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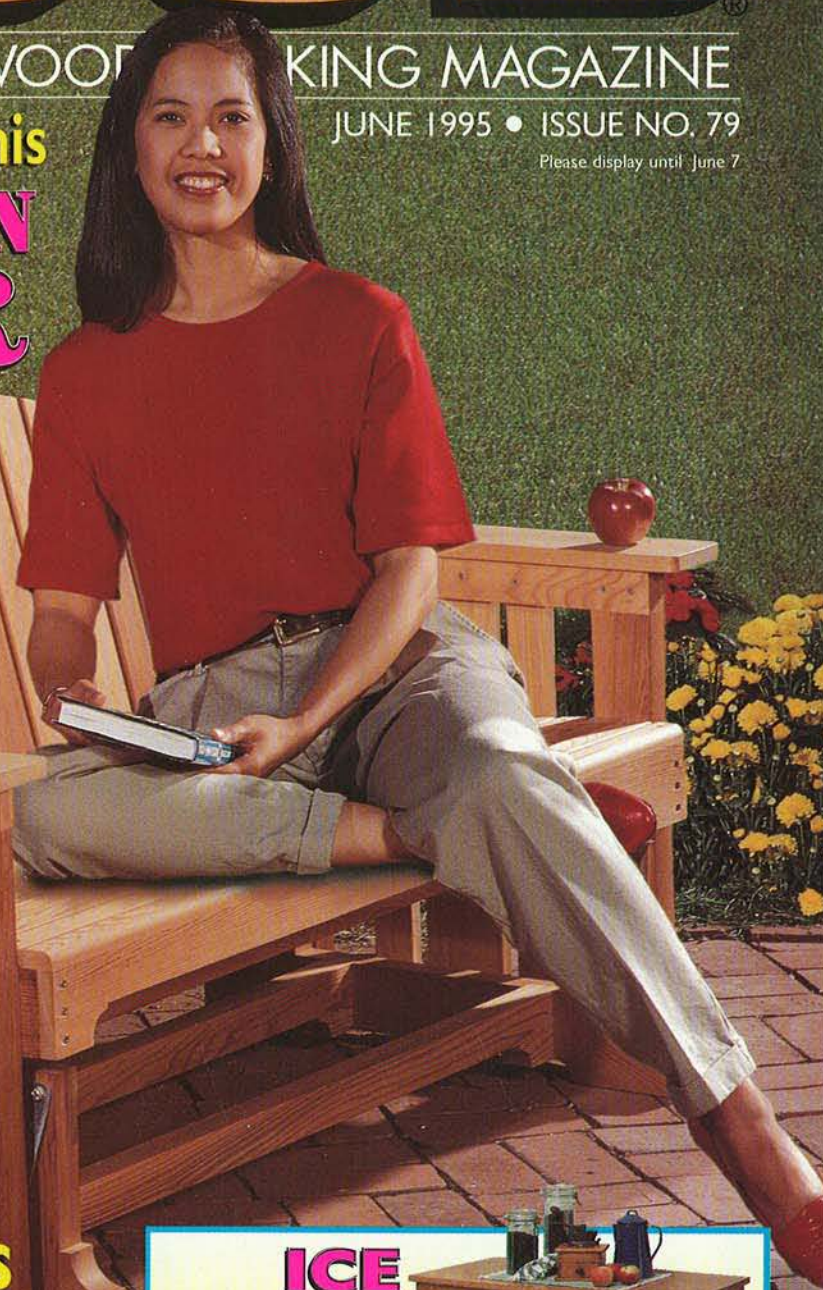
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THE EDITOR'S ANGLE

YOU MIGHT SAY HE'S "REALLY INTO" CHAIRS

Have you ever been out just browsing around and come across something you had no intention of purchasing? And before you realize it, you've bought it? I know I have. And not long ago, so did *WOOD*® magazine reader Greg Wood.

Greg, who is in the process of starting a furniture-making business, told me, "I just took off one morning in the pickup, hoping to find four or five pressed-back chairs to go along with a dining table I had just built for the family. But before the day was over, I got a little carried away."

It turns out that when Greg pulled into a small southern-Iowa town and started looking around, he happened onto a 75-year-old man who owned about 400 old chairs! After talking with Greg for a few minutes, the man and his wife offered to sell Greg their entire inventory—lock, stock, and barrelsful of miscellaneous parts.

So what did Greg get for his \$1,200? "Most of the chairs need a fair amount of work," reports this adventurous woodworker. "But I like refinishing things. And I've turned up a Stickley chair and a folding rocking chair that are pretty neat."



"Refinishing chairs is hard work," says Greg Wood. "Sometimes you just have to sit down and admire what you've done."

And how did he break this interesting news to his wife, Danita? Greg, who just turned 40 years old, told her, "Honey, some guys buy a Ferrari as part of their midlife crises; I bought 400 chairs." And can you believe it; she liked the idea!

So far, Greg has refinished about 100 chairs and has sold 20 of them. Good luck, my friend. May your business grow and prosper.

Larry Clayton

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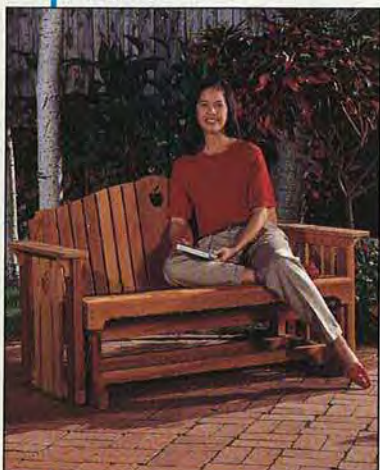
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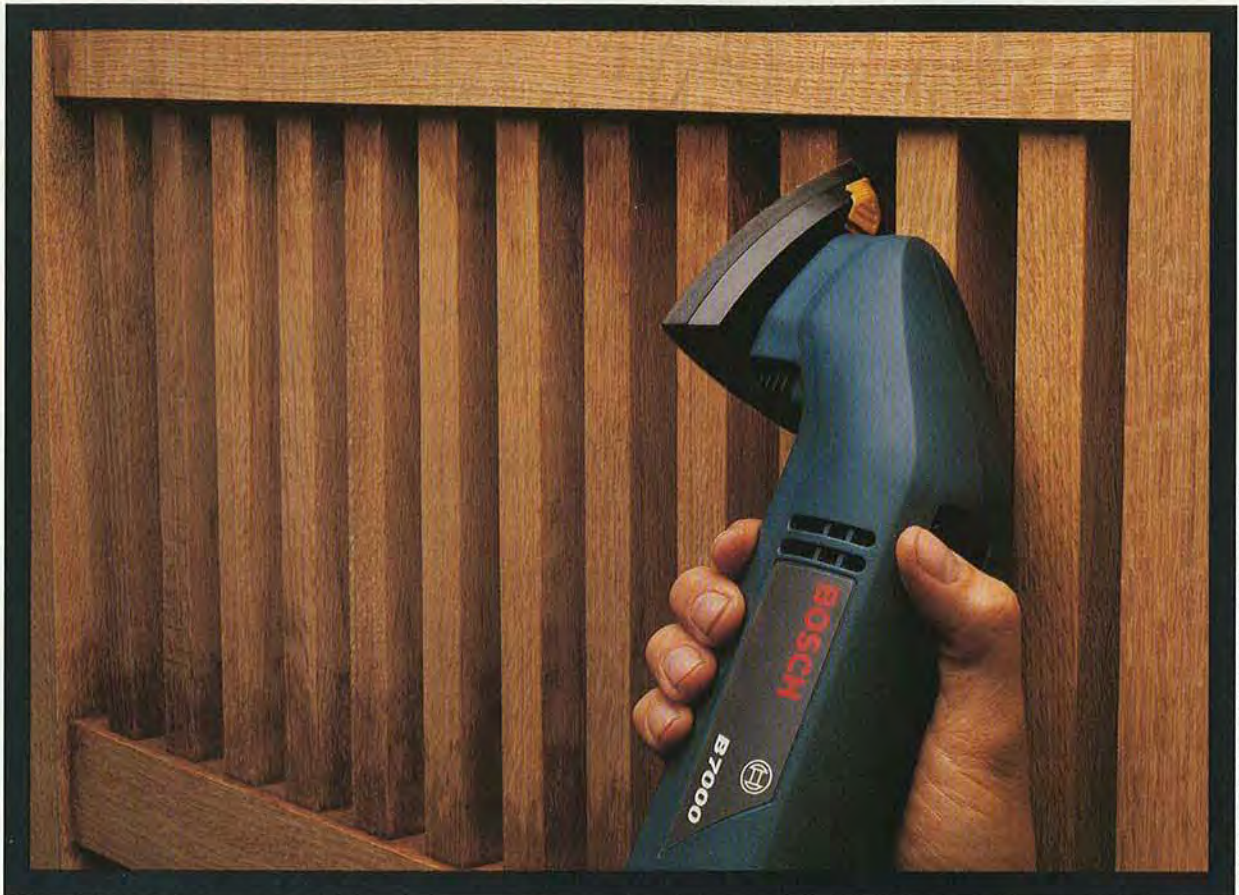
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This issue's cover wood grain:
Bald Cypress



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What
woodworkers
need to know

DRILLING AND BORING TOOLS

Need to make a hole in wood? You'll find a wide array of bits suitable for drilling and boring in wood. Here's a look at some of the popular choices.

•**Standard twist drill.** This bit, the type shown at far left in Photo 1 *below*, is the first one you're likely to think of for drilling holes up to ½" in diameter in wood, metal, or plastic. Inexpensive and readily available, twist drills come in a vast array of sizes. The most common bit sizes are the fractions of an inch from ¼" to ½" in ¼" increments. (You can buy inch-sized twist drills in diameters from ¼" to 1½".)

But, twist drills also come in wire-gauge sizes numbered from 1 through 80—all less than ¼" diameter. (Larger numbers are smaller drills.) Need more sizes? Try letter bits from A to Z. These range from just under ¼" to a little over ½" in diameter, with drill size increasing as you go up the alphabet. If those aren't enough, you'll find bits in metric sizes, too.

You could gather scores of twist drills without any two being the same size. But for most wood-working chores, a set that ranges from ¼" to ½" by 64ths plus the four bits from ¾" to 1" by 16ths will suffice. You can buy the larger bits with reduced-size shanks.

Twist drills work best at higher speeds. In hardwood, you can run bits up to ¾" in diameter as fast as 3,000 rpm. Cut the speed to 1,500 rpm for bits up to ½", and slow down to 750 rpm up to ¼".

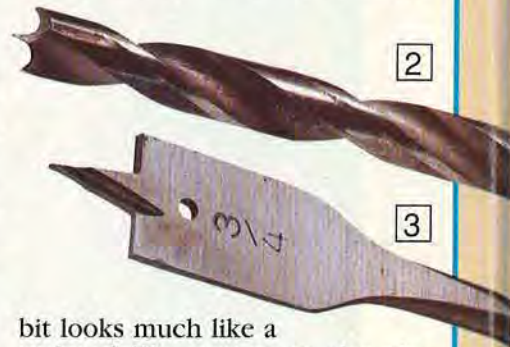
•**Improved twist drill.** Starting a hole with a standard twist drill can be irksome, particularly with a hand-held drill. (For best results, center-punch marks for drilling, even when using a drill press.) So often, after positioning the bit where you want the hole, you pull the trigger and the bit wanders off across the wood, missing the mark completely and marring the surface, too.

Tool manufacturers have brought out new bits that reduce this tendency. Split points, pilot points, and different point angles are some of the tactics used to make premium drills such as the gold and silver ones shown in Photo 1 easier to start.

In addition to the modified tip, many of the new premium bits feature changes to the flute and body aimed at reducing friction and wear while increasing cutting ease. Such bits require less power to drill a hole, so you can drill more holes per charge with your cordless drill. The pilot-point type exits more cleanly than other twist drills, too.

•**Titanium-coated bit.** Some bits feature titanium-nitride or -nitrate coating. The hard, slick finish helps them cut better and last longer, the manufacturers say. WOOD® magazine testing found that the titanium coating offers few advantages for drilling wood. If you drill metal frequently, though, the gold-colored bits represent a good buy.

•**Brad-point bit.** Many woodworkers turn to brad-point bits for precise drilling, particularly for dowel holes. This



bit looks much like a twist drill, except at the tip. There, it's ground nearly flat, but with an extended point in the center—the brad point—and a pair of cutting spurs, as on the bit shown in Photo 2.

The bit's extended point makes lining up on a mark easy. The spurs minimize splintering, making a cleaner cut. And the bottom of a hole drilled with a brad-point bit is nearly flat. Run brad-point bits at about 1,200 rpm for ¼", 1,000 rpm for sizes up to ½", and 750 rpm to 1".

Allowing chips to pack into the flutes on any twist-type drill can overheat the bit and burn the wood. To avoid problems, back the bit out of the hole often to clear the chips.

•**Spade bit.** The flat blade shown in Photo 3 distinguishes this bit from other drills. Spade bits cost little and work well for general drilling in hard or soft woods. They're a good way to go when drilling holes beyond normal twist-drill size, from ½" up to 1½" in diameter. You can buy spade bits as small as ¼".

These bits bore relatively quickly. Don't rely on them for your finest cabinetwork, however. Spade bits don't make particularly clean holes—they seem to scrape and tear the wood more than they cut and slice it.

Continued on page 6



TR215 - Sliding Compound Miter Saw



The Freud Sliding Compound Miter Saw - It's new. It's fast and it's very precise. It's versatile like a radial arm saw and easy to adjust. Best of all, it comes complete with a Freud saw blade, specially designed for our new miter saw. And the price? Very reasonable.

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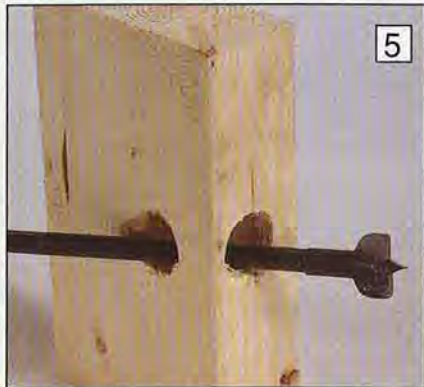
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What woodworkers need to know

DRILLING AND BORING TOOLS

Continued from page 4

4 Variations on the standard spade bit, such as Irwin's Speedbor 2000 and the Vermont American Wood Eater, *left*, offer refinements for faster, cleaner boring. The Wood Eater has a self-feeding screw point. Another style from Vermont American called Around the Corner, Photo 5 *below*, lets you drill, as the name implies, a curved hole—handy for electrical wiring in home remodeling, among other things.



Spade bits and their brethren call for lower speeds. In hardwood, limit the speed to 1,500 rpm for spade bits up to 1", 1,000 rpm for larger ones. Speedbor 2000 bits can go to 1,800 rpm for all sizes. Recommended speed for 1/2" and 3/8" Wood Eater bits is 700 rpm; larger sizes, 600 rpm. Go slow in curves, too: operate the Around the Corner bit in the 600-850 rpm range.

•Powerbore bit. Stanley's Powerbore, Photo 6, drills a cleaner hole than the spade bit. Available in diameters from 3/8" to 1" in 1/8" increments, these bits handle end-grain drilling particularly well. The long, brad-type point guides the bit, and makes it easy to center on a mark. The bit cuts relatively quickly, but doesn't carry chips out



of the hole. So, if you're drilling a deep hole, withdraw the bit frequently to clear the chips. Speeds in the vicinity of 500-750 rpm will work fine.

•Auger bit. Before power drilling, there was the brace and auger bit. Many tool dealers still sell augers with the traditional tapered square shank end for use with a brace. You can also buy a straight-shank version to fit the chuck on your power drill.

Augers, like the one shown in Photo 7, bore smooth holes. They're well-suited to deep-hole boring because of their length: A 1/4" auger is nearly twice as long as a 1/4" twist drill. And you can buy even-longer ship augers and pole augers. While some augers are sized in inch fractions, you'll still find many identified by the traditional number system. Don't let it throw you, though. The number simply refers to the bit diameter in 16ths of an inch. So, a bit marked 10 would be 10/16", or 5/8".

Most augers self-feed with a screw tip. When power-drilling with an auger, don't run the bit at more than 600-700 rpm.

•Forstner bit. A true Forstner bit, named after its inventor, has only a small center point, shown on the left in Photo 8. The outer rim guides the bit instead of the center point, enabling the Forstner to cut holes with nearly flat bottoms and smooth, true sides. That also means you can cut any arc of a hole on a workpiece—the center doesn't have to be on the stock. The small point makes the bit difficult to center on a mark, however.

These are expensive bits, but to many woodworkers, they're the ultimate drilling or boring tool. Sizes generally run from 1/4"-2". For maximum accuracy, you'll want to use the Forstner bit in a drill press. Clear the chips often, and run the bit at a moderate



speed to prevent heat damage to the cutting edge. Try 700 rpm for bits less than 1/2" diameter, 500 rpm for bits up to 1", and 250 for those larger than 1". Carbide-tipped Forstner bits are available.

•Multi-spur bit. Though this one is often called a Forstner bit, it isn't. The teeth around the multi-spur bit's rim (shown at the right in Photo 8) are the difference between it and the Forstner type.

These bits are expensive, but cut cleanly and without splintering. Multi-spur bits work well when drilling into a workpiece on an angle. They do a great job with overlapping holes, too.

Sizes range up to more than 4". You should consider any large one a drill-press-only bit. Even the smaller sizes are much easier to keep under control with the drill press. In hardwood, you can run bits 1" or smaller at about 500 rpm. Slow down to 250 rpm for bits from 1" to 4".

•Holesaw and circle cutter. Instead of taking out the inside of a hole as chips, you can remove it in one chunk with a holesaw or circle cutter, both shown *below*. They're the tools to turn to when you need a really large hole.

Continued on page 8



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DRILLING AND BORING TOOLS

Continued from page 6

You'll find holesaws up to 6" in diameter and circle cutters that adjust to 8" or more.

Holesaws use fixed-size cutters. The cup-shaped blade fits onto a mandrel equipped with a twist drill in the center. The drill bit acts as a pilot for the tool.

The circle cutter (sometimes called a fly cutter) adjusts to any diameter within its range. It also employs a twist drill for a pilot, but cuts with a single blade.

With either, the inside depth of the tool limits

the cutting depth. To go through thick stock, you can drill as far as the tool will go, flop the workpiece, then drill from the back, using the pilot hole as a guide. With a holesaw, you can withdraw the tool when it bottoms out, break the core out of the stock, then saw farther.

Clamp the workpiece firmly when using either one. Holesaws, especially those 1" or less, work well with a portable drill (but hang on tight). Larger holesaws and any size circle cutter should be used only in the drill press. Limit the speed for either tool to 250 rpm.

•**Specialty bits.** If you use a lot of screws in your projects, check out *screw pilot bits*. These inexpensive bits drill the pilot and shank holes for a screw and form a countersink for the head, all in one operation. Other bits of this type counterbore for a plug. The three bits at the lower left side of Photo 10 are typical.

For attaching hinges and other hardware, a *Vix bit*, shown at the upper right of the photo, comes



in handy. A sleeve on this bit fits into the countersunk screw hole on the hardware item, automatically centering the bit, which then extends from the sleeve to drill the screw pilot hole.

An *expansive bit* like the one shown in Photo 11 bores holes of many sizes. A sliding cutter sets the diameter—useful if you need to bore odd-sized holes. The two available sizes cover a range of hole diameters from 5/8" to 5". Interchangeable cutters give the bit shown a range of hole diameters from 5/8" to 3". Power-drilling with one can be problematic, though. You'd be better off using one only with your brace.



General tips for drilling

•Back the workpiece with scrap-wood to minimize splintering when the bit breaks through. This doesn't always guarantee a splinter-free hole when you're using twist drills, however.

•Feed the bit steadily into the work. Don't force the bit, trying to make it cut faster than it's able to. On the other hand, don't feed it with such light pressure that the bit rubs without cutting. Either situation can overheat the bit, dulling it and possibly burning your project part.

•Always secure the workpiece solidly. When possible, use a drill press, and clamp the piece being drilled to the table. When using a portable drill, clamp the work-

piece, and use both hands to hold the drill. Be sure to use an auxiliary side handle when using a large bit in a portable drill.

•Before you start the drill, chuck the bit tightly. Give the chuck key a twist in each of the three holes around the chuck body.

•Wear eye protection whenever you're drilling.

•Clear chips from the hole as you drill. If you're drilling metal, don't sweep the chips away with your hand—they can be razor sharp. Instead, blow them away or use a brush.

•Remember that the bit will be hot, possibly very hot, after drilling. Don't grab hold of it as soon as you pull it from the hole.

•Use only sharp bits. You can sharpen twist drills yourself—although the smaller ones can be difficult to sharpen well. Spade bits sharpen easily.

•When you have a choice, buy bits made of high-speed steel (HSS). They'll hold an edge longer, even if you run them hot. Carbide-tipped tools last a long time, too. (But don't think that carbide-tipped twist drills for masonry drilling will help you in woodworking. They won't.)

To receive a comprehensive drill-press speed chart for use in your shop, send \$1 for postage and handling to WOOD® magazine Speed Chart, 1912 Grand Ave., Des Moines, IA 50309-3379.

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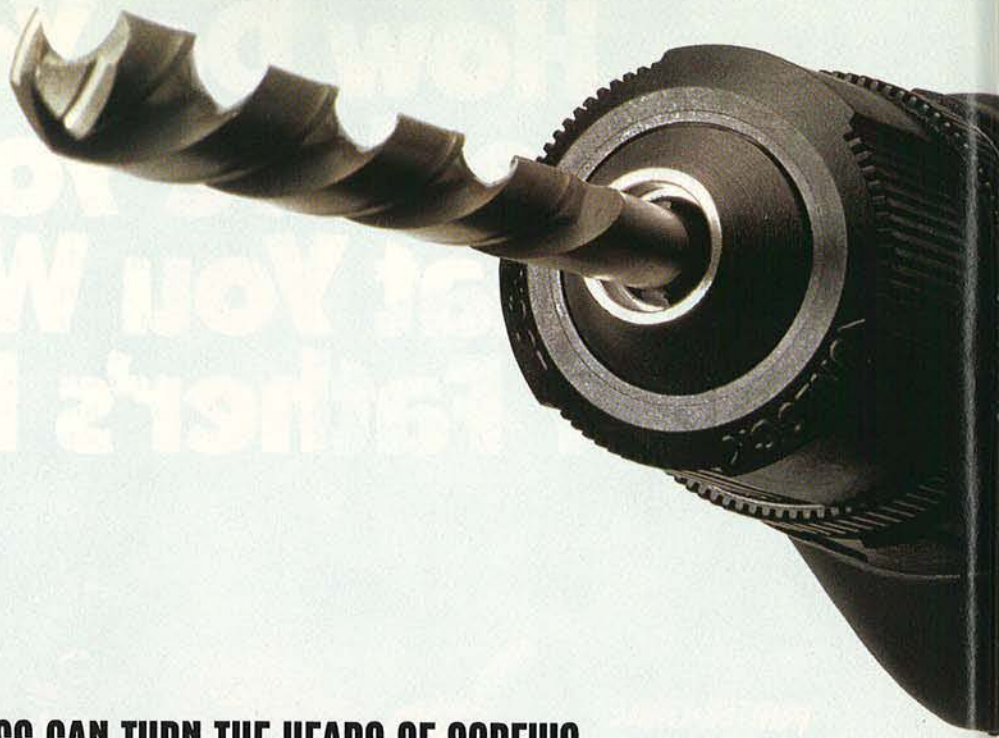
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TALKING BACK



A new twist to the heart and arrow

I tried to modify "Cupid's Mystery Valentine" from the February 1994 issue by running the arrow through from the front of the heart instead of from side-to-side as was shown in the article. Unfortunately, while driving the arrow through the heart, it hit my bench, turned around, and came right back through the front. Fortunately, the arrow missed me on the rebound, but I feel other woodworkers should be warned of this potential problem.

—Steve Emig, Ward Cove, Alaska

Steve, we're glad to hear that you didn't suffer a broken heart.

What? No more Watco?

A long-time favorite finish of woodworkers far and wide, Watco Danish Oil, will no longer be available. The manufacturer halted deliveries on December 1, 1994, just days after a New York investment firm purchased Minwax, the parent company of Watco. The decision also came only nine days after an emotional television report on the spontaneous-combustion hazards of linseed-oil-based finishes. In the Dateline NBC program, Watco was cited as the largest-selling linseed-oil finish, and as the defendant in at least five pending lawsuits alleging inadequate warning labels.

According to Brian Curtiss of Minwax, the decision was not made because of the lawsuits "The business didn't grow and didn't meet profit expectations," Curtiss told me. "We don't have plans to sell the brand to another manufacturer."

So where's a faithful Watco user to turn for an oil finish? In a letter announcing Watco's withdrawal from the market, Minwax president R.W. Harrison suggests Minwax Antique Oil Finish and Minwax Tung Oil Finish as replacements. (We've tried Minwax Antique Oil Finish in the *WOOD* magazine shop with excellent results.)

Two other manufacturers we spoke to, Tom Barnham of Deft, and George Adams of General Finishes, hope you look to their products. "Since the Watco deliveries stopped, the orders for Deftoil are way up," Barnham said. "I don't know the exact Watco formula, but Deftoil is a danish oil that performs like Watco, and comes in the same colors. For more on Deftoil, call 800/544-3338.

Adams told me that General Finishes Danish Oil "performs like the original Watco Oil, before Minwax changed the formula." For information on where to buy General Finishes, call 800/783-6050.

—Bill Krier, Assistant Managing Editor

We welcome comments, criticisms, suggestions, and even compliments. Send your correspondence to: Talking Back, *Better Homes and Gardens*® *WOOD*® Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. CompuServe address: 74404,3516 (or) Internet: 74404.3516@compuserve.com

When should I let it slide?

In "Talking Back" in the February 1994 issue, you illustrated the use of a slotted screw hole as a means of dealing with wood expansion caused by humidity changes. Is there a rule of thumb or a guide for when this expansion slot is required?

—Richard Gartee, Danville, Ky.

Use a slotted screw hole when you fasten a piece of molding across the grain of a board that's wider than 7". This joint works for moldings on the outside of the carcass, as described in the Talking Back article, for fastening wood-drawer supports and internal frames to solid-wood carcass sides, and many other situations involving a long cross-grain overlay.

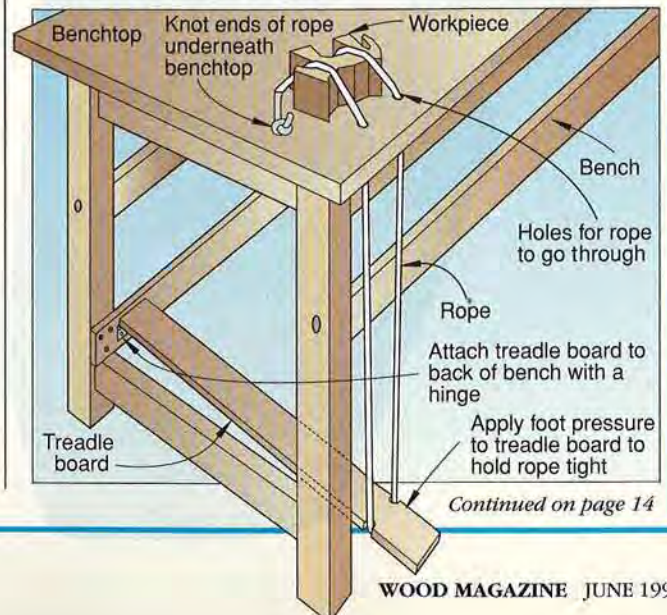
For fastening moldings across the grain of narrower panels, glue the mitered end of the molding and fasten the other end with a finishing nail or brad. There will be enough flex in the nail to compensate for wood movement.

Rope that carving, pardner

In the article "Merry-Go-Round Menagerie" in the January 1994 issue, you have a photo of Jerry Reinhardt using two ropes to hold down a small carousel horse while carving it. How does this rope hold-down work?

—Dean Schlick, Charles City, Iowa

Dean, this hold-down consists of a rope passed through holes in a workbench top, and a treadle board under the bench to apply tension to the rope. See the drawing (below) for more detail on this simple, effective device.



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TALKING BACK

Continued from page 12

Miniature-lathe pattern duplicator

"The Lure of Wood" article in the October 1994 issue showed a picture of Ron Mirabile working on a miniature lathe with a duplicating attachment. Can you help me locate such an attachment I can use for turning wooden pens, perfume applicators, and bottle stoppers?

Richard M. Tong, The Woodlands, Texas

We contacted Bonnie Klein of Klein Design, Inc. about your request, Richard. Her company makes a duplicator that you can use with the small-scale Anker Lathe made by her company. Klein Design also offers a duplicator that works with the Dremel lathe. You can modify it for use with other miniature lathes. For more information, you can write Bonnie at: Klein Design, Inc., 17910 SE 110th Street, Renton, WA 98059. Call 206/226-5937.



Another workshop fire-prevention strategy

In addition to those steps listed in "Simple Strategies to Save Your Shop From Fire" in the February 1994 issue, I found another way to prevent a shop fire (by necessity) when a fire started in the open-frame motor on my 6" jointer/planer. I used a dry-chemical fire extinguisher to put it out. This fire was caused by sanding dust that had accumulated inside the motor. Now I regularly use compressed air to blow out accumulated dust from the motors in my shop.

—Frank Flores, Ida Grove, Iowa

Frank, using compressed air to blow the dust out of an open-frame motor has both good and bad points. While the cleaned motor runs cooler and more efficiently, the compressed air may force dust into the internal starting switch. This dust build-up may not allow the switch contacts to come together, preventing the motor from starting. Then, to get the motor back in operation, you'll need to dismantle and clean the internal switch contacts. That's why we recommend you use totally enclosed motors on all machines operated around sawdust.

Continued on page 17

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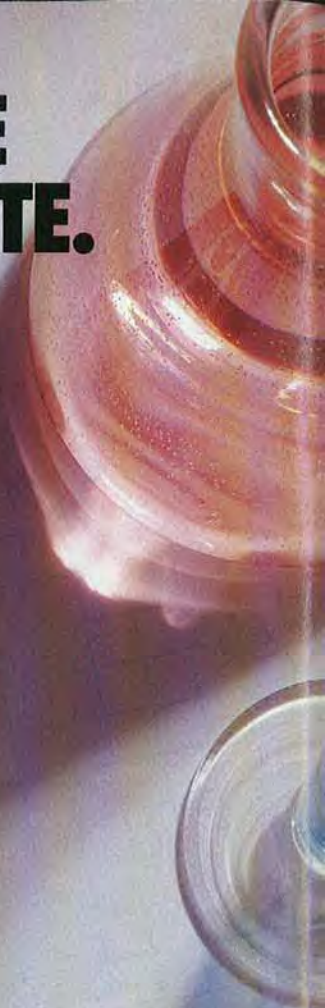
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TALKING BACK

Continued from page 14

Ryobi cures a belt problem

For about eight months, I have used a Ryobi OSS 450 oscillating spindle sander like the one you reviewed in the September 1994 issue. One day it stopped oscillating, although the drum was still turning. I called the service center, and was informed the problem was most likely the oscillating belt. This repair was covered under warranty, but as the belt drive has to be dismantled to replace the belt, this repair is best done at a service center. I feel prospective buyers should take this into consideration before purchasing this machine.

Joe G. Abernathy, Allen, Texas

Joe, for an answer to your concerns, we contacted Frank Coats at Ryobi Tools and received the following response:

"Belt systems on the Ryobi BT3000 tablesaw and the OSS450 sander are designed for a normal-use life-cycle of at least five years.

The compact design of the tools requires the belt system be located within the tool housing. Because of the relatively inaccessible belt location, Ryobi recommends that belts be serviced by one of our more than 200 authorized factory service centers. Service will normally be completed within 1-3 days. In special cases, belt replacement can be accomplished while the customer waits. Call 800/525-2579 for the location of a nearby center.

Belt replacement is covered free of charge under Ryobi's two-year warranty. For tools older than two years, drive belt repairs are given a 90-day limited warranty.

Users can purchase belts and install the parts themselves. Ryobi technical services (800/525-2579) will walk users through the installation. However, tool warranties are voided when repairs are not performed by an authorized service center.

Less than 1% of all BT3000 units sold within the past two years have required belt replacement. However, belt replacements for the OSS450 have been running at a higher-than-normal rate. The problem has recently been traced to a pulley that causes the belt to fail when the unit is used and stored in areas of high humidity. The part has been redesigned and is now available at authorized service centers. Users experiencing belt problems should take the unit to a service center for belt and pulley replacement. The repairs will be made under warranty. We apologize for any inconvenience to our customers." 🌳



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To learn more about the Fein Triangle Sander and its many accessories (for sanding or sawing or scraping or polishing), call 1-800-441-9878.



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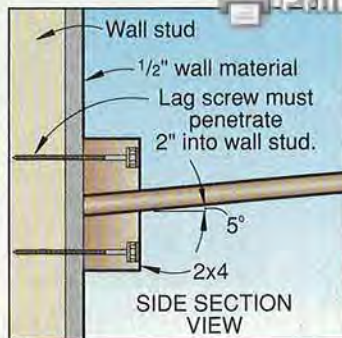
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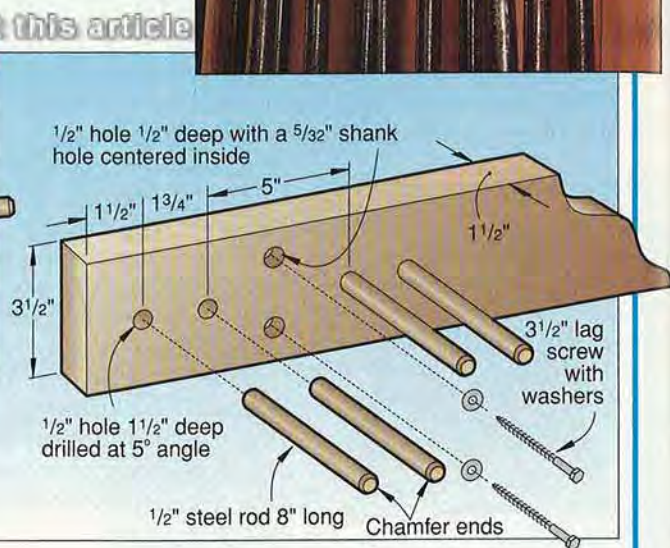


By building this pipe-clamp rack (it takes no time at all), you can store dozens of clamps in a small space. You'll need some 2x4 stock, 1/2" steel rod, 3 1/2" lag screws, and washers. Drill 1/2" holes at a 5° upward angle through the 2x4 where shown. Then, attach the 2x4 to your wall with the lag screws. Cut your steel rod and chamfer the ends (for safety) with a file or bench grinder. Drive the rods into the holes in the 2x4 and hang your clamps.



PIPE-CLAMP RACK

Project Design: Jim Downing
Photograph: John Hetherington
Illustrations: Roxanne LeMoine



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Working in a cabinet shop or construction site, I was never far from an extra set of hands. But as a home woodworker, I'm usually on my own. That's why I appreciate shop tips such as Curran Johnson's prize-winning tip *right* that help free up an extra hand or two.

Most woodworkers have rigged dozens of fixtures like this. As shop tips, these humble helpers could be worth money. So I encourage you to look around your shop and send us a photo or a sketch of anything you've built that you think other home woodworkers would enjoy using.

If we choose to publish your tip, we'll pay you \$40 and you'll earn a chance to win the top shop tip prize. Send your ideas along with a photo or drawing to:

Tips From Your Shop (And Ours)

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We try to publish only original ideas so please send your tip to only one magazine. Also note that we cannot return submissions. Thanks and keep sending those tips.

Tom Jackson

General-Interest Editor

Sliding stop slips down out of the way

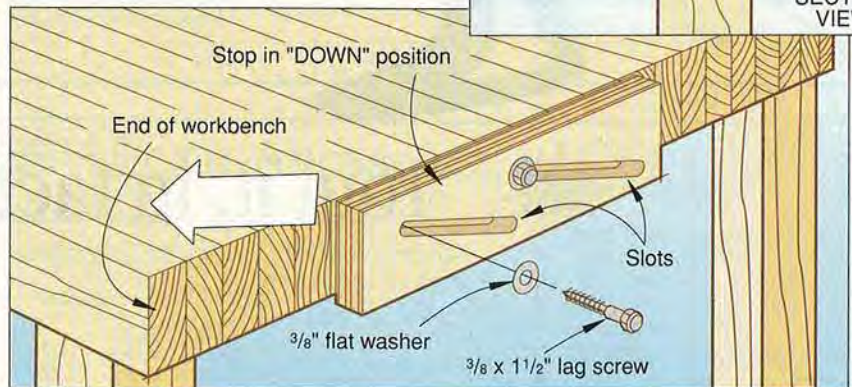
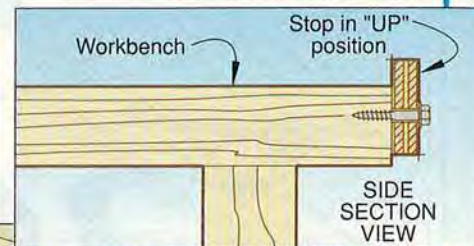
Sometimes you need a solid edge to butt your workpiece against. But clamping a temporary stop to your bench usually proves awkward and time-consuming.

TIP: Mount a stop that slides up and down on the end of your bench. Make the stop from a piece of $\frac{3}{4} \times 2 \times 10$ " plywood, and cut the slots at a 10° angle. Then, install two lag screws to guide the board on the angled slots. Loosen the lag screws whenever you need to raise or lower the stop. Tighten the lag screws when you have the stop in position.

—Curran A. Johnson, Canton, Conn.



For his shop-tip prize, Curran will receive a Sears model 22590 Oscillating Spindle Sander.



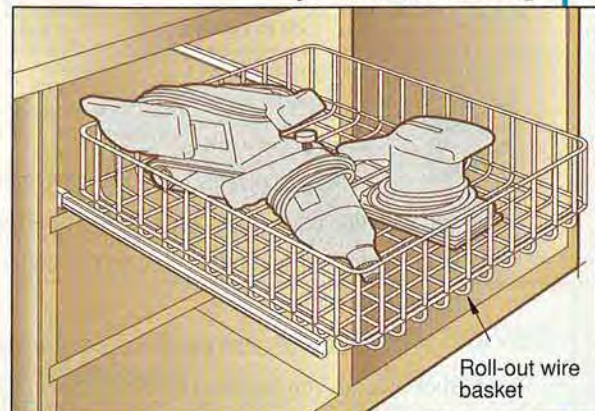
Coated-wire baskets work great in the shop too

Digging around for a tool lost in the deep dark recesses of a shelf or bench enclosure sometimes causes accidents when you run across a sharp bit or blade.

allows sawdust to fall through so you don't have to vacuum it out of the crevices and corners.

—from the WOOD® shop

TIP: Head for the cabinet hardware section of the local homecenter and pick up a few of those coated-wire baskets. These storage drawers ride on glides that enable you to pull them out to where you can see everything in the drawer. Another plus: the wire



Continued on page 22

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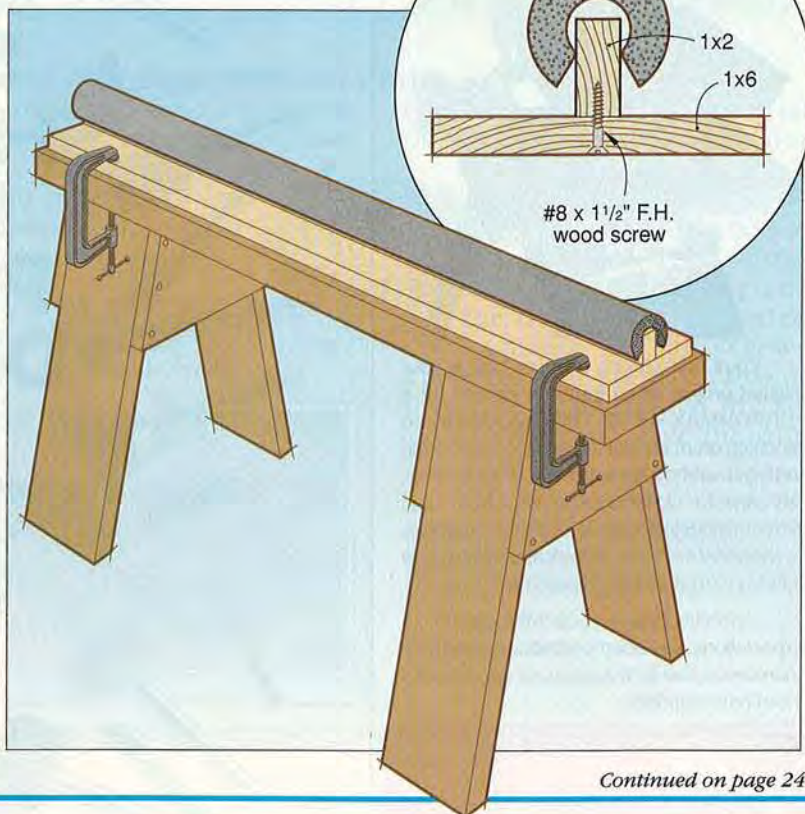
Continued from page 20

Pipe insulation protects work from dings and dents

Sawhorses get plenty of abuse in the shop, so they're not a good surface on which to lay a delicate workpiece. You've tried attaching carpet scraps, but once you staple this material to the sawhorse, you're stuck with a work support that you can't saw on for fear of snagging the blade on the carpet.

TIP: Make a pair of sawhorse pads that you can quickly install or remove as the project requires. Cut two 1x6s and two 1x2s as long as the top of your sawhorse, and glue and screw them together as shown. Next, cut two pieces of foam pipe insulation to the same length and slit them down the middle. Install the foam pipe insulation over the tops of the 1x2s. Now, whenever you need to protect a workpiece, just clamp these two pads to your sawhorses, and lay the workpiece on top of them.

—Steve Whitehouse, Randolph, Mass.



Continued on page 24

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Wood Magazine test, Sept., '93, pg. 45.



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Delta	9" x 80T x 5/8"	204 119
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Ryobi-Makita	14" x 100T x 1"	266 179
Hitachi	15" x 100T x 1"	277 189

For good general purpose cuts use Woodworker II 30T & 40T or Woodworker I

Use small stiffener where possible

QUIET! Also help all your other blades to cut better. Use our 1/8" DAMPENER STIFFENERS, against one side

4" - \$21 Tryable and RETURNABLE. CUTS NOISE to 1/2 or 1/4. Stops vibration, flutter, cutting noise and blade ring. Parallel and flat to .001" 7" and larger available.

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5/8" holes std. Boring up to 1-1/4" \$7.50 extra. Others available. Add \$2.50 Shipping.

REDUCE NOISE 50%-75%

WE RECOMMEND OUR FACTORY SHARPENING as some local sharpening creates problems with Micro-chipped edges reducing blade life & cutting quality. 2-4 DAYS ON THESE AND ALL MAKES OF FLAT FACE & CONCAVE CARBIDE TIP SAWS. SHIP VIA UPS. Typical 10 x 40T \$15.00, 60T \$17.75. Add return UPS \$4.50 or 2nd Day Air \$8.

SATISFACTION GUARANTEED OR FULL CASH REFUND. Fine American saw making & sharpening since 1946.

Dear Mr. Forrest: What a pleasure it is to find a product that is even better than expected. I am a long time owner of a Woodworker I (10"-60T) which I use with your 4" stabilizer, which has consistently produced cross cuts on my radial arm saw which look polished and are far superior than any produced using any other blade I have tried, but it is not good for ripping. When I recently purchased a new Delta 10" Contactor's Saw, I tried it with a couple of premium blades, including a specialized rip blade, as my principal use was ripping 1" oak planks. Although everything checked out, and the blade was sharp, I was not satisfied.

Fortunately, I ran into one of your magazine ads and, despite the price, I purchased a new Woodworker II (10"x1/8"-40T) with a 5" stabilizer. The first thing I did when I opened the package was to nick my finger on one of the teeth. I have never seen a saw blade so sharp! I immediately had to test the new blade, now wearing gloves for the installation (doesn't take me long to look at a horseshoe).

The first cut was ripping a three foot piece of 1" thick oak, I thought that I had mis-set the fence and missed the wood. It was so quiet that I neither heard the cut over the machine noise, nor felt the resistance as I fed the piece into the blade at normal speed. The cut edge was flawless and could have been edge-glued without jointing. I then tried a cross cut on the same piece. It was every bit as smooth as the rip and every bit as quiet and effortless. I have since learned to hear the whisper of the cutting and to feel the almost sensual touch of the blade slicing through the wood. In over 40 years of making sawdust, I have never worked with so fine a blade. I have heard all my life that no combination blade could equal both dedicated rip and cross cut blades, but the WW II proves that to be an "old saw," (pun intended).

As soon as I realized what a terrific tool my new WW II was, I immediately sent you the old WW I and the rip blade for re-sharpening. I have been using it for about six years, so maybe it has worn a bit.

Sincerely, Hank Meltzer Richardson, Texas

GOOD ON ALL FORREST OR OTHER MAKES OF CARBIDE BLADES OR DADO SETS. Total Savings \$82 or more! Nine \$5 sharpening coupons supplied with blade or dado. Offer good through June 30, 1995. Must mention WOOD® mag. to receive coupons and extra bonus.

WOODWORKER II	List	SALE
14" x 40T x 1"	\$215	\$149
14" x 30T x 1"	195	139
12" x 40T x 1"	183	129
12" x 30T x 1"	162	119
10" x 40T x 1/8" or 3/32"	156	119
30T 1/8" or 3/32"	135	99
9" x 40T	146	109
30T	125	99
*8-1/4" x 40T 3/32"	136	99
8" x 40T 3/32"	136	99
30T 3/32"	115	89
7-1/4" x 30T 3/32"	112	69
**NEW 6" x 40T 3/32"	136	89

**NEW For Sears & Makita Table Saws **For Saw Boss

FORREST, WELL - I WILL BE D----- - READ YOUR STATEMENTS ABOUT YOUR BLADES AND ORDERED ONE EACH, WOODWORKER I & II. YOUR BLADES ARE AS ADVERTISED - WHICH IS A PLEASANT CHANGE IN TODAY'S WORLD, SINCE SO MANY CO'S ARE GOING OUT OF BUSINESS THESE DAYS - WILL PLACE THE FOLLOWING ORDER. DO NOT WANT TO BE WITHOUT YOUR BLADES, EVEN THOUGH I AM 71 YEARS OLD. (ORDERED 4 MORE BLADES & 1 STIFFENER).

CARL KLAENHAMMER CASPER, WYOMING

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this trim and crosscut ALL PURPOSE blade gives scratch free POLISHED cuts on all materials RIP or CROSSCUT up to 2".

- All 60T and 3/32" THIN kerf 30° ATB and 5° face hook on 10" dia and under. 12" and 14" are 20° ATB 1/8" K.
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- THIN KERF.

Saves 1/3 wood loss on each cut, radial or table. Feeds easy when used for moderate rip and crosscut on table saw. Reduces "JUMP IN" greatly for better "PULL CONTROL". Practically eliminates bottom splinter on RADIAL-CROSS CUT.

- Totally stops ALL bottom and top splinter on ply veneers in push-cut mode on RADIAL.
- Our STIFFENER STRONGLY RECOMMENDED AGAINST outside of blade only for best cuts.

Made and serviced in USA for your benefit.

	List	SALE
14" x 60T x 1" 1/8"	\$224	\$159
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10" x 60T x 5/8" 3/32" K	162	129
9" x 60T x 5/8" 3/32" K	156	119
8" x 60T x 5/8" 3/32" K	150	109
New 8-1/4" x 60T x 5/8" 3/32" K	150	109
New 7-1/4" x 60T x 5/8" 3/32" K	150	109

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"No tearout on all five woods tested." - Fine Woodworking July/Aug. 1991

Boring up to 1-1/4" SALE! 10% OFF NEW 3/32 Chipper & Shims Incl. Woodworking \$25 per set \$5.50 Per Set Shipping

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Forrest Dado King (Superior)	Frost S0008 (Excellent)	V-A 26742 (Good)	U.S. Saw 800-G-RPD (Fair)	V-A 26747 (Poor)

DURALINE HI-AT For TABLE & RADIAL SAW

(very good on chop saw too!) STOP SPLINTERING those SPLINTERY OAKS, HARDWOOD VENEERS and thin 2 SIDE LAMINATES ON PARTICLE BOARD.

FOR FASTER FEED RATES AND MORE ABSOLUTE SPLINTER CONTROL.

DURALINE HI-AT

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



Jim Forrest, President and designer microscoping cutting edge.

All 5/8" holes. Boring up to 1-1/4" \$7.50 extra. Larger holes - lime basis. Shipping \$4.50

	List	SALE
7-1/4" x 60T 3/32"	\$145	\$119
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10" x 80T 1/8" & 3/32"	207	\$159
SPECIAL SALE! ONLY \$159		
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16" x 100T x 1"	294	\$243

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You've probably read the recent articles on the new "quiet" blades. But the fact of the matter is a Forrest 80 tooth Duraline Hi-AT with blade stiffener cuts 50% quieter than those so-called "quiet" blades.

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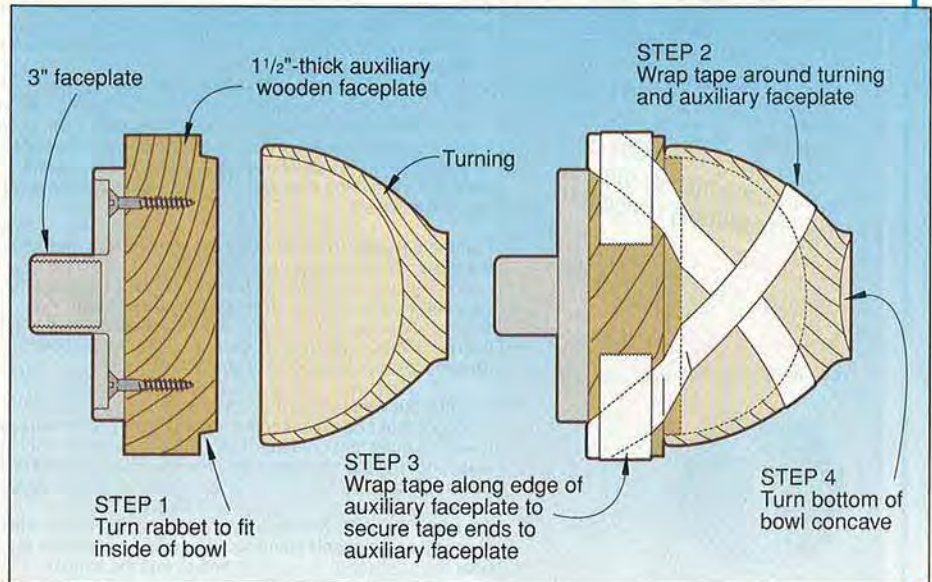
Continued from page 22

Poor man's lathe chuck ends telltale screw holes

Unightly screw holes in the bottom of a turning can detract from its beauty. And sometimes, the bottom won't sit flat enough to prevent rocking.

TIP: This low-tech lathe chuck solves both problems. To use it, proceed with your turning as usual—turn, sand, and add the finish. Then, use a parting tool to separate the turning from the auxiliary wooden faceplate. Using waste stock from the turning (or a separate faceplate with waste stock attached), turn a rabbet on the waste stock to fit snugly inside the top end of the turning, as shown in *Step 1*.

Next, secure the turning to the waste stock with masking tape as shown in *Step 2*, but don't place the tape over the base of the



bowl. Wrap another band of tape around the faceplate to secure the ends of the crisscrossed pieces as shown in *Step 3*. Finally, in *Step 4*, turn on the lathe and

turn and sand the base to a slightly concave shape. This will give you a blemish-free base that sits flat on a table.

—from the WOOD® magazine shop

Continued on page 26

Here's the one thing Belgians don't waffle on.



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The Robland X31 is as welcomed in European workshops as a home run in the World Series. We put together a 12" jointer, 12" planer, 10" table saw, 50" sliding table, and a shaper with a mortiser. No cheating. No compromises. Some 1100 lbs. of cast iron stability, with three separate 3HP motors. It stays put. It stays true, and it stays neatly in a little corner of your shop. That's why Belgians call the Robland X31 The Intelligent One Man Shop. About the only thing you can't make on it is breakfast.

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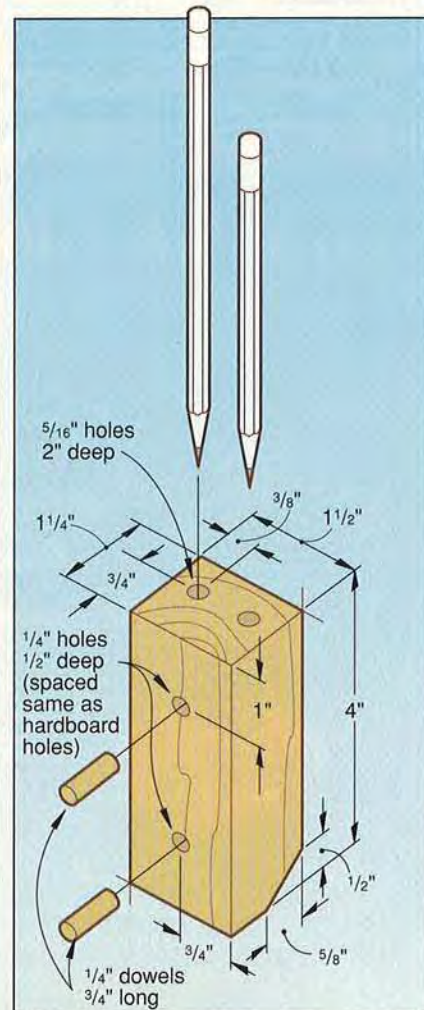
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Scrapwood block puts pencils at your fingertips

Pencils disappear frequently around most workshops. Why? Because few people designate a place to put them.

TIP: Build this simple pencil holder, and you can store pencils anywhere you have perforated hardboard. Cut the block from scrapwood to the dimensions shown, and glue two 1/4" or 1/8" dowels (depending on the size of holes in your hardboard) into holes in the back. Measure your perforated hardboard to get the exact spacing for the dowels. Mount the holder alongside the other tools, and you'll always know where to go for the pencils.

—Greg Galchutt, Brookings, Ore.



Continued on page 28



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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 26

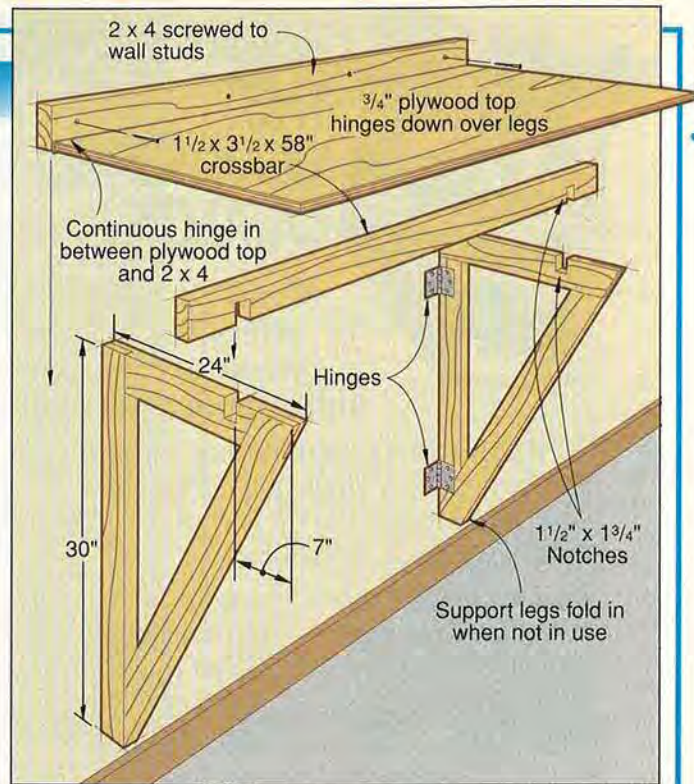
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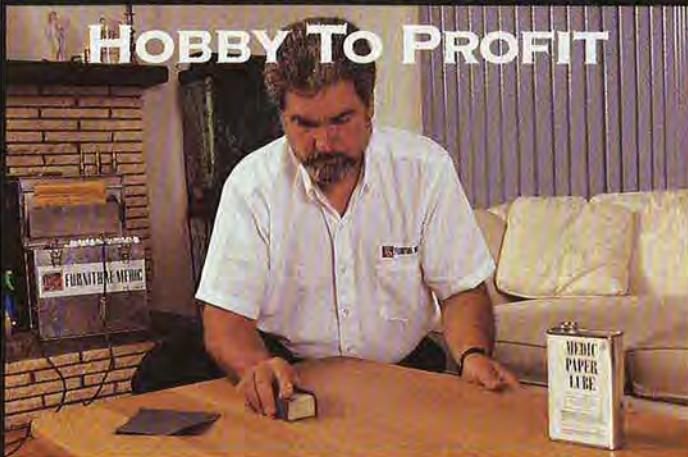


you need to store the table, remove the crossbar, fold the legs flat against the wall, and drop the tabletop down.

—Keith Juryea, Birdsboro, Pa.
Continued on page 30

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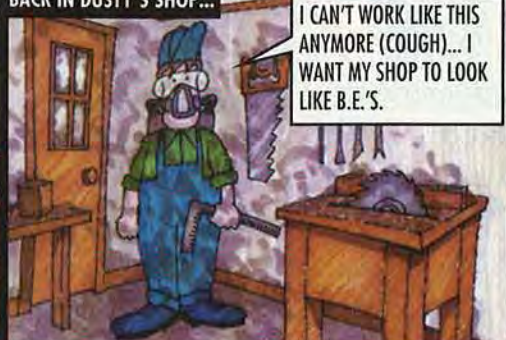


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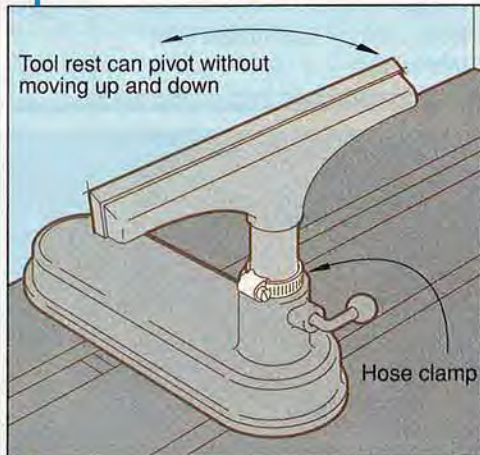
Continued from page 28

Hose clamp marks position of lathe tool rest

When you rotate your lathe's tool rest to cut angles and tapers, it's easy to lose track of the original elevation. And finding that exact spot again can try your patience.

TIP: Slip a \$.25 hose clamp from the hardware store onto the shaft of the tool rest in the position you want to return to, and tighten it down as shown below. Then go ahead and move the tool rest to cut your tapers and angles. When you're ready to return to the original spot, the hose clamp will keep the tool rest at the proper level.

—William D. Phillips, Punxsutawney, Pa.



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- On page 46, find out how to dress up a turning with silver. You can use this technique with copper and brass too!
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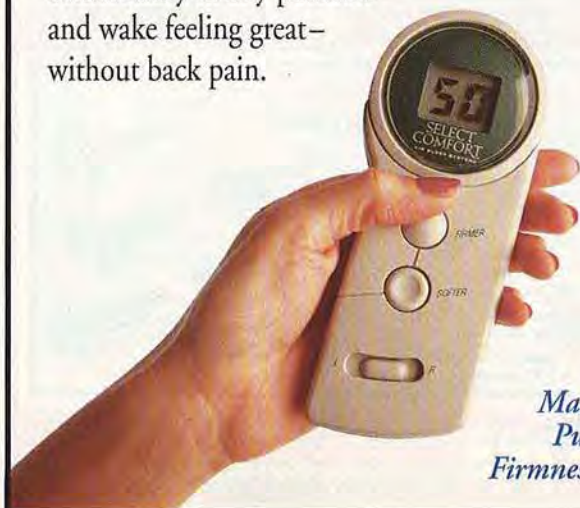
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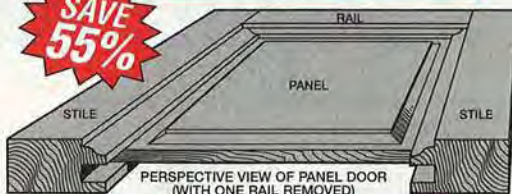
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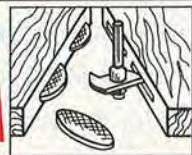
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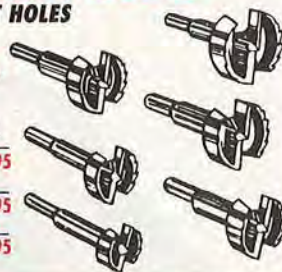
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CARVING'S

Izaak Walton

Colorado trout fisherman and carver Gary Barnard creates his artificial flies in a big way.

"I tie my wooden flies in the same manner a fly tier ties his," says woodcarver Gary Barnard.

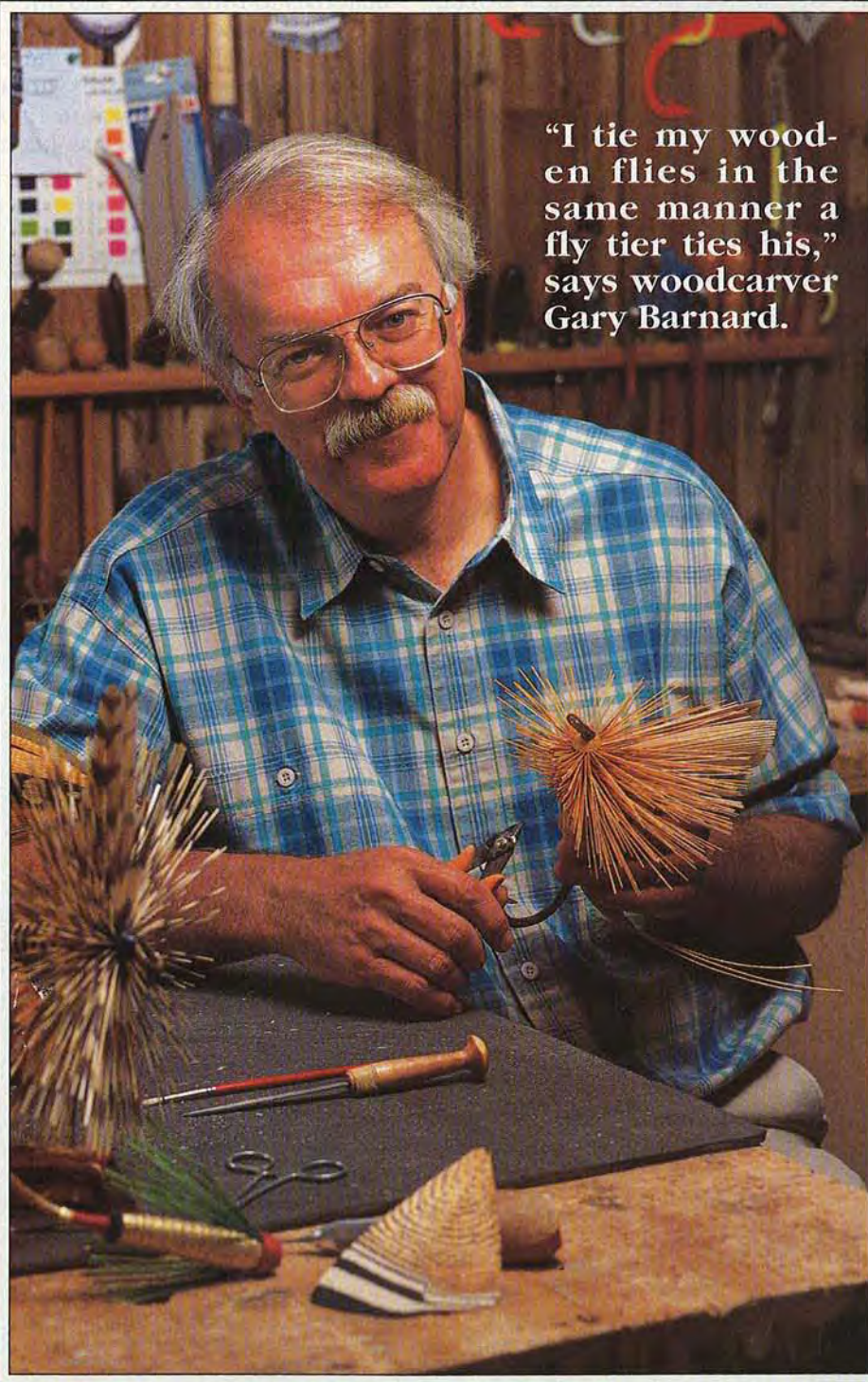
Fly fishing is theater, with the water as a stage, the fisherman as director, and the fly as actor. At least that's how Gary Barnard looks at it. And he's no novice when it comes to angling theatrics.

A native of Colorado, Gary, 53, was raised with a fly rod in his hand. As an adult, he applied his graphic-design talent and dexterity to tying flies. Now, as a full-time carver living in Lakewood, Colorado, he still focuses on artificial flies, but ones ten times life-sized and made of wood.

"A fly is nothing more than a caricature, a cartoon, of a living thing—an insect, fish, or tiny animal," says Gary. "And when it's cast to the surface of a stream, it's being put on stage to act out a role. If a fish hits it, that's just a bonus. The reward is the theatrics of it all, from the waders and gear to the scenery, and the way the fly behaves on the water."

Gary pauses and grins as he looks at the giant, gaudy, dry fly in his hands. Then he con-

Continued



“A fly is nothing more than a caricature, a cartoon, of a living thing – an insect, a fish, or a tiny animal.”

Fly fishing: a heritage of centuries

In 250 A.D. Roman Claudius Aelianus wrote this about fly fishing: “The fishermen wind red wool around their hooks and fasten to the wool two feathers that grow under a cock’s wattles and which are the colour of dark wax.” His graphic description of the technique used by fishermen on a river in what is now Bulgaria marks the first written mention of fly fishing. But we know from Egyptian wall paintings dating to 2000 B.C. depict-

ing men with fishing rods that fishing was a sport even then.

The first written fly-fishing how-to book, though, came from Dame Juliana Berners, an English gentlewoman, who in 1496 not only covered the technique in detail, but prescribed a dozen effective fly patterns for catching trout. And about 150 years later, the most famous fisherman of all, Izaak Walton, in his book *The Compleat Angler*, elaborated on the necessary tackle and tactics

for trout fishing on the spring-fed streams of Staffordshire, England.

So it’s from this centuries-long heritage that today’s fly fishers draw their knowledge, equipment, and technique. And despite the addition of aerospace materials to rods, reels, and lines, the basic presentation of a hand-tied artificial fly (of which there are thousands of patterns) to a wary trout or other game fish remains the same as it has been for at least 500 years.

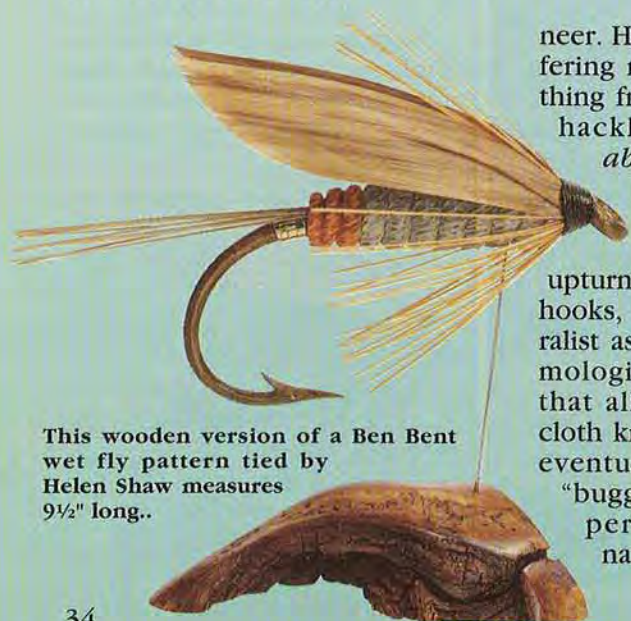
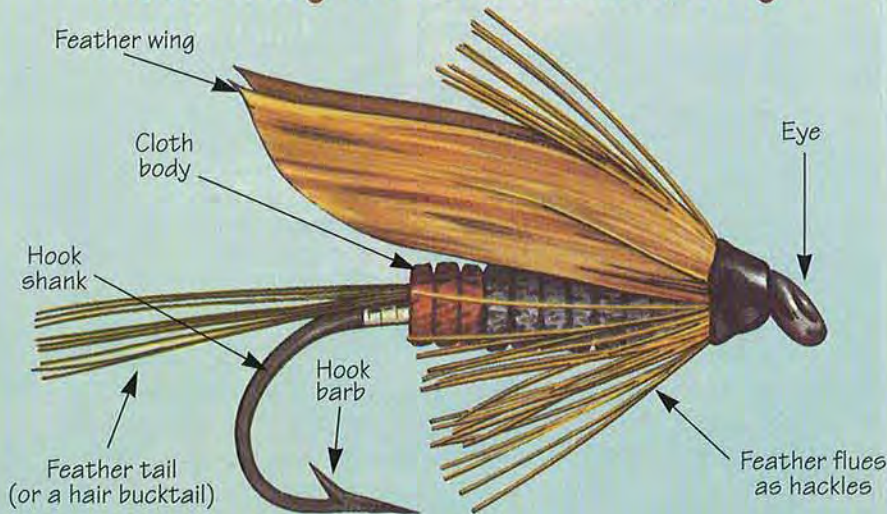
tinues. “Fly fishing is pure fantasy and imagination. The whole sport is an art—even if that statement seems like a cliché. And yes, it’s sometimes important to catch fish, but just to see that fly run and float down the river is what’s most important to me. And fly tying is an extension of all that.”

Tying flies: It’s part technical, part personal

By the Roman writer Aelianus’ description, flies in his time were fairly simple things. But as fly fishing has evolved, so has the fly. And the fly tier.

A fly tier must be a highly skilled technician, yet part naturalist, part artist, and part engi-

Anatomy of an artificial fly



This wooden version of a Ben Bent wet fly pattern tied by Helen Shaw measures 9½" long..

neer. He must know the vastly differing materials required—everything from game-bird feathers for hackles (see the drawing, above) to squirrel hair for bucktails and the pieces of feather flue called herls used for bug bodies, plus upturned hooks and downturned hooks, and on and on. The naturalist aspect also implies an entomologist’s knowledge in order that all the feathers, a type of cloth known as chenille, and hair eventually resemble something “buggy.” The artist part is the personal interpretation of nature in the fly being tied.

Then finally, he has to understand aerodynamics, or else his creation will prove uncastable and useless.

In wood, Gary has discovered that only his materials have changed. “I try to replicate the process of fly tying as much as I can. In effect, I’m tying a wooden fly,” the craftsman explains.

And that’s precisely what Gary set out to do five years ago when he gave up his 25-year career as a graphic designer. He had been carving wood as a hobby for a long time, but knew he was looking for something just a bit out of the ordinary.

“I got to thinking that maybe

The Evening Star, a classic salmon fly, is Gary's 15"-long original version of a pattern tied by Major J. H. Hale in 1895.



This detail photo of The Evening Star shows how Gary carved the eye to simulate a twisted-gut loop and the body set with hackles.

there was a way to combine all my skills; the illustrator, the sculptor and carver, the fly tier," Gary says. "So I decided to try wooden flies, large ones.

"You see, people look at artificial flies, yet they really don't appreciate the art that they represent because what they're looking at is so tiny," Gary continues. "Even the fly fisher may appreciate them only to the extent that they imitate natural fish food. But if they were made really big, there might be more appreciation for the art."

What species makes the perfect fly wood?

Gary knew the traditional materials for fly tying. How could he imitate them with wood? It wasn't easy. "It took me a year to find just the right wood, then see how thin I could make it for feathers," he says. "I also learned how to dye it and to maintain its stability after it was wet, bent, and dried."

The fly tier made some of his first wooden flies from pine, which was okay but not perfect. Next, he tried birch, and even black walnut, but there were problems. "There's a point to which you can take most hardwoods where they become so thin that they're brittle as glass," he says. "On the opposite end, pine and basswood are so soft that they won't hold texture very

well. So I ended up relying on yellow poplar for bodies and wings, although I still use a tiny bit of basswood. For hackles and tails, I split bamboo and cane (see photo on *page 34*)."

According to the carver, yellow poplar may be a bit tougher to work than basswood, but the species has its advantages, especially for flies. "I've figured out that instead of trying to find absolutely straight-grained wood like basswood that's dull and boring with no color to it, I can get straight-grained yellow poplar. Yet, it will have a mottling of color and hues, from a dark, blackish green in the heartwood to white as can be in the sapwood. And all those pieces get used for different things: white, when it's appropriate, for wings, dark wood for the hook, greenish wood for the body. Using the wood the way it should be used is just as important as making the fly the way it should be tied."

Carving dry flies, wet flies, and nymphs

Fly fishing for trout and salmon primarily developed on the waters of England, Ireland,

Scotland, and Wales. Today, the sport reaches all frontiers of the globe, because where no native trout and salmon species existed, the fish were introduced. Artificial flies attract other fish, too, including freshwater pike and saltwater bonefish. That's why the array of fly patterns available seems endless. Here are some basic classifications (a fly tier or serious fly fisher would add many more):

Dry flies float atop the water, buoyed by their feather parts to imitate a newly hatched insect, such as a mayfly. *Wet flies* work underwater, sunk by bits of lead or weighted line to mimic swamped bugs, swimming larvae, and other potential fish food. *Nymphs* are also wet flies, but have emerged as a separate type of fly because they portray living underwater creatures, including freshwater shrimp and insects called midges. And, not surprisingly, there are flies tied that represent nothing at all. Named *attractors*, their flash and dash tease a fish into hitting.

Continued



A closeup of The Colonel shows the wing texturing, the detailed carving of the body wrap, and the thin, split-bamboo hackles.

wet butterflies. Imagine someone taking a butterfly by the nose and dragging it through the water—that's what a tier is trying to replicate. And if I can, I try to hit a happy medium between copying the actual bug and doing the fly as it was intended to be as a tied pattern," says Gary. "But I don't do scale models. My flies are representational. So buying a wooden fly from me is like buying a real fly from a tackle shop. Each one is different, even in the same pattern. Like a cook, I change the ingredients a little each time.

A recipe for a wooden fly begins with the hook

Gary's first wooden fly was a dry-fly pattern called a quill. Originally created to ride high on tumbling streams, it was heavily hackled, as is The Colonel, shown in the photo left.

"I made it all with hand-carving tools," Gary recalls. "The body and wings were all textured, and I made the hackles from pine that I peeled down to about the diameter of a toothpick. And I left it all naturally colored with a clear finish. It was a pretty piece, but after that first one I knew that a natural finish—and pine—was not always the way to go."

Today, with yellow poplar and bamboo, plus dyes, stains, and some paint, he feels that he can

Within each type of fly classification, there may be hundreds of patterns and variations. Some go back to the earliest days of fly fishing. Many are more modern—in fact new patterns are tied every day. Their names can reflect the original tier, the creature they represent, or just a fantasy. Gary knows this rich legacy of fly fishing, yet like most tiers, he isn't afraid to interpret, even if the flies he makes are of wood.

"Some flies are intended to replicate certain bugs. For instance,



This classic salmon fly called The Colonel is a mixed-wing pattern that dates back to the late 1800s. Gary's version is 15" long.

DETAILS OF TYING A WOODEN FLY



Left: After carving, shaping, and finishing the hook, Gary hand-carves the wrap of the fly body along the shank. His carving imitates the real material.

Right: For the individual feather flues called hackles on a real fly, Gary splits bamboo down to 1/32". To curl the hackles, he steam-bends them singly or in bundles. Dye gives them color.



“Imagine someone taking a butterfly by the nose and dragging it through the water...that’s what a tier is trying to replicate.”

represent any of the vast materials in the recipes that a fly tier draws from. He also follows the general order in which a real fly is made.

Gary selects the proper hook shape and size from among the many cardboard patterns hanging on the wall. Then, after tracing the pattern onto 1" or 1¼" yellow poplar stock, he saws out the hook with a jigsaw. Now, Gary shapes the hook with a knife, riffler files, and a 1" belt sander. “Working the bend is touchy,” he says. “For strength, the grain must run with the hook shank. This means that the bend runs cross-grain. It’s here, and at the hook eye, that the wood can snap.”

When the hook and barb are carved, Gary fine-sands the wood to ready it for finishing (for now, he leaves the body part uncarved). He explains: “I then oil-stain the hook and varnish it because the finish actually toughens the wood for handling.”

How to imitate materials in wood

A fly tier tying a real fly has several choices of material for the body: winds of fuzzy cloth called chenille, colored thread, clipped deer hair, shiny Mylar ribbon, bright braid, or combinations of them. To imitate the real thing,

Modeled after a dragon fly, this 15" Blue Damsel in yellow poplar and bamboo is Gary's interpretation of a version done by fly tier Scott Dawkins.

Gary carves thread wraps with a series of stop cuts and grooves with a knife. For fluffier chenille, he switches to a Foredom power carver. For shiny Mylar and similar materials, he has a special technique. “I lay-in tiny flat cuts—like chip carving. Then, after the wood is dyed, I can let the varnish pool in those places to catch the light and reflect the color.”

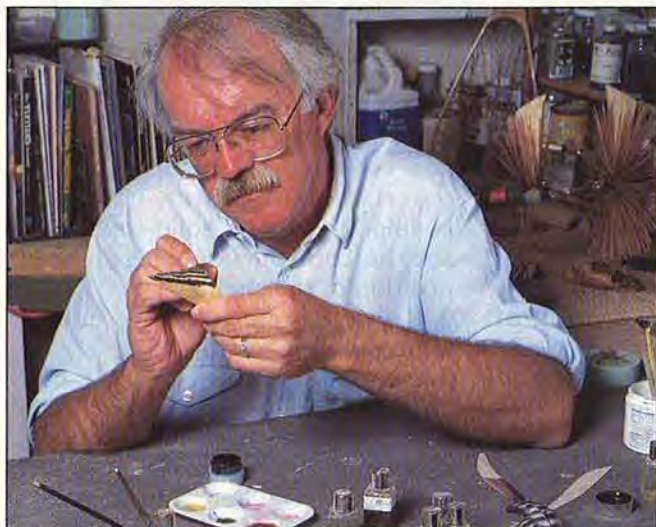
Although Gary prefers dyes and stains because he likes the wood grain to show, he uses paint where pearlized material would be used. “I can simulate pearlized material by starting with white stain, then dyeing it with dapples of pink, blue, and green” he says. “then, if I varnish it while the dye is still wet, the colors blend together quite nicely.”

After Gary carves, colors, and varnishes the entire fly body, he adds the wings, hackles, and any other parts, such as tails, crafted earlier. The wings, for instance, he makes from resawn stock hand-planed to less than ¼" thick. Then, he textures them with a veining gouge and file. Gary next dampens the wood with water, bends it to shape, and lets it dry.

With all the handwork, you'd expect Gary's wooden flies to carry sky-high price tags. But no. His prices begin at \$150 and range up to \$800 and possibly more, depending on the finished size and the complexity of the requested pattern. “The price of custom work actually reflects what someone might spend for a collectible fly from a noted tier of the past,” says Gary. He chuckles. “As I said, fly fishing is all theater, and the fly fisherman is particular about choosing his costume, right down to the fly.”

Casting about for a wooden fly?

For a descriptive price list of Gary's fly patterns in wood, write him (enclose a SASE): Gary Barnard, Fishfeathers & Wood, 815 Hoyt St., Lakewood, CO 80215. Or call 303/237-4082.



Left: To color the thin wings of yellow poplar and other parts, the woodcarver relies on dyes and stains that he mixes himself. Often thinly applied, they allow the wood grain to show through.

Right: After drilling holes in the body, Gary glues in the bamboo hackles. Depending on the dry-fly pattern he's “tying,” a fly can have as many as 300 of them.



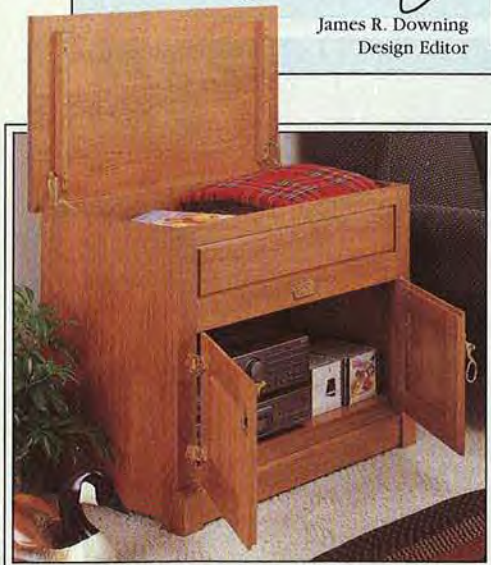
A HARDWORKING ADAPTATION OF A ONE COOL

With so many traditional icebox plans on the market, I decided that something different might be in order. So I asked Bob Colpetzer, a regular design contributor to *WOOD*® magazine, if he had any ideas. After researching the subject, Bob showed us many configurations used in building yesterday's iceboxes. Our favorite is the "ice chest," similar to the one shown at *right*.

This project offers ample storage for afghans and blankets. And it's also the right size for use as an entertainment center.

J. R. Downing

James R. Downing
Design Editor



Start with the carcass and lid

1 Edge-join enough solid stock to form the end panels (A), fixed shelves (B), lid (C), and upper back (D). See the Cutting Diagram and the Bill of Materials for reference. (To minimize warping of these wide panels, we edge-joined boards about 4½" in width and alternated the end grain. Also, we formed our panels so that they are about 1" extra in length and ½" extra in width initially. This allowed us to crosscut both ends

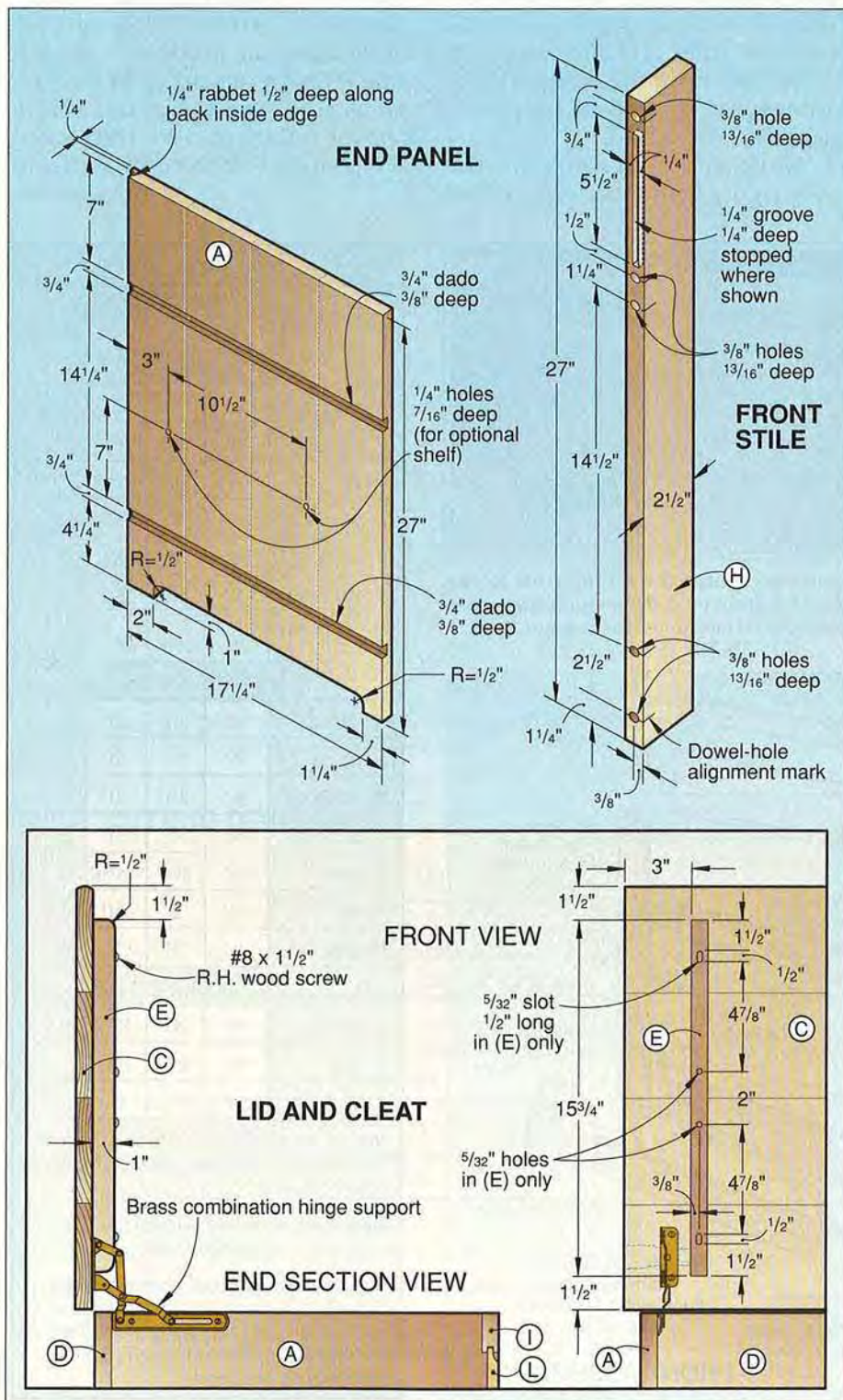
of each laminated panel flush and square and trim both edges. If you're using the project as an entertainment center, consider adding a ¾×17×34" solid oak shelf. See the End Panel drawing for the position of the shelf.

2 Rip and crosscut the edge-joined oak panels (A, B, C, D) to the finished size listed in the Bill of Materials.

3 Mark and then cut the ¾" dados on the *inside face* of each end panel (A) where dimensioned on the End Panel drawing. Using a

TURN-OF-THE-CENTURY ICE CHEST

CABINET



narrower dado blade, cut a 1/4" rabbet 1/2" deep along the back inside edge of each end panel. Also, if you plan on adding the optional shelf, drill a pair of 1/4" holes 7/16" deep in each side panel where shown on the drawing.

4 Mark the shape, and then band-saw the notch along the bottom end of each end panel. Use a 1"-diameter drum sander to sand the radiused corners smooth.

5 Fit your table-mounted router with a 1/2" round-over bit and fence as shown in the Lid Edge detail accompanying the Exploded View drawing. Rout the front and ends (not the back edge) of the lid (C).

6 To minimize the chances of the lid warping, cut a pair of cleats (E), and screw them to the bottom of the lid where shown on the Lid and Cleat drawing.

7 Cut the lower back (F) to size, and cut the radiused notch to shape along its bottom edge.

8 Cut a 1/2" rabbet 1/2" deep along both ends of the upper and lower backs (D, F) where shown on the Exploded View drawing and accompanying Rabbet detail.

9 Dry-clamp the carcass assembly (A, B, D, F) in the configuration shown on the Exploded View drawing to check the fit. For fitting the lower back panel (F) later, the back edges of the shelves (B) must be recessed 1/4" from the back edge of the end panels (A).

10 Measure the rabbeted opening for back panel (G), and cut it to size from 1/4" oak plywood.

11 Drill countersunk mounting holes through the upper and lower backs (D, F) and into the back edge of the end panels (A). Remove the clamps.

Continued

ONE COOL CABINET

12 Glue and clamp the carcase together, checking for square. Drive the screws now. They eliminate the need for a couple of clamps and help hold the assembly square while the glue dries.

Now, let's construct the front assembly

1 Cut the face-frame stiles (H), rails (I, J, K), and panel (L) to the sizes listed in the Bill of Materials. Note that the raised panel (L) is

cut from 1/2"-thick stock. Dry-clamp the face frame together, and check that it fits properly against the front of the cabinet.

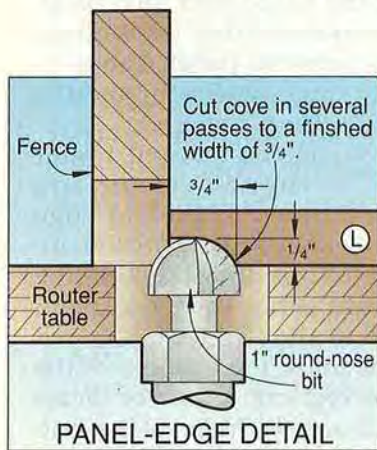
2 Using the Front Stile drawing on the *previous* page for reference, mark dowel-hole alignment marks on both stiles (H) and rails (I, J, and K.) Remove the clamps. Using a doweling jig, drill 3/8" holes 1 1/2" deep where marked.

3 Mark the locations of the stopped groove on the inside

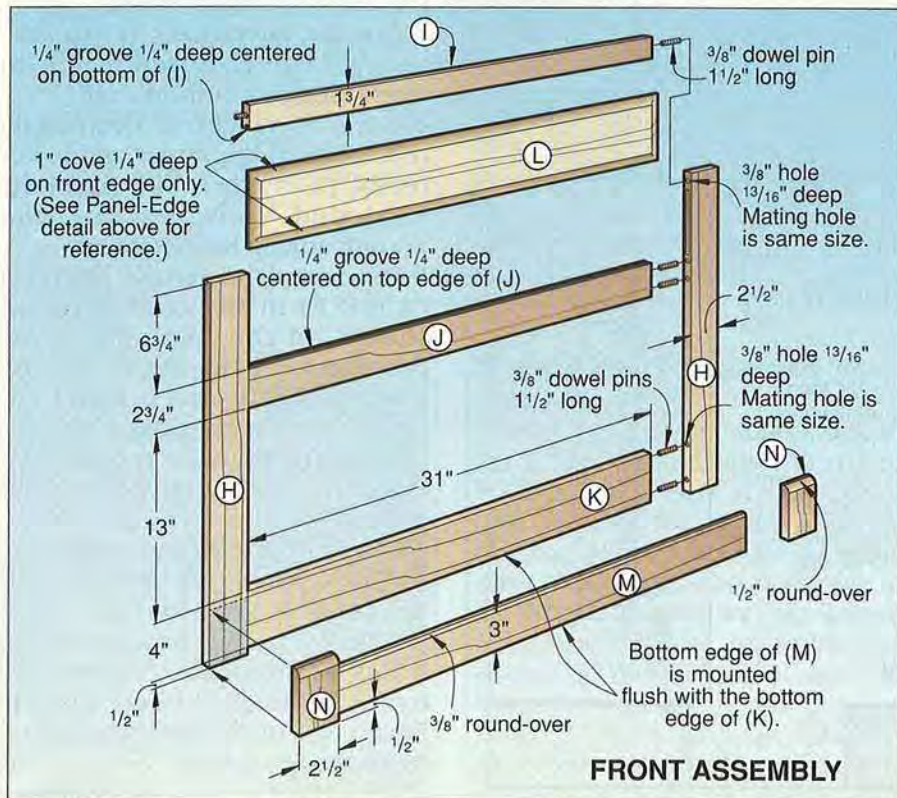
edge of each stile where dimensioned on the Front Stile drawing. The grooves house the ends of the raised panel (L) later.

4 Fit your table-mounted router with a 1/4" straight bit and a fence. Rout a 1/4" groove 1/4" deep centered along the inside face of each stile (H) where marked in the previous step. See the photo *below left* for reference. (We test-routed scrap stock first to verify start and

Continued



Using a fence to center the straight bit to the stock, rout a 1/4" groove 1/4" deep along the inside face of each stile (H) to house the top panel (L).

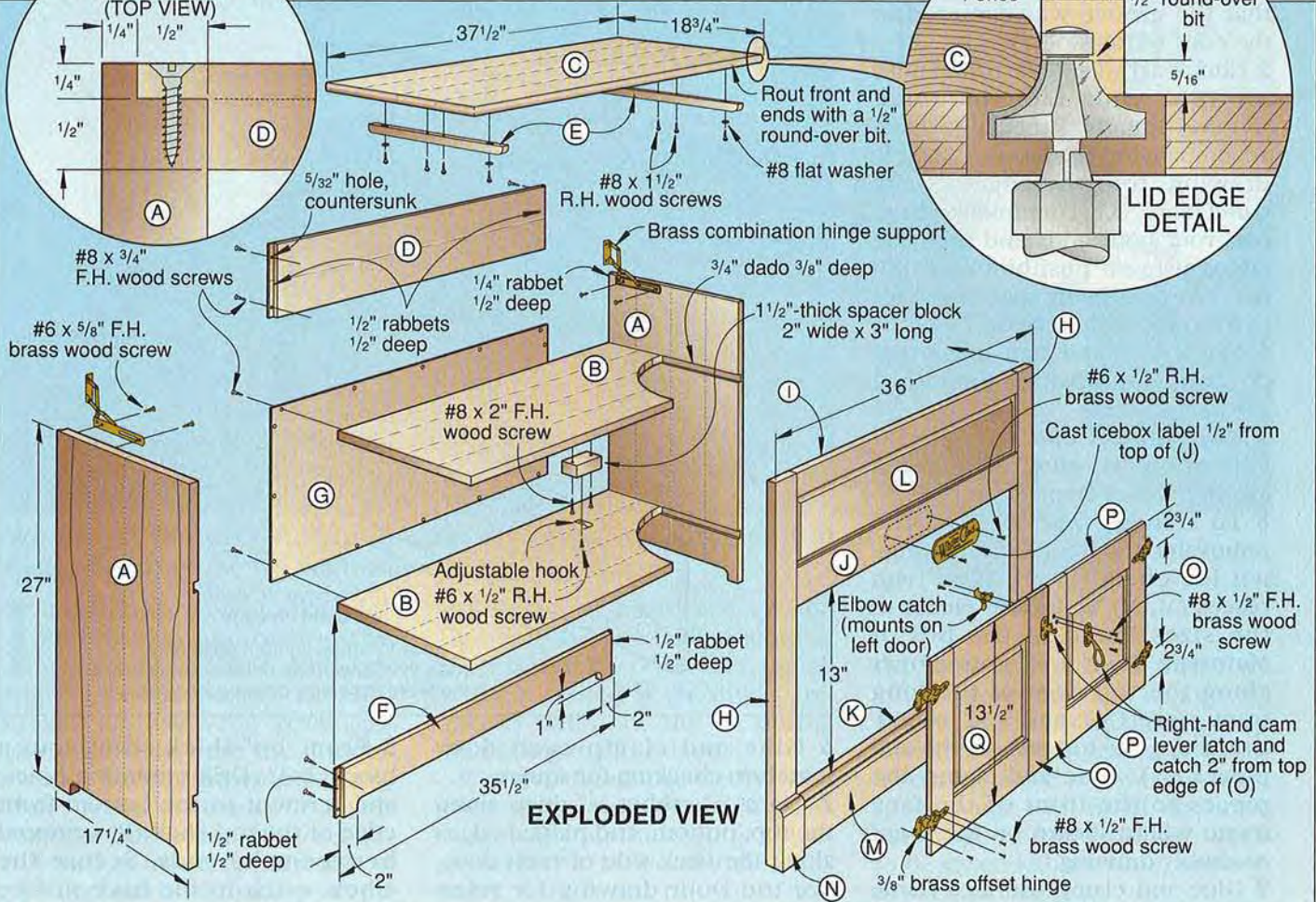
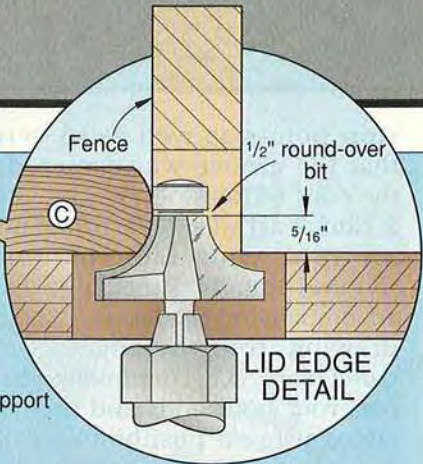
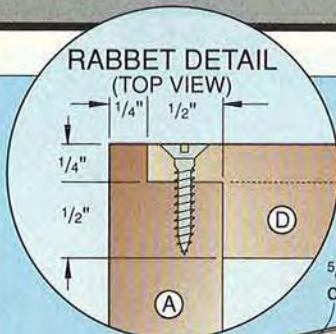


Bill of Materials					
Part	Finished Size			Mater.	Qty.
	T	W	L		
BASIC CARCASE					
A* end panels	3/4"	17 1/4"	27"	EO	2
B* shelves	3/4"	17"	35 1/4"	EO	2
C* lid	3/4"	18 3/4"	37 1/2"	EO	1
D* upper back	3/4"	7"	35 1/2"	EO	1
E cleats	3/4"	1"	15 3/4"	O	2
F lower back	3/4"	4 1/4"	35 1/2"	O	1
G middle back panel	1/4"	15 3/4"	35 1/2"	OP	1
FRONT ASSEMBLY					
H stiles	3/4"	2 1/2"	27"	O	2
I top rail	3/4"	1 3/4"	31"	O	1
J middle rail	3/4"	2 3/4"	31"	O	1
K bottom rail	3/4"	4"	31"	O	1
L panel	1/2"	57 1/16"	31 7/16"	O	1
M trim	1/2"	3"	31"	O	1
N ends	3/4"	2 1/2"	4"	O	2
DOORS					
O stiles	3/4"	2 3/4"	13 1/2"	O	4
P rails	3/4"	2 3/4"	10 1/4"	O	4
Q panels	1/2"	10 11/16"	8 7/16"	EO	2

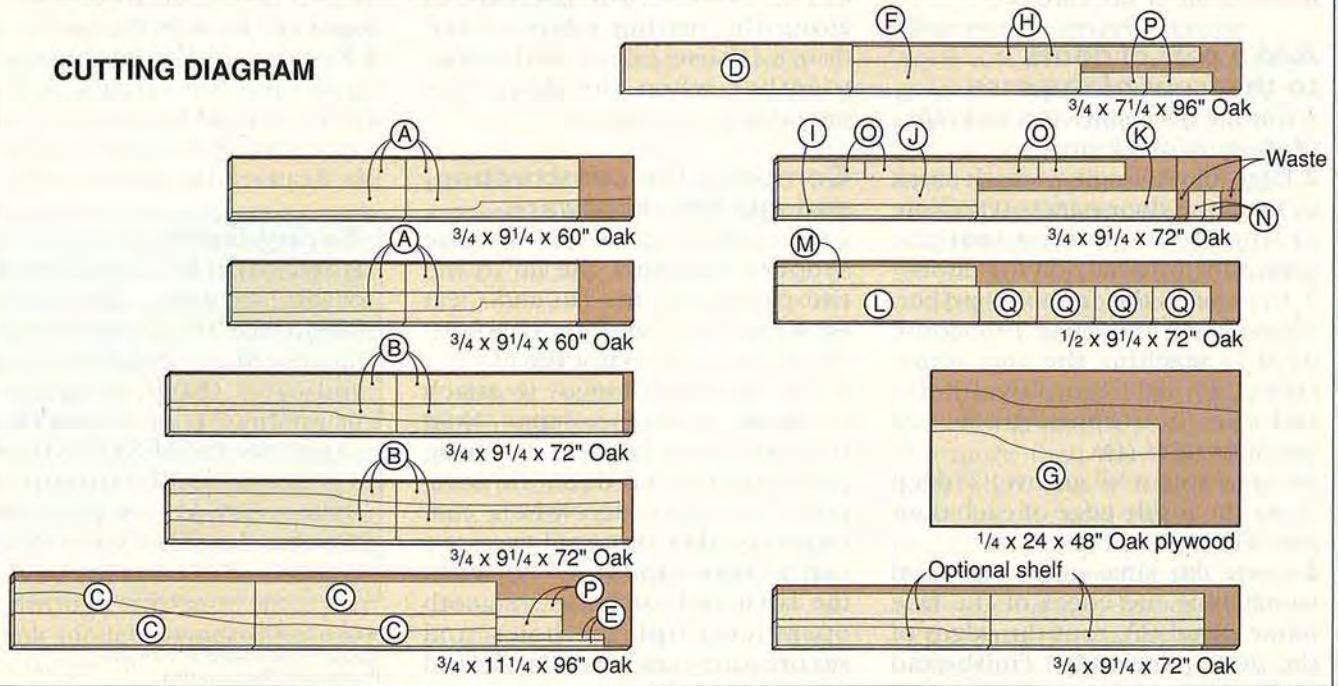
*Initially cut parts marked with an * oversized. Then, trim each to finished size according to the how-to instructions.

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

Supplies: #6x1/2" flathead wood screws, #8x3/4" flathead wood screws, #8x1 1/2" roundhead wood screws and four #8 flat washers, #8x2" flathead wood screws, 3/8" dowel pins 1 1/2" long, stain, clear finish.

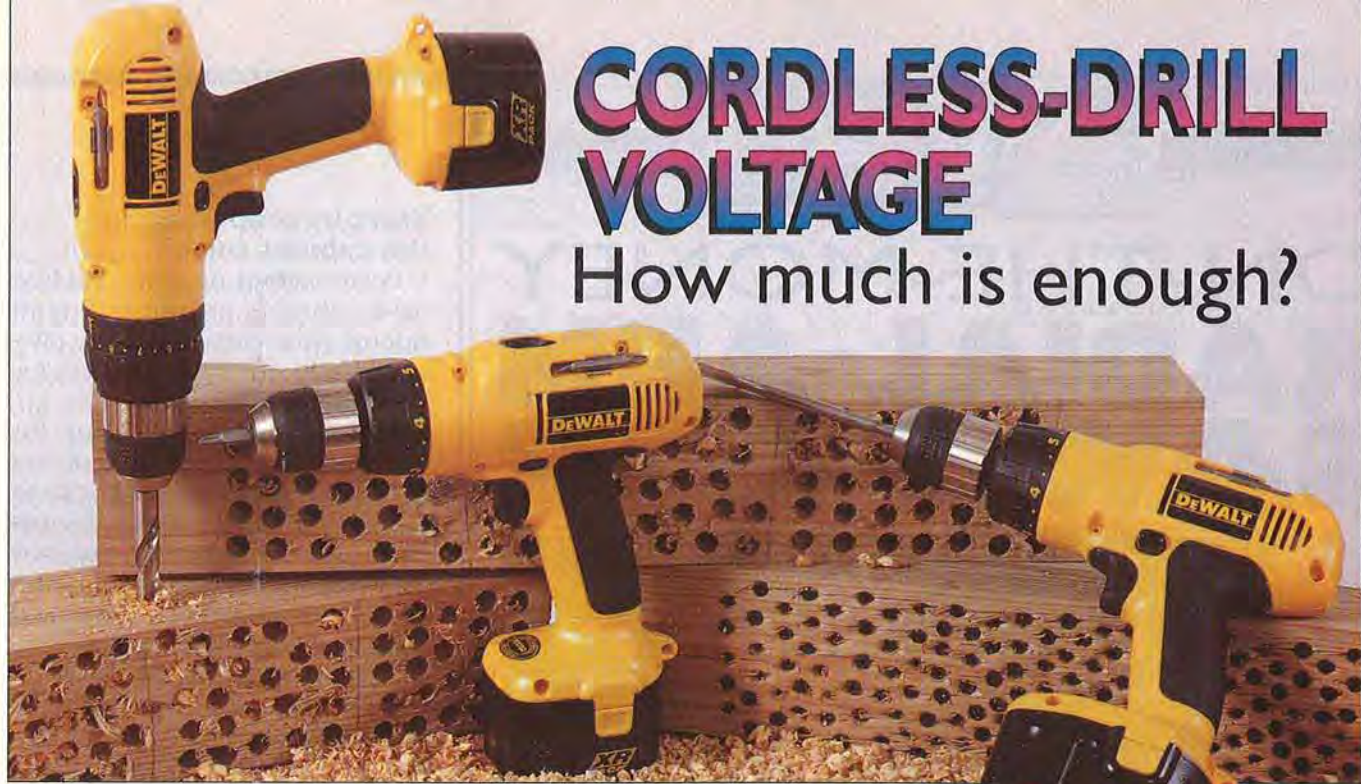


CUTTING DIAGRAM



CORDLESS-DRILL VOLTAGE

How much is enough?



We bored hundreds of holes and drove pound after pound of fasteners to come up with our voltage guidelines.

In a literal “power struggle” among manufacturers, the voltage of cordless drills has gone in one direction recently: straight up. Just a few years ago, 12-volt models were the musclemen of battery-powered tools. Then, Freud debuted a 13.2-volt cordless drill, and in 1994 a 14.4-volt DeWalt model appeared.

To find out how much power a woodworker really needs, we put three similar drills of different voltages, but of the same brand, through a variety of demanding tasks. The DeWalt models in our trials were the DW962K-2 (9.6 volts with two batteries, about \$180), DW972K-2 (12 volts with two batteries, \$190), and DW991K (14.4 volts with one battery, \$200). You can also save about \$20 on the 9.6- and 12-volt models by buying versions with just one battery pack.

Here's what happened in our side-by-side trials

In our first test, we chucked a new ½" twist bit into each drill and bored as many holes as possible through a treated 4×4. The 9.6-volt model averaged 28 holes per charge, the 12-volt unit produced 35 holes, and the 14.4-volt

tool drilled 44 holes. The 12- and 14.4-volt models drilled slightly faster than the 9.6-volt unit, but all of them stalled if we didn't frequently withdraw the bit during the drilling to clear debris.

We also tried the drills with some of the most demanding bits in our shop, including a 1½" spade bit, a 1" wood-auger bit, and a 2" Forstner bit. All of the drills handled these bits in 1½" pine, but for harder or thicker material we suggest you use a ½" electric drill.

Next, we drove 3" drywall screws and ¼×3" lag screws into our treated 4×4. The 9.6-volt drill averaged 170 drywall screws and 30 lag screws. The 12-volt model buried 220 drywall screws and 42 lag screws. And the 14.4-volt model averaged 265 drywall screws and 49 lag screws.

Black & Decker, maker of DeWalt tools, lists the power of these units, expressed in inch/pounds of torque, as 175, 200, and 235 for the 9.6-, 12-, and 14.4-volt models respectively. Although we could feel the differences in torque in our wrists, all of the drills had sufficient power for most any workshop task. However, we did find that with

the higher-powered units we could sometimes get away with drilling big holes or driving large fasteners in high gear. (All of the machines have a low- and high-speed range.) All in all, the main advantage of extra voltage seems to be extended run time, more so than extra torque.

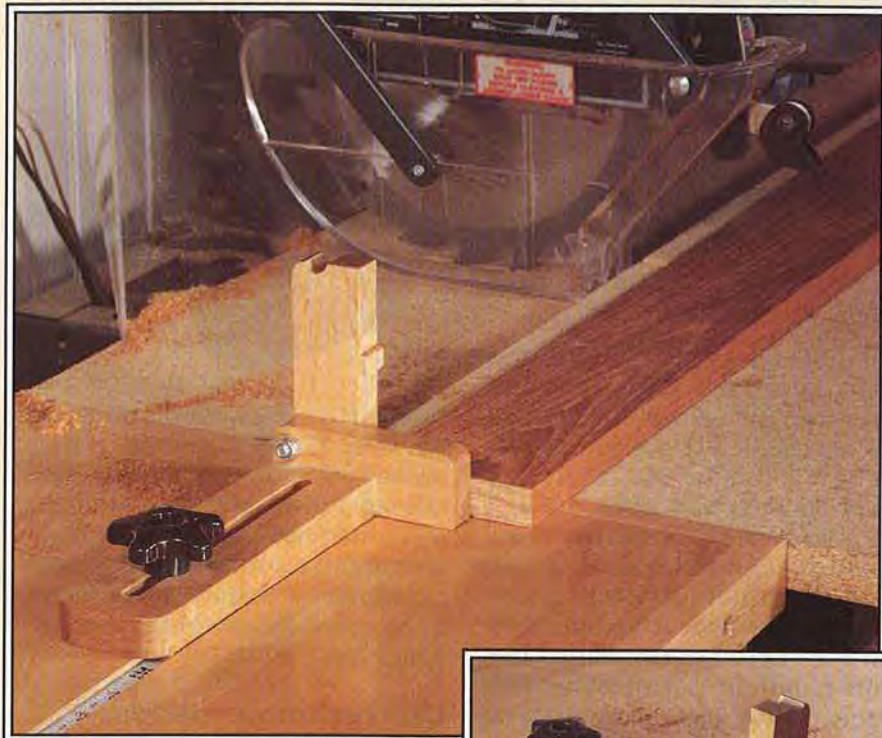
Our recommendations

A 9.6-volt machine will handle 99 percent of the drilling and driving tasks a woodworker will likely run into. If you do construction tasks that require you to drive long lag screws, or several hundred deck or drywall screws, you'll appreciate the extra power and run time of a higher-voltage machine.

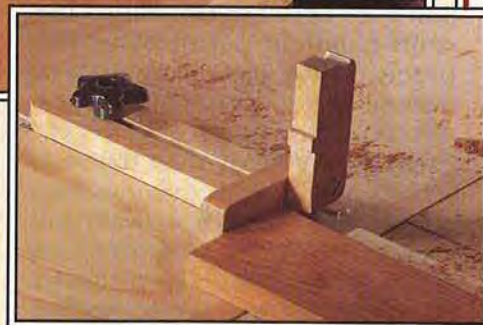
Among the tested DeWalt drills, we recommend buying the 12-volt machine with *two* battery packs for two reasons. First, it costs only \$10 more than the 9.6-volt, two-battery kit, and it clearly delivers more torque and run time. And, the 12-volt kit costs \$10 less than the 14.4-volt model that comes with *one* battery. In our trials, the extra battery proved itself more valuable than the additional 2.4 volts of the larger unit. ♣

Photography: John Hetherington Photography

ON-THE-MONEY RADIAL-ARM SAW STOP



Looking for a way to expand your radial-arm saw's cutoff capability and create more work surface? If so, here's how we set up our radial-arm saw center in IDEA SHOP 2. We positioned two 4'-wide base cabinets to the left of the saw, added a top, and designed a sliding stop to fit into a groove in the top. The stop allows you to eliminate the need for a fence, creating more usable, unobstructed work surface.



Buying Guide

Tape and knob. Self-stick metal tape measure, reads right to left, 12' long, catalog no. 100-045, \$7.95. Star knob, 2¼" dia. with 1/4-20 threaded insert, catalog no. 862-214, \$1.20. Woodworker's Supply Inc., 1108 North Glenn Road, Casper, WY, 82601 or call 800/645-9292.

Start by preparing the cabinet top

1 Position two or more kitchen base cabinets on the left-hand side of your radial-arm saw. (We added two 48" base cabinets for an 8'-long storage unit.)

2 To form the 1½"-thick top for the base cabinets, cut two pieces of ¾" plywood (we used birch) to size. With the edges and ends flush, glue and clamp the two plywood pieces together face-to-face. Later, band the edges with solid stock to hide the plies.

3 Temporarily position the laminated top on the base cabinets. You'll probably need to add sub-bases to raise your cabinets so the top surface of the laminated top is flush with the top surface of the radial-arm saw table. Build the subbases and secure them to the bottom of the cabinets. Mark the location and cut or rout a ½" groove ⅝" deep along the length of your cabinet top, flush with the front of the radial-arm saw fence where shown on the drawing titled Positioning the Tape.

4 Mark a centerline parallel to the groove and ⅝" behind it where shown on the drawing. Drill ⅝" holes 6" apart down the length of the marked centerline. Using epoxy, adhere a ¼" T-nut into each hole on the bottom side of the cabinet top. A few drops of epoxy is critical to keep the T-nuts from falling out of the holes over time. Be careful not to get any epoxy in the threaded part of the T-nut.

5 Fit a ⅝×½×96" length of aluminum bar stock into the groove. Position one end of the bar flush with the left-hand end of the cabinet top. Trim the other end (that nearest the saw blade) ¼" from the right-hand end of the laminated top to allow for adjustment. See Positioning the Tape drawing for reference.

6 Cut a ⅜" slot ½" long into the end of the aluminum stock where shown on the Adjustment detail.

(We drilled two $\frac{3}{16}$ " holes and scrollsawed the waste between the holes to form the slot.)

7 Fit the aluminum bar into the groove. Now, drill a $\frac{1}{8}$ " pilot hole through the center of the slot in the aluminum bar and into the laminated top.

8 Position the laminated top on the cabinets. Then, secure the laminated top to the cabinet tops.

9 Before removing the back of the self-adhesive tape, hold one end (the 0" end) of the tape against the left edge of the saw blade. Mark the point where the tape meets the end of the aluminum bar stock, and cut the tape in two here. Now, remove the backing and adhere the tape to the aluminum bar stock. See the Buying Guide for our self-adhesive measuring tape source.

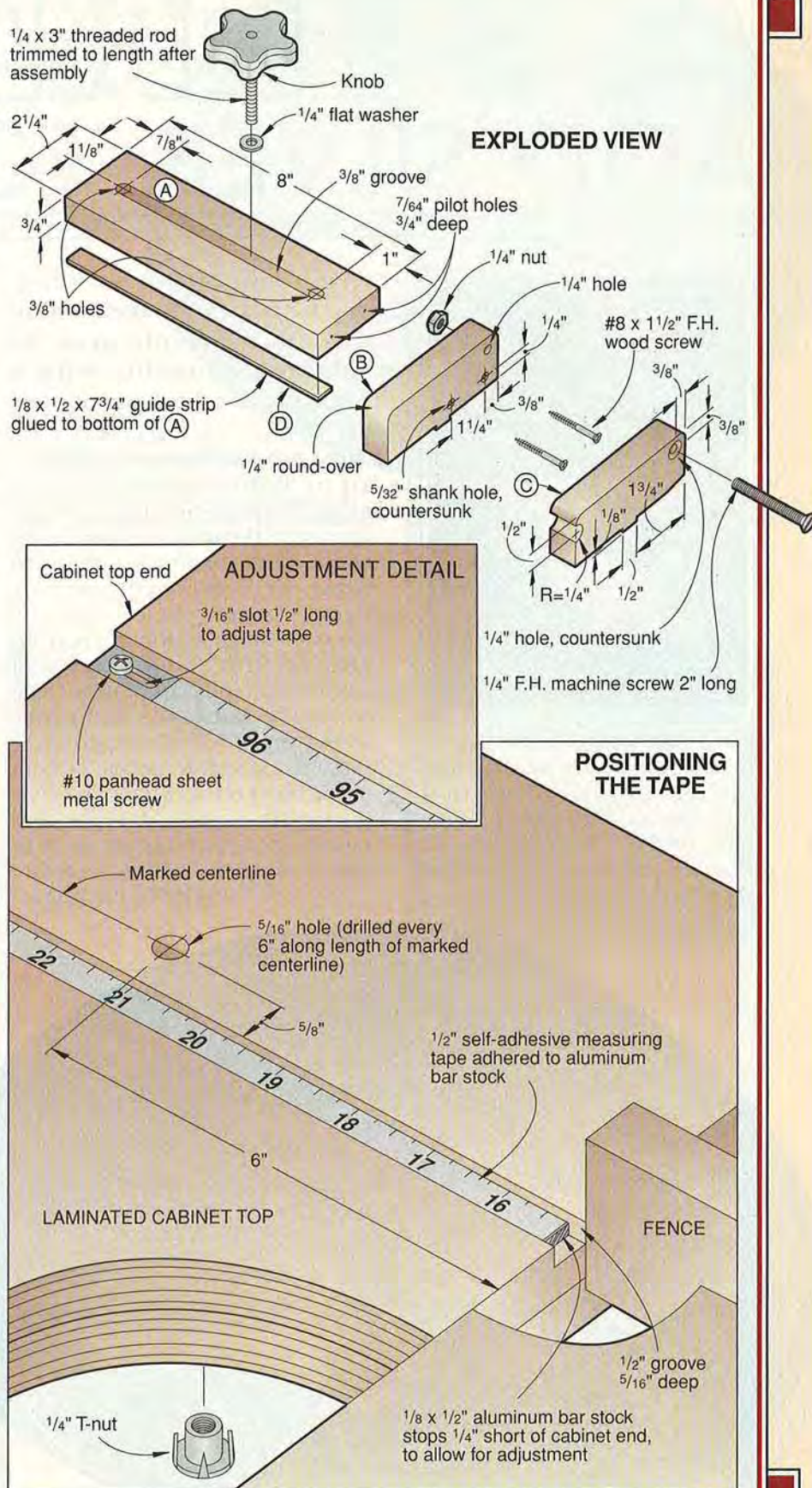
And, now for the stop

1 From $\frac{3}{4}$ "-thick maple, cut the stop body (A) to size. See the full-sized patterns for parts A, B, and C on the *WOOD PATTERNS*TM insert in the center of the magazine. Mark the slot location, and drill a $\frac{3}{8}$ " hole at each end of the slot. Draw a pair of lines to connect the outside edges of the holes, and scrollsaw along the lines to remove the waste and form the slot.

2 Transfer the full-sized patterns for the support (B) and the flip-up stop end (C) to $\frac{3}{4}$ " stock, and cut them to shape. Cut part D to size. Drill the holes and assemble the pieces in the configuration shown on the Exploded View drawing.

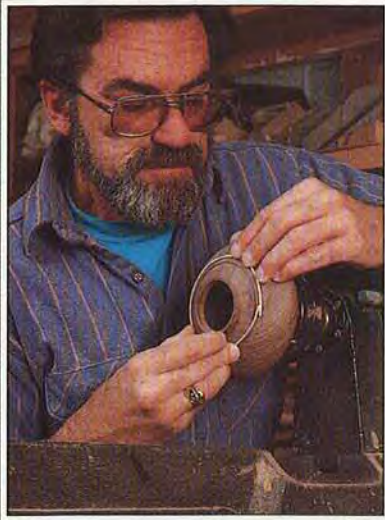
3 Epoxy a 3" length of $\frac{1}{4}$ " threaded rod into the threaded insert in a plastic knob (see the Buying Guide for our source). Trim the opposite end of the rod so it reaches through part A, through the cabinet top and into the $\frac{1}{4}$ " T-nut. The length of the threaded rod will vary with the thickness of your cabinet top.

Continued on page 93



A STERLING

ADD SILVER TO YOUR



Frank Nabrotzky's turnings really sparkle. That's because the Salt Lake City woodturner inlays them with silver. When we saw how straightforward Frank's process is, we knew you would want to learn about it.

Here's a technique we think you turners will take a shine to. It's a simple way to brighten a turning with a dramatic touch of silver.

Turn a bowl for your silver

To try Frank's silver inlay technique yourself, first turn a vessel to receive the inlay. A closed form about 6" in diameter, similar to either one shown on the *opposite page*, is a good choice. The precious-metal inlay looks great on urns, too. (For a wide selection of suitable shapes, check out the Southwest-style bowls in the June 1994 issue of *WOOD*® magazine.)

Mount a faceplate on the bottom of the bowl blank. Attach the faceplate with screws, driven either directly into your turning stock or into a wooden auxiliary faceplate glued to the blank.

Round the blank and establish the top of the rim and the bottom of the base with parting-tool cuts. Turn the blank to the major diameter and form the profile with a $\frac{3}{8}$ " or $\frac{1}{2}$ " bowl gouge.

Size the turning to allow for an inlay 3–6" in diameter. Circles in this size range make nicely proportioned accents when using the $\frac{1}{16}$ " square silver wire shown.

Mark the vessel's inside depth on the shank of your bowl gouge with a piece of tape. Then, bore straight into the center of the turning with the gouge, stopping at the mark. From that starting point, clean out the inside with the bowl gouge, a round-nose scraper, or a boring-bar tool, depending on the vessel design.

Turn the outside of the bowl to final shape, leaving the wall about $\frac{1}{4}$ " thick. Sand with progressively finer grits to 220, but do not apply finish yet. Don't part it off, either.

Make that bowl sparkle

With the vessel still mounted on the lathe, begin the inlay process. First, determine the location for the silver band. Frank avoids placing it at the exact middle of the turning. Likewise, he doesn't divide any part or surface exactly in two with it. In the example shown, he selected a point for the accent about three-fourths of the way from the major diameter to the neck.

Cut the inlay groove with a parting tool the same thickness as your silver wire— $\frac{1}{16}$ " here. Frank uses a parting tool ground thinner at the



IDEA! TURNINGS



This parting tool, ground to the thickness of the inlay wire, cuts the groove.

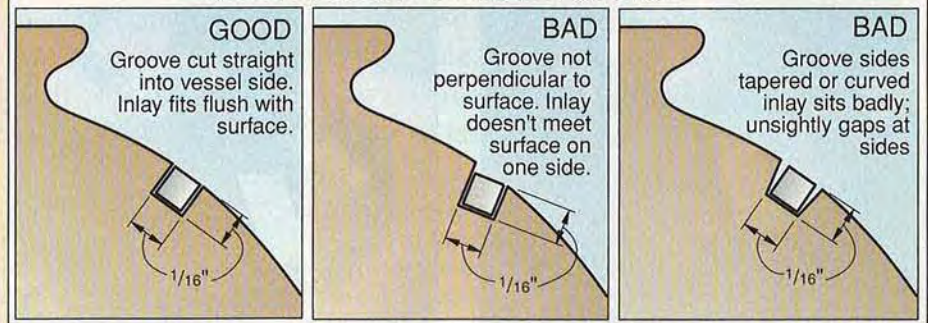


Cut the inlay groove straight into the vessel's side. A snug-fitting inlay looks best, so test-fit the wire as you work.

This silver-wire inlay isn't the only way Frank adds precious metal to turnings. He has accented a natural opening with a stone-set accent on the vessel shown *opposite page bottom*. A necklace chain makes a patterned inlay, *bottom*. To make this type, cut a

groove as for the wire inlay, glue the chain in with the top just above the surface, then cut lightly into the chain with the final scraper cut.

CORRECT INLAY GROOVE POSITION



tip, *above top*. You also could grind a suitable tool from an Allen wrench or screwdriver.

For a snug, neat-fitting inlay, take care to form straight sides in the groove, perpendicular to the bowl's surface. (See the Inlay Groove drawing, *above right*.) The groove's depth equals the thickness of the inlay material— $\frac{1}{16}$ " for our square wire. Check the wire's fit as you work.

After sizing the groove, cut the silver wire to length. To do this, lay it into the groove and mark the overlapping end with a scribe or knife, shown *next page top left*. Allow some extra length

Continued



A STERLING IDEA!



Lay the silver wire into the groove, then mark the length. Cut the end square for a close-fitting joint.



Gap-filling cyanoacrylate (CA) adhesive in the bottom of the groove holds the inlay in place. Apply CA along the sides after the inlay is in place.

when cutting with ordinary wire cutters. They'll snip through the silver easily, but will leave a pointed end. File or sand the end square to the mark for a neat-looking joint. You can trim the wire right to the mark with flush-cutting pliers.

Lay the wire into the groove once more to test the fit. Then, dismount the turning from the lathe, and glue the silver into place.

Glue one end of the wire into the groove with gap-filling cyanoacrylate (CA) adhesive. Secure that end with tape, then work around the bowl, putting CA in the bottom of the groove and pressing the inlay into it, as shown *left*. Tape it at several points until the glue cures, *below*.



Tape the silver down as you glue it into the groove. The tape prevents one side from popping up when you press down on another.

Remove the tape, remount the turning, and clean up glue residue along the inlay with a light scraper cut, shown *below*. The soft silver won't hurt your turning tool if you happen to cut into it. The metal could snag a gouge, though, so stick to the scraper for this operation.

Apply a clear finish overall, then part the bowl from the lathe. Sand and finish the bottom. ♣

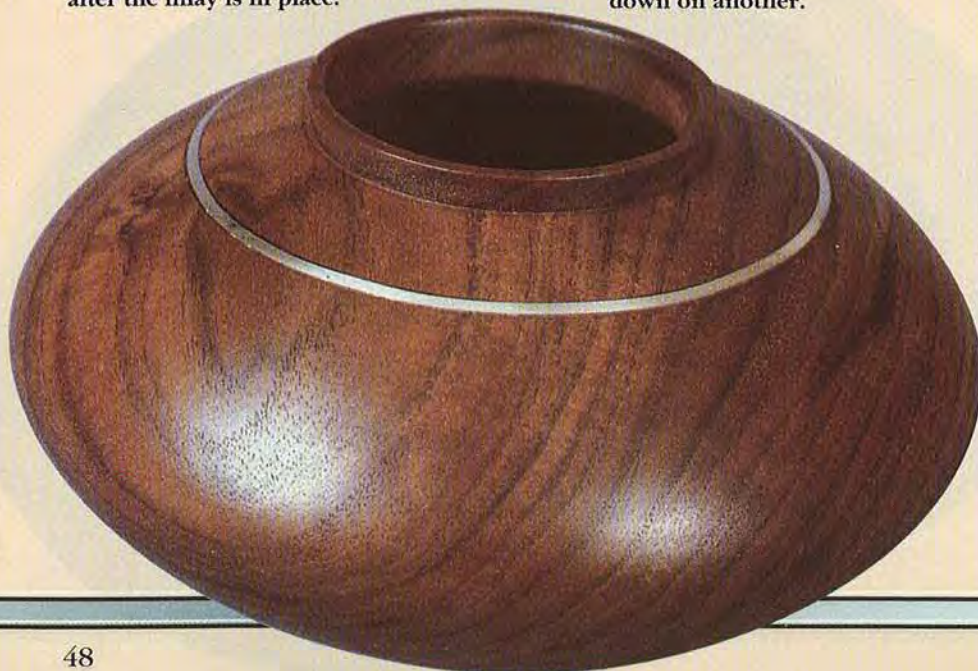


Clean up the inlay and surrounding wood with a light scraper cut. Remove as little material as possible.

Sources for silver

Frank often uses $\frac{1}{16}$ " square silver wire for his inlays. "Use annealed silver wire, it's soft and easy to work with," Frank advises. "Custom jewelers and jewelry-supply houses dealing in standard silver are the best places to buy it," he adds. If you have trouble finding the right stuff, write to Frank for a price and availability quote. (The market price fluctuates.) Frank Nabrotzky, 1381 E. 1300 S., Salt Lake City, Utah 84105. (No telephone calls, please.)

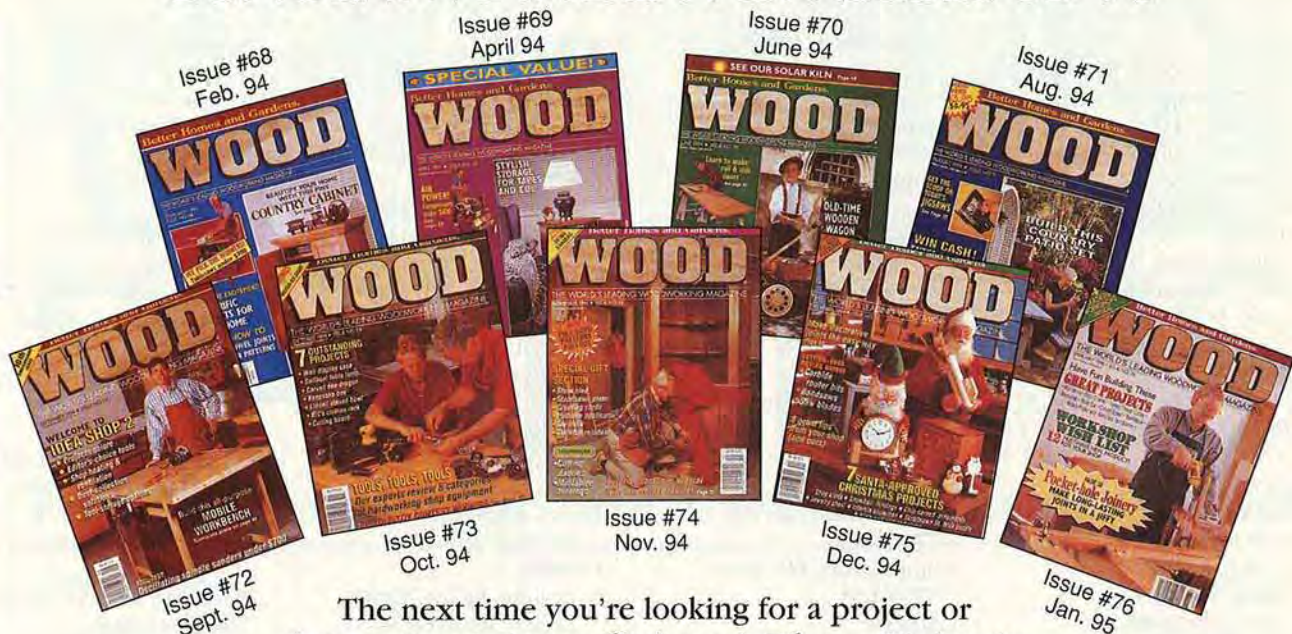
Another source of inlay material: sterling silver necklace chains from jewelry stores or department stores. Chains create a repeating pattern when skimmed with a scraper. Different styles of chains will give varying effects. Be sure, though, to buy a solid silver chain, not a silver-plated one.



Project Design: Frank Nabrotzky
Photographs: Gary Zeff
Illustrations: Kim Downing

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CUMULATIVE INDEX FOR ISSUES 68-76



The next time you're looking for a project or feature story in issues 68 through 76, use this handy reference to help you find it fast. We kept it simple. For instance, when searching alphabetically for the story on bowl blanks, you'll find "Bowls: blanks for, 76:48." To locate the story, go to issue 76, page 48.

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EASY GLIDER

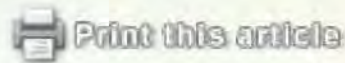
QUITE POSSIBLY
THE WORLD'S MOST
COMFORTABLE
OUTDOOR SEATING



There's nothing quite as relaxing as sitting on your front porch or patio at the end of a hard day. That's especially true now that you can settle into this graceful glider. Built of cedar, our project requires just strap iron and inexpensive bronze bushings for the smooth-action swing arms that support the seat. Start now, and you'll be enjoying those beautiful sunsets in no time at all.

Continued

EASY GLIDER



A solid base makes for a firm foundation

1 Cut the uprights (A), base end tops (B), feet (C) and the top and bottom crossmembers (D, E) to the sizes listed in the Bill of Materials (we used cedar).

2 Mark the locations, and cut half-lap joints across both ends of the uprights (A) and base end tops (B). See the Base drawing for reference. (We did this on our table-saw using a dado blade. To support the pieces cutting, we attached a wooden extension and stop to our miter gauge. Cut scrap stock first to verify the depth of cut and location of stop.)

3 Mark the location, and cut a 1½" dado ¾" deep centered from end-to-end in the base end top (B).

4 Using the dimensions on the Foot detail accompanying the Base drawing, mark the outline and dado locations on both feet (C). Cut a pair of dados on the inside and then the outside surfaces of each foot where marked. Now, cut the feet to shape.

5 Using the full-sized pattern on the WOOD PATTERNS™ insert in the center of the magazine, mark the bottom edge of the lower crossmembers (E), and cut them to shape.

6 Use a drum sander to sand the radii on parts C and E.

Note: The tannic acid in western red cedar is notoriously hard on galvanized and other coated screws. To avoid the unsightly

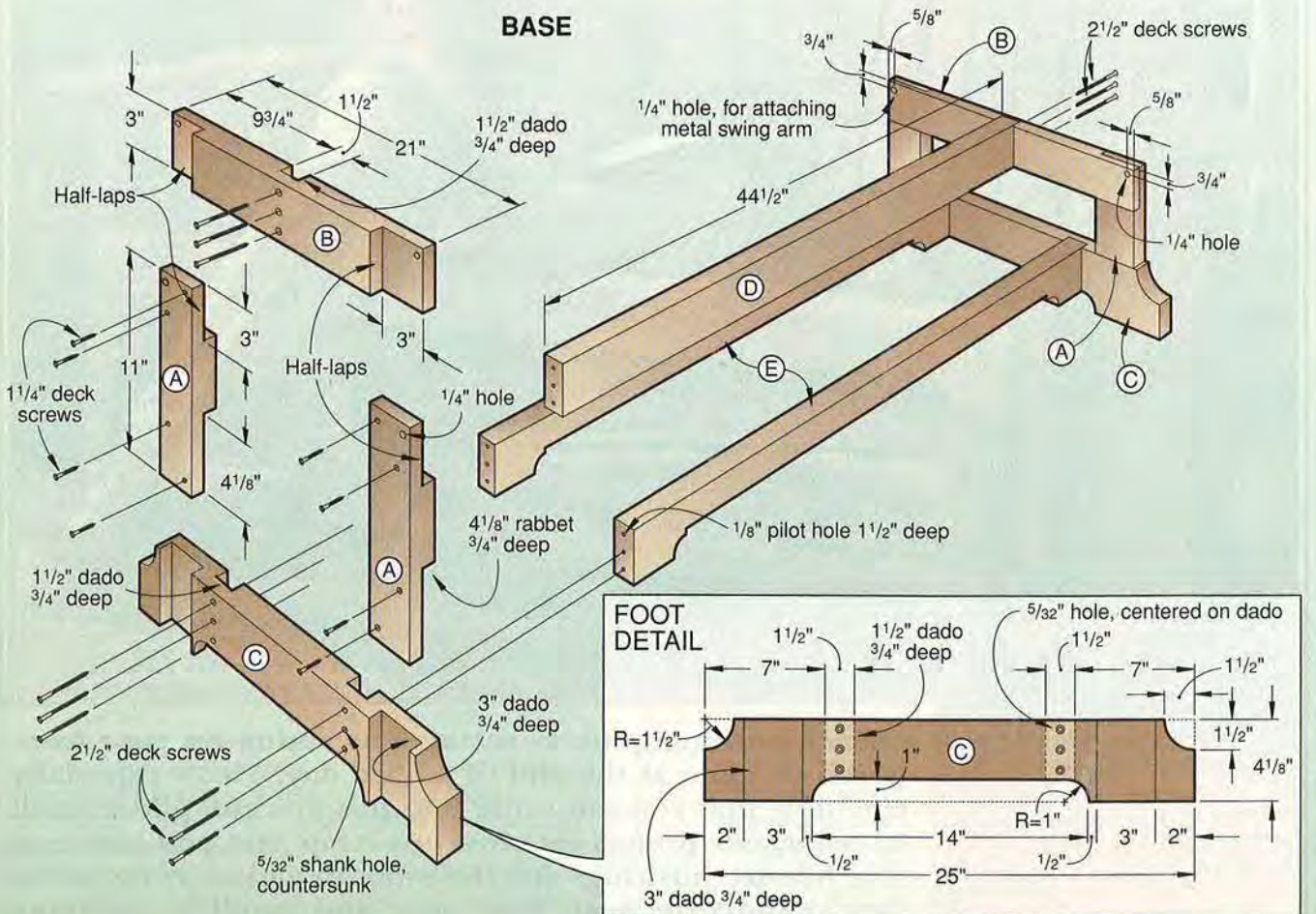
black streaks that appear over time as the project weathers, we recommend stainless steel screws.

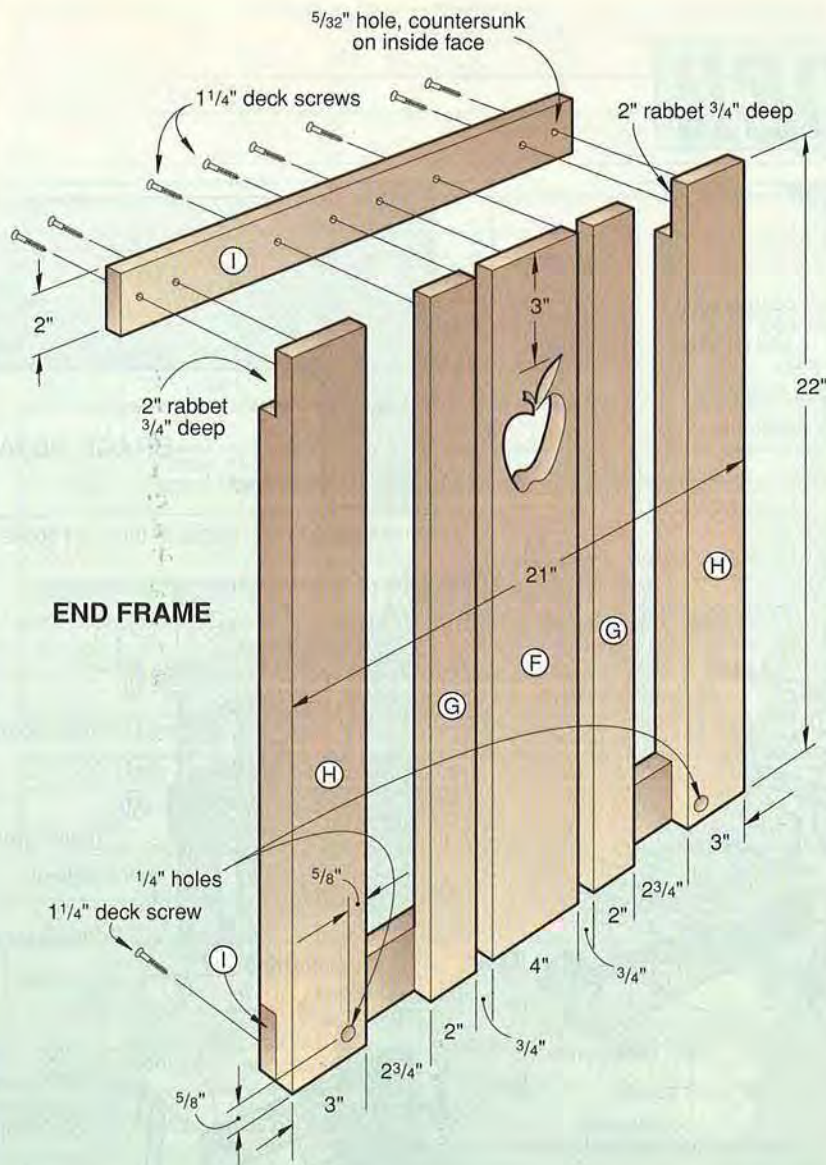
See the Buying Guide at the end of the Bill of Materials for our source of screws. We suggest you construct your glider using a water-resistant glue so that it will stand up to the weather.

7 Glue and screw the base ends (A, B, C) in the configuration shown on the Base drawing.

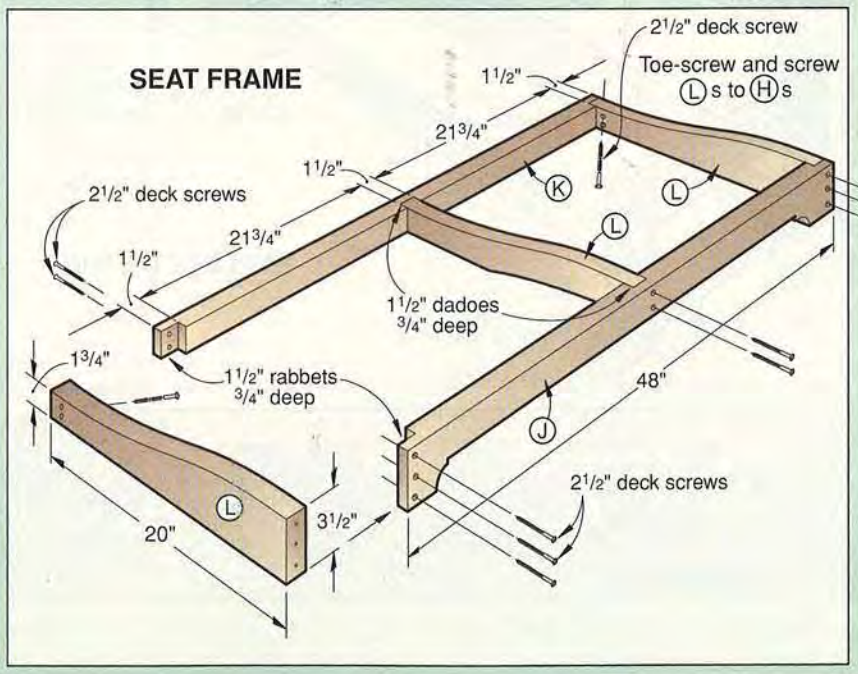
8 To facilitate adding the metal swing arms later, mark the center-points on the top corners of each assembled base end where shown on the Base drawing. Using a ¼" brad-point bit mounted in your drill press, drill the holes.

9 Drill ⅝" countersunk shank holes in the base ends where





END FRAME



SEAT FRAME

shown on the Base drawing. Clamp the crossmembers (D, E) in place between the end assemblies. Glue the mating surfaces, and drive 2 1/2" deck screws to secure the crossmembers in place. Sand the base smooth.

The end frames come next

1 Cut the end-frame slats (F, G, H) and rails (I) to size. Note that parts F, G, and I are cut from 3/4" stock, and part H is from 1 1/2"-thick stock.

2 Using your tablesaw fitted with a dado blade, cut a 2"-wide rabbet 3/4" deep across both ends of each outside slat (H).

3 Transfer the full-sized apple pattern from the pattern insert to the center slats (F), 3" from the top end of each, where shown on the End Frame drawing. Drill a blade-start hole, and scrollsaw the patterns to shape.

4 Glue and screw each end frame together in the configuration shown on the drawing.

5 For attaching the swing arms later, mark the centerpoints near the bottom corners of each assembled end frame where shown on the End Frame drawing. Using a 1/4" brad-point bit mounted in your drill press, drill the holes where marked. Sand the end frames.

Now, construct the seat frame, and add the slats

1 Cut the seat-frame crossmembers (J, K) and supports (L) to size.

2 Mark the locations, and cut rabbets and dados in the crossmembers (J, K) where dimensioned on the Seat Frame drawing *at left*.

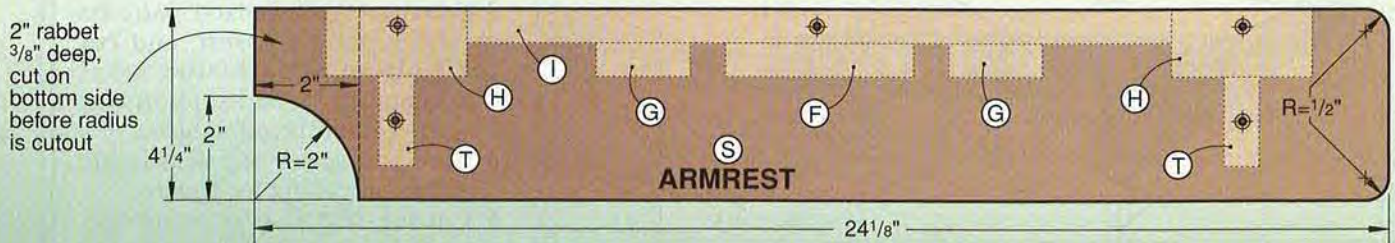
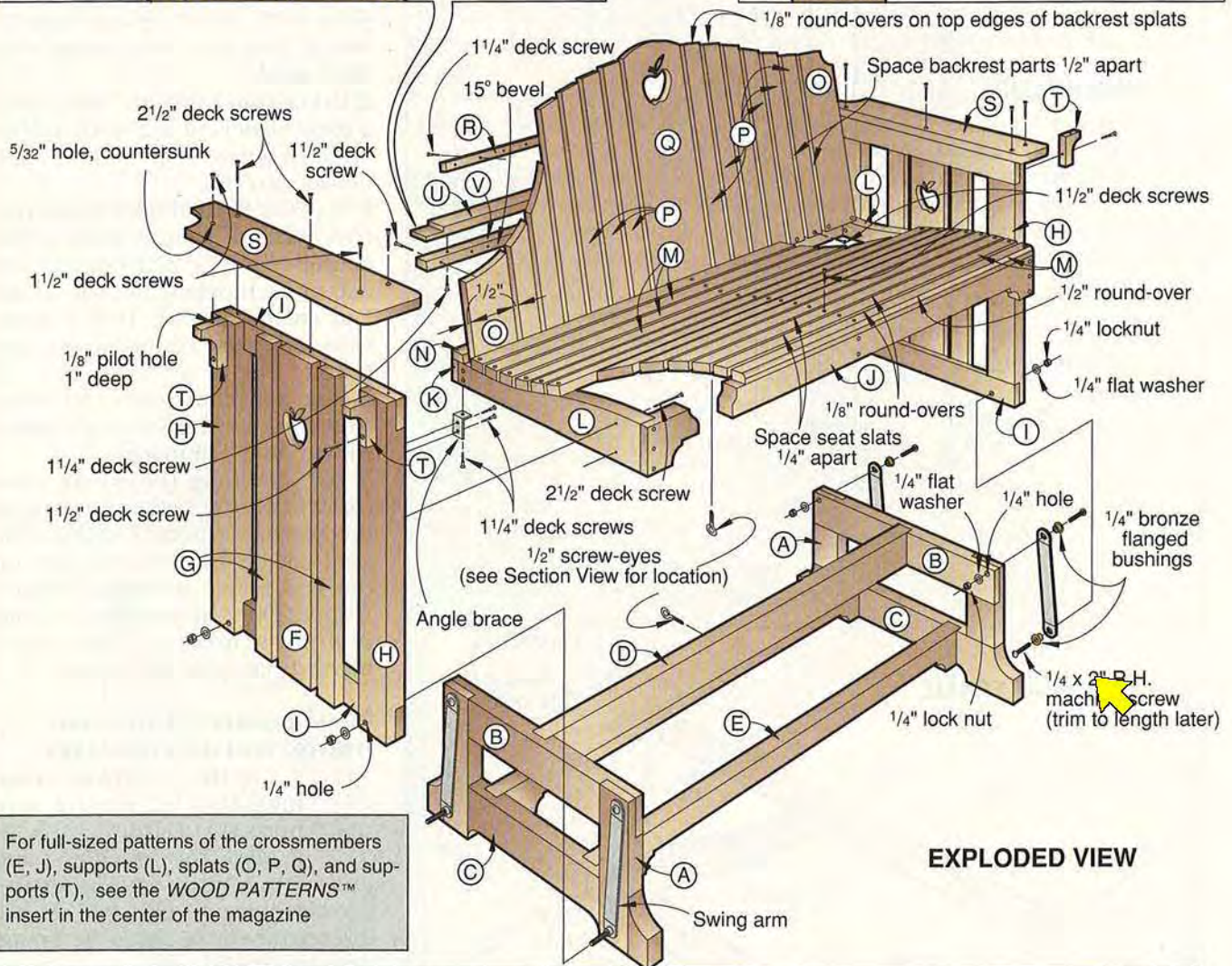
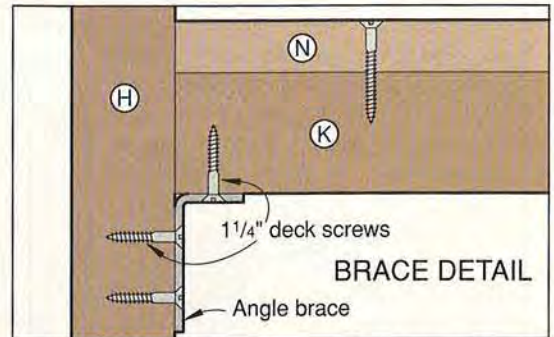
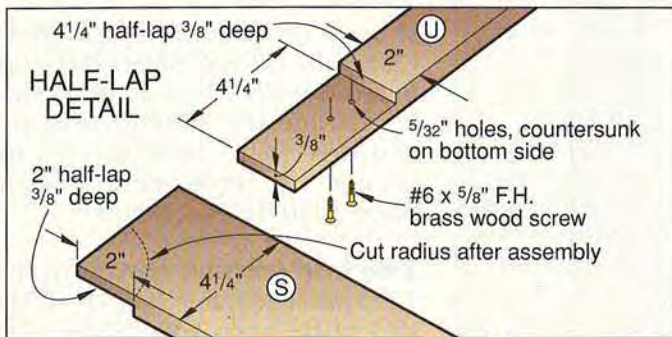
3 Transfer the full-sized patterns from the pattern insert, and cut the bottom edge of the front crossmember (J) and supports (L) to shape. Sand the cut edges.

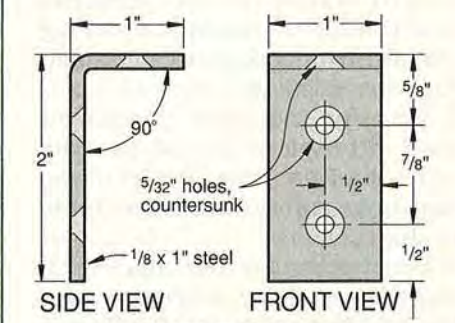
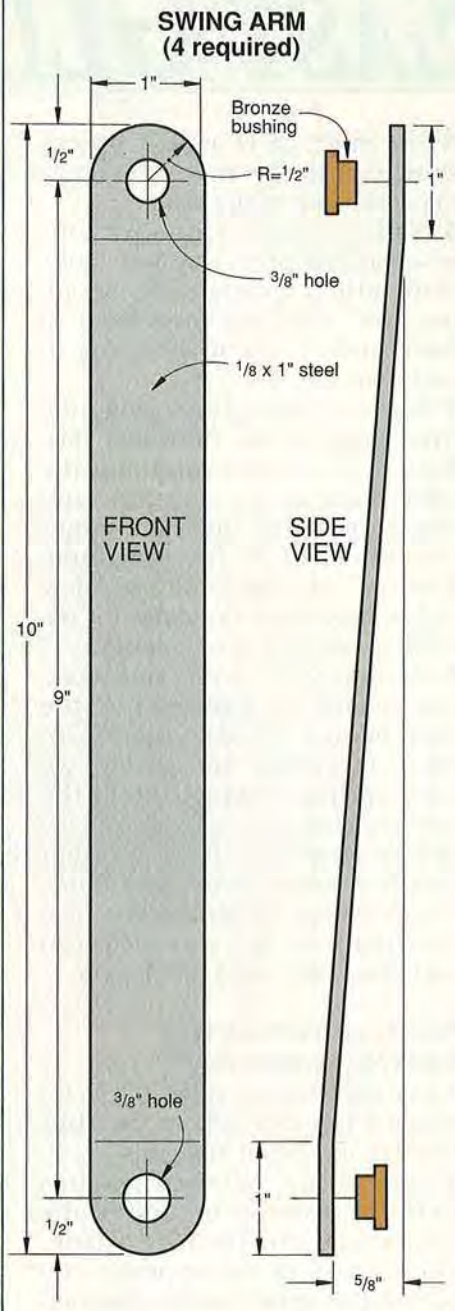
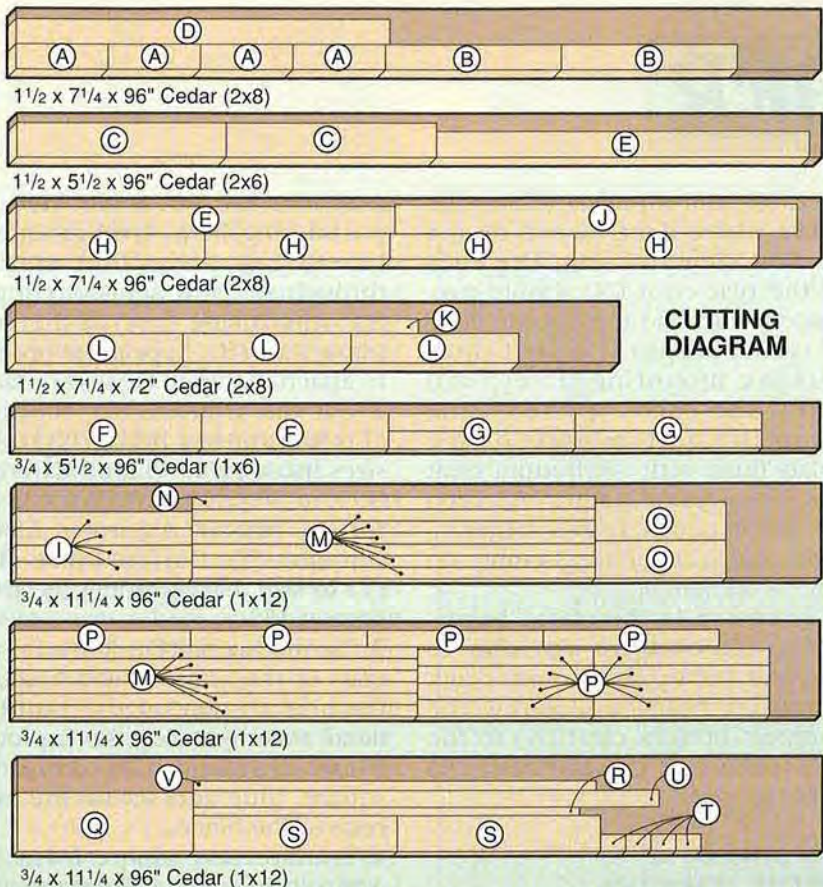
4 Glue and screw the seat frame together, checking for square.

5 Cut the seat slats (M) and rear cleat (N) to size, bevel-ripping the

Continued

EASY GLIDER





Bill of Materials											
Part	Finished Size			Mati.	Qty.	Part	Finished Size			Mati.	Qty.
	T	W	L				T	W	L		
BASE						SEAT SLATS AND CLEAT					
A uprights	1 1/2"	3"	11"	C	4	M slats	3/4"	1 3/8"	48"	C	12
B frame tops	1 1/2"	3"	21"	C	2	N cleat	3/4"	1 1/2"	48"	C	1
C feet	1 1/2"	4 1/8"	25"	C	2	BACKREST ASSEMBLY					
D top crossmember	1 1/2"	3"	44 1/2"	C	1	O* splats	3/4"	4 1/2"	16"	C	2
E bottom crossmember	1 1/2"	3 1/8"	44 1/2"	C	2	P* splats	3/4"	2"	**	C	12
END PANELS						Q* splat	3/4"	7"	21"	C	1
F slats	3/4"	4"	22"	C	2	R top cleat	3/4"	1"	46"	C	1
G slats	3/4"	2"	22"	C	4	S armrests	3/4"	4 1/4"	24 1/8"	C	2
H slats	1 1/2"	3"	22"	C	4	T supports	3/4"	2"	3"	C	4
I rails	3/4"	2"	21"	C	4	U brace	3/4"	2"	55 1/2"	C	1
SEAT FRAME						V cleat	3/4"	1"	47"	C	1
J crossmember	1 1/2"	3 1/2"	48"	C	1	**See the patterns on the WOOD PATTERNS™ insert for exact lengths of splats O, P, and Q.					
K crossmember	1 1/2"	1 3/4"	48"	C	1	Material Key: C—cedar					
L supports	1 1/2"	3 1/2"	20"	C	3	Buying Guide					

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

Supplies: 1 1/4", 1 1/2", 2 1/2" deck screws (see the Buying Guide for our source of stainless steel screws); 8-1/4x2" roundhead stainless steel machine screws with 1/4" lock nuts and flat washers; #6x3/8" brass flathead wood screws; 1/8x1x48" flat steel, 8 1/2" of 2/0 open link coil chain and two 1/2" screw eyes; exterior finish.

Stainless steel screws. Flathead, square-drive #8 screws, 100 per box. One box each of 1 1/4", 1 1/2", and 2 1/2" screws plus two #2 drivers. Kit no. WD-GLIDER. \$29.95 ppd. McFeely's, P.O. Box 3, Lynchburg, VA 24505-0003 or call 800/443-7937 or 804/846-2729 to order.

Bronze bushings. Eight 3/8" O.D., 1/4" I.D., 1/4" long bronze flanged bushings. Stock no. NLIFL26-2. \$10 ppd. Standard Bearings, P.O. Box 823, Des Moines, IA 50304 or call 800/554-8123 to order.

EASY GLIDER

front edge of N at 15° where shown on the Section View drawing at the end of the article.

6 Nail or clamp stops to your wooden drill-press auxiliary table. Now, drill a countersunk mounting hole, centered from front to back and $\frac{3}{4}$ " from the ends of each seat slat.

7 Rout a $\frac{1}{2}$ " round-over along the front edge of the front slat (M). Rout a $\frac{1}{8}$ " round-over along the back edge of the front slat and along the front and back edges (not ends) of all the remaining slats (M). See the Exploded View and Section View drawings for reference. Sand the slats smooth.

8 Starting at the front and working toward the back, screw the slats, but not the rear cleat (N), in place. (To check the spacing, we used spring clamps to hold the last five slats and cleat N in place before attaching. It's important that N attaches to the seat frame where shown on the Section View drawing.) Set the rear cleat (N) aside for now; you'll add it later.

Next, construct the backrest assembly

1 Cut the backrest splats (O, P, Q) and the top cleat (R) to the sizes listed in the Bill of Materials.

2 Transfer the full-sized patterns from the insert to the top of the splats, and cut them to shape. Then, crosscut the opposite end to cut the splats to the finished length stated on the patterns insert. Rout $\frac{1}{8}$ " round-overs along the top front edge of each slat. Sand the splats smooth.

3 Transfer the apple pattern to the center slat (Q), $1\frac{5}{8}$ " from the top end of the slat. Drill a blade-start hole, and scrollsaw the apple to shape.

4 Keeping the bottom edges flush and the good face down, position the backrest splats (O, P, Q) on a flat work surface. Place $\frac{1}{2}$ " spacers between the splats, starting with the center slat, and work toward the ends. Now, position the rear

cleat (N) and top cleat (R) on the splats where dimensioned on the Section View drawing. The ends of the rear cleat (N) should protrude $\frac{1}{2}$ " beyond the outside edge of each end slat (O). Drill countersunk mounting holes, and screw the splats to the cleats. Keep the bottom ends of the splats flush with the bottom cleat (N). Use a framing square to keep the pieces square to each other.

5 Set the seat frame assembly on your workbench.

6 As shown in the photo below, clamp the backrest assembly to the seat frame, drill countersunk mounting holes, and screw the backrest bottom cleat (N) to the seat-frame rear crossmember (K) at 6" intervals.

It's time to do a little assembly

1 Place one end-frame assembly (F, G, H, D), outside face down, on your workbench. Use a framing square to mark a reference line on the *inside* face of the end frame $10\frac{7}{8}$ " from the top end. With the aid of a helper, position the seat assembly on the end frame so the bottom edge of the seat support (L) aligns with the marked refer-

ence line. See the Section View for positioning help. Drill mounting holes, and drive four screws through the seat support (L) and into the inside face of the end-frame slats (H). Repeat the process to attach the opposite end frame.

2 Cut the armrests (S), supports (T), and armrest brace (U) to the sizes listed in the Bill of Materials. See the *WOOD PATTERNS™* insert for the full-sized pattern of the supports (T). Cut the brace cleat (V) to size, bevel-ripping the front edge at 15°.

3 Cut mating half-lap joints on the ends of the armrests and brace to the size shown on the Half-Lap detail accompanying the Exploded View drawing. Checking for square, glue and screw the armrests to the brace.

4 Transfer the shape from the Armrest drawing, and cut the armrest front corners and outside back corners to shape. Using the pattern on the pattern insert, cut the supports (T) to shape.

5 Position and clamp the armrest assembly (S, U) on top of the end frames and against the back face of the backrest assembly. Drill the mounting holes, and screw the assembly in place.



Clamp the backrest assembly to the seat frame, drill countersunk mounting holes, and screw the backrest bottom cleat to the seat-frame rear crossmember.

6 Glue and screw the brace cleat (V) to the bottom side of the armrest brace (U). Now, drill countersunk mounting holes through the brace cleat and into the back of the splats. Drive screws through these holes.

Forming the swing arms and braces comes next

1 From a $\frac{1}{8} \times 1 \times 48$ " piece of flat steel, use a hacksaw to cut four pieces measuring 10" long each. Drill a $\frac{3}{8}$ " hole in each end of each swing arm where shown on the full-sized pattern insert. Grind the corners round.

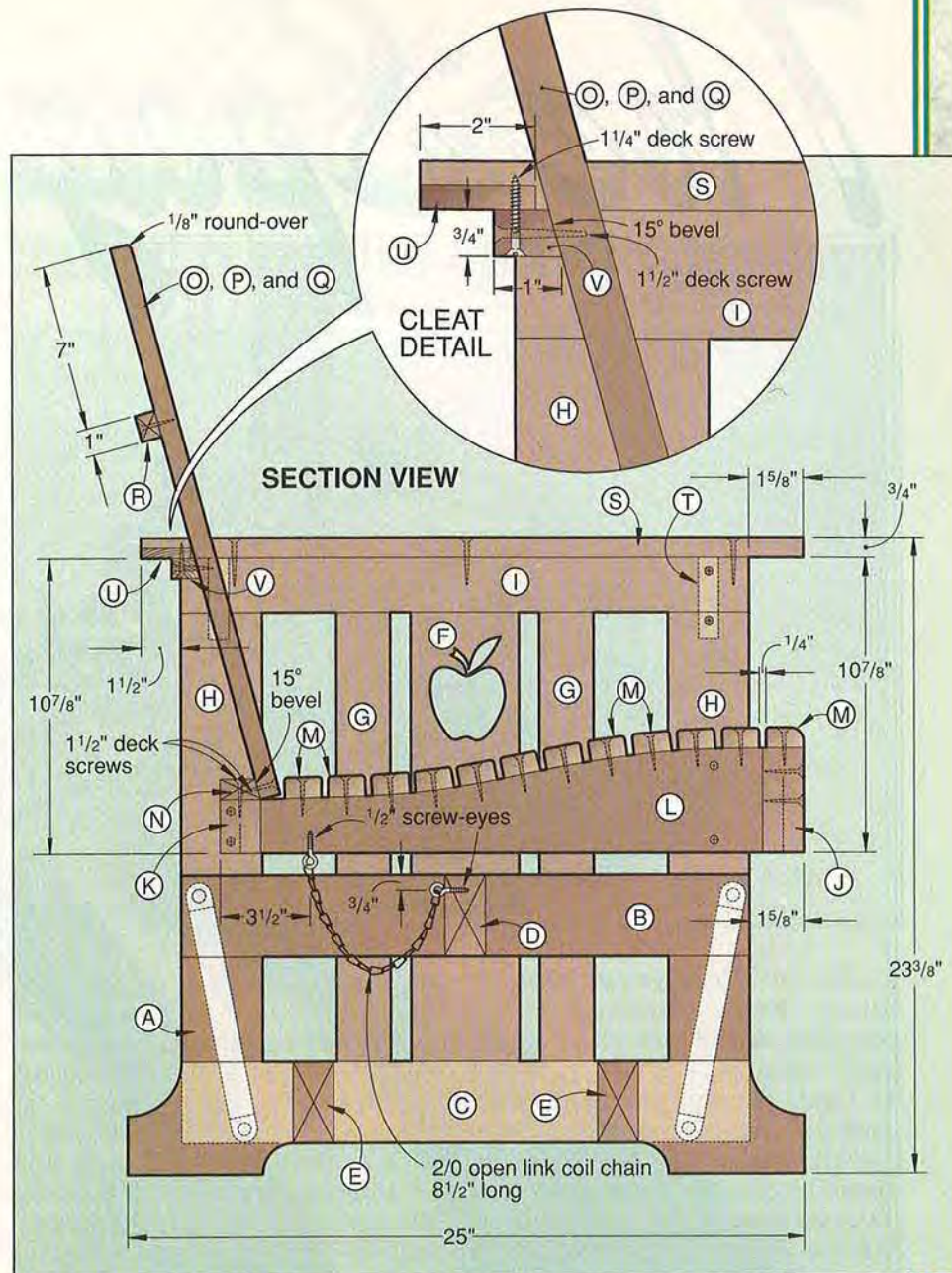
2 Clamp each end of each swing arm in your woodworker's vise, and bend to the angle shown on the full-sized pattern.

3 To form a pair of angle braces, cut two 3"-long pieces from the remaining flat steel stock. Bend them to the shape shown on the pattern insert. Drill mounting holes, and screw the braces in the corner where parts K and H meet. The braces strengthen the joint.

4 Press a bronze bushing into each $\frac{3}{8}$ " hole in each swing arm where shown on the pattern insert. See the Buying Guide for our source of bushings.



Connect the steel swing arms from the rear holes in the base to the rear holes in the seat assembly.



5 As shown in the photo at left, position the seat assembly, back face down on either your workbench or the floor. Position the base in front of it, and connect the two swing arms from the rear top holes in the base to the rear holes in the seat assembly. Repeat the process to attach the front swing arms. Use a hacksaw to trim the protruding ends of the bolts flush with the outside ends of the locknuts.

6 To keep the glider from swinging too far back, attach a pair of screw eyes and an 8 1/2" length of 2/0 open link coil chain to parts D

and the middle L where shown on the Section View drawing.

7 Finish-sand the entire assembly, and add an exterior finish, we used Flood CFW (Clear Wood Finish). It's critical to get a good seal on the bottom of the base (those parts that come in direct contact with the ground or patio). Recoat the chair annually. For an added touch, paint the inside edges of the apples red and the stems and leaves green. 🍏

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

The Spaghetti



Specialists

Print this article

Let this handcrafted trio spice up an Italian meal

Whether plain old spaghetti or fashionable pasta, preparing and serving it will be a pleasure with this three-piece set. And you'll enjoy a woodworking feast of cutting and carving as you make these neat utensils.

Cut two blanks $\frac{3}{8} \times 3 \times 11$ " and one $\frac{3}{4} \times 3 \times 11$ ". (We used walnut.) Photocopy the three full-sized patterns in the *WOOD PATTERNS™* insert in the middle of the magazine. Using spray adhesive, adhere the patterns for the spaghetti measure and the spaghetti server onto the $\frac{3}{8}$ " blanks, and the one for the sauce spoon onto the $\frac{3}{4}$ " blank.

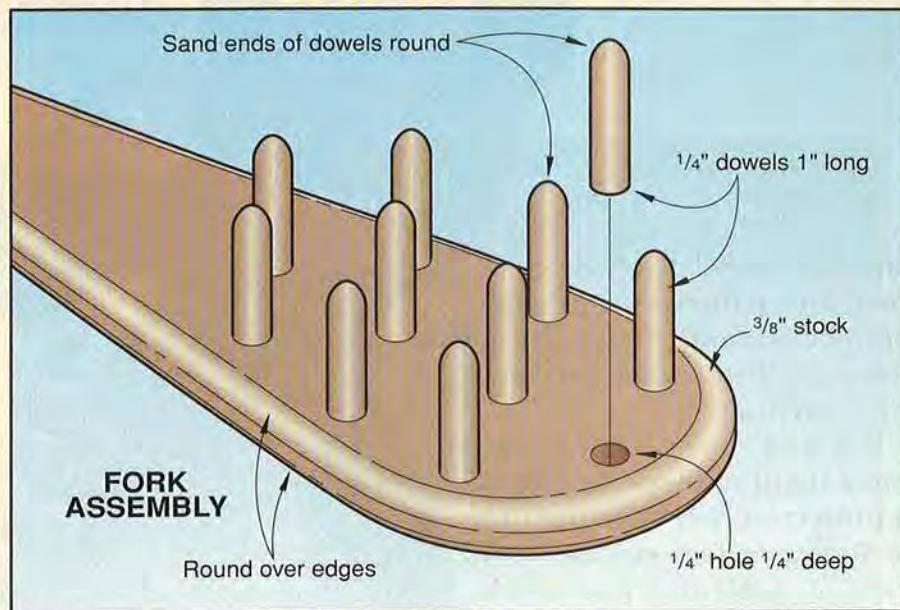
On each, drill a $\frac{1}{8}$ " blade start hole through the topmost heart on the handle. Scrollsaw the design on each. (We used a #4 blade, .035 \times .015" with 18 teeth per inch.) Don't cut around the outside pattern line yet.

Drill the three holes in the spaghetti measure, using a drill press and Forstner bits. (The holes measure one, two, or three portions of uncooked spaghetti—you can label them, if you wish.)

For the spaghetti server, drill 10 $\frac{1}{4}$ " holes $\frac{1}{4}$ " deep where shown. The holes must be perpendicular to the face of the server for best appearance, so use the drill press.

Now, hollow out the inside of the spoon bowl. You can carve it out with gouges or with a carving bit held in either a rotary hand tool or a flexible-shaft machine.

No. 7 and no. 5 palm-handle gouges about $\frac{5}{16}$ " wide work well for gouge-carving the bowl. A spoon-bent gouge comes in handy, too. Rough out the bowl



with the no. 7 gouge. Start from the inside rim line, and carve toward the center of the bowl. Hollow it out to a depth of about $\frac{5}{8}$ " at the center. Cut with or across the grain as you carve; if you go against the grain, you'll probably tear out long splinters.

After roughing the bowl, smooth the surface with the no. 5 gouge. For a fine, smoothing cut, slide the beveled side of the gouge along the carving surface, then raise the handle just enough to let the cutting edge shave off a thin curl of wood. The sharper your gouge, the better this will work. Sand the bowl smooth.

For rotary power-carving, rough out the bowl with a Kutzall or carbide burr. A cutter with a rounded end rather than a point would be a good choice for forming the shallow bowl. Smooth the roughed-out surface with a ruby carver, then sand.

Now, bandsaw the three utensils to shape. With a rasp, spokeshave,

or drum sander, shape the back of the spoon handle and the outside of the bowl. The handle thickness tapers to $\frac{5}{16}$ " at a point $5\frac{1}{4}$ " from the tip of the handle. Sand all three pieces to 220-grit, rounding over the outside edges. Round over the edges of the portion-sizing holes in the measurer, too.

Cut 10 pieces of $\frac{1}{4}$ " walnut dowel rod 1" long. Sand one end of each round. Refer to the Fork Assembly drawing above, and glue the dowels into the holes in the server handle. Be sure to use moisture-resistant glue—you'll be dipping the fork into hot, wet noodles. (Slow-set epoxy would be a good choice.)

Finish with salad-bowl oil. In use, hand-wash and dry the utensils. Re-oil them periodically.

To use the portion measurer, grasp a bundle of uncooked spaghetti noodles in one hand. Put an end of the sheaf into the appropriate hole, adding or subtracting noodles to fit. ♣

Project Design: © Kim and Rob Russell

Photograph: King Au Illustrations: Kim Downing

HOW TO HIDE YOUR WOODWORKING GOOFS

Six fool-proof strategies for dealing with dings, dents, and divots

 Print this article

Let's face it—mistakes happen. Tools fall off shelves, projects get dropped, and hammers and chisels occasionally miss the mark. Even the best woodworkers mess up sometimes.

But you don't have to shell out a lot of money—or rebuild a project—every time the fickle finger of fate strikes. With careful, patient repair work, you can render practically invisible the most serious dents and dings. How so? To find out, we quizzed the shop experts on our staff and came up with six repair strategies every woodworker should know.



GOOF NO. 1: You've gashed the middle of an expensive piece of plywood.

HERE'S THE CURE: Cut out the damaged area and insert a full-length filler strip.

Round, square, or football-shaped patches in damaged plywood always seem to stick out like a sore thumb. Our preferred technique—splicing in a filler strip that runs the full length of the workpiece—is easier to make and less visible.

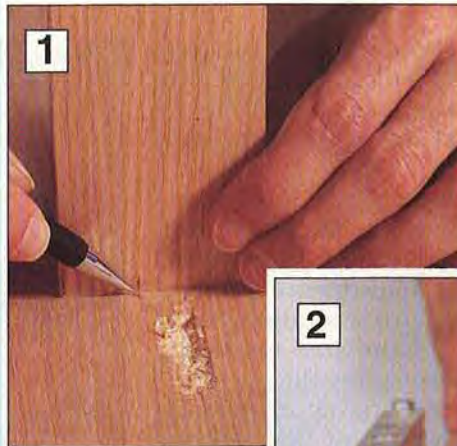
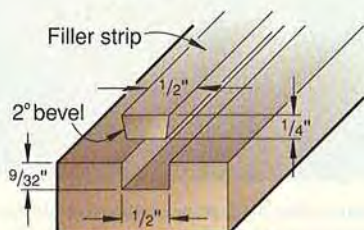
Start by matching the color and grain of a scrap piece of plywood with the area of the panel containing the gash, as shown in *Photo 1*. Then, remove the damaged area by cutting a full-length groove $\frac{3}{32}$ "-deep with the grain. Unless you have a high-quality dado set, use a router and straight bit to get the cleanest possible groove.

Next, tilt your tablesaw blade 2° from vertical and rip a beveled-edge filler strip to put in the groove as shown in the Full Length Filler Strip drawing *below*. Make sure you bevel both edges of the filler strip. Now, turn your filler strip on edge and rip it down to $\frac{1}{4}$ " in thickness. Use a wooden pushstick for safety. The tapered edges of the filler strip prevent it from binding when you tap it into the groove and give excess glue a place to escape.

Now, apply woodworker's glue to the filler strip and groove. Push the filler strip into the groove, but leave it slightly above the surface of the workpiece. Place a flat piece of hardwood over the groove and tap on it with a hammer to bring the strip flush with the top of the panel as shown in *Photo 4*. After the glue dries, a light sanding will help hide the joint lines of the filler strip. You also can use this technique on solid stock to remove naturally occurring defects such as knots and checks.

Continued

FULL-LENGTH FILLER STRIP



Left: Match a scrap piece with the color and grain pattern of the damaged area.



Right: Cut a shallow groove across the damaged area with the grain using a dado blade. If you don't have a good dado blade, use a router and straight bit.



Left: From your matched piece of scrap plywood, rip a filler strip with your tablesaw blade set at 2° from vertical.



Right: Apply glue to the filler strip and groove, and tap the filler strip into place with a flat hardwood block and hammer.

HIDE YOUR WOODWORKING GOOFS

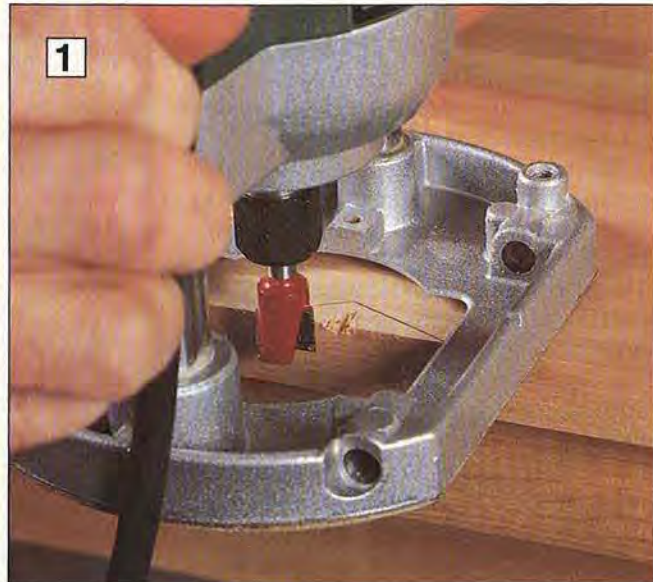
GOOF NO. 2: You've gouged the edge of a board.
HERE'S THE CURE: Glue in a patch.

Start by comparing scraps to the damaged area, and look for a close match of color and grain pattern. When you've found a similar piece, make a triangular patch. Cut the patch as thick as you need to cover the depth of the gash plus about $\frac{1}{16}$ ".

Mark the outline of the patch onto the face of the board around the gash. Don't place the edge of the patch flush with the edge of the workpiece, though. Leave about $\frac{1}{8}$ " overhang on the patch to allow for adjustments and trimming later. Now, using a router with a straight bit as shown in *Photo 1*, rout as much of the area inside the scribed triangle as you can without touching the lines.

When you're done routing, take a sharp chisel and pare down along the lines for the patch as shown in *Photo 2*. Next, place the chisel horizontally on the flat surface created by the router and remove the waste by chopping back toward the vertical chisel cuts.

Now, test-fit the patch. If it does not quite fit, adjust it by sanding the inside edges. When you've got a tight fit, coat the mating surfaces with woodworker's glue, as shown in *Photo 3*, and clamp the patch in place. After the glue dries, trim and sand the patch flush.



Rout out the damaged wood and most of the patch area, but without touching the patch outlines.

GOOF NO. 3: You've dropped a board and smashed one corner.
HERE'S THE CURE: Use instant glue to attach a new corner.

With a sharp chisel, cut away the damaged corner of the board as shown in *Photo 1*. Position the front edge of the chisel at 45° to the edge of the board so that it removes the same amount of wood from the face and the edge of the workpiece. With the chisel, trim this cut as necessary to ensure that it's perfectly straight and flat.

Next, cut a wedge-shaped patch from a matching piece of scrap as shown in *Photo 2*. A dozuki (a Japanese-style handsaw) or other fine-toothed handsaw works best. Make the patch large enough so you have extra wood to trim off later. If the kerf side of the patch is rough, flatten it on a piece of sandpaper taped to a flat, hard surface.

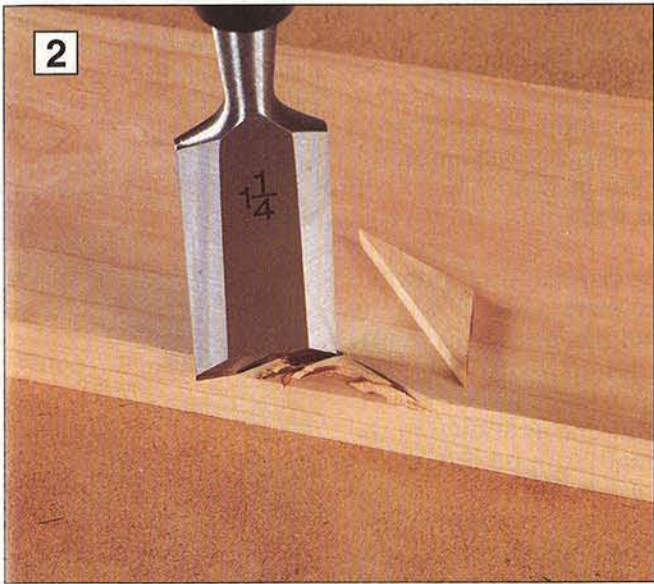
Use cyanoacrylate (instant) glue and accelerator to fasten the patch to the pared-down edge, as shown in *Photo 3*. You need only hold the patch to the workpiece for a few seconds with CA glue, thus eliminating the need for clamps. After the glue dries, use a hand plane or sanding block to bring the edges of the patch flush with the workpiece.

Continued



Secure the board in a woodworking vise and pare away the dented corner with the chisel positioned at 45° to the edge.

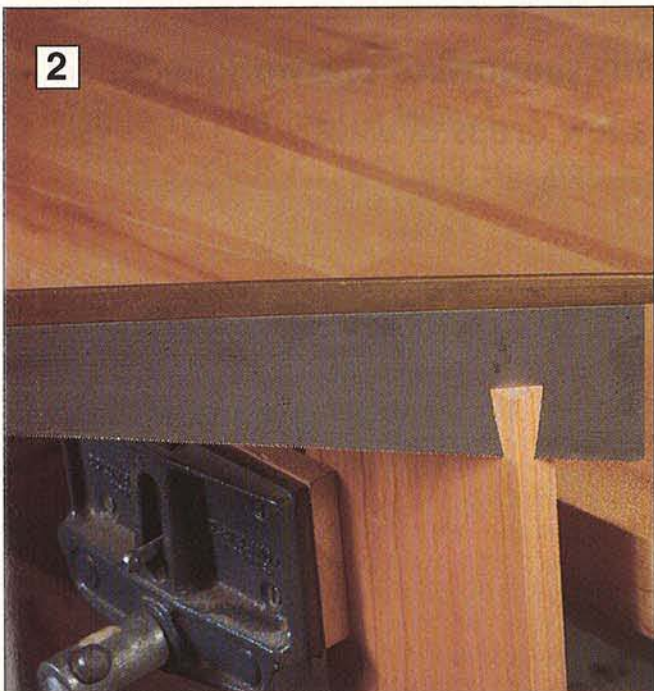
BOOP NO. 4: You've cut a board an inch too short or you can't find a board for
HERE'S THE CURE: Build a "board stretcher."
your board stretcher. It's actually a pair of boards joined at the corners. When a board



2 Chop along the lines of the patch with a chisel, taking care not to slice deeper than the area cut by the router.



3 Adjust the patch for a tight fit by lightly sanding its inside edges, then glue and clamp the patch in place.



2 With a dozuki or other fine-toothed handsaw, cut the patch from a matching piece of scrapwood.



3 Use cyanoacrylate (instant) glue and accelerator to join the patch to the workpiece, and hold the patch in place until the glue dries.

HIDE YOUR WOODWORKING GOOFS

GOOF NO. 4: You've cut a board an inch too short, or you can't find a board long **HERE'S THE CURE:** Build a "board stretcher."

Our "board stretcher" is actually a jig that helps you make scarf joints. What's a scarf joint? It's like a butt joint where two workpieces are glued together along a low-angle cut. The lower the angle, the more glue surface you provide for the joint, hence the stronger the joint. An angle of 20° works well, and that's the angle we built into our jig.

To use a scarf joint to lengthen a board, you have to sacrifice some of the board's width. See the How to Stretch a Board drawing at *right*. For every 1" you gain in the length of the board with a scarf joint, you'll have to sacrifice 7/16" in width. Also keep in mind that cutting and trimming a 20° line across the board will eat up another 3/4" in the length of the board.

If the board you cut too short is wide enough to meet these criteria, then proceed to build the scarf-joint jig shown in the drawing. Use the jig to mark a line across the midsection of the workpiece, and then cut along that line with a portable circular saw. Now, clamp the jig to the workpiece, as shown in the photo *above right*, and clean up the cut edge with a router and a flush-trim bit.

Now, place the two edges together. Slide them along the joint line as shown in the How to Stretch a Board drawing until you have the needed length. Cut off the excess width on each board, and then glue and clamp the pieces as shown in the photo *below right*. The triangular blocks prevent the pieces from sliding as you tighten the clamps. Attach the blocks with CA glue. For 20° scarf joints, the angle at the narrowest corner of the clamp block should equal 20°. After the glue in the scarf joint dries, trim off the clamp blocks. This procedure works for boards cut too short as well as for boards you wish to lengthen.

Note: *Unlike our other repair techniques, a scarf joint will almost always show up as a visible line. Paint will cover the line, and closely matching grain and color also help. But don't put a scarf joint in a prominent location on projects that take a clear finish. Also, scarf joints aren't as strong as a solid piece of stock. Don't use them to carry loads or bridge a span. When in doubt about the strength, add a spline or biscuits to reinforce the joint.*

Right: Clamp your workpiece and scarf-joint jig to your workbench and trim the edge of the workpiece flush.

Right: Clamp the scarf joint using angled clamp blocks to keep the clamping pressure perpendicular to the joint.

GOOF NO. 5: A misplaced hammer blow dents the surface of a workpiece. **HERE'S THE CURE:** Raise the dent up with a few drops of water.

If you've got a shallow dent and the wood fibers are not torn or broken, a few drops of water will swell the fibers and cause them to return to their original position. As shown in the photo *right*, apply the drops of water with an eye dropper, and wet only the dented area. Check the workpiece every hour or so. If the water soaks in, add more water until the dent is gone.

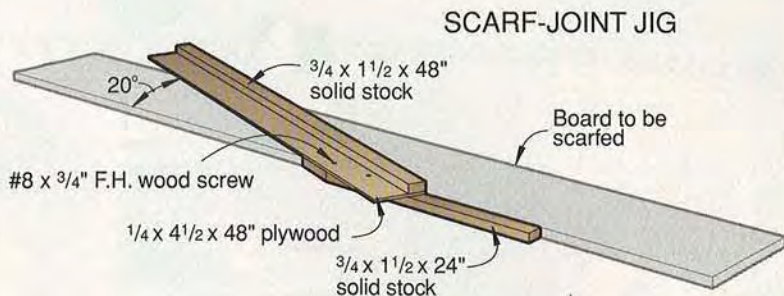
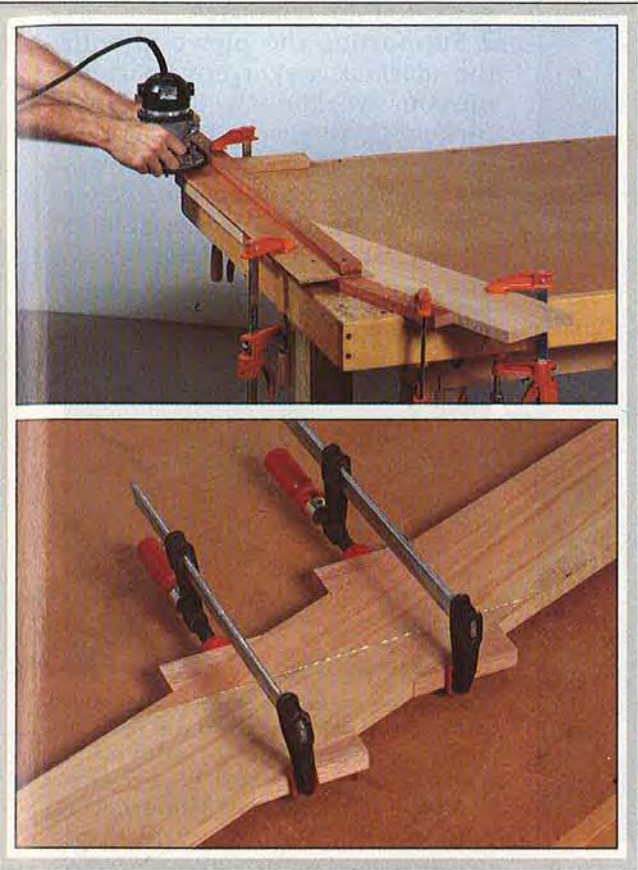
After soaking the wood, you'll probably see a small water stain and some fuzzy wood fibers where the dent was. Let the wetted area dry thoroughly, and then sand the spot until the water stain and raised fibers disappear.

You sometimes can get quicker results by steaming the dent with a clothes iron. Be careful not to scorch the surface of the wood or raise the grain on a large section. Instead, wet the corner of a rag or towel, place it in the dent, and steam the dent through the rag with the pointed front end of the iron.

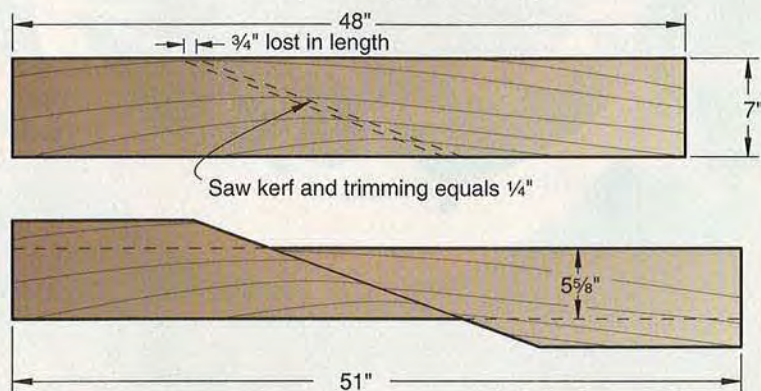


Fill the dented area with water from an eye dropper. Repeat until the dent rises up flush with the surrounding surface.

enough for the job.



HOW TO STRETCH A BOARD



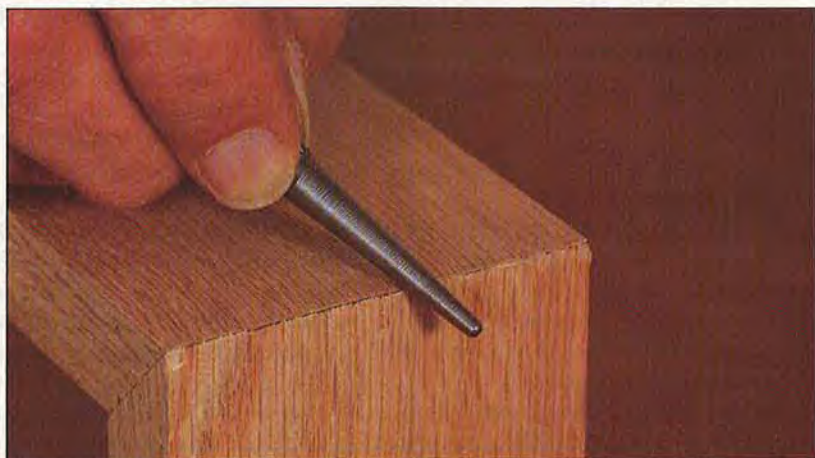
For every inch of length gained, you lose $\frac{7}{16}$ " in width.

GOOF NO. 6: Your miter joint doesn't quite fit and the resulting gap appears visible to the entire world.

HERE'S THE CURE: Fill the gap by pushing the wood fibers together.

With a smooth, round, steel implement (the side of a nailset works great), push across and slightly down on both edges of the miter, as shown in the photo at *right*. As you apply pressure, the gap in the joint will narrow and close up.

The objective is not to flatten the corner, but to bend the edges of the wood fibers a few degrees. Keep in mind that this only works on hairline gaps no wider than about $\frac{1}{32}$ ". You will get a slightly rounded appearance where the two pieces meet, but you can minimize the roundness of the corner by lightly sanding both faces of the project. Use a sanding block rather than hand sanding. ♣



Push down on the edges of an open miter joint to close the gap.

Written by Tom Jackson Photographs: John Hetherington Opening photo: King Au Illustrations: Mike Gatzke



numerous projects, transfer the shapes to hardboard, and cut to shape to form templates.

2 Supporting the plywood with the marked rocker/cow pattern on your workbench, jigsaw one rocker (C) to shape. For support when cutting the narrow cow's tail to shape, position the rocker blank on the edge of the table as shown in the photo *below*.



Clamp the rocker to your workbench for support when cutting the narrow cow's tail to shape.

3 Sand the edges of the rocker (moon/cow) smooth, and then use this rocker as a template to mark the moon and cow outline onto plywood. Cut the second rocker/cow to shape.

4 Clamp the rockers together with the edges flush. Using a belt sander, sand the top and bottom curved edges of the rockers flush. Now, drill $\frac{5}{32}$ " counterbored mounting holes through the *outside face* of each rocker for attaching the seat (A), crossmember (E), and dowel handles later. Unclamp the pieces.

5 Using the holes at the handle location for reference, use a Forstner bit to drill a pair of $\frac{3}{4}$ " holes $\frac{1}{4}$ " deep, centered over the $\frac{5}{32}$ " holes on the *inside surface* of each rocker.

Next, machine the rest of the pieces

1 Transfer the Background (D) half pattern to plywood twice, and use a jigsaw or bandsaw to cut the two pieces to shape.

For use indoors or out, this cleverly designed playtime project will send kids to the moon with excitement, literally. Themed after the legendary cow that jumped over the moon, our teeter-totter design features stops beneath the seats to safely control the rocking motion.

Let's start with the seat and stops

1 From $\frac{3}{4}$ " plywood, rip and crosscut the seat (A) to size. (We used MDO plywood for the entire project; see the box on the *opposite page* for more information on this sheet-good product.)

2 Using the full-sized patterns on the *WOOD PATTERNS™* insert in the center of the magazine, transfer the Seat-End pattern including the hole centerpoints to both

ends of the plywood seat blank. Cut and sand the seat to shape.

3 Transfer the Stop (B) pattern to the plywood two times, and then cut the stops to shape.

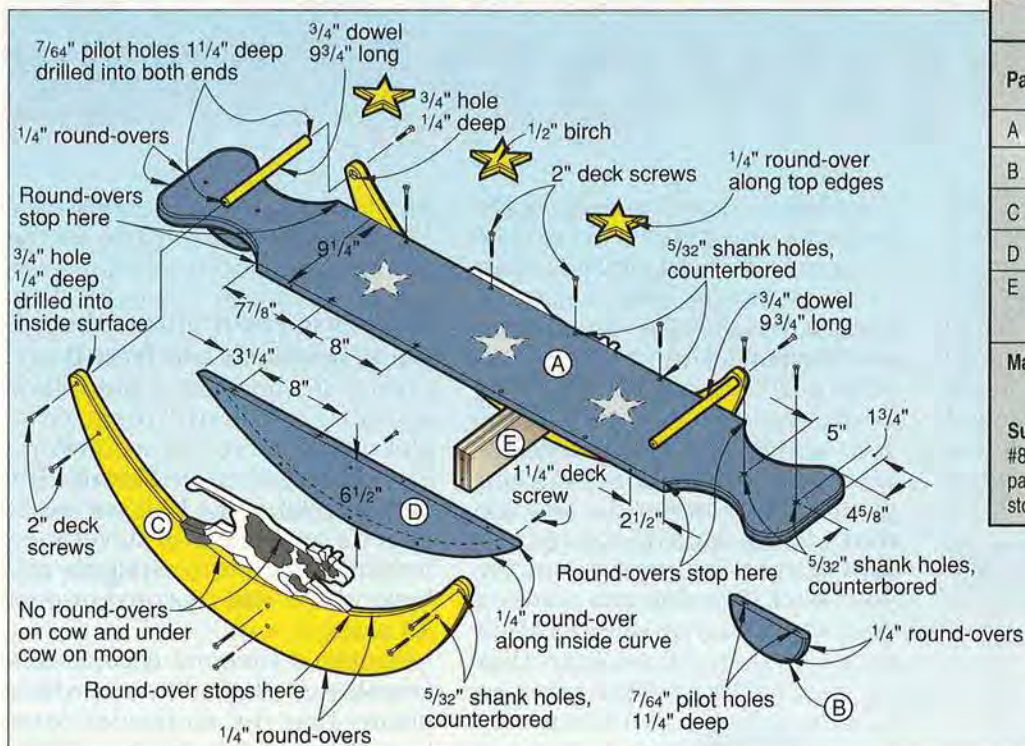
4 Drill mounting holes near both ends of the seat (A), drive screws through the holes, and press the stops (B) against the protruding screws to transfer the centerpoints. Drill holes in the stops where indented. Glue and screw the stops to the seat bottom.

Now, add the rockers

1 To make the rockers (C), you'll need to transfer the full-sized Moon half pattern, hole centerpoints, and seat location twice to a piece of plywood, joining the patterns at the centerline. Transfer the full-sized Cow pattern to the top edge of the marked moon, aligning the centerline of the cow with that of the moon patterns. For making

TOTTER

It's out of this world



Bill of Materials

Part	Finished Size			Mati.	Qty.
	T	W	L		
A seat	3/4"	9 1/4"	60"	PW	1
B stops	3/4"	3 3/4"	7 1/2"	PW	2
C rockers	3/4"	16"	38"	PW	2
D background	3/4"	6 1/2"	31"	PW	2
E cross-member	1 1/2"	3 1/2"		LP	1

Materials Key: PW-plywood, LP-laminated plywood or a piece of a 2x4.

Supplies: 3/4" dowel stock, #8x1 1/4" deck screws, #8x2" deck screws, wood filler, latex primer and paints, water-based polyurethane, 1/2"-thick birch stock for the three decorative stars.

EXPLODED VIEW

2 Mark the hole centerpoints for attaching the backgrounds (D) to the inside surface of the rockers (C), and drill countersunk holes.

3 Laminate two pieces of 3/4"-thick plywood together, or crosscut a section from a piece of 2x4 to form the crossmember (E).

4 Transfer the star pattern to 1/2" birch stock three times, and cut to shape. Rout or sand a round-over along the top edges of each. Left as is, the corners of the stars are sharp. Glue the stars in place.

5 Cut two pieces of 3/4" dowel to 9 3/4" long for the handles.

Assemble the teeter totter

1 Dry-clamp (no glue) the pieces, including the dowel handles, together. Now, using the holes in the rockers (C) as guide holes, drill 7/64" pilot holes 1 1/4" deep centered in each end of each dowel handle. Disassemble the project.

2 Rout 1/4" round-overs on the pieces where marked on the Exploded View drawing.

3 Fill any voids and sand all routed edges smooth.

4 Glue and screw the background pieces (D) centered from end-to-

end on the bottom outside edges of the seat. Use a framing square to ensure that the ends of the background pieces are directly across from each other.

5 Glue and screw the seat/background assembly (A/D), cross brace (E), and dowel handle between the rockers (C). Take your time to keep the assemblies square to each other.

Now, give the project a spectacular paint job

1 Fill the counterbores with wood putty and sand smooth. Slowly and carefully run your

hands across all surfaces and edges to feel for rough edges caused by protruding filler. Sand where necessary. Any unevenness will become more prominent once painted.

2 Prime the entire project (we used a latex primer), and allow to dry for 24 hours. Transfer the paint lines, and paint the blue areas (we used a 1" brush for the larger areas and a #8 for the tight spots). Paint the yellow areas, then the white, and finally the black and pink. For added protection, add two coats of water-based polyurethane. 🌟

MDO: The Sign Painter's Choice

Medium density overlay plywood (commonly called MDO) is an exterior-grade plywood with an impregnated-paper overlay to conceal the grain and provide a smooth surface for painting. Because of this, MDO is a favorite among professional sign painters.

AC-grade MDO plywood has paper on one side, and AB-grade MDO has paper on both sides

(we used the AB grade for this project). If it is available, purchase MDO with the lauan crossband directly under the paper overlay rather than the fir veneer next to the paper. The repaired surface (football-shaped patches) of the fir plywood will tend to telegraph the repairs through the paper while the crossband has no repair patches to show through.

WOOD® MAGAZINE'S GUIDE TO TODAY'S ADVANCED WOODWORKING

Why would anyone pay \$20 for a bottle of glue? That's the question we faced when we first tried the new polyurethane-based glues Excel and Gorilla Glue. And the more we studied these glues, the more we realized that they open up a whole new world of options. But traditional woodworker's glues also have taken several strides forward in the past few years. So we

decided to compare the new polyurethane glues with two of the more advanced aliphatic resin (AR) glues on the market—Elmer's Weather-Tite Wood Glue and Franklin's Titebond II.

Our goal was not to conduct a head-to-head contest to find out who has the best glue. Rather, we wanted to find out what each glue can and cannot do, and use that information to figure out how to get the most bond for your buck. We also ran across a new speciality product called

RooClear that offers hope to woodworkers who have struggled when trying to glue up

melamine-coated sheetgoods. (See "What About RooClear?" in the box on page 73.)

Aliphatic resin glues: the woodworker's old friend

Creamy in consistency and yellow in color, aliphatic resin (AR) glues have served as woodworker's trusted companions for decades. But in the last four years, Elmer's and Franklin developed formulas that perform above and beyond the call of conventional AR glues.

Franklin's Titebond II contains a cross-linked aliphatic resin which means that the molecules form long chains as the glue cures. This gives it increased resistance to water penetration. Elmer's Weather-Tite Wood Glue derives its distinction from a gel formula that contains finely ground particles of wood. The gel formula causes the squeeze-out to bead up neatly on the joint line and helps conceal glue lines by absorbing stains and finishes better.

Polyurethane glues: the new kids on the block

Developed in Europe about ten years ago, polyurethane glues were formulated to replace epoxies which give off fumes that can pose health hazards. But unlike epoxies which you must mix with a catalyst, Excel and Gorilla Glue come ready to



To see how well these glues worked we glued and broke hundreds of samples.

 Print this article

GLUES

use straight from the bottle. And unlike AR glues, which require evaporation of a solvent, the polyurethanes contain little or no solvent. For a catalyst, the polyurethanes need only moisture in the air and wood.

TESTING THE GLUES Here's what we found

•Drying time

In our chart on *page 73*, we refer to “open time,” (the amount of time you have to apply the glue and adjust the pieces before the glue sets up), and “clamp time,” (the length of time you need to leave the workpiece in clamps). In both open and clamp time, Elmer's Weather-Tite Wood Glue and Titebond II cure much more quickly than the polyurethanes. This has advantages and disadvantages, depending on the project.

The shorter clamping times of the AR glues enable you to reuse your clamps sooner—an important consideration when you have more assemblies than clamps. The longer open times offered by polyurethane glues come in handy when you are dealing with complicated assemblies. In our tests, the polyurethane glues allowed us to tweak and reposition pieces for up to 20 minutes.

•Application/spreadability

With their honeylike consistency and longer open times, polyurethanes spread easily, especially over large surfaces. Ounce for ounce, we found that the polyurethanes cover 50-100% more area than the AR glues. Elmer's Weather-Tite Wood Glue and Titebond II skin over fairly quickly, and become difficult to spread or squeegee after 4 to 5 minutes. Another time-saving benefit we discovered with the polyurethanes is that you apply them to just one surface instead of the two required by AR glues.

If you are accustomed to spreading AR glue with a fingertip, you will need to change methods with the polyurethanes. These require a solvent such as alcohol or mineral spirits for cleaning, and can stain your skin and gum up your hands. Apply polyurethanes with a stiff brush or squeegee.

•Squeeze-out/expansion

Excel and Gorilla Glue expand as they cure, much like spray-foam insulation. If you spread them too thick, the squeeze-out turns into a torrent. Elmer's gel formula offers the least-messy squeeze-out—a nice feature on vertical glue-ups where excess glue might run down the side of your project.

The expansion of the polyurethane glues helps to fill gaps in furniture repairs where dowels have loosened slightly in their holes, or joints fit with less than their original precision. In our testing, we discovered that Gorilla swells up roughly a third more than Excel.



Polyurethane glues spread easily and need only be applied to one side or edge of a workpiece, making them ideal for large or complicated glue-ups.



On vertical applications, glue squeeze-out can lead to a sticky situation. We purposely overloaded these joints to show how Elmer's Weather-Tite Wood Glue gel formula resists running.



Scraping off dried polyurethane glue proves easy and won't dull or nick your cutting edges like AR glues can.

Continued

WOODWORKING GLUES

This expansion ability however, won't compensate for sloppy work. Both manufacturers caution that the polyurethane glues will not provide structural gap filling beyond 0.1mm.

•Water resistance

In our tests that involved repeated soaking and drying, none of the joints we glued delaminated. The Elmer's Weather-Tite Wood Glue did soften while wet, but regained its hardness after drying. Completely submerged, however, the Elmer's glue line broke first, after three days. Titebond II broke after six days and the polyurethanes remained intact.

Titebond II, however, has passed national standards for type-II water-resistance testing. This means you can leave projects glued with Titebond II exposed to the rain as long as they are not submerged in water. Excel and Gorilla are both waterproof, meaning you can submerge these joints underwater indefinitely.

•Sanding ease

When sanded, Excel and Gorilla Glue turn into a fine powder. They also yield easily to a scraper and don't dull your tool edges.

Elmer's Weather-Tite Wood Glue and Titebond II tend to soft-

en and gum up the abrasive when you smooth them with a belt or pad sander. They also can nick your scraper and chisel edges.

•Creep resistance

When you glue a flush assembly of different woods, or pieces with their grain running in different directions, you may detect a slight bump at the glue line a few months later. This phenomena is called creep. It happens when the wood shrinks or swells at different rates and the glue bond, if it is flexible, allows the pieces to move independently.

In our tests, Titebond II resisted creep better than Elmer's Weather-Tite Wood Glue. The polyurethanes, however, are "non-thermoplastic," meaning they allow little or no flexibility at the glue joint. When an assembly glued with polyurethane shrinks or swells, all the pieces move together due to the rigidity of the glue joint. The result: creeping is reduced or eliminated.

•Bonding strength

All the glues demonstrated more-than-adequate strength on edge-grain glue-ups. When we tried to break these, the wood failed, not the glue line. End-grain glue ups proved less successful. Titebond II scored the best here, followed by Elmer's Weather-Tite Wood Glue, and then the polyurethanes.

Although the makers of the polyurethanes claim their products work better than other

glues on oily woods such as teak, we found that all four products performed equally well on our teak edge grain. Your results, however, may vary depending on the oiliness of the wood. Experiment by gluing up a few scraps before you commit a large project to a particular glue.

We did find a difference in gluing aluminum and brass to wood. Here, the polyurethanes held fast, while Elmer's and Titebond II failed to bond to the metal.

•Price

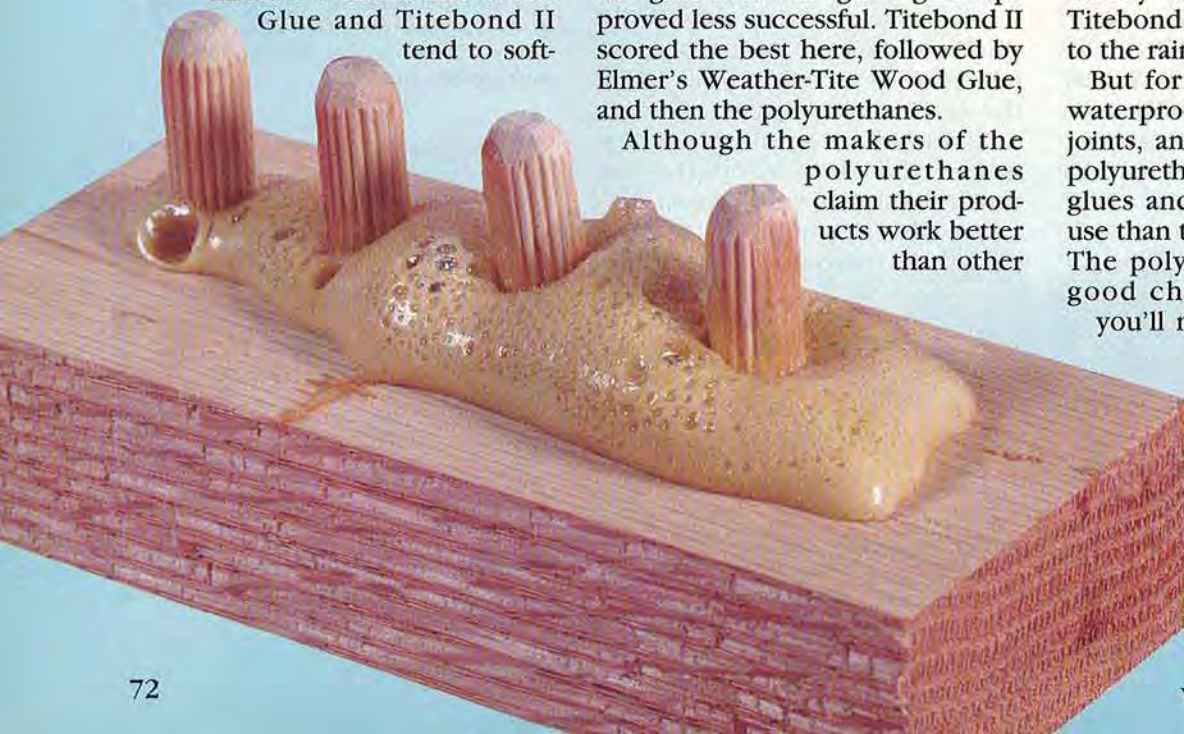
The chart at *right* shows the cost per ounce of each of the glues. The cost will vary depending on the size of container you buy. The more you buy, the less you pay per ounce. And keep in mind that the high cost of the polyurethanes can be partially offset by the fact that you get more coverage per ounce.

Our recommendations

Elmer's Weather-Tite Wood Glue and Titebond II do a good job at a price that's hard to beat. They still deserve a spot on every woodworker's shelf. Choose Elmer's Weather-Tite Wood Glue when you want to prevent a messy squeeze-out, and use Titebond II for projects exposed to the rain.

But for many specific needs—waterproof joints, metal-to-wood joints, and creep resistance—the polyurethanes outperform the AR glues and prove much easier to use than the old two-part epoxies. The polyurethanes also make a good choice when you know you'll need extra open time to assemble a glue-up with a lot of parts, or you anticipate lots of sanding or scraping.

As they cure, polyurethane glues expand, forcing the glue into the wood fibers and helping to fill small gaps.



COMPARING THE NEW GLUES

MANUFACTURER AND BRAND	GLUE TYPE (1)	OPEN TIME (MINUTES)	CLAMP TIME (HOURS)	CLEAN-UP SOLVENT (2)	SHELF LIFE (YEARS)	PERFORMANCE (3)											PRICE PER OUNCE (10)	COMMENTS		
						WATER RESISTANCE (4)						BONDING STRENGTH (9)								
						EASE OF SANDING (5)	SPREADABILITY (6)	STAIN ABSORPTION (7)	CREEP (8)	EDGE GRAIN			END GRAIN							
										OAK	MAPLE	WALNUT	TEAK	OAK	MAPLE	WALNUT			TEAK	
FRANKLIN TITEBOND II	AR	10	1	W	1	G	G	G	P	G	E	E	E	E	E	E	G	G	\$.52	Penetrates deep into wood fibers for excellent bonding strength. Not water-proof like the polyurethanes, but will shrug off rain.
ELMER'S WEATHER-TITE	AR	10	1	W	1	F	G	G	G	G	E	G	E	E	E	G	E	E	.51	Less water-resistant than Titebond II, but the gel formula prevents messy squeeze-out and wood fibers help absorb stains.
GORILLA GLUE	P	20	1-4	MS	1	E	E	E	F	E	E	G	E	E	G	G	G	G	.88	The most expensive per ounce, but expands more and offers a shorter clamp time than Excel.
EXCEL	P	20	1-12	MS	1	E	E	E	F	E	E	E	E	E	G	G	G	G	.62	A high-performance polyurethane at a price that's not much more expensive than the aliphatic-resin glues.

NOTES:

- | | | | | | |
|---|--|---|--|---|--|
| 1. (AR) Aliphatic resin
(P) Polyurethane | 3. E Excellent
G Good | F Fair
P Poor | 4. Samples soaked and dried twice, then observed for delamination. | 6. Ability to wet the wood and amount required. | 8. Graded on whether glue line could be felt after soaking and drying cross-grain laminations. |
| 2. (W) Water
(MS) Mineral spirits | | | 5. Graded on both effort and sandpaper loading. | 7. Mahogany stain on maple. | 9. Observed bond strength. |
| | | | | | 10. Price varies depending on volume of container. |

Although Gorilla Glue costs roughly 30% more than Excel, we didn't detect any significant performance differences once they had dried. That makes Excel a better buy per ounce in the bottle, but these glues are not entirely identical. Gorilla Glue is solvent-free and odorless, whereas Excel contains about 5% solvent by volume and imparts a slight odor. And, Gorilla expands more than Excel, and offers a shorter clamp time.

How to find these glues

You can find Elmer's Weather-Tite Wood Glue and Franklin's Titebond II in most hardware or homecenter stores. For more information on Elmer's call 800/848-9400. To find out about Franklin's glues, call 800/877-4583. Excel, Gorilla Glue, and RooClear are sold primarily through woodworking catalogs and some retail outlets. To find out where to buy Excel, call 800/779-3935. You can order Gorilla Glue direct by calling 800/966-3458. For information on RooClear, call 503/588-0788.

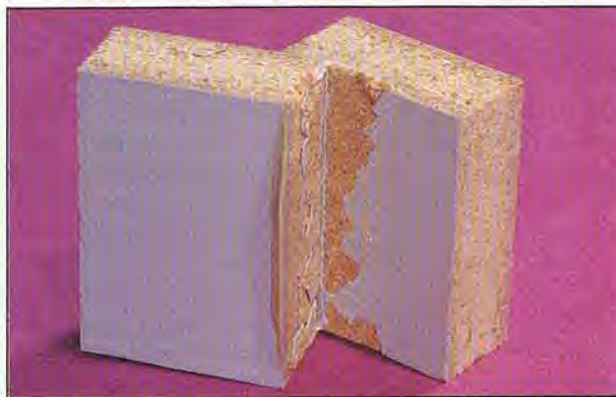
What About RooClear?

Even though it isn't a conventional woodworking glue, RooClear solves one of woodworking's most time-consuming problems—how to glue melamine-coated particleboard used in cabinets and countertops.

Before RooClear came along, the only way to glue two perpendicular pieces coated with melamine was to rout away the thin melamine layer on one piece to get a particleboard-to-particleboard bond. With RooClear, you simply apply it to both mating surfaces, clamp or screw the pieces together, and wait four hours. If you manage to pull this

joint apart, you'll wind up tearing the melamine, as shown in the photo below.

RooClear costs about \$.50 per ounce, and gives you 20 minutes open time and 4 hours clamp time. It's not water resistant and it doesn't sand well, but the undried glue cleans up easily with water. In addition to melamine, you can use it on PVC, vinyl, particleboard, stone, metal, and wood. But RooClear acts like a flexible construction adhesive. This makes it less desirable for wood and materials you can join with AR or polyurethane glues that create a more rigid bond. 🌲



RooClear bonds so well to melamine-coated particleboard that a joint, when stressed, will rip the melamine facing off rather than fail at the glue line.

Written by Tom Jackson Technical consultant: Dave Henderson Photographs: John Hetherington

TAKE THE BAIT

AND CARVE THIS BASSWOOD BLUEGILL



Project prep

Stock: Basswood or other carving wood 2×3¼×7½".

Carving tools

Gouges:

¼" no. 5)

⅛" no. 9)

¼" no. 9)

⅛" no. 11 U-veiner ...)

⅛" no. 11 U-veiner ...)

V-tool:

⅛" no. 12 ✓

Knife: Bench knife.

More and more carvers seem to like fish these days. Not necessarily on the dinner table, but as carving subjects. Try your hand at this realistic bluegill, and discover the lure of aquatic carving.

Transfer the full-sized fish body side-view and top-view patterns in the *WOOD PATTERNS™* insert in the middle of the magazine onto a 2×3¼×7½" piece of basswood. Here's how carver and project designer Bill Payne of Broken Arrow, Oklahoma, does it quickly and accurately. First, he pastes a photocopy of each pattern to a piece of light cardboard, such as a cereal-box side. Then, he cuts out the pattern to create a cardboard

template. He then lays the template on the stock and traces around it with a sharp pencil.

Bandsaw the side-view outline. Reattach the cutaway parts to the blank with masking tape, and bandsaw the top-view outline. Save the waste pieces to cut the fins from later.

Give it a slippery shape

Smooth the body, using abrasives or gouges, a knife, and shaves. Remove all saw marks, and round the corners to give your fish a smooth, sleek form.

Mark the eye location on each side of the head. Glass eyes look realistic and are easy to install. (Use 10mm fish eyes, available from many carving-supply dealers.) Or if you prefer, you can



carve the eyes. If you plan to use glass eyes, drill about $\frac{3}{8}$ " deep with a $\frac{1}{2}$ " brad-point bit at each mark. (The oversized holes enable you to position the eyes later by setting them in putty.)

Sketch the end-view curve of the caudal fin, or tail fin, as we'll call it, onto the end of the bandsawn fish. Then, rough the curled tail fin, starting about $1\frac{3}{4}$ " from the tail end of the sawn blank. Carve the fin itself to about $\frac{3}{16}$ " thick.

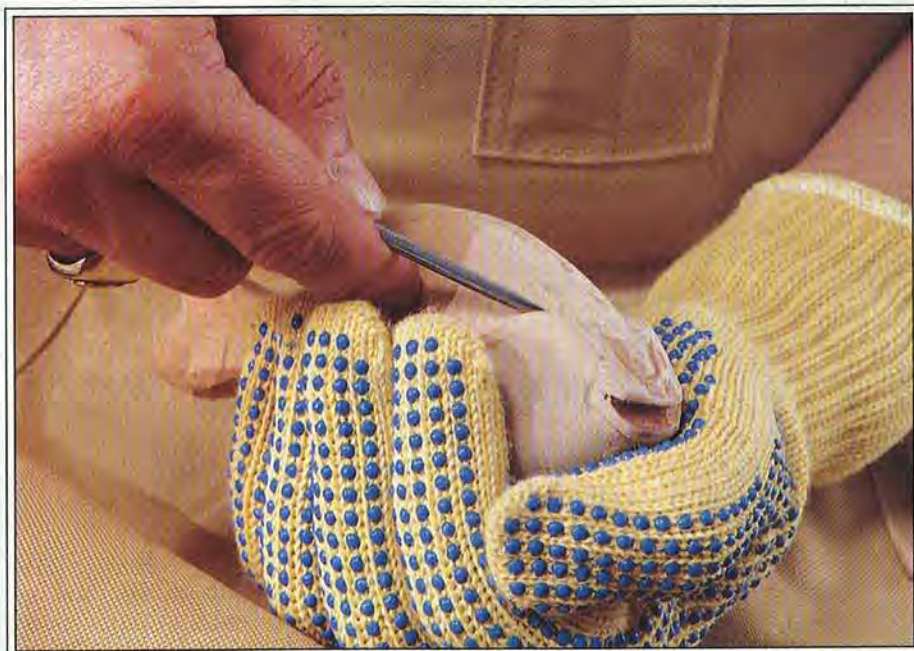
Refer to the photographs of the finished carving, then sketch rib lines along the tail fin. Space them so they're about $\frac{1}{4}$ " apart at the end of the fin, a bit closer where the fin joins the body.

With a no. 9 gouge or no. 11 U-veiner about $\frac{1}{4}$ " wide, carve from the base of the fin straight out to the edge between each pair of lines. Make shallow cuts to begin, first on one side of the fin, then on the other. Deepen the hollows until the fin is a little less than $\frac{1}{8}$ " thick at the trailing edge.

Draw the gill line and ear on each side. Stop-cut the gill lines. (A stop cut is simply an incision along the pattern line, made with a knife or gouge. It allows you to cut right to the pattern line without splitting off wood beyond it.)

Now, shape the gill area. From about $\frac{3}{4}$ " behind the gill line, carve toward it, establishing a relief behind the line of about $\frac{1}{16}$ ". Working down from the top of the gill line—adjacent to the ear, gradually deepen the relief so it tapers from $\frac{1}{16}$ " at the top to $\frac{5}{16}$ " at the bottom. To represent the gill cover, undercut the line about $\frac{1}{8}$ " with a small U-veiner or knife, forming a flap as shown *above right*. Make it $\frac{1}{8}$ " thick or less at the trailing edge.

Refer to the detail photo on page 76 as you carve the lower part of the head and the portion of the body beneath the flap. With a small gouge, slightly cut away the side of the head to create the



Undercut the gill covers easily with a $\frac{1}{16}$ "-wide no. 11 U-veiner.

bulging area around the eye and onto the cheek. If you've opted to carve the eyes, draw a $\frac{3}{8}$ " circle at each eye location. With the tip of your knife, carve a slightly flattened spherical section inside the circle. Remove wood from, or relieve, the surrounding surface slightly so the eye will appear to be standing out from the side of the head. With a small V-tool, carve the maxillary line.

Fashion the fins

Saw the waste pieces into stock for the fins. You'll need one piece $\frac{7}{8} \times 3\frac{1}{2} \times 1\frac{1}{4}$ " for the dorsal fin, one $\frac{1}{4} \times 2\frac{1}{4} \times 1\frac{1}{4}$ " for the ventral fin, and four $\frac{3}{8} \times 1 \times 2$ " for the two pectoral and two pelvic fins. Trace the fin patterns onto the blanks.

The uncurled ventral fin is the easiest to carve, so start with that one. Cut around the pattern line with a coping saw or scrollsaw. Then, with a shallow gouge, taper the fin from about $\frac{3}{16}$ " thick at the base (where the mounting tab is located) to $\frac{1}{8}$ " or less at the outer edge. In general, thinner fins will look more realistic.

Next, carve the ribs in the fin. Refer to the photographs, then sketch guidelines on both sides of the blank. Carve the ribs and grooves as you did on the tail fin. Gradually deepen the grooves until the thickness at the bottom of the grooves along the edge of the fin is about $\frac{1}{32}$ ".

Cut out the pelvic and pectoral fins. Refer to the cross-section view with the pattern, then carve a hollow running along the grain. Shape the back of the fin in a curve to match the hollow, creating a crescent-like cross-section about $\frac{1}{8}$ " thick at the center. Be sure to carve one curving toward each side so you'll have left and right fins. Raise ribs on these fins with the $\frac{1}{8}$ " V-tool.

For the compound-curved dorsal fin, cut out the pattern outline. Then, referring to the top and bottom views accompanying the pattern, sketch the top and bottom lines on the edges of the cut-out fin. With your gouge, carve out the front contour. Cut down to the lines on the edge, creating a curved surface between them.

Continued

BLUEGILL



Give the form a natural-looking ripple to make it look as if it is moving through the water.

Carve the back surface to match, forming a fin about $\frac{1}{8}$ " thick. With the no. 9 gouge or U-veiner, form the ribs and hollows as you did for the ventral fin.

Now, fit the fins to the body. Hold each fin in position, and mark the location for the slot that will receive the fin tab. Carve the slots with a knife, angling the ones for the pectoral and pelvic fins so the fins will stand away from the body at about 45° . Sand or carve the mating surface of each fin to fit the body. Don't glue the fins into place, however.

Work on a wet fish

A series of gouge cuts represents the fish's scales. But before you begin carving them, wet the fish under running water—the kitchen-sink sprayer does a fine job. Then, wrap the carving in a damp towel and let it sit for two hours or so. Dampening the wood this way prevents the scales from flaking off as you carve.

Carve the scales with a deep gouge, such as a no. 9 or 11, about $\frac{1}{8}$ " wide. Keep the open side of the gouge toward the front of the fish so the rounded end of the carved scales will point toward the back.

Start carving the scales at the mouth. Angle the gouge into the wood at about a 45° angle, as shown *opposite page bottom*. Push it in about $\frac{1}{16}$ ", raising a rounded flap of wood. Cut another right next to that one, and so forth until you've completed a row all around the body.

For the next row, place the cutting edge about a gouge width toward the back of the fish and midway between two scales. Offsetting them like this will create the effect of overlapping layers, like roof shingles. Carve the row as before, then start another one, again offsetting it by $\frac{1}{2}$ a scale's width. Rewet the body as you work, if necessary.

Cover the entire body with scales, but not the tail. Remember to orient the scales so that water flowing along the fish's body would smooth them down, not ruffle them up.

Let the carving dry. Sand lightly in the direction the scales lie—just enough to remove fuzz raised by wetting the carving. A Scotch Brite pad works well for defuzzing the carving.

Take care of some details

Now, add the fins and, if you haven't already carved them, the eyes. Glue the dorsal and ventral fins into position, then the pelvic and pectoral ones. Fill any gaps

between the fins and the body with wood putty, and allow to dry. Sand the filled areas smooth.

To set a glass eye, fill the drilled eye hole with putty. While that's still soft, push the eye into place, with the lobe on the pupil to the front. Blend the putty that squeezes out around the eye into the eye bulge in the head. After the putty dries, carve and sand the eye area to form the eyelid. After setting the eyes, mask them to protect them during painting.

On the left side of the fish near the tail, drill a hole about $\frac{1}{4}$ " deep to fit a $\frac{1}{4}$ " dowel. Glue a 4-6" length of dowel into the hole. Later, you'll shorten this to attach the fish to the display stand. For now, however, it makes a convenient handle for painting the fish.

Bring color to your bluegill

Paint the fish with acrylic artist's colors, available from art-, crafts-, or carving-supply dealers. You'll need black, white, red, orange, avocado, and a light blue.

When painting the fish, thin your paint with water or acrylic medium to the approximate consistency of milk. Then, build the color by applying multiple thin coats. A single, heavy coat of unthinned paint would obliterate many carefully carved details, particularly the scales.

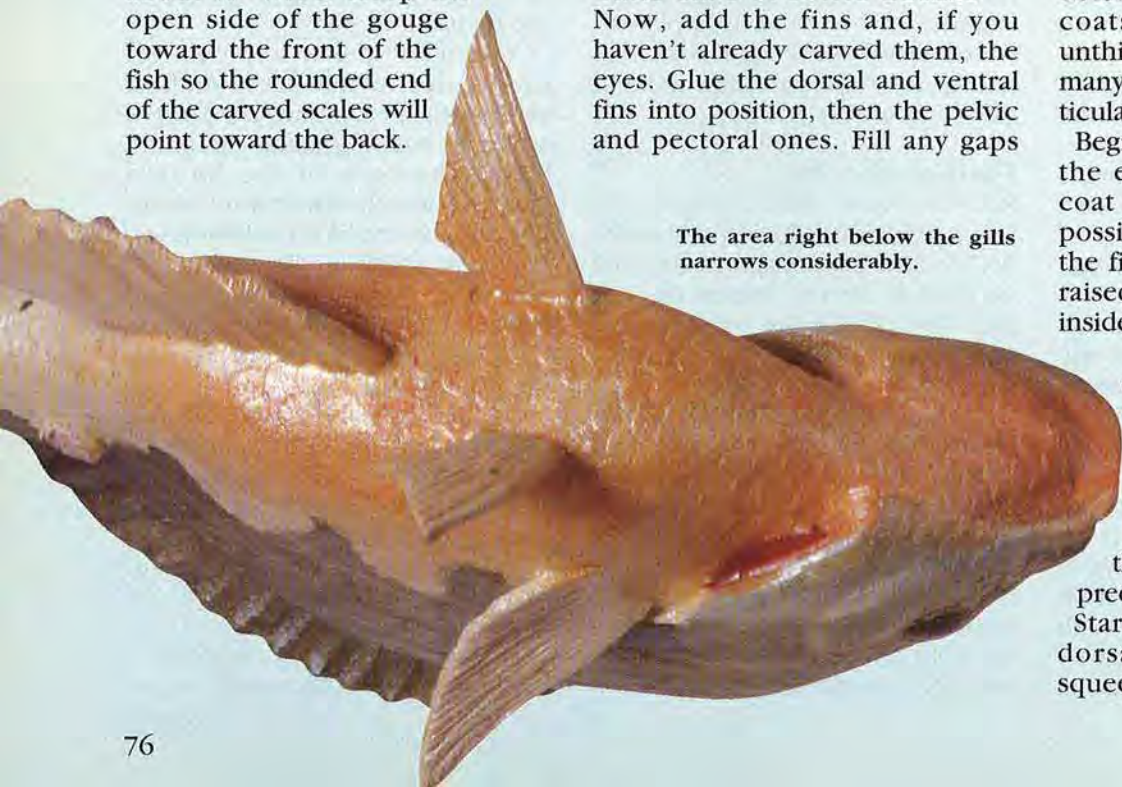
Begin with a coat of white over the entire fish. Apply this base coat as smoothly and evenly as possible. Paint along the ribs on the fins, and be sure to cover the raised edges of each scale. Paint inside the mouth and gill areas.

Refer to the photographs as you add color to the fish.

Consult other references, too, to learn more about the fish's coloration.

Colors can vary widely from one fish to another in the same species, so hitting a precise shade isn't crucial.

Start painting on the back and dorsal fin. Mix the color by squeezing a bit of avocado onto



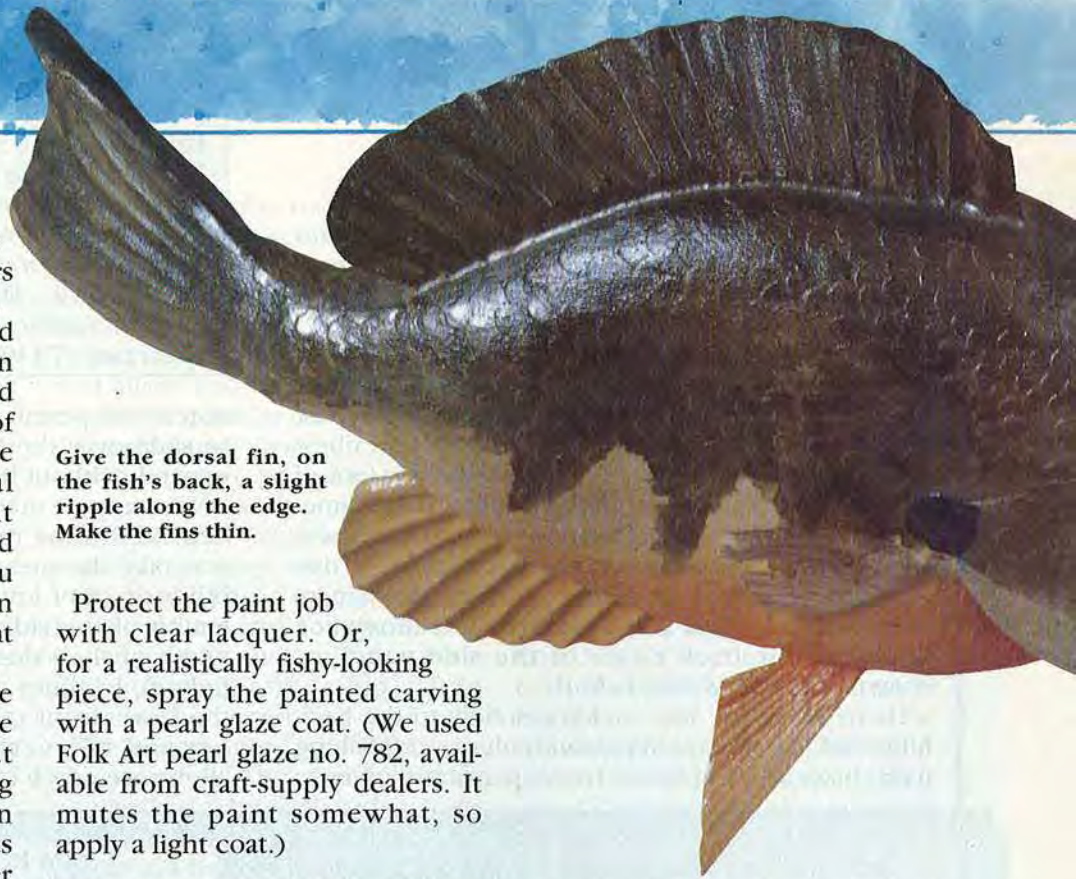
The area right below the gills narrows considerably.

your palette and mixing a small amount of black into it. (A plastic snap-on coffee-can lid makes a perfect palette.) Mix the colors well to prevent a marbling effect.

Hold the fish upside down, and start painting the two stripes on the side. Work onto the back and dorsal fin, adding more coats of the color wash until you reach the color you want. For a natural appearance, mix several slight variations of the color, then blend them together on the body. You can force-dry the paint between coats with a hair dryer if you want to speed things up.

Next, color the underside orange. The color is more intense in the isthmus (the area that would be the fish's chin), fading toward the back of the fish and on the sides. Apply additional coats under the throat for the brighter color. Blend the orange into the white around the edges.

Add the blue that gives the fish its name over the gills. Here again, the color is more intense at the front, fading toward the back. Paint a red stripe inside the gills. Color the inside the of the mouth orange and the ear gray.



Give the dorsal fin, on the fish's back, a slight ripple along the edge. Make the fins thin.

Protect the paint job with clear lacquer. Or, for a realistically fishy-looking piece, spray the painted carving with a pearl glaze coat. (We used Folk Art pearl glaze no. 782, available from craft-supply dealers. It mutes the paint somewhat, so apply a light coat.)

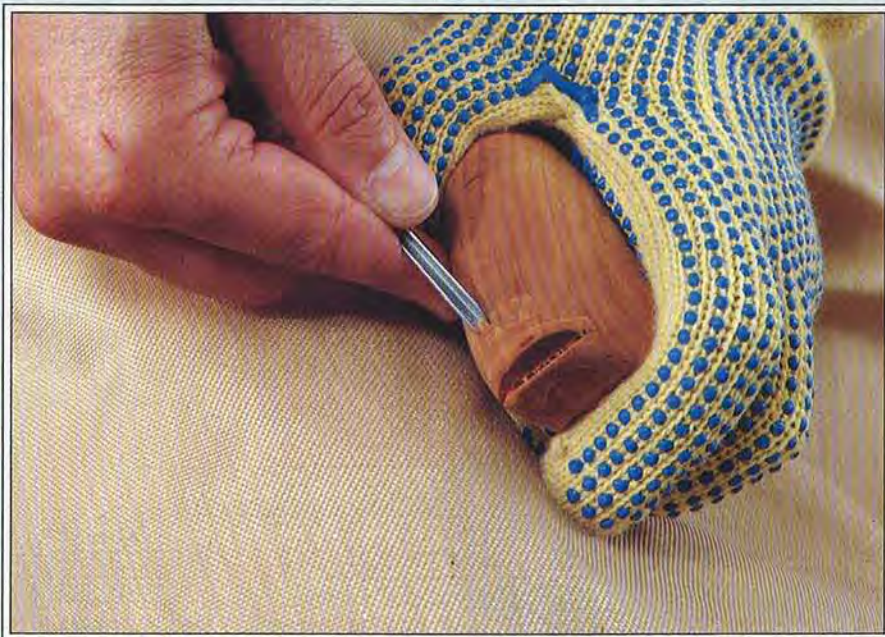
Mount your fish on a twig

To make a display stand like the one shown in the opening photo, find a piece of driftwood or a twig about $\frac{1}{2}$ " in diameter with a straight section about 5" long. If you use a twig, peel off the bark and sand the bare wood smooth to give it a driftwood look.

In a piece of carving wood about $1 \times 3 \times 5$ ", drill a hole for the twig at a 30° angle to the left, $1\frac{1}{2}$ " from the right end and 1" from the back edge. Carve the top surface and edges to represent a section of a streambed. (The one shown was carved to a roughly oval shape to fit on a 4×6 " oval base.) Keep the bottom flat.

Brush woodworker's glue over the surface and edges, and pour sand all over the carved stand. After the glue dries, brush off the loose sand. Fit the driftwood into the hole without gluing.

Hold the fish up to the stand to determine the location for the fish-mounting hole in the driftwood. Drill a $\frac{1}{4}$ " hole as deep as possible into the driftwood. Saw off the fish's mounting dowel to the depth of the hole plus $\frac{1}{4}$ ". This will stand the fish off from the driftwood by about $\frac{1}{4}$ " when the dowel is fully inserted into the hole. Glue the driftwood into the stand, and the fish to the driftwood. Sign and date the carving on the bottom of the stand. ♣



Dampen the fish before carving the scales. A $\frac{1}{8}$ "-wide no. 11 U-veiner forms the scales neatly. Overlap the scales shingle-style as you work from front to back.

Project Design: © W. L. Payne
Illustrations: Kim Downing
Photographs: John Hetherington; King Au

ASK WOOD

Looking for more information on moldings and wood movement

I want to fasten trim moldings on all sides around the top and the bottom of my solid-maple chest of drawers. How can I do this and still make allowance for wood movement?

—Bill Ledgerwood, Hot Springs Village, Ark.

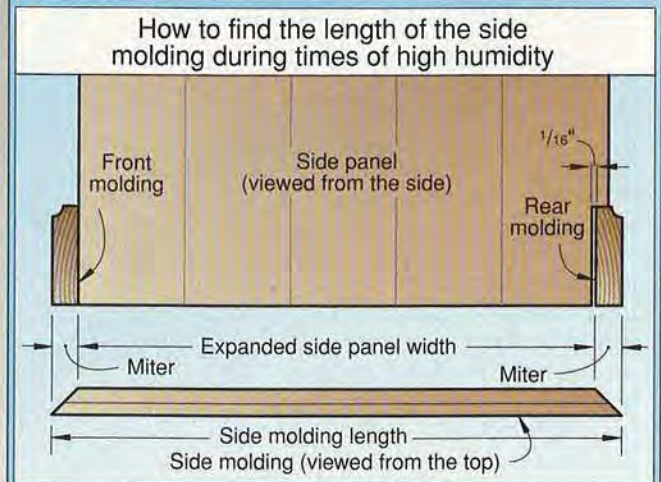
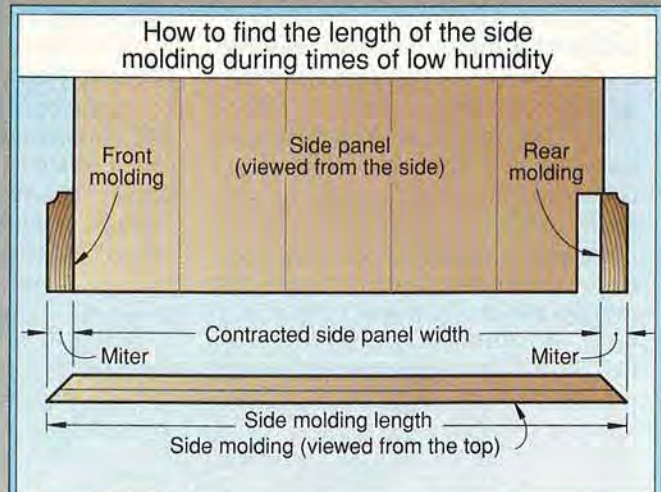
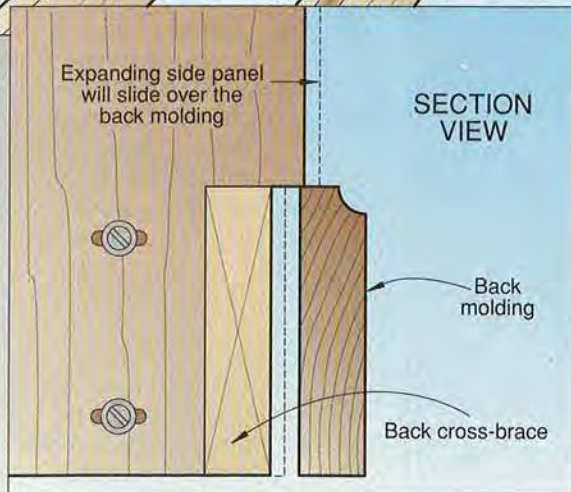
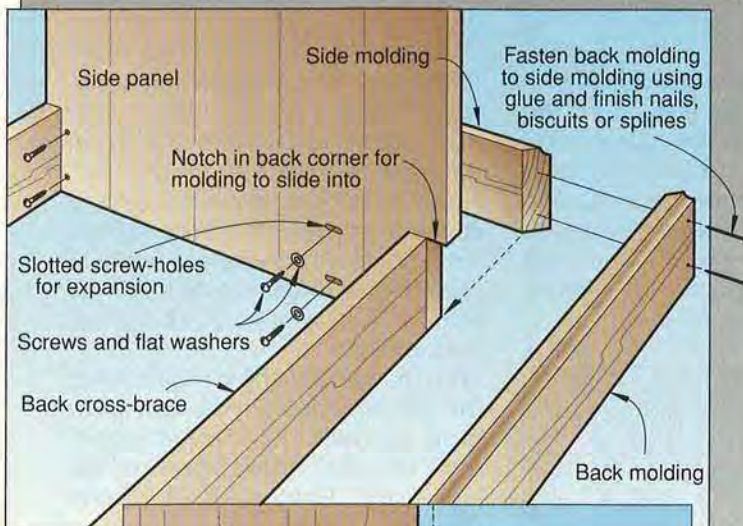
Bill, as we mentioned in the February 1994 Ask WOOD "The Joint is Open," the sides of this chest will change in dimension as much as $\frac{1}{8}$ " per foot of width due to humidity variations over a year's time. To cope with this movement, we suggest you use a sliding-type joint to fasten the back of the cross-grain side moldings, as described in the above-mentioned article, and add an expansion-allowance notch on the back edges of the side panel, as shown in the drawings, *below*.

Then, fasten the rear molding solidly to the back miters of the side moldings with glue and finishing nails, biscuits, or splines. The expansion-allowance

Whether your woodworker's license reads "Beginner," "Intermediate," or "Advanced," you're bound to have a few questions about your favorite hobby. We can help by consulting our staff and outside experts. Send your questions to Ask WOOD®, Better Homes and Gardens® WOOD Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. CompuServe address: 74404,3516 (or) Internet: 74404.3516@compuserve.com

notch will permit the back edge of the case sides to slide over the top of the rear molding as they expand, without breaking loose the miter joints.

Where you measure the side-molding length depends on the relative humidity level at the time you take the measurement. During the winter or other times of low humidity, determine the inside length of the side molding by measuring the full width of the sides, above the notch (see drawing *below*). In times of high humidity, measure from the lower-front corner of the cabinet side to $\frac{1}{16}$ " beyond the vertical edge of the expansion-allowance notch (see drawing *bottom*).



Router bit arbor comes up short

I have been using a slot-cutter bit mounted in the router on my router table to cut 1/4" slots in the middle of 1 1/2"-thick wood. I am finding that raising the slot cutter to the height I need leaves only about 1/2" of the router-bit shank remaining in the collet. I was taught to insert the shank to the bottom of the collet, and then raise it 1/16" before tightening. I am concerned that the bit may work itself loose while cutting with my current setup. What can I do to make this safer?

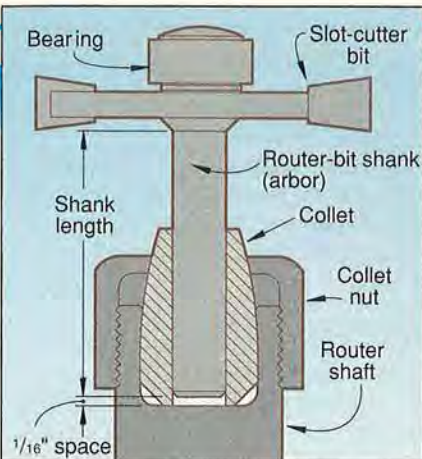
—Robert N. Goldsmit, Bellefontaine, Ohio

Bob, you are correct in believing that router bits should be set deep into the collet to keep them from working loose during operation. And yes, we do have some ideas that may help.

First, remove the router from the table, and operate the tool free-hand, using the slot-cutter's bearing as a guide. Many router table mountings are thicker than the router base plate, so this often will allow you to fit more of the router-bit shank in the collet.

Second, many slot-cutter bits are available as two parts, the slot cutter and the mounting shaft or arbor. For the smoothest cut, use a slot-cutter arbor with a 1/2"-diameter shank. These arbors provide more surface area for the router collet to grip, they will flex less, and consequently, vibrate less than the thinner arbors.

We recommend you compare the length of the shank on the router-bit arbors listed in our advertisers' catalogs, and buy the cutter and its corresponding arbor



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that best meets your needs. The longest-shanked slot-cutter arbor we found in our catalog library comes from Eagle America, P.O. Box 1099, Chardon, OH 44024, (call 800/872-2511). This arbor has a 1/2 x 1 3/4" shank, with a 5/16" spindle diameter, part #197-8305, and priced at \$6.99 plus shipping. The 1/4" three-wing slot cutter to fit this arbor, part #146-1030, is priced at \$11.99 plus shipping.

Continued on page 80

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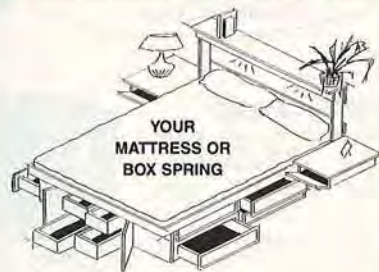
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ASK WOOD

Continued from page 79

A neat way to build a staved wishing well
I want to build an outdoor wishing well, about 3' in diameter. How can I figure out the necessary number of staves and the angle for ripping them?

Bob Myers, McClellandtown, Pa.

The first thing to find out, Bob, is the circumference or measurement around the outside of the wishing well. To get this figure, multiply the diameter of the well (36") by a number known as Pi (π) calculated to be 3.1416. Here's the formula:

$$\text{Circumference} = 36" \times 3.1416 = 113.1"$$

Then, to find the number of staves, divide the circumference by the width of the wood you plan to use. We chose the width of a 1 x 4, or about 3 1/2":

$$113.1" \div 3.5" = 32.3$$

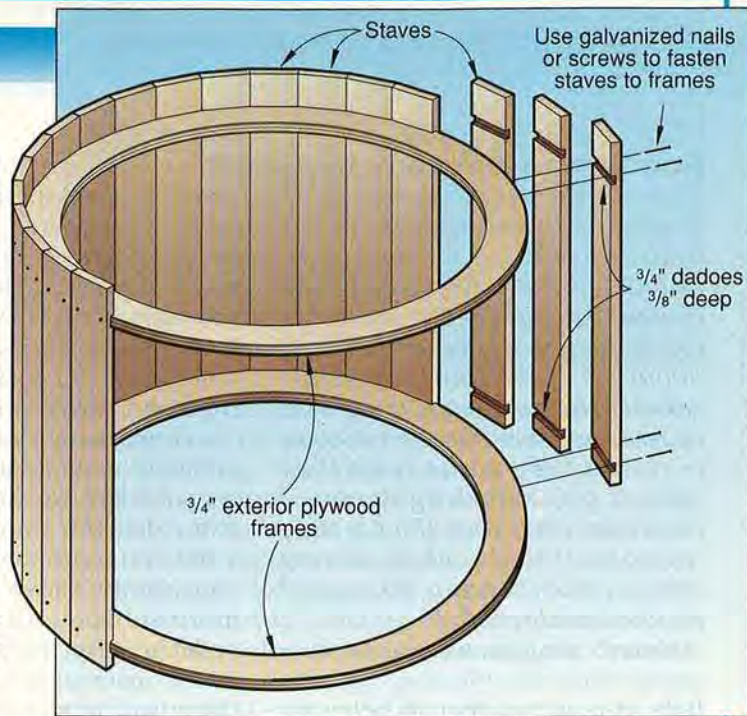
Because we don't want a partial stave, round this answer up to 33, and divide the circumference by this number to get the final stave width:

$$113.1" \div 33 = 3.427", \text{ or about } 3\frac{7}{16}"$$

To determine the bevel ripping angle, first divide the degrees in a circle (360°) by the number of staves (33), and then divide this answer by 2:

$$360 \div 33 = 10.91 \quad 10.91 \div 2 = 5.46$$

Set your tablesaw to rip a bevel just under 5 1/2°.



To assemble your wishing well, screw or nail the staves to two 35 1/4" outside diameter frames made from 3/4" exterior plywood (as shown above). Fit the frames into dadoes cut 1" from the top and bottom of the inside faces of the staves.

Continued on page 83

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ASK WOOD

Continued from page 80

Bubbles make for toil and trouble

I am having a problem with bubbles appearing on the surface of my finished work. I use water-based polyurethane over a stain and a sanding sealer. I am careful to stir both the sanding sealer and the finish, and I apply both the sealer and the final coat with a foam brush. Can you tell me what causes the bubbles?

—Ronald W. Ray, San Jose, Calif.

We think we can, Ron. You have done most of the steps necessary to prevent bubbles from forming in a water-based finish. However, we suspect the foam-type brush caused the bubbles. Apply water-based finishes with a high-quality, clean, nylon or polyester brush. Dip this brush no more than 1" into the finish, and spread it onto the wood in smooth, even strokes.

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—Betty Boggs, Trumansburg, N.Y.



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The word "ironwood" refers to several species of trees, usually the hardest wood in a given area. In New England, ironwood describes American hornbeam or blue beech. In Texas, honey mesquite earns the name of ironwood. In fact, most areas of the world have a specific tree referred to as "ironwood", some of which have weights approaching that of lignum vitae. However, because of slow growth and small log size, very few of these woods are commercially available. Those ironwoods that are harvested usually end up being used in their vicinity as flooring, bearings, rollers, and tool handles. ♣

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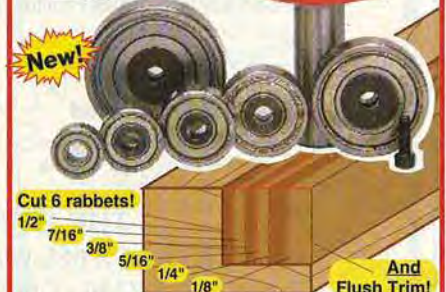
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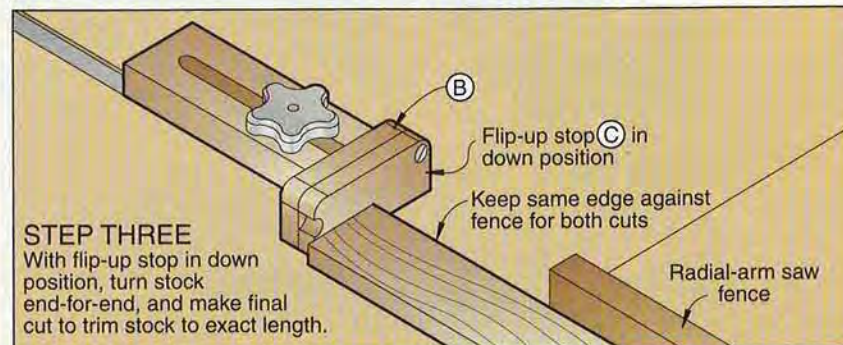
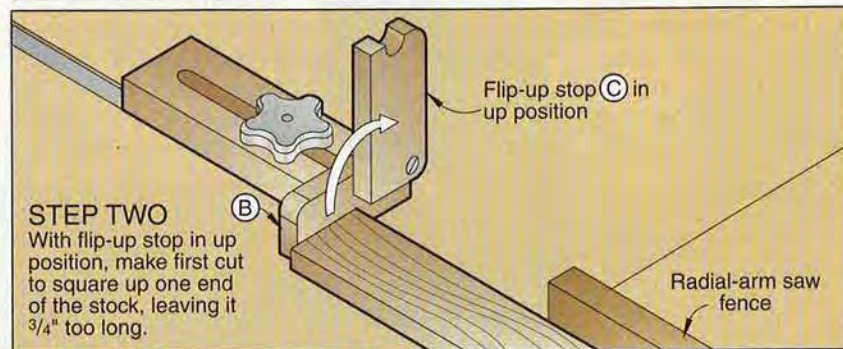
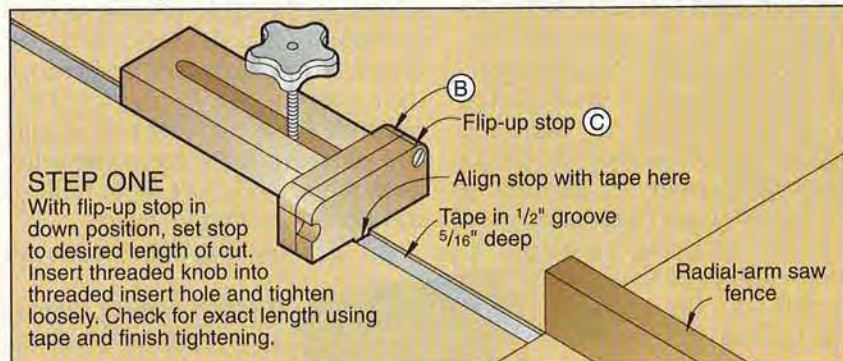
Continued from page 45

As shown in Step One of the three-step drawing below, position the assembled stop in the groove machined in the laminated top, aligning the outside face of part (C) with the desired length on the measuring tape. Secure the stop to the laminated top by tightening the knob.

When cutting boards to length, we often cut both ends of the board to ensure square ends. To do this using the stop, lift the flip-up stop (C) as shown in Step Two, position the end of

the piece being cut against the support (B), and crosscut the opposite end to length (causing the board to be $\frac{3}{4}$ " too long). Next, as shown in Step Three, turn the board end for end, lower the flip-up stop (C), and cut the other end of the board to the exact length.

Note: After changing saw blades, loosen the panhead screw in the adjustment slot in the aluminum bar, and adjust the bar stock if necessary to ensure an accurate cutting.



Written by Marlen Kemmet Project Design: James R. Downing
Illustrations: Jamie Downing, Lorna Johnson Photographs: John Hetherington

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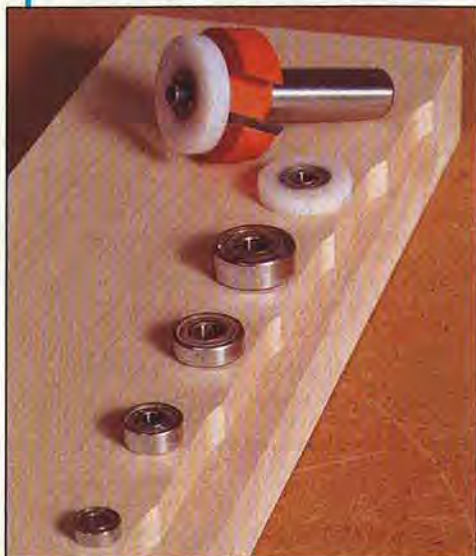
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This kit helps you rout rabbets of various widths

In the past, if you wanted to rout a rabbet you had to have a bit with cutters that matched the exact width of the rabbet. With this CMT Rabbet-Master Kit, however, you simply loosen the set screw on the bottom of the shaft, slip one bearing off and the other on, and tighten the set screw.



The kit comes with a two-flute carbide-tipped rabbet bit, an allen wrench, and six pilot bearings—four steel bearings and two with plastic rims. Depending on which bearing you use, you can rout rabbets with widths of 1/8", 1/4", 5/16", 3/8", 7/16", and 1/2".

I found changing the bearings easy and fast, and the accuracy of the cuts turned out right on the money. What makes this kit even more valuable was that I could put these same bearings on a number of other piloted router bits—coves, chamfers, round-overs, and such—and change those profiles too.

—Tested by *Chuck Hedlund*

Rabbet-Master Kit, 1/2" shank, model 800-623, \$40.90 ppd.; 1/4" shank, model 800-622, \$37.90 ppd., from CMT Tools, 310 Mears Blvd., Oldsmar, FL 34677. Call 800/531-5559.

Multi-function machine makes sanding easier

I hate sanding! And if you feel the same way, take a look at the new Delta Sanding Center. Powered by a 1.5-hp motor, this machine works as a belt and disc sander. What's more, a power take-off spindle opposite the disc sander accepts a number of different accessories including pneumatic drum sanders, buffing wheels, abrasive flap wheels, and a flexible-shaft drive.

The 6×48" belt sander tilts from fully upright to fully horizontal, and a cast-iron platen minimizes heat build up. The tilting cast-iron table dedicated to the belt sander helps you to sand bevels and miters. A removable backstop prevents the workpiece from being carried along with the belt. For sanding inside curves, you can take off the cover on the end of the belt and work freehand.

The 12" disc sander also comes with a cast-iron table that tilts 45° up or down from horizontal. But my favorite component is the sliding pivot pin that travels in the miter slot of the disc-sander table. The pivot pin and the large table

(13×16") enable you to sand perfect circles up to 24" in diameter. You can also buy an accessory extension arm to sand circles up to 48".

Dust from the disc and belt sanders is collected through a 4" port underneath the base of the machine. An optional plastic basin can be mounted under the accessory spindle to trap the dust from the accessory sanding tools.

In terms of performance, I found the belt tensioning and tracking simple to adjust. The tables rotate smoothly and lock securely, the scales on the table trunnions read easily and accurately, and the induction motor delivers more than adequate power. This machine gave me accurate results and provides some welcome relief from woodworking's most tedious and time-consuming chore.

—Tested by *Dave Henderson*

Delta Sanding Center, about \$800, at Delta dealers nationwide, or contact Delta International Machinery Corp., 246 Alpha Dr., Pittsburgh, PA 15238. Call 800/438-2486.



Continued on page 96

Classic Adirondack Furniture Plans

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PRODUCTS THAT PERFORM

SHOP TESTED

Continued from page 94

Get into the groove with this rubber sanding grip

Hand sanding seems simple, but it's easy to screw up if you sand curved profiles with just your fingers behind the paper. The uneven pressure can sand away too much material in one area, or leave another area barely touched.

With the Curve-A-Flex Sanding Grip, you wrap a half-sheet (5½x9") of sandpaper around the grip, bend it into the profile you need, and sand. When you've worn the paper out, simply discard it and put on a fresh sheet. The grip is made from a durable rubber that holds the sandpaper firmly in place.

In my tests, I got great results using the Curve-A-Flex. It's stiff enough to enable you to bear down, and yet it's easily bent into small-or large-profile curves. I also found it comfortable to use because I was applying pressure with my palm instead of my fingers. If you sand curved profiles on wood and want good results, I recommend this helpful tool.

—Tested by Bob McFarlin

Curve-A-Flex Sanding Grip, about \$10 in catalogs and stores, or contact A.L.L. Building Materials Corp., 1606 Hamner Ave., Norco, CA 91760. Call 800/772-6346.



Continued on page 98

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351K	351 W/10 ASST BELTS & BELT CLNR	158
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361K	361 W/10 ASST BELTS & BELT CLEANER	193
362	4" X 24" BELT SANDER W/DUST BAG	195
362K	362 W/10 ASST BELTS & BELT CLEANER	206
363	4" X 24" BELT SANDER	191
363K	363 W/10 ASST BELTS & BELT CLEANER	204
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9690	1 1/2 HP ROUTER W/CASE	144
691	1 1/2 HP "D" HANDLE ROUTER	148
691K	691 W/CASE, EDGE GD & TEMP GD KIT	204
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695	SHAPER TABLE W/ 1 1/2 HP ROUTER	216
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7336K	7336 W/CASE, DUST EX SYS, 100 SHTS PPR	169
73333	RANDOM ORBIT DUST EXTRACTION	24
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7527	2 1/2 HP FIXED BASE "D" HNDL RTR	208
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1584VSA	1584VS JIG SAW W/CASE	168
1584VSB	1584VS JIG SAW W/CASE & 20 BLADES	182
1584DVS	BARREL HANDLE JIG SAW, DUSTLS	193
1587VS	TOP HANDLE JIG SAW, VARSP	148
1587VSA	1587VS JIG SAW W/CASE	168
1587VSB	1587VS JIG SAW W/CASE & 20 BLADES	182
1587DVS	TOP HANDLE JIG SAW, DUSTLESS	193
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6172DWE	7.2V CDLS DRILL KIT W/2 BATT	99
6095DWE	9.6V CDLS DRILL KIT W/2 BATT	145
DA391DW	9.6V ANGLE DRILL KIT	175
5090DW	CORDESS CIRCULAR SAW KIT	139
4190D	CORDLESS TILE CUTTER	109
6211DWE	12V KIT W/2 BATTERIES	175
5007NBK	7 1/4" CIRC SAW W/CASE & BLADE	129
LS1011	10" COMPOUND MITER	539
LS1211	12" COMPOUND MITER	849
N1900B	3 1/4" PLANER	129
B05001	5" RANDOM ORBIT SANDER	69
GV5000	5" SANDER POLISHER, VAR SPEED	79
8510LVR	3/8" DRILL	95
DA3000R	3/8" ANGLE DRILL	189
9.6V BATTERY		29
7.2V BATTERY		24

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AM78HC4V	1 1/2 HP COMPRESSOR	\$309.00
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77	7 1/4" WORM DRIVE CIRCULAR SAW	145
77M	7 1/4" MAGNESIUM WORM DRIVE SAW	154
160502	BISCUIT JOINER	136
2736-04	12V VSR CORDLESS DRILL KIT	145
5657	7 1/4" CIRCLE SAW	99
6567K	5657 W/6 CARBIDE BLADES	124
5860	8 1/4" WORM DRIVE SAW	184
3400	10" TABLE SAW	189

DEWALT

DW318K	4.5 AMP HVY DTY JIG SAW KIT W/CASE	156
DW360	7 1/4" SAW W/BRAKE	149
DW420	5" RANDOM ORBIT SANDER, PSA	69
DW421	5" DSTLS RNDM ORB SANDER, VELCR0	79
DW430	3" X 21" DUSTLESS BELT SANDER	169
DW431	3" X 21" DSTLS BELT SANDER VAR SP	188
DW610	1 1/2 HP ROUTER, 9 AMP	149
DW614	1 1/4 HP PLUNGE ROUTER	149
DW615	1 1/4 HP PLUNGE ROUTER, VAR SP	164
DW624	3 HP HVY DTY PLUNGE ROUTER	245
DW625	3 HP HVY DTY PLUNGE RTR, VAR SP	279
DW670	NEW LAMINATE TRIMMER WITH GUIDE	97
DW662K	BISCUIT JOINER KIT	224
DW930	12V CORDLESS CIRCULAR SAW	109
DW930K	12V CRDLS CIRC SAW KIT W/BAT & CS	199
DW935	14.4V TRIM SAW	149
DW935K	14.4V TRIM SW KIT W/BAT, CHRGR, CS	249
DW972K2	NEW 12V CRDLS KIT W/BATTERY & CASE	189
DW991K	14.4V CRDLS KIT W/BATTERY & CASE	199

RYOBI

D39VSR	3/8" VSR DRILL, 4.0 AMP, 0-2500 RPM	59
DC500	DETAIL CARVER	62
DS2000	DETAIL SANDER	62

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80 - 320 GRIT	12.95

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TR215	8 1/2" SLIDE COMPOUND MITER SAW	369
JS100	BISCUIT JOINER	164
JS102	BISC JOINER W/TILT FENCE & DUSTBG	189
FB2000	3 1/2 HP ROUTER VAR SPD	206
EB100E	EDGE BANDING SYSTEM	209
ES132	13.2V CRDLS DRILL KIT W/2 BAT	215
F0107	7 PIECE FORSTNER BIT SET	57
FC107	7 PC CARBIDE FORSTNER BIT SET	84
LM72M010	10" X 24T FLAT TOP RIP BLADE	36
LU82M010	10" X 60T CROSSCUT RIP BLADE	49
LU84M010	10" X 50T ATB COMBO BLADE	40
LU85M010	10" X 80T ATB FOR MIRROR FINISH	58
LU87M010	10" X 24T RIP BLADE THIN KERF	39
LU88M010	10" X 60T CROSSCUT THIN KERF	45
LU89M010	10" X 72T TCH NON FERROUS METAL	57
LU92M010	10" X 80T TCH - BEST FOR LAMINATES	59
LU98M010	10" X 80T TCH LAMINATES OR WOOD	67
SD308	8" SAFETY DADO WITH CASE	116
SD508	NEW 8" SUPER DADO SET	168
WC104	4 PIECE WOOD CHISEL SET	86
WC110	10 PIECE WOOD CHISEL SET	26
94-100	CABINET DOOR SET	158

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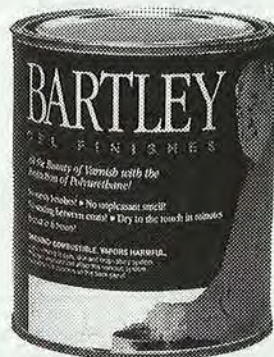
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PRODUCTS THAT PERFORM



Continued from page 96

Bentctop sanding table helps keep shop air clean

Many power sanders with built-in dust collection only pick up 50-80 percent of the dust they generate. The stuff that escapes—the ultra-fine sawdust—poses the greatest threat to your lungs. And if you hate sawdust as much as I do, I think you'll appreciate this new Dustless Sanding Table.

The unit includes a 5"-deep plastic tub with a 4" hose port that hooks up to your dust collector. A 25½×21" rust-resistant steel grate sits on top, and a rubber strip around the edges keeps it from rattling. Three plastic posts support the middle of the grate. To prevent the grate from scratching your wood, slip the two 3½×7½" rubber pads supplied with the unit under the workpiece.

When hooked up to my dust collector, this system inhaled every speck of dust from my pad sander. And, sanding long pieces of wood proved easy enough—just keep the sander over the middle of the grate and slide the workpiece along the top. The whole unit is light enough to set up and store easily, and the lip on the tub also allows you to drop it into a rabbeted tabletop opening to make a dedicated sanding table.

—Tested by Bob McFarlin



Dustless Sanding Table, \$87 ppd., in New Mexico residents add 5.82%, Wyoming residents add 5%, and North Carolina residents add 6% tax. Woodworker's Supply, Inc., 1108 North Glenn Rd., Casper, WY 82601. Call 800/645-9292. ♣

Model	Description	List	Sale
23-700	Wet/Dry Grinder	234	155
23-680	6" Bench Grinder 1/4 HP	286	75
11-950	8" Drill Press	199	135
31-050	1" Belt sander 2.0 amp	104	75
31-460	4" Belt/Disc Sander	198	129
31-340	1" Belt/Disc Sander	268	204
40-560	16" 2 speed Scroll Saw	266	178
11-990	12" Bench Drill Press	276	195
11-090	32" Radial Bench Press	399	305
43-505	12" Bench Router/Shaper	399	299
22-540	12" Bench Top Planer	345	235
36-220	10" Compound Miter Saw	350	219
28-180	Bench Band Saw	232	158
28-190	NEW 12" Band Saw	465	395
40-640	20" Bench Scroll Saw	466	395
37-070	NEW 8" Vspd Bench Jointer	337	258
14-650	Hollow Chisel Mortiser	668	289
46-700	12" Wood Lathe	548	449
33-990	10" Radial Arm Saw	818	699
37-280	6" Motorized Jointer	488	389
50-170	3/4 HP 2 stage Dust Collector	483	365
33-055	8-1/4" Sawbuck comp w/lgs	865	625
34-330	8-1/4" Table Saw 13 amp	343	245
32-100	Stationary Plate Jointer	645	255
36-040	10-1/4" Compound Miter Saw	224	149
34-915	30" Unifence	385	235
34-897	50" Delta Unifence	525	399
36-755	10" Tilt Arbor Saw	1264	995
17-900	16-1/2" Floor Drill Press	462	399
33-060	"Sidekick" Miter Saw	510	399
37-190	NEW 6" Deluxe Jointer	554	479
36-275	NEW 8-1/4" Builders Saw	444	265
36-210	NEW 10" Compound Miter Saw	284	165
36-070	NEW 10" Miter Saw	284	165
36-630	NEW 10" Contractors Saw II	700	579
34-555	NEW Sliding Table	459	345
28-285	14" Band Saw w/lens stand	910	745
22-661	13" Planer w/2HP motor	1513	1215
37-154	DJ15 6" Jointer w/3/4HP motor	1451	1215
34-444	Contractors Table Saw	812	649
34-445	34-444 Saw w/30" Unifence	1200	775
34-445K	34-444 Saw w/mobile base	1200	819

Model	Description	List	Sale
6527	NEW Sawzall with case	320	172
6528	above Sawzall w/wired cord	316	172
1407-1	12" Drill w/keys chuck & 2 batt	172	120
4006-1	9.6V Drill Kit with 2 batteries	332	159
0224-1	3/8" Drill 4.5 amp magnum	227	124
0234-1	1/2" Drill 4.5A mag 0-950 rpm	237	128
0244-1	1/2" Drill 4.5A mag 0-600 rpm	237	128
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	198	109
0229-1	3/8" Drill 3.5 amp 0-1000 rpm	195	109
0375-1	3/8" close quarter Drill	237	135
0379-1	1/2" close quarter Drill	268	155
6546-1	cds Screwdr 200 & 400 rpm	141	84
6547-1	6546-1 w/bits, 1/4" chuck, & case	176	105
5399	1/2" D-handle Hammer Drill Kit	332	194
6507	Original SawZall with case	264	144
8977	Variable temp. Heat Gun	131	79
5397-1	3.8" var. spd Hammer Drill Kit	255	142
5371-1	1/2" var. spd Hammer Drill Kit	340	188
3101-1	1/2" vspd night angle Drill Kit	399	219
6504-1	Drywall Gun 0-4000 5.4 amp	196	114
3750-1	1/2" var. spd night angle Drill	356	194
5680	Router 2 HP w/ 1/4" & 1/2" collets	362	215
0235-1	1/2" Drill w/keyless chuck	237	128
6142	4-1/2" Grinder w/case & access	208	124
6749-1	Drywall Gun 0-2500 5.4 amp	218	128
6365	7-1/4" Circular Saw 13 amp	218	122
6366	6365 w/lens & carbide blade	228	129
6368	6365 w/lens, carb. blade, & case	249	139
8377	7-1/4" Worm Drive Saw	330	188
8256	Top Handle Jig Saw	264	144
8490	10" Miter Saw	444	275
8491	8490 w/ carbide blade & bag	532	275
6494	NEW 10" Compound Miter Saw	444	309

Model	Description	List	Sale
SG-2000	Subfloor/drywall, drives screws 1" - 2", complete kit incl. extension	765	485
SG-3000	Deck/subfloor, drives screws 2" - 3", complete kit incl. extension	936	595

Item	Description	Teeth	List	Sale
LUT2M010	Gen Pur. A.T.B. 10" 40	89	39	
LUT6M010	Cut-off 10"	60	42	
LUT4M010	Combo 10"	60	78	
LUT5M010	Super Cut-off 10"	60	115	58
LMT2M010	Ripping 10"	24	69	38
LUT7M010	Cut off 10"	60	84	45
LUT3M010	Thin Kerf 10"	24	72	39
LUT8M010	Thin Kerf 10"	60	89	45
LUT8M010	Ultimate 10"	80	128	68
LUT9M010	Compnd Mitr 10"	60	88	54
F410	NEW Quiet Blade 10"	40	95	49
F810	NEW Quiet Blade 10"	80	135	74
TK303	7-1/4" Finishing	40	38	22
TK906	10" Combo	50	53	32
SD308	8" Dado - Carbide	230	119	
SD506	6" carbide w/case & shims	292	155	
SD508	8" carbide w/case & shims	344	168	
F10	1-3/4" x 5/8" Biscuit 1000 Qty	43	29	
F20	2-1/8" x 3/4" Biscuit 1000 Qty	43	29	
FA	Assorted Biscuits 1000 Qty	45	29	
FB100	16 piece Forstner Bit Set	338	189	
94-100	5 pc. Router Bit Door System	320	159	
TR215	NEW 10" Slide Cmpd Mitr Saw	669	389	
JS102	NEW Biscuit Joiner w/diag.Inc&cs	355	179	
FT2000E3	1/4 HP wsp Plunge Router	410	205	
JS100	Biscuit Joiner with case	334	164	

Model	Description	List	Sale
6772DW	3/8" vspd Reverse Drill 7.2V	128	64
612DWE	3/8" vspd Drill Kit w/ 2 batt.	220	109
50900D	3-3/8" Saw Kit 9.6 volt	270	145
DL390	Incandescent Flashlight 9.6V/Sale	312	179
DA391DW	3/8" angle Drill Kit 9.6 volt	312	179

Model	Description	List	Sale
5007NBA	7-1/4" Saw w/electric brake	263	135
5008NBA	8-1/4" Saw w/electric brake	346	195
9900B	3" x 24" Belt Sander w/bag	344	175
9924DB	3" x 24" Belt Sander w/bag	329	164
4031BV	Orb. var. spd Jig Saw 3.5A	292	158
JR3000V	var. speed Recip Saw w/case	252	159
9820-2	Blade Sharpener	394	209
N1900B	3-1/4" Planer with case	244	129
N9514B	4" Disc Grinder 4.6 amp	111	65
DA4500	1/4 sheet Pad Sander w/bag	98	52
DA3000R	3/8" Angle Drill	314	179
2708W	8-1/4" Table Saw	585	298
2711	10" Table Saw with brake	1067	665
6404	3/8" Drill Rev. 0-2100 rpm	112	65
N9514VR	3/8" Drill Rev. 0-1050 rpm	168	98
6013BR	1/2" Drill Rev. 6 amp	280	149
9401	4" x 24" Belt Sander w/bag	378	229
4302C	var. speed Orbital Jig Saw	351	199
5077B	7-1/4" Hypoid Saw	281	155
5007NB	7-1/4" Circular Saw 13 amp	232	124
5007NBK	5007NB Saw w/ plastic case	246	125
LS1011	10" Slide Compound Saw	946	525
LS1211	NEW 12" Slide Cmpd Saw	1550	865

Model	Description	List	Sale
810X	New 3/8" var/spd Drill	250	145
8000	3/8" var/spd close qtr Drill	201	125
9600	5" Air/Random Orbit Sander	139	132

Model	Description	List	Sale
SNF1	Finishing Nailer 1" - 2"	448	305
SN325	Nailer 1-7/8" - 3-1/4"	685	415
SLP20	New Pinner w/case 5/8" - 1-5/8"	399	269
SNS	Stapler 5/8" - 1-1/2"	399	269
SK70	Fram. Nailer Clip Hd 2"-3-1/2"	690	475
SN60	Fram. Nailer-Full Hd 2"-3-1/2"	638	445
SNFNA	NEW Finish Nailer 1-1/4" - 2-1/2"	351	179

Model	Description	List	Sale
N80S-1	Stick Nailer	348	199
NM45	Coil Roof Nailer 3/4" - 1-3/4"	845	409
NB30F-1	Finishing Nailer	650	335
BT35-2	Brad Tacker 5/8" - 1-3/8"	275	165
BT35-2K	BT35-2 w/ case, oil, & brads	299	175
CW500-1	HP Pancake Compressor	463	289
M11FS	Flooring Stapler 15 gauge	931	535
S325X-2	Finish Stapler - 1/2" - 1-3/8"	275	165
S325X-2K	S325X-2 with case & oil	269	179

Model	Description	List	Sale
77	7-1/4" Worm Drive Saw	257	144
77M	NEW 7-1/4" Worm Drive Saw	300	164
2735-04	12 volt cordless Drill Kit	249	144
2735-04	2735-04 with keyless chuck	269	144
1605-02	Biscuit Joiner w/case	221	139
3400	10" Table Saw - Bench Top	270	189

Model	Description	List	Sale
EY6205EQK	Same as EY6205BC but comes with Ironman battery	368	192
EY6207BC	NEW 12 volt 1/2" Drill w/keyless chuck var. speed w/15 min. charger & case	420	222
EY6282EQK	Var. spd 9.6 volt Drill with 15 min. charger, case & NEW Ironman battery	315	169
EY62821DKW	9.6 volt Drill Kit w/2 batt.	395	162

Model	Description	List	Sale
EY6181CRKW	NEW 9.6V Compact Drill Kit w/2 batt - 10% more pow than EY62821DKW	305	165
EY6100CRKW	NEW 12 volt Drill Kit with 2 batteries, 1 hour charger, & case	358	185
EY6100CQK	Same as EY6100CRKW but has 15 minute charger	420	198
EY6100EQK	NEW 12 volt Drill Kit with NEW Ironman battery, 15 min. charger, & case	375	199
EY6100EQK	Same as EY6100EQK but w/2 Ironman batteries	473	225

Model	Description	List	Sale
IM250	Triimpulse Finish Nailer Kit	849	565
IM325	Impulse Framing Nailer Kit	849	565

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 List 194 Sale 104

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 List 310 Sale 175

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Model	Description	List	Sale
DW364	7-1/4" Circ. Saw w/brake	285	154
DW945K-2	12V cds Drill Kit w/2 batt	309	179
DW944K-2	9.6V cds Drill Kit w/2 batt	283	165
DW610	1-1/2 HP 2 handle Router	274	149
DW411	1/4 sheet Palm Sander	97	58
DW100	3/8" Drill, 4 amp, 0-2500 rpm	118	68
DW682K	Biscuit Joiner with case	429	219
DW705	12" Compound Mitr Saw	706	359
DW615	1-1/4 HP Elec. Plge Router	290	164
DW625	3 HP var. spd Plunge Router	275	159

Model	Description	List	Sale
DW930K	NEW 12V 5-3/8" Trim Saw kit	370	199
DW935K	NEW 14.4V 5-3/8" Trim Saw kit	444	239
DW935K	comes with FREE DW9524 24 tooth carbide blade!		
DW675K	3-1/8" Planer with case	289	164
DW431	3" x 24" vspd Belt Sander	331	179
DW444	6" Ran Orb Sander-PSA pad	266	144
DW443	DW444 whook & loop pad	266	144

Model	Description	List	Sale
DW952K	3/8" vspd w/lens 9.6V batt	260	159
DW953K	3/8" vspd w/lens 12V batt	306	175
DW954K	2-3/8" vspd w/lens 9.6V XR batt	324	179
DW972K-2	3/8" vspd w/lens 12V XR batt	352	189
DW991K	3/8" vspd w/lens 14.4V XR batt	370	199

Model	Description	List	Sale
C8F8	8-1/2" Slide Compound Saw	1400	575
P12R	2" 9/32" Planer	1470	789
P12RA	Planer/Joiner	1940	989
G12SA	4-1/2" Grinder 6.9 amp	160	89
NR83A	Fram Nailer 2 - 3-1/2" Full Head 7000	395	219
NR83AA	Framing Nailer 2 - 3-1/2"	750	419
NT65A	16 ga. Brad Nailer 1 - 2-1/2"	610	335
NV45AB	Coil Roofing Nailer 7/8" - 1-3/4"	750	419
NV83A	Coil Nailer 2 - 3-1/4"	750	419

Model	Description	List	Sale
B-50	50" Commer. Saw Fence	345	298
T-SQUARE	52 52" Homeshop Fence	279	238
T-SQUARE	40 40" Homeshop Fence	259	208
T-SQUARE	28 28" Homeshop Fence	249	198

Item#	Length	Cap	List	Sale	Box
#0	8"	4-1/2"	19.76	11.75	58.00
#1	10"	6"	22.63	12.50	68.00
#2	12"	8-1/2"	25.95	14.50	78.00
#3	14"	10"	32.88	18.00	

FINISHING TOUCHES

NEW GUINEA WOODS STAR ON THE TONIGHT SHOW



The new set furniture for Jay Leno's *The Tonight Show* on late-night television was built from lesser-known species of environmentally certified tropical wood.

Narra and kwila, two tropical hardwood species, may not be household words, but since last September they've starred on late-night television. The highly figured woods showed up on Jay Leno's *The Tonight Show* as new furnishings for the set—a desk, end chairs, and side tables.

What's so remarkable about this new furniture? The wood used for it came from an environmentally certified community forestry program in Papua, New Guinea. It was certified by the Smart Wood Program of the Rainforest

Alliance, in New York.

Certification assures that the logging operation follows environmentally sound forestry practices and that none of the trees harvested are endangered species. The narra and kwila (just two of many lesser-known species beginning to appear on the market) were supplied by Eco Timber, a San Francisco company, and the furniture was designed by Roy McMakin, of Seattle. Domestic Furniture Co., in Los Angeles, built all the pieces.



Which way is south?

Perhaps no other people in history cared more about direction than the Chinese. That's because one of their religious practices required dealing with the movement of spirits.

To avoid unpleasant collisions, they developed two types of compasses. One was the familiar magnetic-needle type. The other was a south-pointing chariot that relied on mechanical parts. The model shown *below* of a Chinese south-pointing chariot compass was built in walnut and maple by John Goniea of Hartland, Michigan. John says he built it from a magazine photograph. He also told us how the original (used about 120 A.D.) worked. Apparently, wooden gears turned shafts to keep one arm of the goddess that's mounted on top always pointing south, no matter which way the cart was turned.

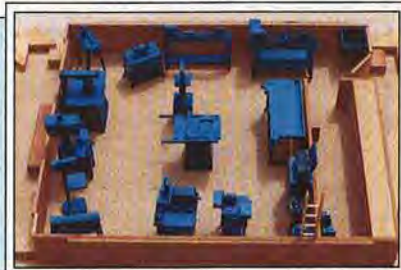
Michigan craftsman John Goniea built this 16"-long model of a Chinese chariot compass from a photograph in a magazine.



A California model shop

Paul Burri of Ventura, California, couldn't wait to retire and move to a home where he would have an entire two-car garage for his shop. But planning it on paper or with cutouts to arrange machine placement just wasn't his style.

"Neither planning method gave me a feel for how much working space I needed," Paul wrote. So, he decided to build 1:12 scale models of all his equipment and arrange them in a box scaled to his future shop, as shown in the photo *right*. He even included



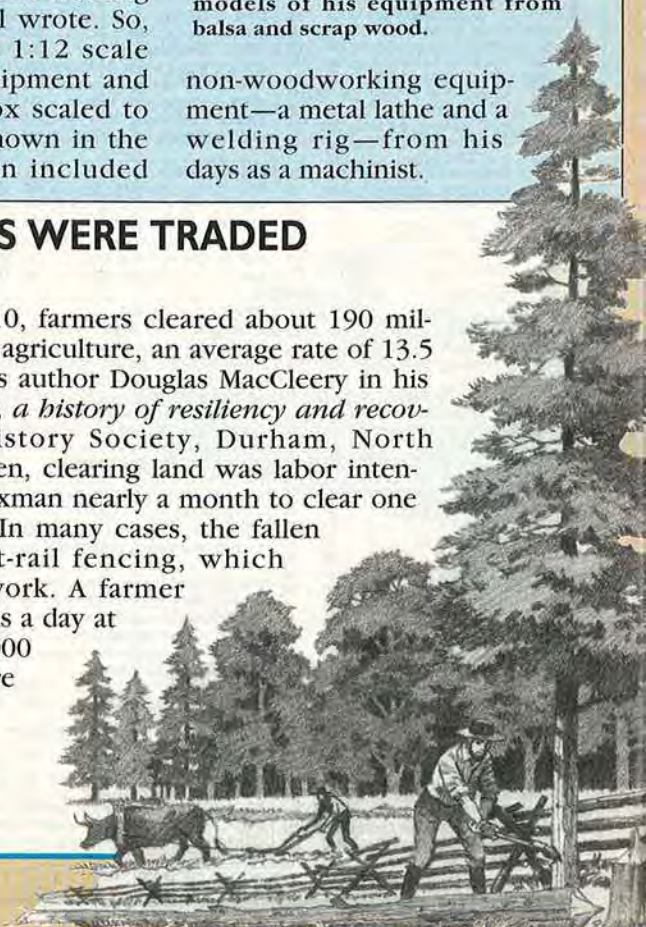
To plan his new shop layout, woodworker Paul Burri made 1:12 scale models of his equipment from balsa and scrap wood.

non-woodworking equipment—a metal lathe and a welding rig—from his days as a machinist.

WHEN FORESTS WERE TRADED FOR FARMING

Between 1850 and 1910, farmers cleared about 190 million acres of forests for agriculture, an average rate of 13.5 square miles a day, says author Douglas MacCleery in his book *American Forests, a history of resiliency and recovery* (1992, Forest History Society, Durham, North Carolina). And back then, clearing land was labor intensive—it took a strong axman nearly a month to clear one acre of mature forest. In many cases, the fallen timber went for split-rail fencing, which required even more work. A farmer could only split 100 rails a day at the best, and it took 8,000 rails to enclose a square 40-acre field! ♣

Photographs: Courtesy of Eco Timber International; Paul Burri; John Goniea
Illustration: Jim Stevenson





300 lbs of pressure and 224 mph winds couldn't break this door down. Better not lose your keys.

We don't test our doors at Stanley. We punish them. We punish them with wind. With water. With very large metal objects. And when we're done, we punish them some more.

If we sound like violent folks, please forgive us. We're not. In fact,

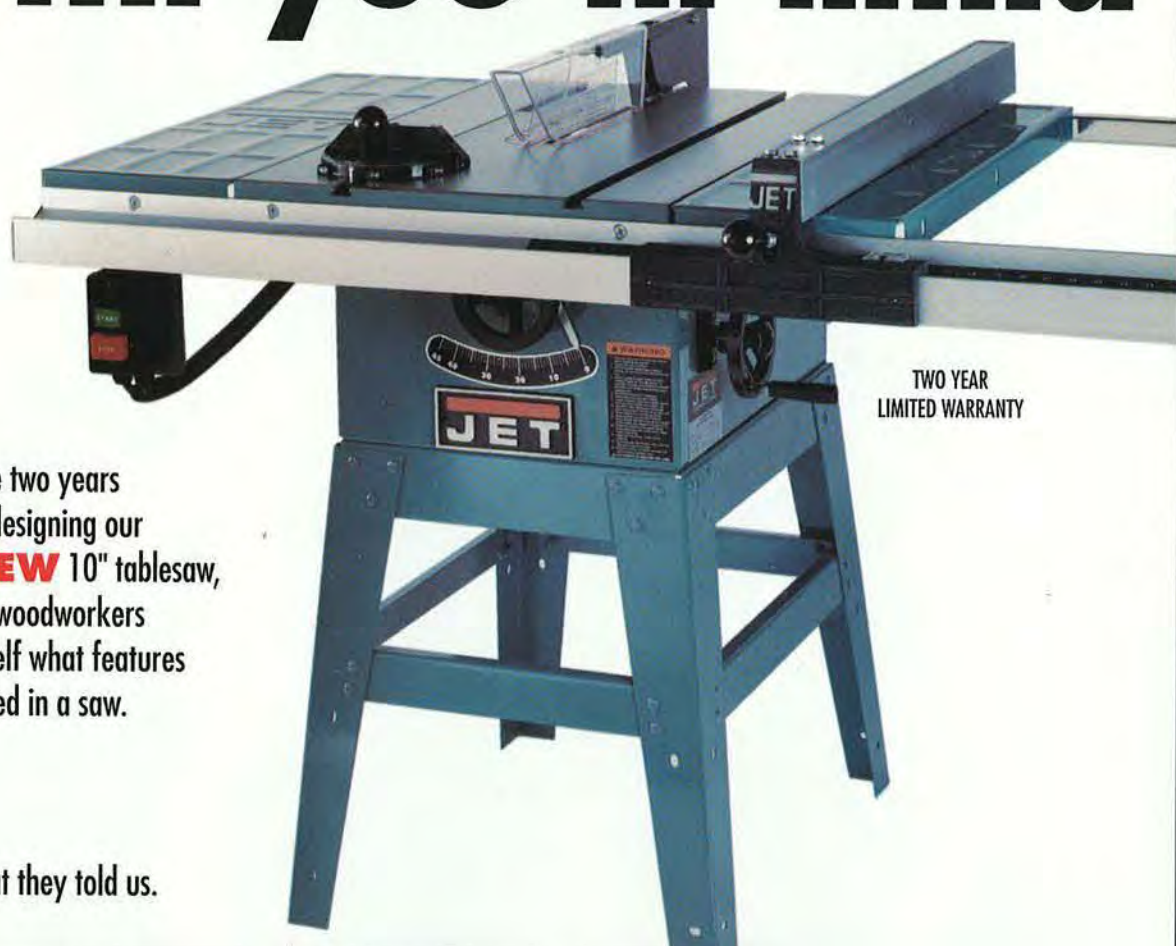
we love flowers, birds and other living things. But to make a better door, you have to be tough.

That's why everything we make at Stanley is specifically designed to be around for a while. Like until the next millennium. Whether it's a mirror

door that doesn't come off its track or a fiberglass hammer that doesn't break on mis-hits, the same will always be true. After all, we've been around for more than 150 years. So, we definitely know a thing or two about longevity.

STANLEY
helps you do things right.™

A tablesaw built with you in mind



TWO YEAR
LIMITED WARRANTY

During the two years we spent designing our totally **NEW** 10" tablesaw, we asked woodworkers like yourself what features they wanted in a saw.

This is what they told us.



Quick-release precision JETFENCE® allows smooth, accurate adjustments on either side of blade.



Dust hood with 4" outlet is built-in for easy hook-up to your collection system.



Totally enclosed, fan-cooled motor. Quick-connect plug requires no wiring; just plug in male and female connectors.



Heavy-duty push button switch positioned for convenience and safety.

J E T
EQUIPMENT & TOOLS

For the name of the JET dealer nearest you, call 1-800-274-6848.

WOOD PATTERNS™

Full-sized for your woodworking convenience

JUNE 1995

ISSUE 79

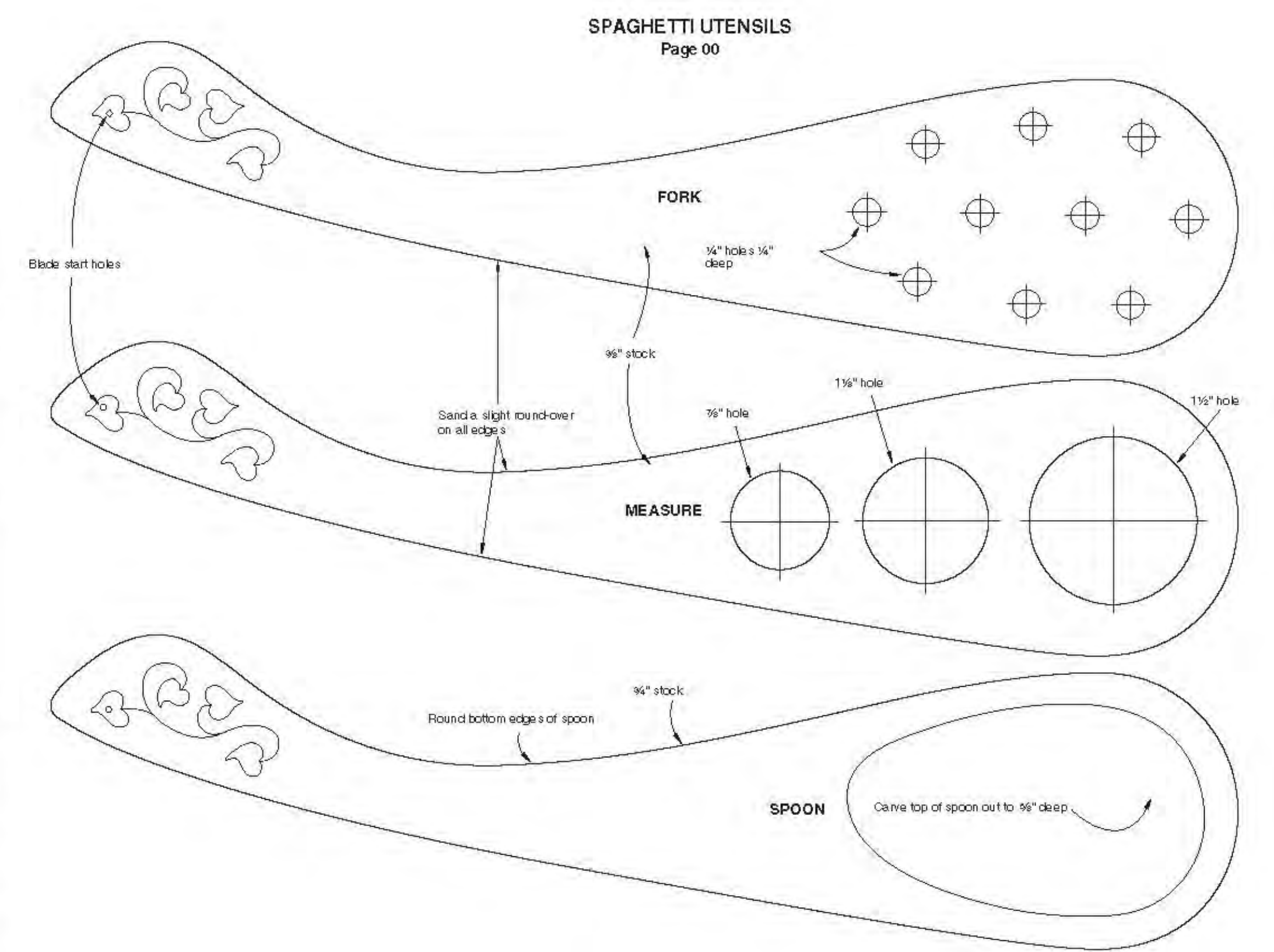
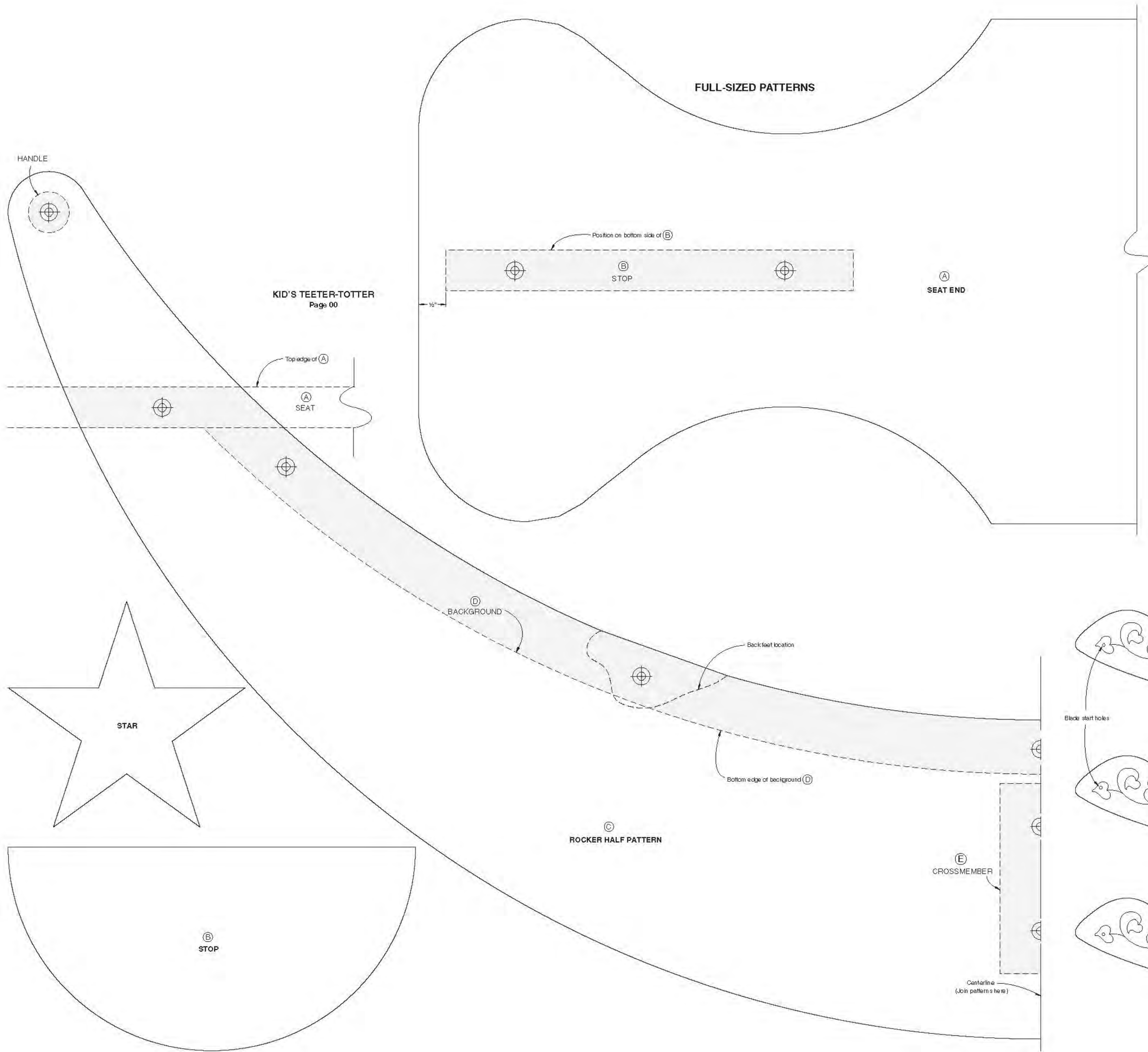
Dear Reader: As a service to you, we've included full-sized patterns on this insert for irregular-shaped and intricate project parts. You can machine all other project parts using the Bill of Materials and the drawings accompanying the project you're building.

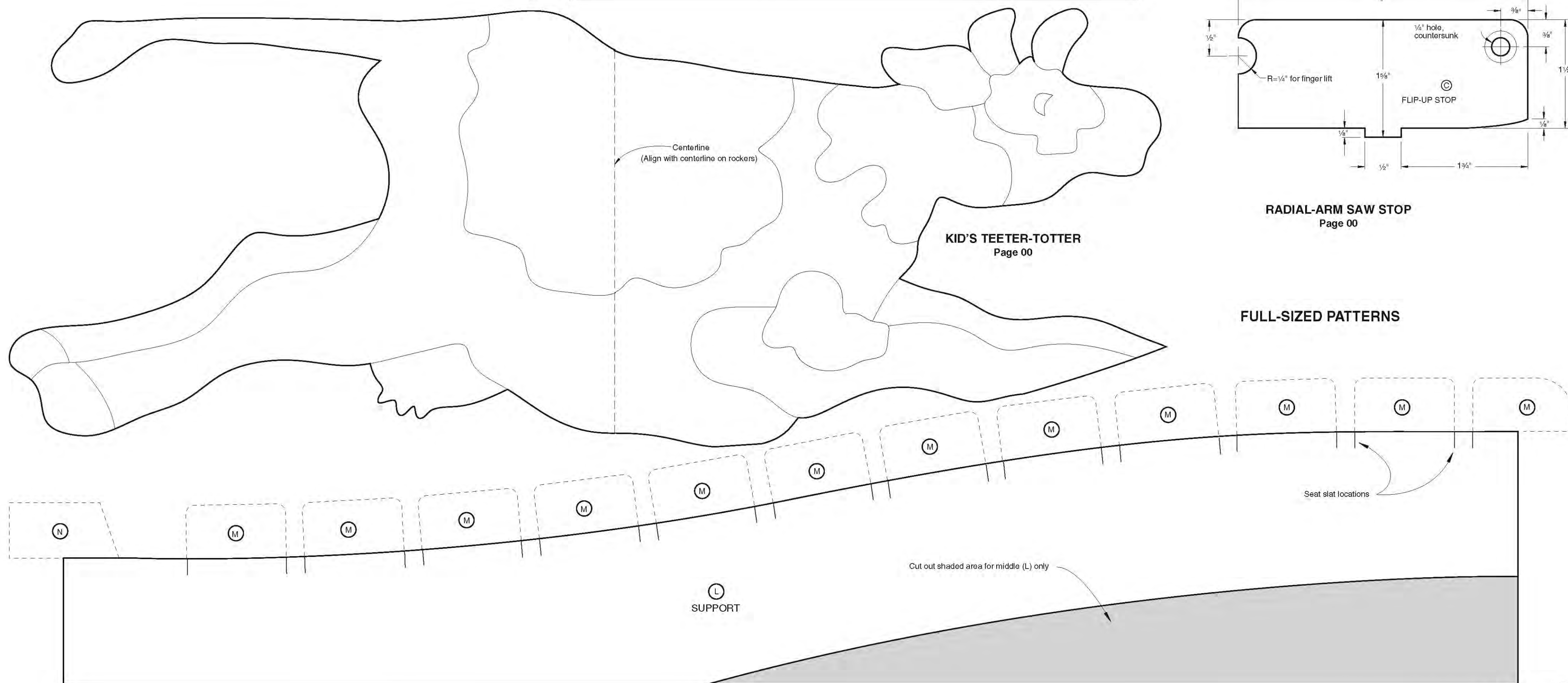
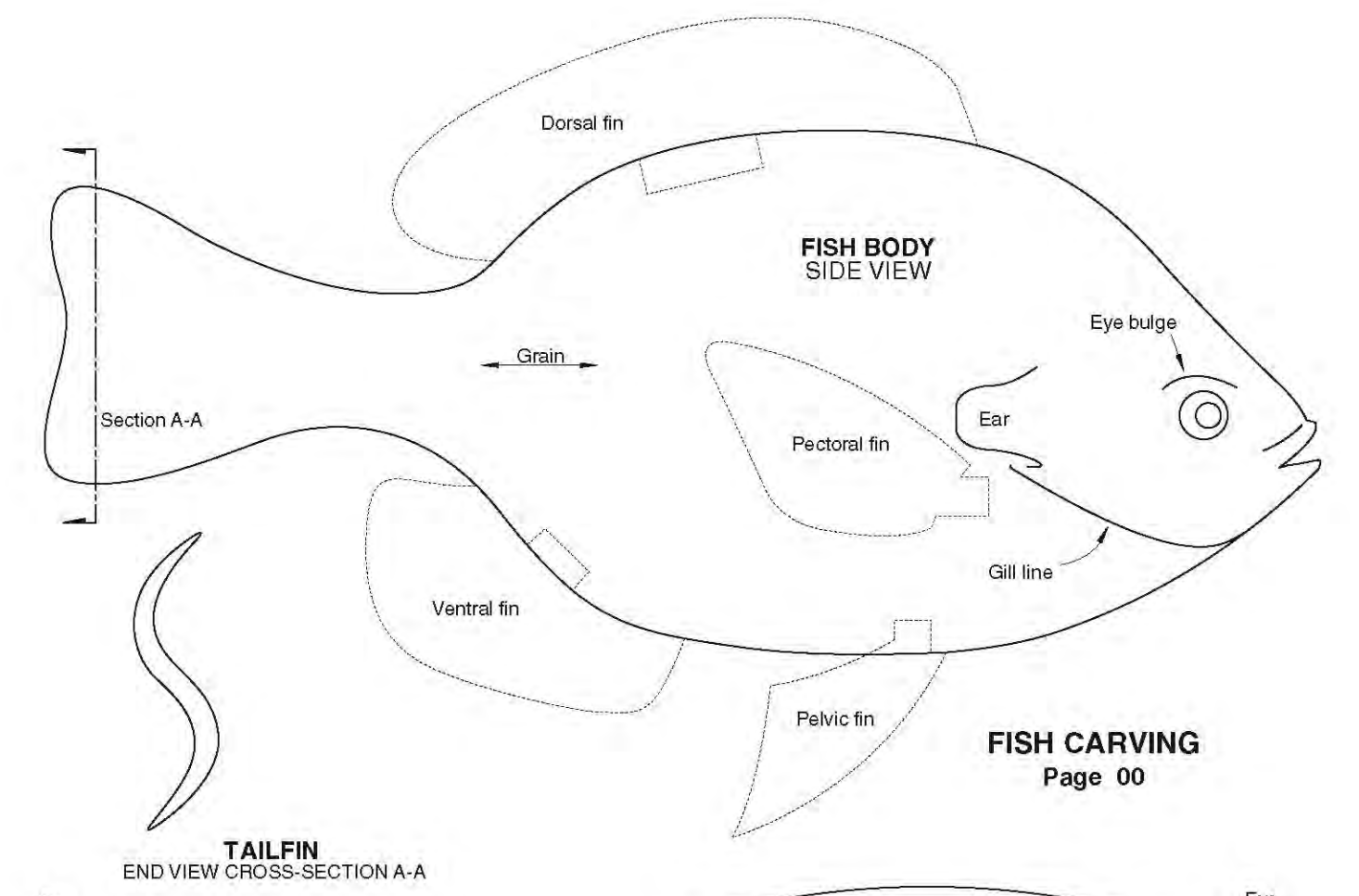
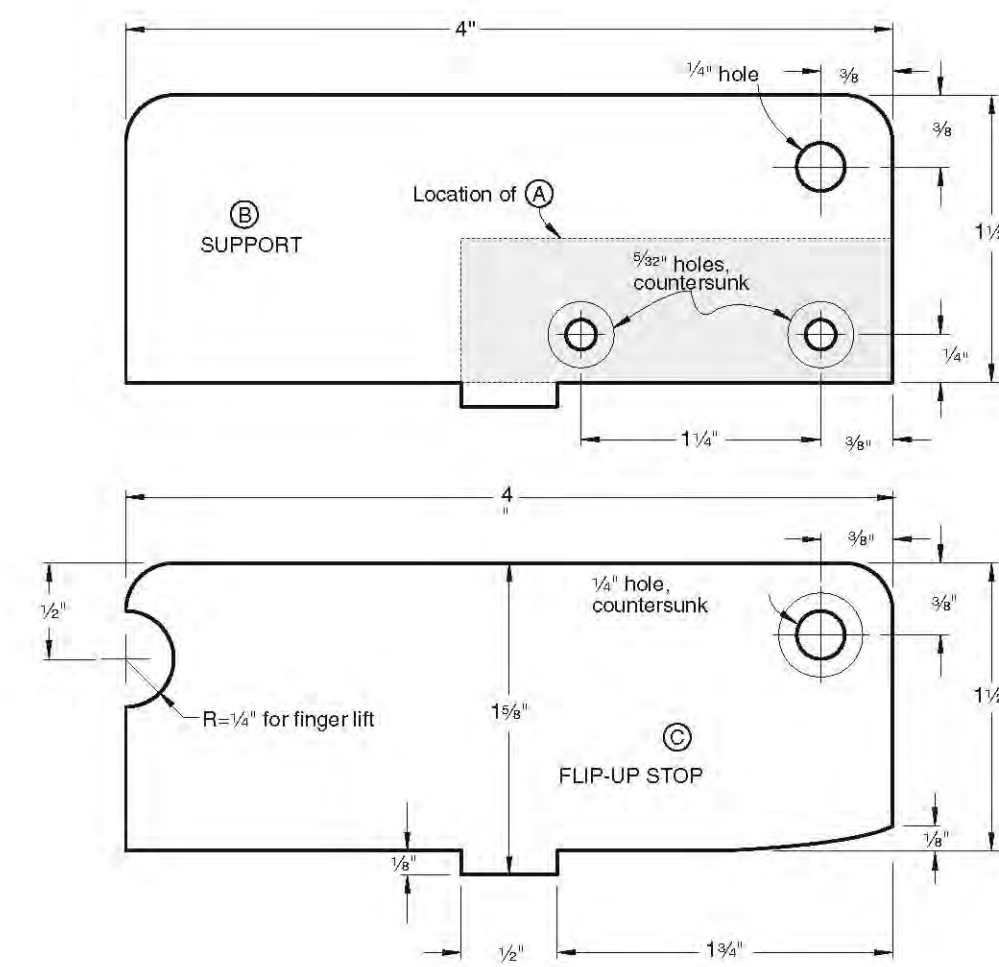
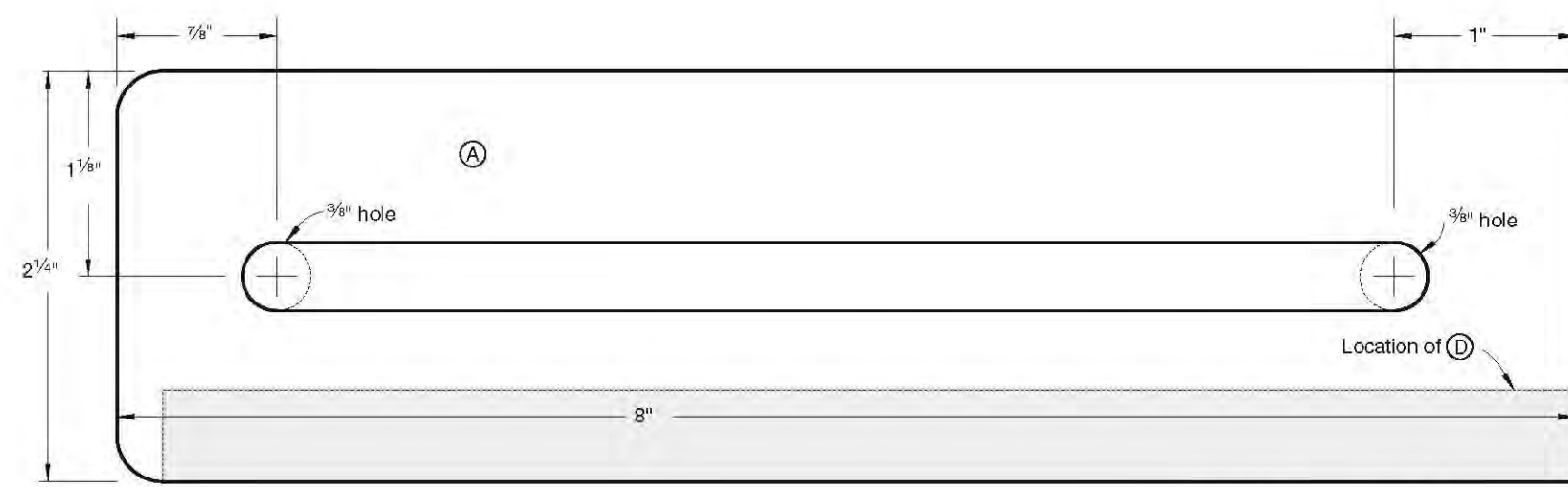


- Easy glider
- Spaghetti utensils
- Kid's teeter-totter
- Radial-arm saw stop
- Fish carving



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FULL-SIZED PATTERNS

