaper and mineral spirits.





Plastics: A totally rot-free alternative to wood

Although just the mention of plastics is enough to make some dyed-in-the-wool woodworkers cringe, there's no denying several key advantages. Plastics are impervious to fungi, insects, cracking, and splintering, and you can buy them in lengths up to 20' for no additional charge. You can mill, assemble, and install most of them as easily as wood, although some require slight modifications in woodworking technique. Here's a look at three plastic-based products designed for outdoor application.

■ **Trex:** This mixture of wood fibers and recycled plastic has been on the market since 1989 and is used primarily as decking. You can't use it for structural members, but it does provide a splinter-free surface that looks pretty good. It does require an occasional cleaning, and mildew can grow on it under certain conditions. To prevent such mildew, you need to periodically apply a sealant with a mildewcide agent.

Trex comes in three shades of brown. Two of the brown shades weather to gray or light gray within a few months, depending on which color you choose. Although water doesn't faze it, Trex does expand and contract slightly across its width and length with changes in temperature.

You can buy it in most nominal lumber sizes (5/4×6" material, supported 16" on center, is typically used for decking) in lengths up to 20'. For the location of your nearest Trex dealer call 800/289-8739. For more information visit via the internet at www.trex.com.

■ **TimberTech:** This composite of virgin plastic/wood fibers shares many of the same qualities as Trex. TimberTech weathers to gray and is intended for decking only.

As you can see by the photo at *right*, TimberTech has an altogether different profile than other decking materials. Because of its tongue-and-groove design, it fits tightly together like a hardwood floor. (Holes in the tongue of each piece allow for water drainage.) Screws don't show because you drive them into the surface just below the groove. You can trim the sides and ends with lumber, or use manufactured starter and trim strips. TimberTech measures 1½" thick, 6" wide on the exposed surface, and comes in 12', 16', and 20' lengths that you support by joists 16" on center. This material is not as widely available as Trex and comes at a premium price. For more information call Crane Plastics at 800/307-7780, or visit www.timbertech.com.

■ **Celtec 550:** This product comes in ⅜"-, ½"-, ⅝"-, ¾"-, and 1"-thick sheets, 4' wide, in any length. It's made of "expanded" (foamed) PVC plastic, making it less dense than solid PVC like you find in PVC pipes. It most frequently is used for architectural moldings, but you also can use it to build furniture, fences, or lawn ornaments. It is not recommended for decking or load-bearing parts. The product has a pure white color that will yellow slightly after 3-4 years if you leave it unpainted. A ½"×4'×8' sheet sells for about $75. For more information call Vycom at 717/346-8254.


Celtec 550

Above Left: **The most commonly sold Trex is in the form of 5/4 deck boards that weather to a light grey.**

Above: **TimberTech appears tan until it weathers to light grey (unless you seal it with a UV-blocking finish).**

Below Left: **Closeup look at Celtec 550.**

Below: **The siding, architectural trim, and fencing shown here were milled from Celtec 550.**

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SHOP TESTED

1999 WOOD® MAGAZINE EDITORS' CHOICE

Random-orbit sander goes where others can't

Of the hundreds of new products shown at the International Hardware Fair in Cologne, Germany, last spring, only a few grabbed my eye. The Metabo SXE 400 Electronic Orbital Sander was one of them.

With a 3⅝2"-diameter random-orbit sanding pad, the smallest I've ever seen, it looks like a mixed breed of variable-speed random-orbit sander and detail sander. The SXE 400 does both parents proud.

The sander saved the day when I recently restored the front door of my home. Prior to restaining the door, it needed a thorough sanding. As shown *at right*, the SXE 400 helped me quickly sand the door's narrow muntins. These areas were too large to sand with a detail sander, and would have taken much longer had I done them by hand.

The SXE 400 removed stock with an aggressiveness equal to large random-orbit sanders, and its abrasives didn't load up as fast as those on a detail sander typically do. The tool showed good manners when I sanded into corners and along edges as it did not hammer or mar adjoining surfaces.

The Metabo SXE 400 was easy to control at full speed (10,000 orbits per minute) except with fresh 80-grit abrasives. At full speed, these low-grit abrasives made the sander a little grabby so I slowed to about 7,000 orbits per minute until the abrasive dulled a little. You can dial the machine to as low as 5,000 orbits per minute. The tool's electronic feedback circuitry kept the speed constant under varying work loads. Like every other Metabo tool I've ever tried, this one appears well built.

What about vibration? During 10-minute stretches of continuous use, it never left a tingling sensation in my hand. Using a 1" dust hose and my shop vacuum, about 90 percent of the dust was drawn through the six holes in the pad.

My test unit came with a hook-and-loop pad. Available accessories include a soft pad, polishing sponge, buffing disc, and nylon abrasive discs. The manufacturer supplies high-quality abrasive discs in grits from 40 to 400.

A tool this specialized clearly doesn't belong in every workshop. But, if you frequently sand narrow panels or frames, and time counts, you'll want to try this tool.

—Tested by Bill Krier

PRODUCT SCORECARD

Metabo SXE 400 Electronic Orbital Sander

Performance	★ ★ ★ ★ ★
Price	$145
Value	★ ★ ★ ★ ★

For a Metabo dealer near you, call 800/638-2264.

Print this article

Muffler puts a dent in shop vacuum din

My shop vacuum leaves a ringing in my ears that lasts long after I shut the thing off. I'll venture a guess that yours does the same. Here's an inexpensive muffler that takes the edge off that whiny shop vacuum noise.

I installed the 2½"-diameter muffler by simply slipping it into my vacuum's exhaust port. Exhausted air passes through with no effect on vacuum suction. The manufacturer claims the muffler reduces the noise level by 25 percent, but my decibel meter showed little real change in the volume. Still, the simple device does remove much of the annoying whine created by shop vacuums.

You can purchase this product at Sears and Home Depot under the Craftsman and Ridgid brand names, respectively. The brands are colored differently—Craftsman is all black; Ridgid is red and black.

—Tested by Dave Henderson

PRODUCT SCORECARD

Craftsman and Ridgid Shop Vacuum Muffler (Craftsman shown *below*)

Performance	★ ★ ★ ☆ ☆
Price	about $10
Value	★ ★ ★ ★ ★

Available at Sears and Home Depot stores nationwide.

Continued on page 108

PRODUCTS THAT PERFORM

SHOP TESTED

Continued from page 107

Hang on for the simple, yet sturdy, Studgrabbers

Every once in a while, I run across a product so simple and effective that I slap my forehead and say, "Why didn't *I* think of that?" Such is the case with Stanley's Studgrabber Storage Hooks.

These strong zinc-plated steel hangers are designed to slip over 1½"-wide wall studs or ceiling joists. And, when you apply a little weight, the sharp points bite into the wood, setting the hook. It's no problem to move a Studgrabber to a different spot: Simply squeeze it (releasing the teeth) and slide it over another stud.

Each Studgrabber hook is rated to hold 25 pounds, and they hang just as well on joists. I hung power cords, tools, my insulated coveralls, sporting goods, and more on them. In fact, I was so impressed with the holding power of these devices, I put two of them side by side on my ceiling joists and pulled myself up on them. They bent, but didn't let go.

—Tested by Bob McFarlin

PRODUCT SCORECARD

Studgrabber Storage Hooks

Performance	★ ★ ★ ★ ★
Price	About $8 for six hooks
Value	★ ★ ★ ★ ★

To find a Stanley Hardware dealer, call 800/622-4393. Or visit Stanley on the web at www.StanleyWorks.com

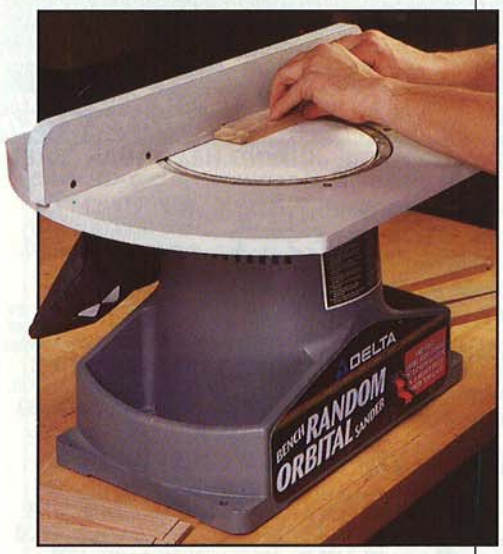
Delta stands random-orbit sander on its head

I can't tell you the number of times I've held my random-orbit sander upside down to finish-sand small parts. But the operation is clumsy at best, and I usually end up filing a fingernail or two in the process. The engineers at Delta apparently had this in mind when they came up with their Bench Random Orbital Sander.

The machine's 9" sanding disc, which takes hook-and-loop or PSA discs, orbits flush with the tabletop to give swirl-free smoothing of pieces too small to secure to a bench. For example, I attached the fence and effortlessly sanded ½×1×12" oak slats—pieces I normally would've hand-sanded for fear of rounding the edges.

The Bench Random Orbital Sander's quiet ½-hp. induction motor provides ample power to drive the disc at 3600 orbits per minute. Even under heavy sanding pressure, I could barely slow the motor. And I found its fan-and-bag dust-collection system extremely effective.

—Tested by Bob McFarlin



PRODUCT SCORECARD

Delta 31-750
Bench Random Orbital Sander

Performance	★ ★ ★ ★ ★
Price	$209
Value	★ ★ ★ ★ ☆

For a Delta International dealer near you, call 800/223-7278. Or visit www.deltawoodworking.com

WOOD ANECDOTE

QUAKING ASPEN

Print this article

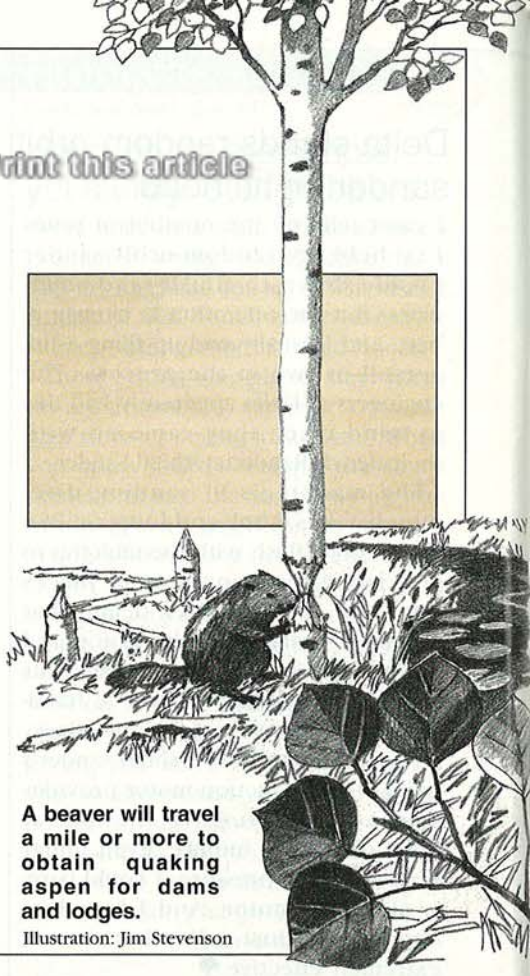
The talking tree that reforests the land

All birches, cottonwoods, and poplars tend to rustle in the wind more than other trees, but it's the quaking aspen (*Populus tremuloides*) that truly "talks." Because of the shape of its leaves and their recurved stalks, even the slightest breeze sets the tree whispering. And the sound—not unlike a soft, musical tinkle—stands out from the coarser voices of its forest neighbors. Even its cousin, the bigtooth aspen, can't approach the lilt of the quaking aspen.

However talkative, the quaking aspen has always been looked on as a weed tree by lumbermen, who call it popple. Compared to the red oak, white pine, and yellow birch by which it frequently grows, the quaking aspen has weak, nondescript wood. It also never attains the size of its companions. Yet, quaking aspen—and bigtooth aspen as well—provide the woody pulp favored to manufacture quality magazine paper.

The beaver also holds the quaking aspen in great favor. Wherever the tree grows, nature's engineer seeks it out for building its dams and dens. No one knows exactly why, but a beaver will travel a mile or more upstream from its building site to harvest its material of choice. Then slowly, foot by foot, it drags its find to the nearby water and floats it downstream to the construction area.

And although the beaver and the pulp logger constantly fell it, the quaking aspen continues to proliferate. In fact, the tree thrives in cutover areas of forest and barren places where fires once raged.



A beaver will travel a mile or more to obtain quaking aspen for dams and lodges.

Illustration: Jim Stevenson

His woodturning helps the world's needy

Woodturner Eric Reeves donates his woodturning profits to Doctors Without Borders USA and other international and national human-service organizations.

By day, Eric Reeves teaches English at Smith College in Northhampton, Massachusetts. By night, the professor turns wood.

Comfortable with his "day job" of 19 years, Eric pursues perfection in his night-time turnings. He has, for instance, mastered the technique of inlaying a ring of contrasting or complementary wood in his vessels. This calls for precision in cutting and fitting, a feat that hasn't gone unnoticed by galleries from coast to coast that sell his work.

Yet, there's another feature of Eric's woodturning that makes it distinctive: He donates his profits from gallery sales to human-service organizations. "The more beautiful a woodturning I can make, the more potential it holds to help those suffering or in need," says the woodturner.

Although Eric has aided food banks, shelters, hospices, Habitat for Humanity, and other organizations, he especially likes the work being done by Doctors Without Borders USA, a major recipient of his profits. The world's largest independent medical relief agency, DWB (212/679-6800, www.dwb.org) has volunteer medical teams in 83 countries where people are threatened by epidemic, war, and natural or manmade disaster. They also implement vaccinations, medical-training programs, and prevention work. In 1998, Eric met his goal of paying for an hour's operation of a fully staffed and equipped DWB field hospital.

Photographs: Courtesy of Eric Reeves, Erick Marcussen, and Grow Biz International

Nothing but salvaged stock will do

Dunnage is loose material, usually large-dimension hardwood, used to support cargo in a ship's hold. But to woodworker Erick Marcussen of Ocean Springs, Mississippi, dunnage and other salvaged wood becomes his stock of choice for tables, model ships, and all sorts of things.

"It's my firm policy never to use anything other than salvaged materials," says the retired naval engineering writer. "These consist primarily of dunnage illegally tossed into the Gulf of Mexico by merchant ships and wood from shipwrecks. I'm still using some of the 40, 20'-long Honduras mahogany 2×4s from a shrimp boat that broke up on one of our offshore islands a few years back," he notes

Erick Marcussen made this coffee table from cross-cut pecan bordered by left-over oak flooring and pieces of "ship-wreck" mahogany.

Erick doesn't limit his recycling efforts to wood washed up on the beach. He also uses tree roots, building-site scraps, and wood from local tree trimmers as well. "I get a big bang out of recycling," he admits.

ReTool recycles tools

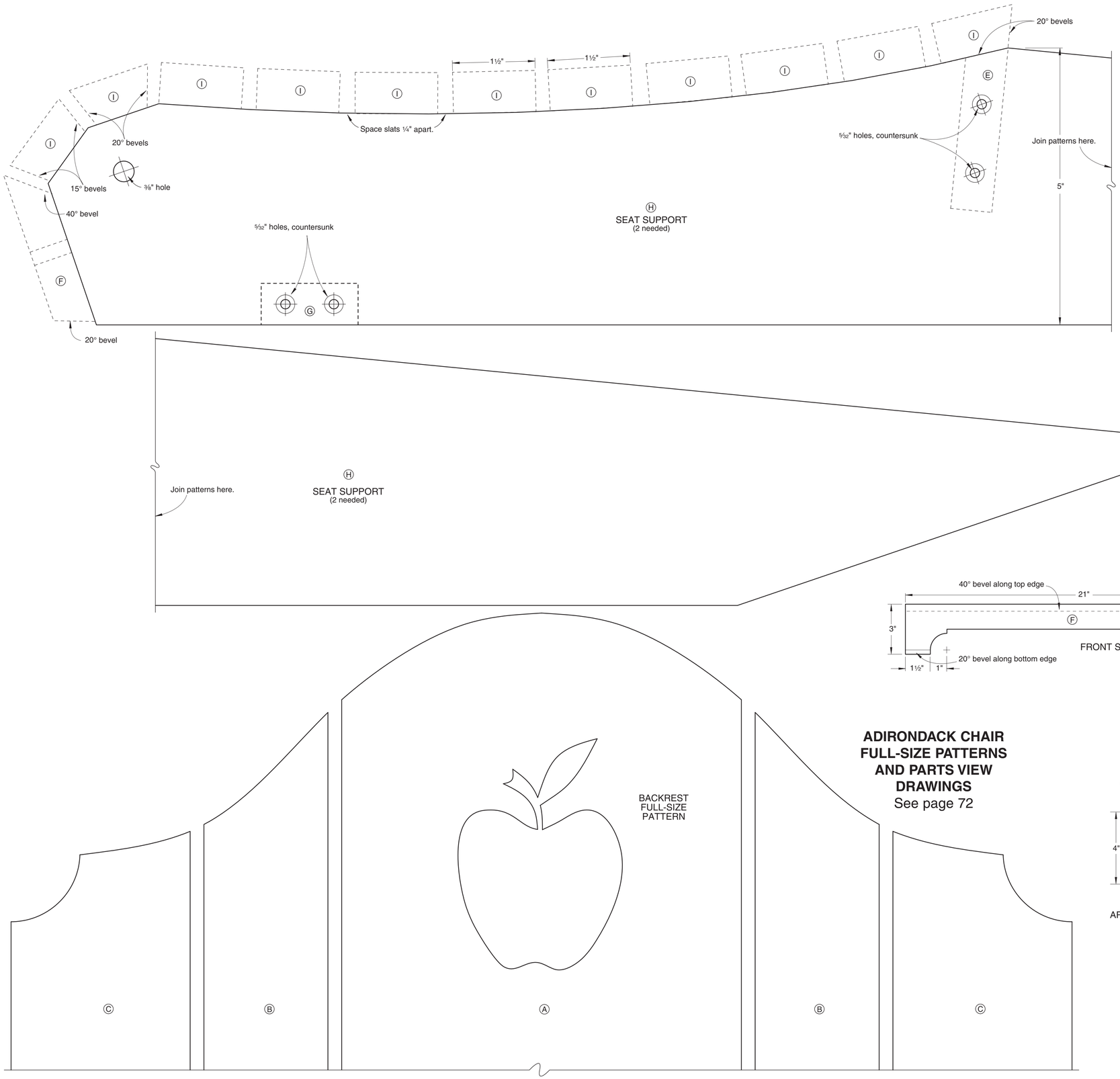
Tired of prowling garage sales for used tools? Minneapolis-based Grow Biz International, Inc. has come up with an alternative: retail stores that specialize in used tools.

Called ReTool, the new franchised stores offer quality used tools at half their original prices, according to company president Brad Tait. They also sell new and factory reconditioned tools. Shoppers can sell their old tools, too, or trade up to better equipment, choosing from woodworking tools, mechanic's tools, construction tools, and garden tools.

The ReTool stores acquire their merchandise from the public, and through manufacturer's closeouts and special buys. Many tools carry extended warranties, and stores offer buy-back prices for tools returned within up to 60 days.

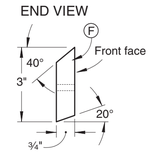
ReTool (800/269-4075), now with stores in Detroit and Minneapolis, plans to eventually have 500 stores nationwide. The parent company sells franchises for other used-goods stores as well—Play It Again Sports, Computer Renaissance, and Music Go Round, to name a few.

At ReTool stores, do-it-yourselfers browse past displays of used tools offered at half the original prices, as well as manufacturers' closeouts and other special buys.

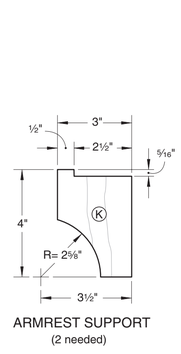


ADIRONDACK CHAIR FULL-SIZE PATTERNS AND PARTS VIEW DRAWINGS

See page 72



PARTS VIEW



ARMREST SUPPORT
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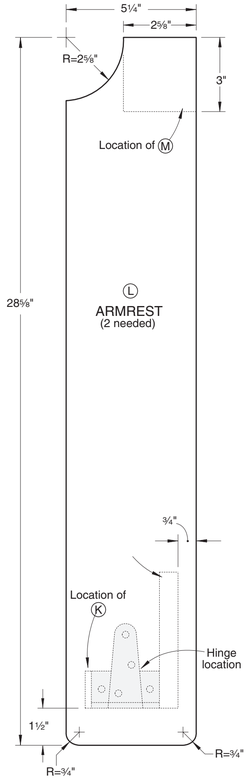


Better Homes and Gardens®

WOOD® PATTERNS®

For your woodworking convenience

JUNE 1999 **ISSUE 115**

Dear Reader: As a service to you, we've included full-sized patterns on this insert for irregular-shaped and intricate project parts. You can machine all other project parts using the Bill of Materials and the drawings accompanying the project you're building.

Page 20

Sawhorses
Adirondack lawn chair
Seat/step stool
Crown jewel clock
Sidewalk Speedster

Page 72

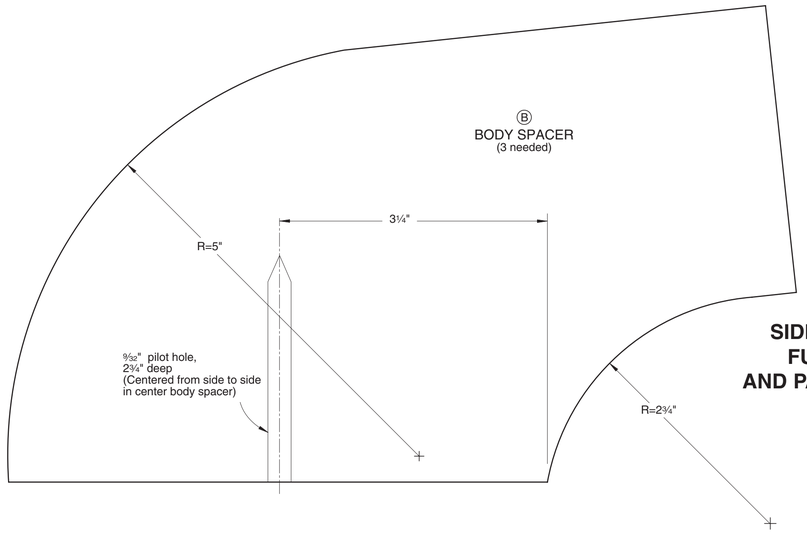
Page 42

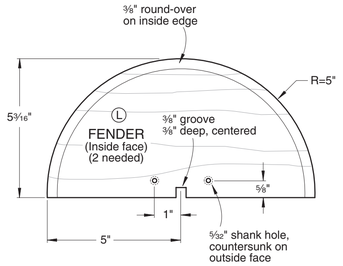
Page 59

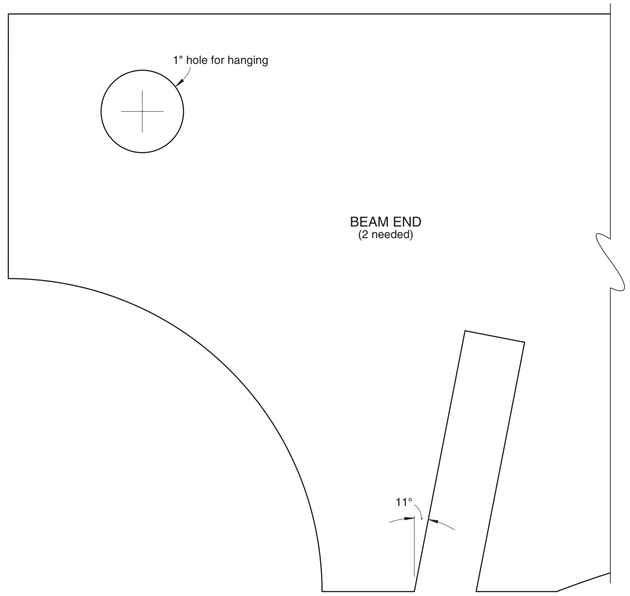
Page 80

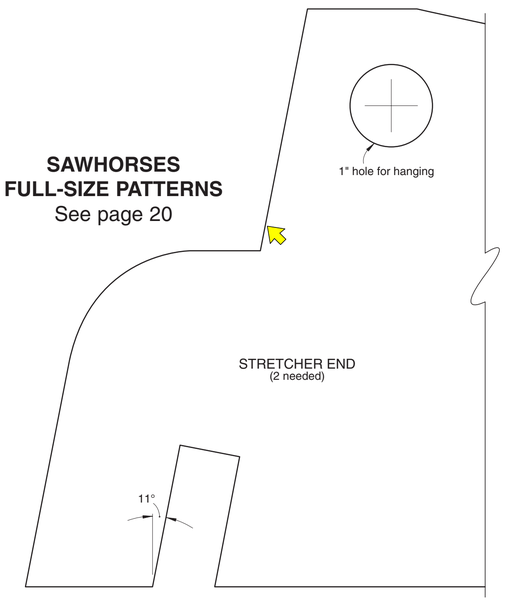
SIDEWALK SPEEDSTER FULL-SIZE PATTERN AND PARTS VIEW DRAWINGS

See page 59

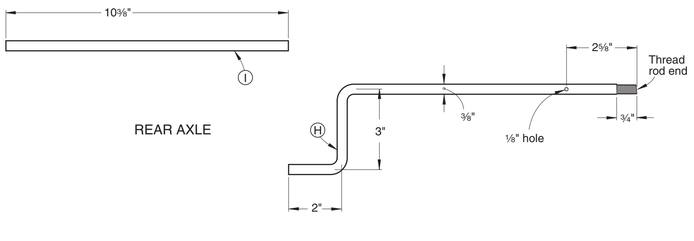


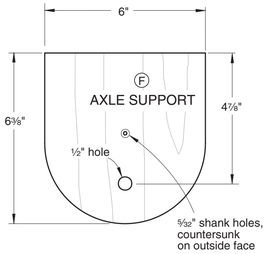






SAWHORSES FULL-SIZE PATTERNS
See page 20

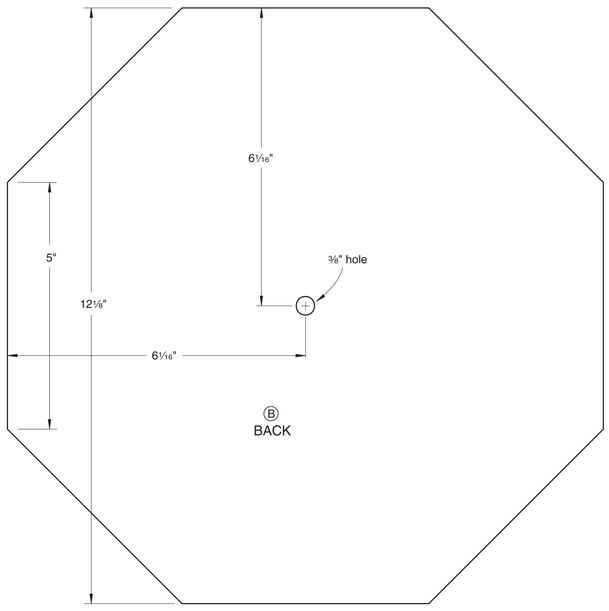


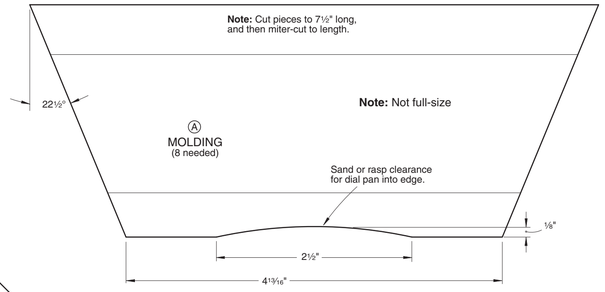


PARTS VIEW

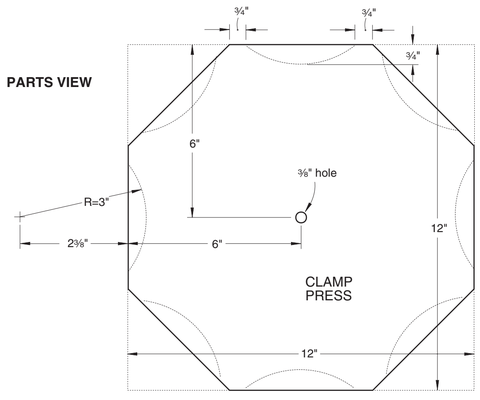
CLOCK PARTS VIEW DRAWINGS

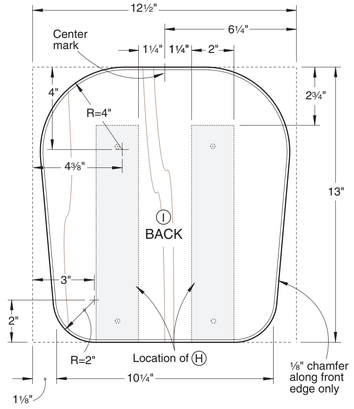
See page 42





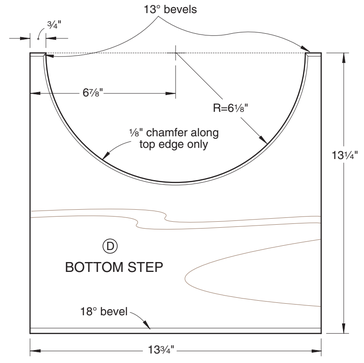
PARTS VIEW

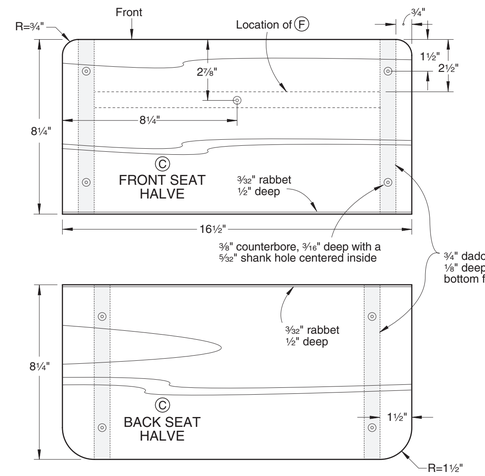




SEAT/STEP STOOL PARTS VIEW DRAWINGS

See page 80





PARTS VIEW