

AMERICAN WOODWORKER

APRIL 1992 #25 U.S. \$3.95 CANADA \$4.95

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COLORING WOOD WITH STAINS AND DYES

BUYER'S GUIDE TO PORTABLE PLANERS



AMERICAN WOODWORKER



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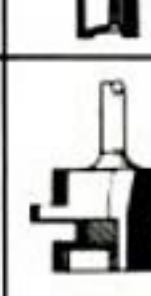
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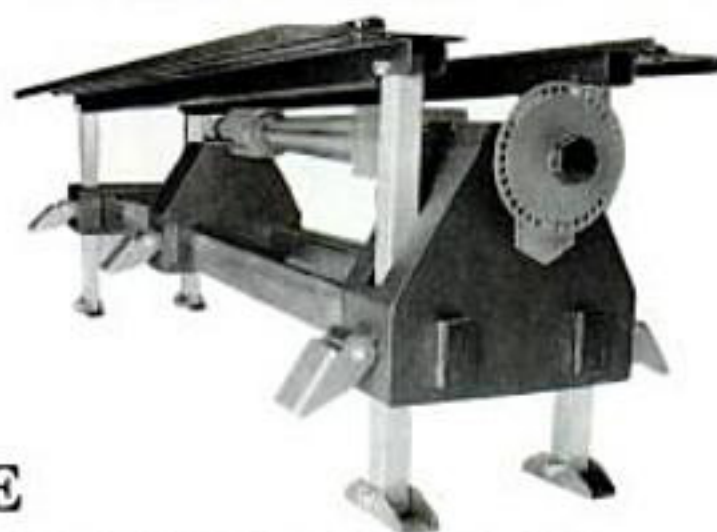
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A WORD FROM THE EDITOR

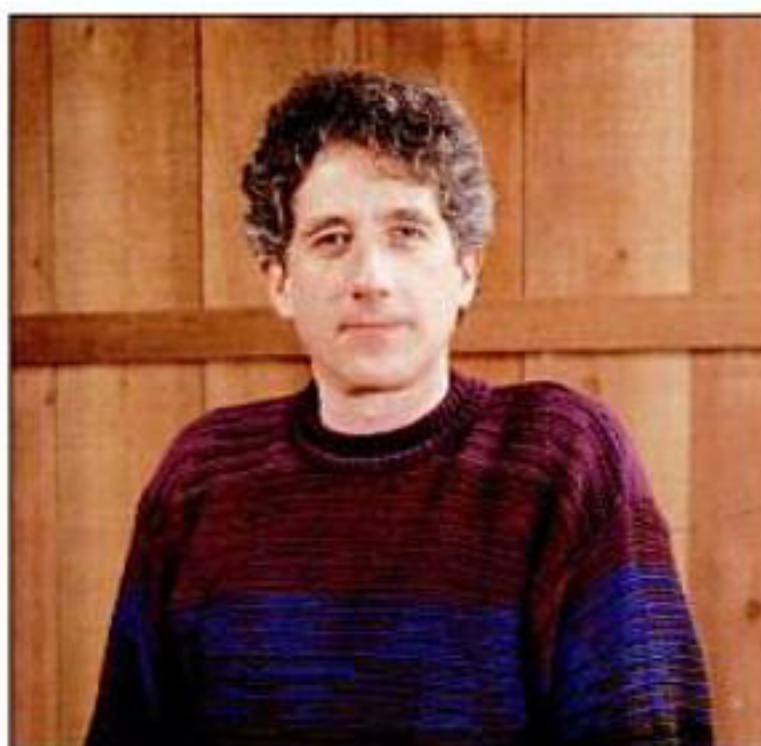
On the occasion of our first color issue, we thought it appropriate to restate our editorial mission—the guiding philosophy behind our magazine.

"AMERICAN WOODWORKER's editorial mission is to challenge and entertain the woodworking enthusiast. We strive to provide practical, in-depth information that will help our readers develop the skills they need to become better woodworkers."

In woodworking, as in most endeavors, information is power; power to imagine, power to achieve, power to expand beyond your present level of skill. Providing information is what AMERICAN WOODWORKER is all about.

Here's what you can expect from us in the future:

- In-depth articles on woodworking fundamentals such as joinery, sharpening, furniture making, and design.
- Ideas for jigs and work methods



that will minimize mistakes and improve the quality of the things that you make.

- Thorough and up-to-date coverage on finishing materials—how they work and how to use them.
- Good looking, well-designed project ideas of all sorts, from simple to challenging.

• Product reviews on the tools, machines, and materials you need in your shop.

But no matter how carefully we plan our magazine, we can't possibly anticipate all of your woodworking needs and questions. To do that, we need to hear from you. Think of AMERICAN WOODWORKER as a service for woodworkers. We're here to answer your questions and help you share your concerns with the greater woodworking community. You can reach us by mail, by phone, or by FAX.

Our address is:

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We're waiting to hear from you.

David Sloan
Editor and Publisher

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This One

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LETTERS

Straight Talk on Old Growth

Re: Word from the Editor (AW, #24). *Right on!* Thank you, thank you, *thank you* for your short but to-the-point comments about old growth forests. I love wood, and I wouldn't be happy if we couldn't get any at the local lumber mill. But I love forests, too, and *they* make all life on this earth possible. And as you say, old growth can't be re-created with a few seedlings. In fact, human beings have *never* re-created an old growth forest; it appears that it would require at least 250 years to get any forests back to that state of grace. I've read "even-handed" articles in other woodworking publications that have pandered to the timber industry. It's one thing to have a difference of opinion; it's quite another to lie. But that's what that industry does, and too often I've seen those lies show up in print. What a joy to see your straight-shooting comments!

Roger Keeling
Santa Cruz, CA

More Production Ideas

When I got laid off back in July, I decided to turn my woodworking hobby into a business. I took on a mill-work job (two raised-panel cherry doors and a fireplace mantel) and spent my evenings designing small Christmas-gift items I could mass-produce in small production runs. I did pretty well with a line of jewelry boxes that sold for about \$100.

I'd like to see more articles that deal with the problems of the small-scale professional woodworker. Production techniques, tax and insurance matters, etc. With the economy in such a sorry state, I'm sure there are lots of readers who'd welcome this kind of info.

Dan Seniuk
Johnstown, PA

Chairs 'n' Ladders

I came across this "library" chair about 10 years ago. It's a chair that cleverly doubles as a step ladder.

I was wondering if you or any of



your readers might have access to a set of plans. If so, I would very much appreciate any assistance in obtaining a copy of them.

Brian Boychuck
Ontario, Canada

Our plans database drew a blank on this one. How 'bout it, readers?

Homely Hutch

Nothing personal guys, but that oak china cabinet you ran last issue (AW, #24) was just plain *ugly*. Please don't run any more of these quasi-Victorian monstrosities in AW. They're mighty hard on the eyes.

Art Gilson
San Diego, CA

Searching for Sources

Bob Moran's article "Tenons on the Tablesaw" (AW, #24) was great. But I am unable to find the hardware that he used to complete the jig. If you would be so kind as to let me know where I can purchase the hardware, I would appreciate it.

Donald E. Smith
Middletown, OH

You can purchase the toggle clamps (part #TC-307-U, two required) and check nuts (part #V-3, four required) from Reid Tool Supply, 2265 Black Creek Rd., Muskegon, MI 49444, (800) 253-0421.

Consumer Update

Re: "Random-Orbit Sanders" (AW, #22). The model number on the AW Best Buy, Skil #7584, has been changed. The new model, Skil #7484, is currently available through mail-order suppliers and soon will be available in stores.

Correction

Re: Bob Flexner's response to "Lowdown on Furniture Polish" (Q & A, AW, #24). In the following passage, the words in brackets were erroneously introduced. They should be deleted from the sentence. "When you oil your furniture with any polish, oil, cream, or treatment from the supermarket, you're putting a very thin layer of oil on top of a finish [The oil is] intended to keep liquids such as oil, water, and perspiration out of the wood."

Tell us what you think. Send your comments, complaints, compliments, and corrections to *Editor*, AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.

Q & A

Dished-Out Cutting Board

Q. I want to reproduce a cutting board that's dished out to prevent juices from running over its edges. I know that the cutting board is probably made with a router, but I don't know how to go about making it. Can you help?

Paul Haas
Cannon Beach, OR

A. An ordinary round-nose router bit, often called a core-box bit, will dish out a cutting board, leaving a nicely rounded corner. It will also leave a series of small ridges all over the dished-out portion. If you have such a bit on hand and plan to make only one cutting board, I'd suggest that you use the core-box bit and clean up the small ridges with sandpaper or a cabinet scraper.

If you have to buy a bit or plan to make several cutting boards, I'd suggest that you get the Bowl, Tray and Dish 3-in-1 Specialty Bit made by Eagle America (Box 1099, Chardon, OH 44024, 800-872-2511). This bit has a straight side, a rounded corner, a flat bottom, and is available with a bearing for following templates. The bit's flat bottom doesn't produce ridges the way the core-box bit does.

Whichever bit you use, be sure to plan the cut so you'll always have adequate support for the router.

Bob Moran
Assistant editor
AMERICAN WOODWORKER

Rubbing Out a Finish Without Rubbing Through

Q. I'm having trouble getting a level, rubbed finish on tabletops without sanding through the top coat. I know that my wood surfaces are smooth and flat. After staining, I've applied a variety of top coatings,

ranging from tung-oil varnish to gel varnish in multiple coats. I then attempt to rub the top coat by hand. I use 400-grit and 600-grit wet-or-dry paper lubricated with mineral oil and backed by a large cork block. No amount of care prevents sanding through the top coat. Can you tell me what I am doing wrong?

Cliff Parmer
St. Charles, MO

A. There's nothing wrong with your method of rubbing out the finish. The problem is that the finishes you're using are not suitable for rubbing out. Your finishes, which are designed to be wiped off after each coat, are simply too thin to be cut back very much.

If you want to stick with these thin finishes, try backing the sandpaper with just your hand. Or skip the sandpaper-leveling step altogether, and simply rub the surface with 0000 steel wool and a lubricant such as wax, oil, or soap and water. For a higher sheen, you could rub with pumice and rottenstone or commercially available rubbing and polishing compounds.

If you'd rather stick with your sandpaper method of rubbing out, switch to a high-build film finish such as varnish, lacquer, shellac, or a water-based finish that has more thickness with which to work.

Bob Flexner
Finishing consultant
Norman, OK

Boring Clean Holes

Q. I have a problem with drills—twist drills to be specific. I get tear-out around the top of the hole when I drill wood. My bits are old but sharp. What's causing this tear-out?

Larry McVie
Schenectady, NY

A. Tear-out at the entrance to a hole in wood occurs when the cutting edge of the drill bit grabs the wood and tears it instead of cutting it. You can prevent this by using a bit with spurs designed specifically for wood. The spurs scribe (cut) the outer edge of the hole before the bit actually removes the wood. This way, if the bit grabs and tears the wood instead of cutting it, the tear won't go beyond the scribed edge of the hole.

Patrick L. Payne
Product specialist
The Irwin Co.
Wilmington, OH

Thin-Kerf Blade Flutter

Q. I recently bought a "thin-kerf," carbide-tipped, Japanese-made circular-saw blade. On both my tablesaw and radial arm saw, the blade starts to vibrate as it exits the cut, leaving gouge marks on the stock. I don't have this problem with other saw blades. Is there a way to eliminate the vibration?

Bob Morgan
Asheville, NC

A. The most likely reason for the problem is incorrect feed rate. Compared to thicker blades, the feed rate must fall within a smaller range with a thin-kerf blade. There's a tendency to feed the stock quickly because the thin blade cuts more easily than a normal blade. If the stock is fed too quickly, the blade will flutter near the end of the cut when there's no more wood to support it. Conversely, feeding too slowly can cause heat buildup, which might distort the blade, causing it to run out of true. I suggest that you attempt to adjust your feed rate, to eliminate the vibration.

Another possible cause of your problem is excessive play in the tilt

Q & A

mechanism on your saw (especially the tablesaw). This problem shows up when the beginning of a crosscut is square but the end is not, and is especially noticeable in angled-bevel cuts. On tablesaws, the excessive play can be caused by too much backlash in the tilt mechanism. Look in your tablesaw manual to find out how to check and adjust the backlash. If backlash is your problem, it's probably not too severe because it only shows up when you use your thin-kerf blades.

Kelly Mehler
Furniture maker
Berea, KY

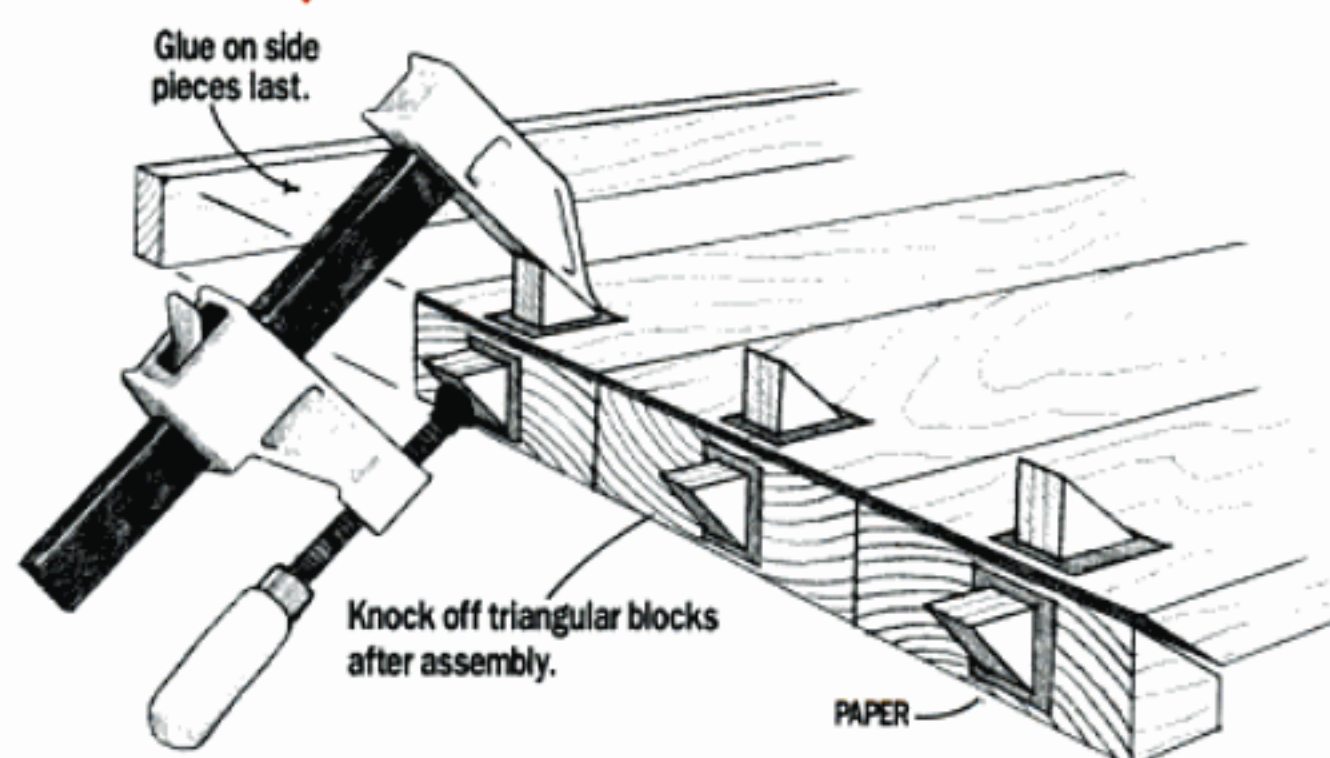
Replacing Chair Spindles

Q. A chair I recently disassembled, repaired, and reglued has been brought back to me with another broken spindle. Because all the joints are quite solidly (and recently) glued, how can I repair the chair?

Larry Wolf
Cuero, TX

A. All well-executed glue bonds are difficult to break apart until they have cured and aged a number of years. I'd suggest that you replace the spindle without disassembling the chair. To do this, first remove the broken spindle and clean the old glue from the spindle mortises. Next, drill the spindle mortise in the crest rail about $\frac{1}{2}$ in. to $\frac{3}{4}$ in. deeper. You can then push the replacement spindle far enough into the crest rail to allow the bottom of the spindle to slip out into the seat mortise. I'd suggest trying it before you glue it.

Bob Flexner
Finishing consultant
Norman, OK



Thickening a Tabletop

Q. I want to make my $\frac{3}{4}$ -in. thick tabletop look thicker—about $1\frac{1}{4}$ in. I see no problem in gluing narrow boards under the long edges of the tabletop, but how can I overcome the problem of expansion and contraction across the end grain?

Brian Honey
Barrie, Ontario

A. To make a solid top look thicker without problems from wood movement, the orientation of the grain in the add-on pieces must be the same as the orientation of the grain in the tabletop. I suggest that you trim the ends of the tabletop at 45° and glue on a row of end-grain blocks, as shown in the drawing. A series of plywood triangles can be temporarily glued to both the tabletop and the end-grain blocks to facilitate clamping. A scrap of paper between

the triangles and the tabletop or end-grain blocks will make it easier to remove the triangles.

When the glue is dry, knock off the triangles. Hand plane the tabletop and/or the end-grain blocks so the glue line is directly at the corner where the top meets the end. Finally, glue on long-grain sides that make the long edges of the tabletop look thicker.

Chris Yonge
Cabinetmaker
Englewood, NJ

Got a woodworking question for the experts? Send it to Q&A, AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.

WHERE TO FIND IT

Handmade replacement irons for Western-style hand planes are available from The Japan Woodworker, 1731 Clement Ave., Alameda, CA 94501, (800) 537-7820.

A variety of machinists' end mills for routing mortises is available from MSC Industrial Supply Co., 151

Sunnyside Blvd., Plainview, NY 11803, (800) 645-7270.

Rare, old decorative banding in more than 200 different patterns is available from Lee Valley Tools, Ltd., Box 6295, Station J, Ottawa, Ontario K2A 1T4, (800) 461-5053.

TECH TIPS



No-Scratch Surfaces for Finish Work

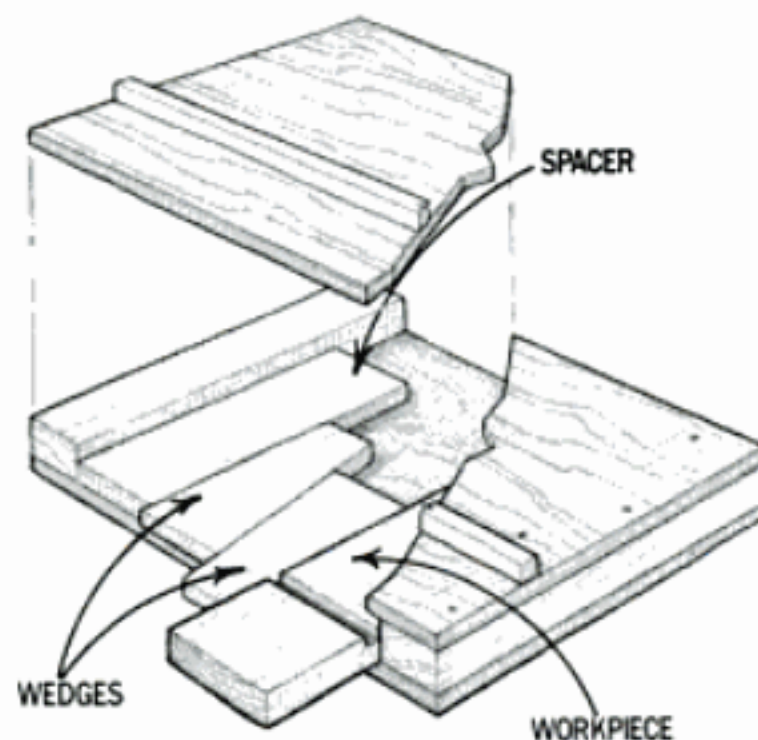
When a project reaches the finishing stage, I protect my work surfaces from finishing materials and the project from scratches by covering the work surfaces with carpet. Because I put large projects on sawhorses for finishing, I made up carpeted, fitted forms for the sawhorses. I store the forms, carpeted-side down, to keep them dust free.

H. Wesley Phillips
Greer, SC

Smoother Bandsaw Cuts

I rip a lot of stock into very thin pieces on my bandsaw. The blade's narrow kerf saves wood, but the teeth marks are a real problem. To lick the problem, I removed most of the set in the teeth by squeezing the blade in a pair of smooth-jaw pliers. The blade no longer cuts as tight a curve as it did, but it cuts a satin-smooth surface.

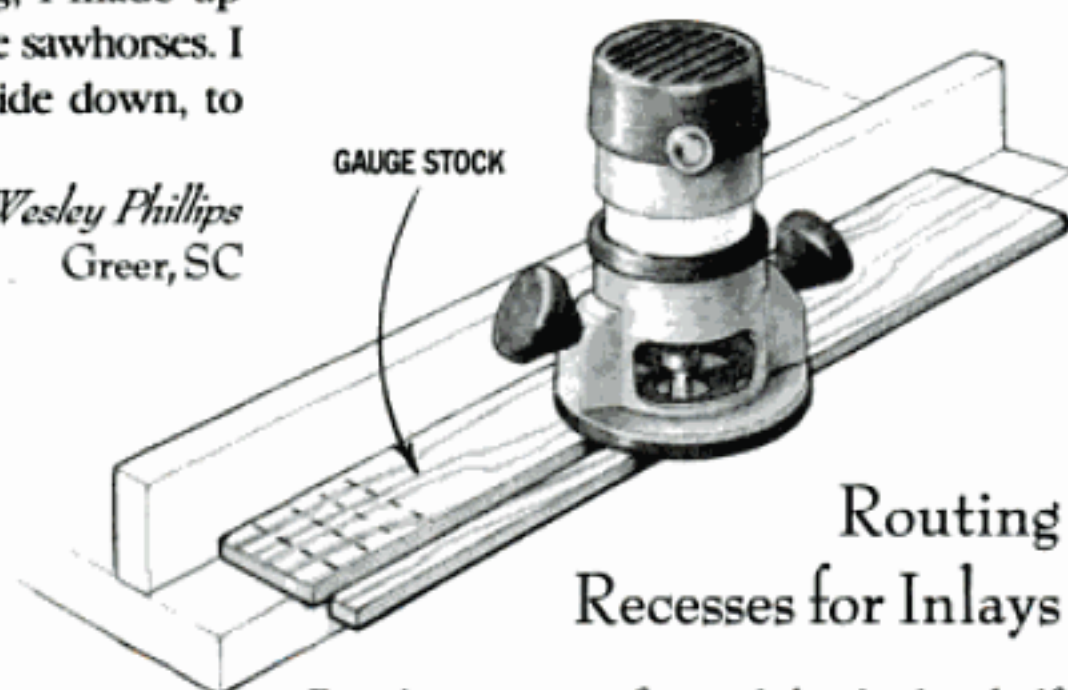
Anson Chaney
Canby, OR



Routing Small Pieces Easily

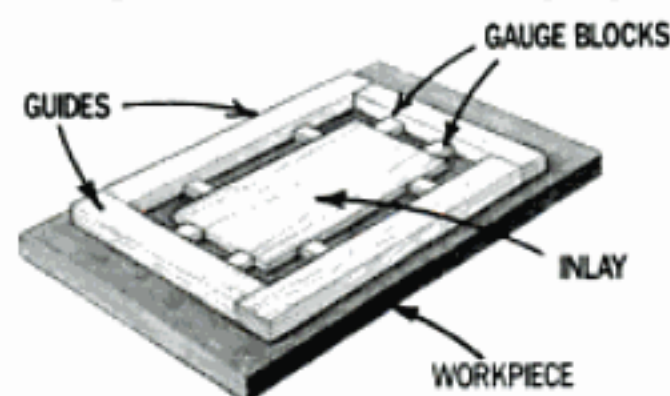
When routing dadoes or moldings on the small parts of the clocks I build, I wedge them into the box-like jig shown in the drawing. The jig holds the small parts securely, and it's easy to line up the edge of the jig with a mark on the parts.

Ron Breadner
Owen Sound, Ontario



Routing Recesses for Inlays

Routing a recess for an inlay is simple if you use gauge blocks to position the router guides. With a straight bit in the router, guide the base against a fence to trim a piece of stock to the proper



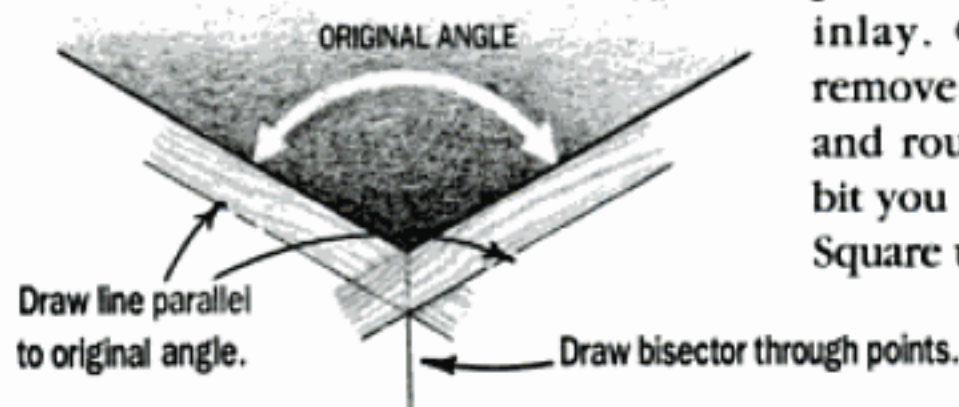
width (the distance from the bit to the edge of the router base). Next, crosscut this gauge stock into short blocks and use them as spacers to position router guides around the inlay. Clamp the guides in place, remove the inlay and gauge blocks, and rout the recess with the same bit you used to trim the gauge stock. Square up the corners with a chisel.

Howard K. Gaston
Naples, FL

Bisect an Angle Without a Compass

I have a very simple method for bisecting angles for mitering moldings. First I lay a parallel-sided board along one side of the angle and draw a line parallel to that side. Next, I lay the board along the other side of the angle and draw a similar line intersecting the first line. Finally, I connect the intersection of the two lines with the point of the original angle. The method is particularly useful for mitering baseboards in a room with odd angles.

J. A. Wilson
Lexington, MA



Picking Up Spilled Nails

Picking up spilled nails with a magnet seemed silly to me because picking the nails off the magnet was as much work as picking them off the floor. That was before I discovered I could pull all the nails off the magnet at once by wrapping it in a handkerchief before picking up the nails.

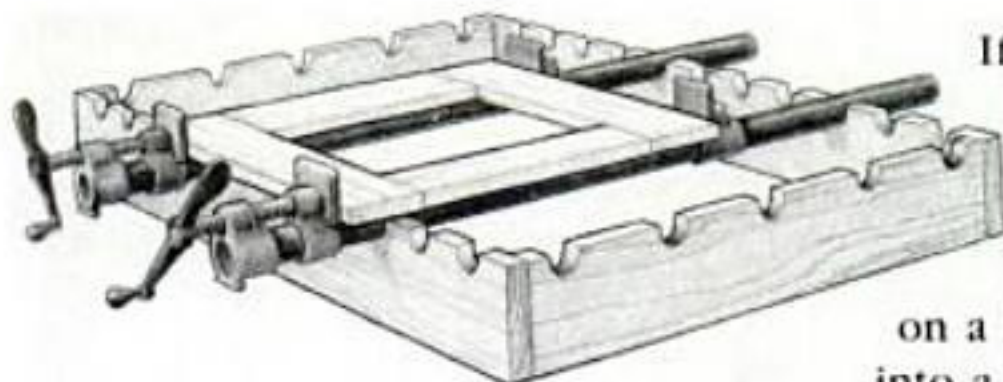
Doug Parker
Appling, GA



DRAWINGS BY HEATHER BRINE LAMBERT

TECH TIPS

Turning Toy Tires



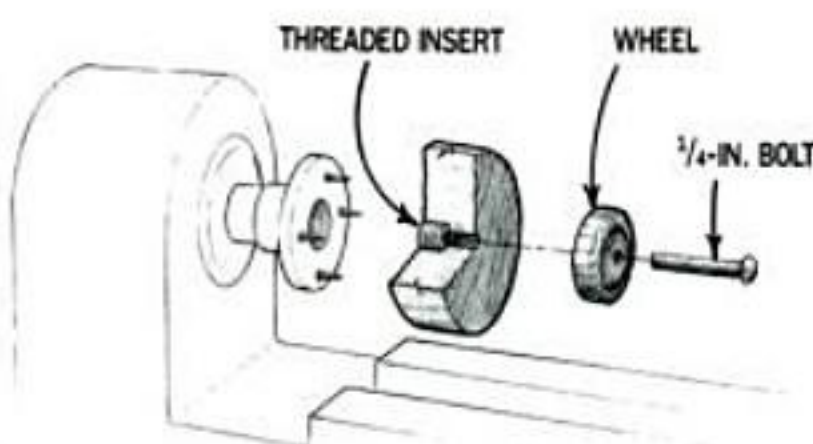
If you make many toys with wheels, you'll appreciate my mandrel for turning wheels on the lathe. I rough cut the wheels with a 1/4-in. pilot bit on a hole saw. A 1/4-in. bolt screws into a threaded insert to secure the wheels quickly and easily for turning.

Gordon E. Krupp
Northbrook, IL

Clamping Aid

I keep my pipe clamps level, parallel, and properly spaced for glue-ups by arranging them in notches in a frame, as shown. By cutting the notches 3/4 in. deep, the upper surface of the pipes remain above the surface of the notched frame.

Mark McClain
Rawlins, WY



Faster-Cutting Oil Stones

I clean and lubricate my oil stones with WD-40, a rust preventative. I get it in a spray can with a plastic extension tube. The blast of WD-40 cleans the surface deeply, giving me a good, fresh abrasive surface for sharpening. I then use more of the WD-40 to lubricate the stone while sharpening.

Arthur Guilmette
Westport, MA

Know a better way of doing something? Designed a clever jig? Send your woodworking tips, along with a sketch or a snapshot, to: *Tech Tips*, AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. We'll pay you \$35 if we publish your tip.

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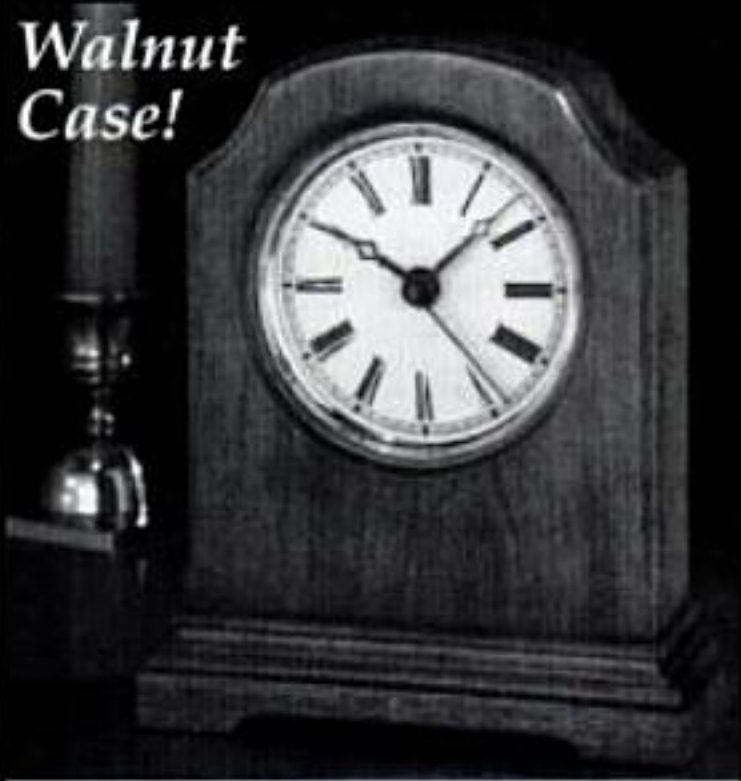
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TUNING A BANDSAW

BY FRED MATLACK

Almost Any Machine Can Be Tweaked to Work Better

Whether it's a new machine right out of the crate or an old one picked up at an auction, most woodworking machines must be fiddled with to work better. You need to fine-tune machines—fuss with various settings and adjustments, and perhaps even correct some minor flaws that simply slipped by the manufacturer.

However, with bandsaws a tune-up isn't a luxury, it's a necessity. By their nature, bandsaws are less precise than

More than any other machine, a bandsaw needs a tune-up to run well. A proper tune-up will have it singing in no time.

most other woodworking machines. The thin, flexible blade is not supported between the upper and lower blade guides, which allows it to deflect and wander in the cut if the guides are not properly adjusted. Also, bandsaw wheels that are misaligned, out of round, and unbalanced can lead to cutting inaccuracy and shortened blade life.

Fortunately, you can tune-up your bandsaw yourself. I'll explain how to do a complete tune-up procedure that includes checking the wheel bearings, wheel balance, and wheel alignment.

Not all bandsaws will require this complete tune-up. Often, routine maintenance—adjusting the guides, tension, and tracking—will get your saw singing. I recommend these routine adjustments when you change a blade, when the saw begins to cut erratically, and after every few hours of use. If your bandsaw cuts to your satisfaction with these simple adjustments, you're home free—there's no need to disassemble the saw for a complete tune-up.

However, if you've made the above mentioned adjustments and your bandsaw still doesn't cut properly, I'd recommend that you run through the whole tune-up procedure. By doing this, you'll discover the problems with your saw and fix them from the ground up. Once you've completed the procedure, you shouldn't



PHOTOS BY MITCH MANDEL

have to repeat it for some time—perhaps not for years if you don't use the saw very hard.

The tune-up procedures described in this article are for two-wheel bandsaws. Much of the information will apply to bandsaws with three wheels, but I recommend that you consult the owner's manual for specific instructions.

Tune-Up Procedures

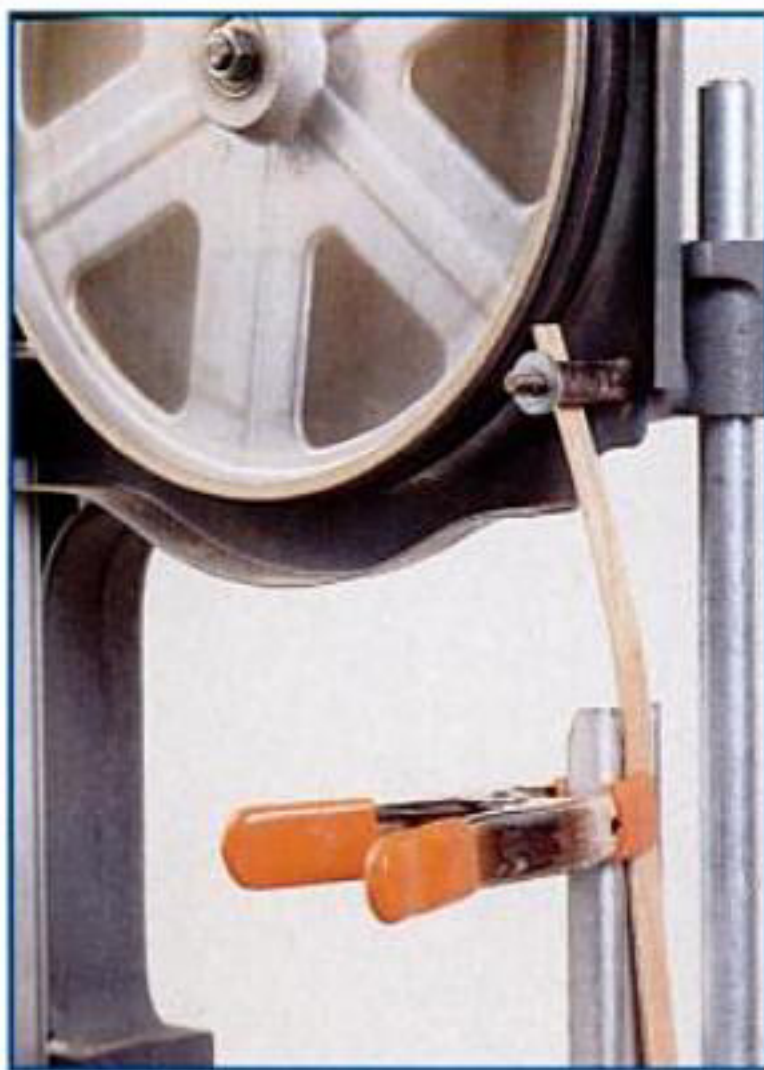
To begin a tune-up, unplug the bandsaw and undress it to gain access to its internal parts. Take off the saw blade, wheel covers, guards, table, and drive belt. Strip the saw down to just the frame and the wheels. Your owner's manual describes how things come apart.

When the saw is stripped down, inspect the bandsaw's frame. Check for broken or loose parts. On cast-iron saws, check the joint where the top and bottom frame pieces are bolted together. On old bandsaws, look for cracks in the frame. Cracks can usually be repaired at a local welding shop.



▲
To check the wheel bearings, grasp the wheel at the rim on either side and rock it. If there's sideways play accompanied by a clunking noise, the bearings are probably shot.

Check the wheel bearings—Starting with the bottom wheel, grasp it at the sides (3 o'clock and 9 o'clock) and rock it from side to side, then grasp it at the top and bottom and rock it back and forth. If you get more than about $\frac{1}{32}$ in. of lateral movement at the



▲
To check if the wheels are out of round, clamp a stick to the frame to act as a reference pointer. Spin the wheel by hand, and watch the tiny space between the stick and the tire. You'll be able to see any hop in the tire or wheel.

wheel's rim (and a noticeable "clunk, clunk" sound), the bearing is probably shot and needs replacing. Look to make sure that the wheel isn't rocking on its shaft or that the bearing isn't rocking in its bore in the frame.

Check the top wheel's bearing the same way. You may have to temporarily clamp the top wheel's tilt mechanism to make sure the slight play in this mechanism isn't masquerading as bearing looseness.

If the bearings are bad, knock them out with a block of wood and a hammer. You can get replacement bearings at your machinery dealer or a bearing-specialist store like Bearings Inc. (Look in your local yellow pages under "bearings.") A large C clamp makes a good bearing press for installing new bearings. If you have an old bandsaw with old-fashioned babbitt bearings, consult a machinist.

Check the wheels and tires—Wheels and tires cause problems when they're out of round. If you found play in the wheel bearings, first replace the bearings, then proceed with the following steps.

Rig up a reference pointer by clamping a stick to the saw frame with one end of the stick about $\frac{1}{16}$ in. away

from the crown (center) of the wheel's rubber tire. (See photo, left.) Spin the wheel by hand, and observe the space between the stick and the tire. If the wheel or tire is out of round, you'll be able to see it at the pointer stick. Don't expect the wheel to be perfectly round. Manufacturing tolerances for a bandsaw typically allow up to 0.020 in. deviation.

A machinist's dial indicator gives a more accurate readout than the pointer-stick method does. Install a blade on the wheels first, and position the stem of the indicator on the blade, not on the tire.

If the wheel is more than $\frac{1}{32}$ in. out of round, determine if the tire alone is the problem. The thickness of the tire could vary if it's stretched around the wheel unevenly. To try to correct this, insert a Phillips screwdriver under the



▲
If the bandsaw tire is lumpy, try restretching it around the wheel by running a screwdriver under it to even out its thickness.

tire and work it around the wheel's circumference. (See photo, above.) The idea is to stretch the tire out and reseal it evenly. If your tire is glued on, it's probably best to remove it and install a new tire from the manufacturer.

Some woodworkers say you can true a tire directly on the wheel by scraping the spinning tire with a chisel or turning gouge held securely against the saw frame. I don't recommend this procedure. It might work on tires



To balance a bandsaw wheel, author drills shallow holes to remove weight at the heavy point of the wheel.

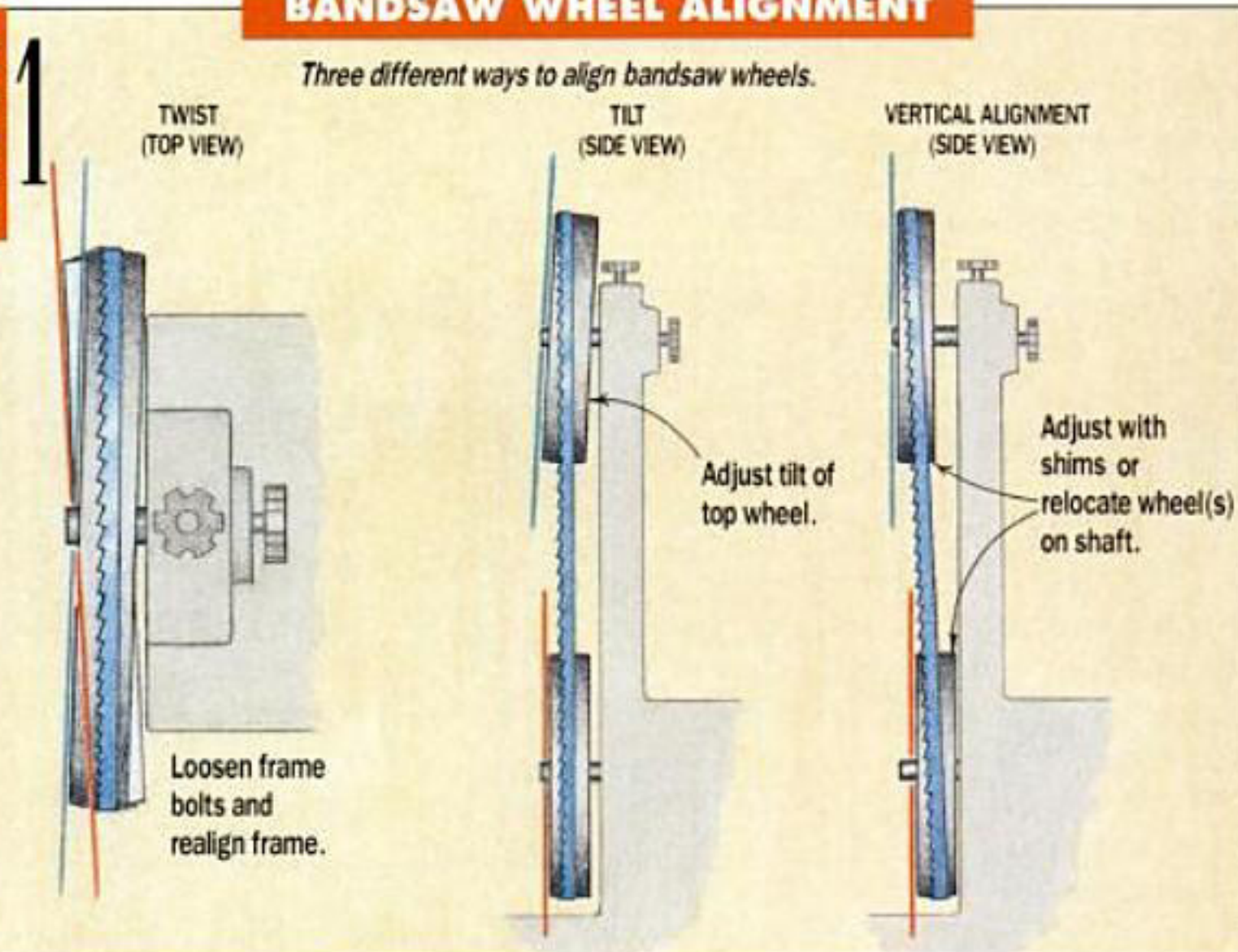
glued to the wheel, but most tires aren't glued. The tire will move around when you operate the saw and become out of round again.

If restretching or replacing the tire doesn't true the wheel, the wheel itself is out of round. Remove the tire and again check the wheel with the pointer stick. If the wheel is more than $\frac{1}{32}$ in. out of round, you have two options: Either purchase a replacement from the manufacturer (this isn't an option with many older saws) or have the wheel turned true at a local machine shop. If you go the machine-shop route, be sure the machinist retains the crowned shape of the rim and the original diameter of the wheel. Truing the wheel will change its balance, so have the machinist rebalance the wheel. Badly balanced wheels can cause severe vibration and premature bearing failure.

Balance the wheels—It's easy to balance the wheels yourself. Check the balance by spinning each wheel by hand and letting it come to a stop. (You may need to loosen the wheel's shaft nut to get the wheel to spin freely.) When the wheel comes to rest, mark the bottom and spin it again. If the same point on the rim always stops near the bottom after several trials, that's the heavy side of the wheel.

If the wheel is out of balance, remove the wheel from the saw and drill shallow holes in the flange between the rim and the spokes at the heavy point, as shown in the photo above. Remove a small amount of metal at a time. Remount the wheel and spin

FIGURE 1



to check it. When the wheel no longer stops with the same point at the bottom, you're as close to balanced as you need to get.

Align the wheels—Adjusting the alignment is tricky because the alignment is influenced by the blade tension and tracking. If you change one variable, you'll change them all, so check the wheel alignment with the blade installed and tensioned. To be correctly aligned, the top and bottom wheels must be *coplanar*—that is, the wheels must lie in the same plane without being twisted, tilted, or out of vertical alignment. (See Fig. 1.)

First check for twist. Stand on a stool and look directly down on the top of the upper wheel. If the upper wheel is slightly twisted with respect to the lower wheel, as shown in Fig. 1, you'll see it when you look down. A pair of winding sticks held up to the wheels allows you to better see any twist, as shown in the photo.

If the wheels are twisted, you can



Check the wheels to see if they're twisted out of alignment by holding a pair of winding sticks up to the wheels. Get a helper to sight down on the wheels from above to look for any twist.

make a small adjustment by loosening the bolts at the joint in the frame (on cast-iron saws), twisting the frame to bring the wheels in line, and retightening the bolts. (Reduce the tension on the blade first.) Metal locating pins in the joint limit the amount of adjustment you can make. If

the wheels are twisted too far to adjust in this way or if your saw has a one-piece frame, you'll just have to live with the twist.

Tilt and vertical alignment—The next two adjustments, tilt and vertical alignment, are interrelated. (See Fig. 1.) To check the wheels, hold a straightedge vertically against the wheels near their centers so it crosses the top and bottom rims of both wheels, as shown in the photo. Now tilt the top wheel by adjusting the tracking-adjustment knob until the straightedge barely touches the lower wheel. If the straightedge touches both wheels at their rims simultaneously, the wheels are aligned. Again, don't expect perfection. If you get the wheel rims within, say, $\frac{1}{32}$ to $\frac{1}{16}$ in. away from the straightedge, you're OK.

If the alignment is off, correct it by installing (or removing) thin shims on the shaft behind the wheels. You can use flat washers if you need a thick shim or cut thinner shims from sheet metal or brass shim stock from an auto-parts store. If your wheels are secured to their shafts with set screws, simply reposition the wheels on the shafts.

To determine the thickness of the shim(s) you need, hold a ruler up to the straightedge at the wheel rim, as shown in the photo, and measure the offset from the rim to the straightedge. If possible, move the outermost wheel *in* to correct the alignment rather than move the inner wheel *out*. (You want to keep the wheels as close to the saw frame as possible.) Check to see if there are any factory-installed shims you can remove to move the outer wheel in. If not, remove the wheel that's recessed the most and install shims behind it. Reinstall the wheel and the blade. Re-tension the blade and check the wheel alignment with the straightedge. Adjust the tilt of the top wheel if necessary. Repeat this process until the wheels are in vertical alignment under tension.

Tension the blade—You tension a bandsaw blade by turning an adjustment screw, which moves the top wheel farther away from the bottom wheel and thus stretches the blade. Most bandsaws have a tension indicator that tells you how far to turn the adjuster for different-sized saw

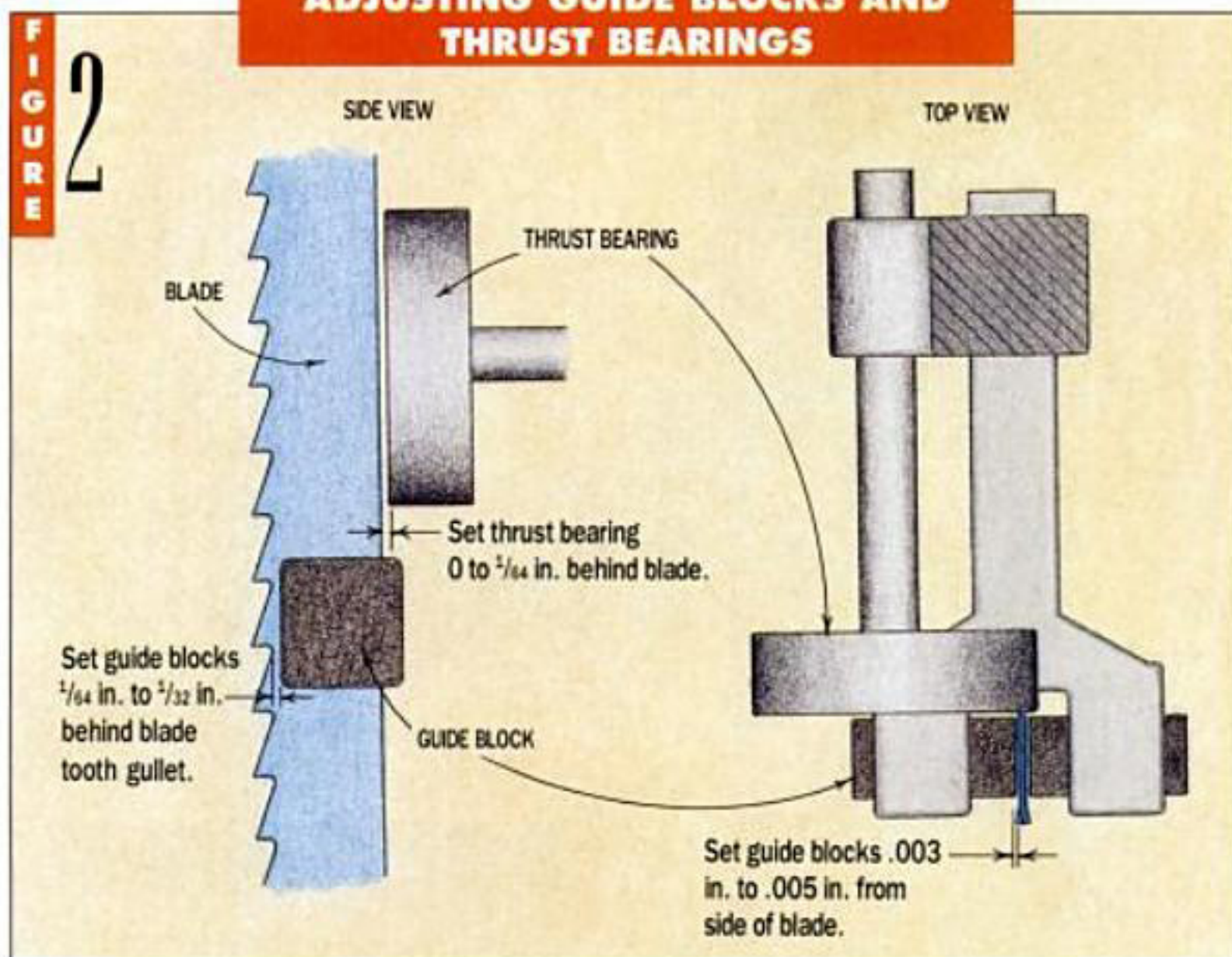


Test the vertical alignment of the wheels by holding a straightedge across both wheel rims near their centers. The straightedge should touch the rims of both wheels at their tops and bottoms.

If the wheels' vertical alignment is off, measure the small gap between the straightedge and the wheel rim with a ruler to determine the thickness of the shims you'll need to install behind one wheel.



ADJUSTING GUIDE BLOCKS AND THRUST BEARINGS

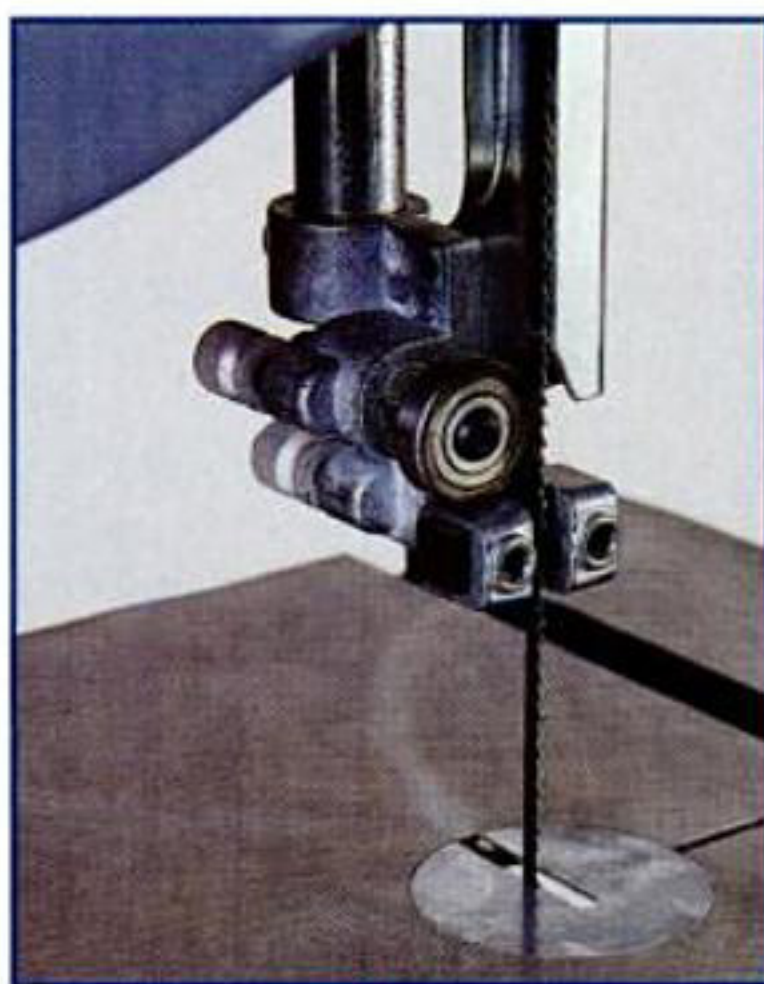


blades. (Wider blades run at higher tension.) Trouble is, the tension indicators are notoriously inaccurate, especially on older saws because the tension spring fatigues in use. Still, the indicator is a good place to start, so adjust the tension according to the indicator scale on your saw.

There are a lot of differing opinions on bandsaw tension adjustments. Some woodworkers advocate tensioning the blade much higher than the tension indicator shows. I prefer to use the least amount of tension that yields satisfactory results for the type of cutting I'm doing.

If your saw doesn't have a tension indicator, test the tension by plucking the blade like a guitar string, and notice how the tone changes as the tension increases. You want a clear, musical tone rather than a dull thud. The tension required will vary with the width of the blade. Experiment to find the tension that makes you and your saw comfortable. Avoid cranking the tension way up as a panacea for all cutting problems. Excessive tension can shorten blade and bearing life and stress the frame of the saw.

Adjust the blade tracking—Track the blade by turning the adjustment screw that tilts the top wheel as you spin the wheels by hand. Aim to get the blade tracking in the center third of the tire. If the wheels are round,



The guide blocks and thrust bearings are mounted in a guide assembly (upper guide assembly shown). Knobs adjust the clearance between the guide blocks and the blade, and the thrust bearing and the blade. Thumb screws lock the adjustments.

balanced, and coplanar, you shouldn't have to tilt the top wheel much to track the blade properly. In fact, some woodworkers claim you should leave the wheels coplanar (by not tilting the top wheel at all after wheel alignment) and allow the blade to find its own equilibrium tracking position near the center of the tire's crown.

Align the drive belt and pulleys—

Inspect for worn, lumpy, and cracked belts. Check the pulleys on the motor and the saw to see if they're running true. A wobbling pulley can cause vibration. Lesser-quality die-cast pulleys sometimes have off-center shaft holes or lumps and bumps in the drive surface. In this case, buy higher-quality machined pulleys as replacements. The pulleys on the motor and saw should line up, making the belt run straight. Align them as necessary by moving the pulleys in or out on their shafts or by shifting the motor position a bit.

Reassemble the saw—Put the wheel covers, guards, and table in place. Install the blade guides (above and below the table). Loosen the blade guide adjustments and back the guide blocks and thrust bearings away from the blade.

Adjusting the Guides

Bandsaws have two guide assemblies—one above and one below the table. The guides keep the blade aligned during the cut, as shown in the photo at left.

To keep the blade from twisting in the cut, most guides have two metal guide blocks that hug the sides of the blade. Instead of guide blocks, some more expensive saws have ball bearings that guide the blade.

A thrust bearing behind the blade prevents the blade from being pushed off the wheels while cutting.

To adjust the guides, position the upper guide assembly about 2 in. above the table. If the guide blocks are worn, grind or sand them square and smooth on the ends, and install them loosely in the guide assemblies. Adjust the upper and lower guide assemblies forward until the front edges of the guide blocks are about $\frac{1}{64}$ to $\frac{1}{32}$ in. behind the gullets of the teeth on the blade. (See Fig. 2.) Spin the blade through a couple of revolutions to make sure the whole length of the blade has proper clearance.

Adjust the clearance between the guide blocks and the side of the blade. Generally, metal guide blocks should be set with about .003 in. to .005 in. clearance between the block and the blade. You can use a dollar bill as a gauge to set the blocks—a dollar is about .004 in. thick. If your bandsaw

has ball-bearing side guides, they can be set to touch the blade. Make sure you don't deflect the blade to either side when you adjust the guide blocks. Turn the wheels by hand at least one full length of the blade to be sure the blade's welded joint passes easily between the guides.

Cool Blocks are aftermarket guide blocks made of phenolic laminate impregnated with graphite to run cooler and closer to the blade (available from Garrett Wade, 161 Ave. of the Americas, New York, NY 10013, 800-221-2942). They replace standard metal guide blocks.

Next, adjust the clearance between the thrust bearing and the back of the blade. Do this with the blade running. With the bearing clear of the blade, slowly advance the bearing until it barely ticks against the blade's rear edge, then back it off a bit. The bearing should have about 0 to $\frac{1}{16}$ in. clearance when the blade isn't cutting but should immediately support the back of the blade when cutting begins. (See Fig. 2.)

It's a good idea to check the guide adjustments when you raise or lower the upper guide assembly. On many saws, changing the upper guide's height alters the settings slightly. It's worth it to readjust the clearances.

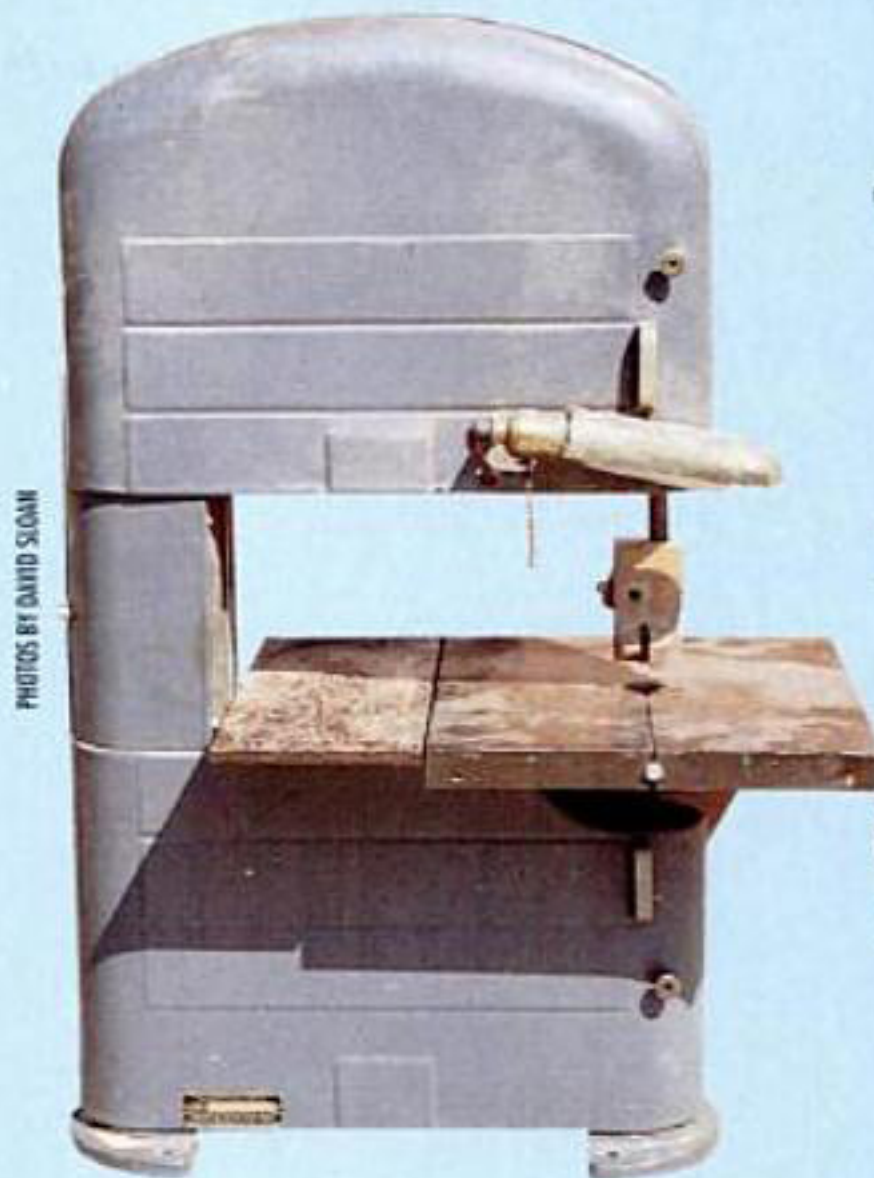
If your bandsaw's guides are broken, badly designed, or if they don't maintain their adjustments, you can purchase ball-bearing guide assemblies that will make your saw run smoother and more quietly (available from Carter Products Co. Inc., 437 Spring St. N.E., Grand Rapids, MI 49503, 616-451-2928). Carter guides are designed to fit bandsaws 14 in. and up.

Your saw should now run as good as new, if not better. ▲



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WHEN A TUNE-UP BECOMES A RESTORATION



PHOTOS BY DAVID SIOGAN

Sad saw.
This vintage
1950s
bandsaw
thumped
along on a
homemade
wooden
guide. It
took more
than a tune-
up to get it
running
right.

A careful tune-up will get most bandsaws running fine. However, you may bump into an old machine that needs more than a tune-up. That's what we encountered when we tried to revive a vintage Craftsman 12-in. bandsaw made in the 1950s.

This saw was sad. The upper guide assembly had been replaced with a homemade wooden guide. (See photo, center.) The blade thumped along on bumpy wheels that were so far out of alignment that narrow blades would fly off the wheels.

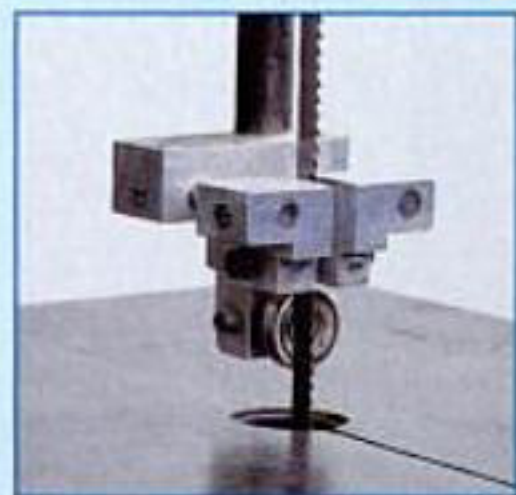
But we decided the saw was worth saving. We replaced the bearings and tires with no problems, but we ran into trouble when we found that the tracking/tensioning mechanism was broken beyond repair. Sears no longer sells parts this old, so we resorted to expensive machine-shop repairs.

We also had to machine a new upper guide—Carter replacement guides won't fit on a small, 12-in. bandsaw. (See photo, bottom.)

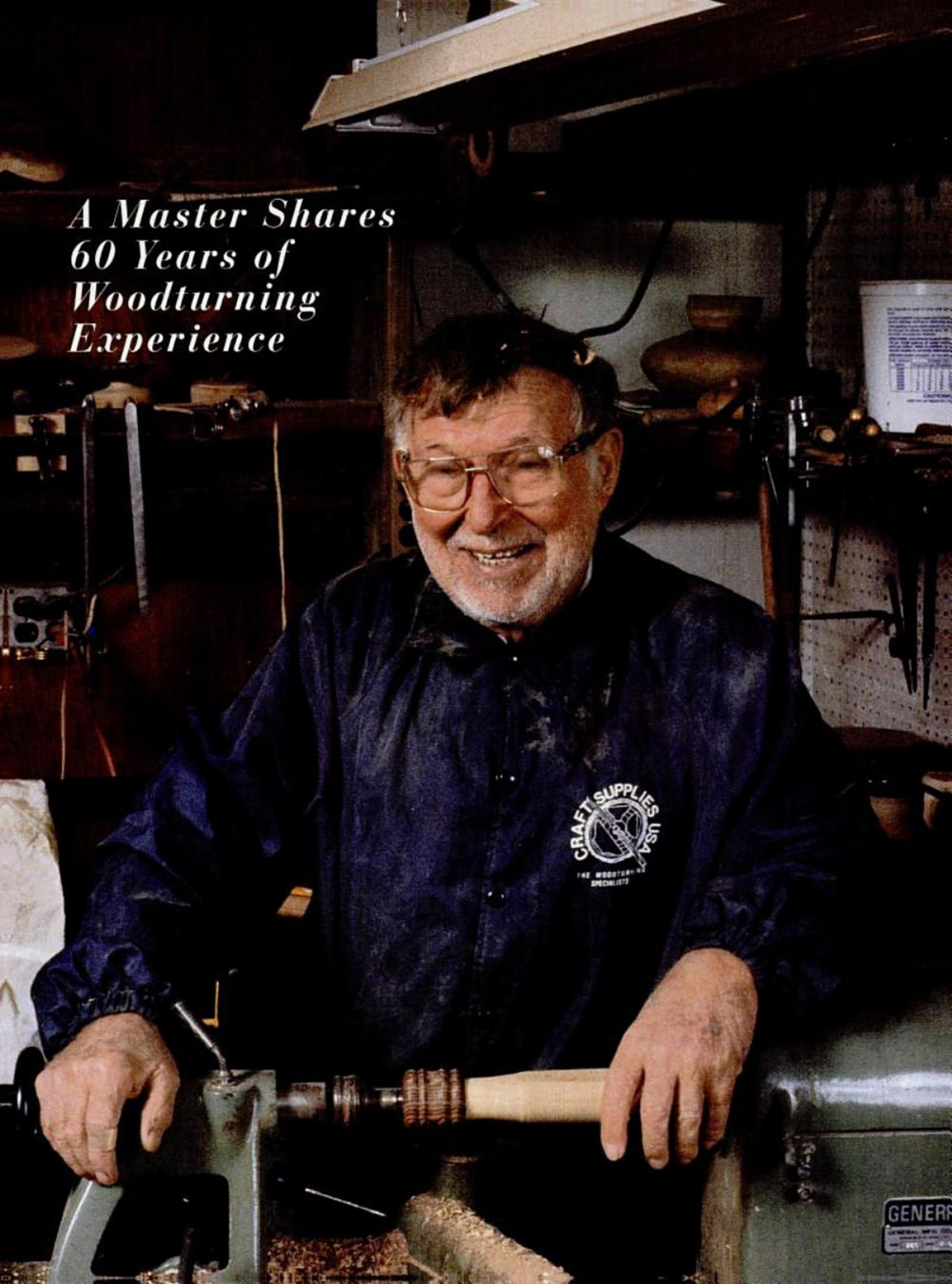
To make a long story short, we invested about \$500 in labor and parts to get this saw running right. Was it worth it? Probably not. We could have bought a new 14-in. bandsaw for about the same amount we spent on these repairs.

When does it pay to restore a basket-case bandsaw? It's worth restoring when the cost of repairs (plus the price of the saw if you're buying it) adds up to less than the

cost of a new bandsaw of similar size. Remember that parts aren't available for many old saws and machine-shop work is expensive. Restorations make the most sense on large (20-in. and up) bandsaws because a comparable new one costs a fortune.—EM.



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RUDE OSOLNIK

B Y D I C K B U R R O W S

Whenever woodturners talk about good teachers, Rude Osolnik's name usually is one of the first mentioned. Rude (pronounced Rudy) has that certain touch that marks a great teacher. He's enthusiastic and energetic, he loves his work almost as much as he loves sharing his knowledge, and he never runs out of tricks to astound his audience.

I've attended several Osolnik workshops in recent years, and every time I think I've heard all he has to say, some student will ask a question and Rude will roll out another good idea or technical tidbit that's inspired in its simplicity and effectiveness. He'll suggest ways to chuck and rechuck even the nastiest block of wood onto a lathe, mention special grinds for chisels and drill bits, and point out neat ways to coax an elegant form from a hunk of gnarled rhododendron.

Even beginners quickly sense he's freely sharing things that could only be discovered by spending thousands of hours in front of a lathe, turning every shape and object imaginable out of dozens of different woods. During the years, I've become convinced that every hour Rude has spent turning he's

thinking, How can I do this better and faster? How can I help this chunk of wood come alive in a way that people will appreciate?

Even though he was influenced by several fine teachers in high school and college, Rude's obsession with turning developed into a unique form of self-teaching, especially if you consider that he started turning in 1929 and has devoted a lifetime to mastering the trade. Today at 77, he's still going strong with new designs and quick, accurate cuts so deftly made that many pieces need just the lightest touch of sanding before a finish can be applied.

His credentials as a teacher are equally impressive. Rude has been teaching turning since the '30s when he became head of the industrial-arts department at Berea College in Kentucky. A native of Johnston City, Illinois, he was a graduate in industrial arts from Bradley University in Peoria, Illinois. Rude was working in the export department at the nearby Caterpillar plant in 1936 when he heard about the Berea job and jumped at the opportunity to teach, despite the pay cut.

Two years later, he married Daphne

Francis. They collaborated to produce a business, Osolnik Originals, with Rude doing the turning and Daphne providing encouragement, and handling business chores, finishing, and marketing. Even with a full-time teaching job, he kept turning, often rising at 2 A.M. to turn until he had to teach at 8 A.M. Since his retirement from the college in 1978, he has continued to be one of the country's most influential and prominent turners, conducting hundreds of turning workshops all across the U.S., and in Canada and New Zealand.

"I get as much of a kick out of turning now as I did back then. I never felt it was work. If you approach turning as a craft rather than a job, you don't tire. An important part of all of this is being willing to explore and to do things differently."

The enthusiasm for experimentation strongly comes across in Rude workshops. He demonstrates cutting and shaping, and all the technical things that every turner needs to know, but he makes it clear that mastering this ancient art requires more than technique.

"I try to convince students that

form, shape, and aesthetics are probably the most important things, the things that differentiate plain turning from something special. Also, I show them how they can use wood defects as advantages rather than view them as detriments. In the '30s and '40s when I was starting out, everyone tried to work with perfect wood. It is impossible to camouflage defects, but now we have the freedom to accentuate flaws to make the turnings really special."

Rude's workshops also stress hands-on practice. "I limit the size of the group. If the group is too large, you just can't give each student the individual attention he or she needs." That means classes are kept at four students; eight, if Rude has an experienced turner to assist him. Every student has a lathe to work on during the entire workshop, and other lathes are set up for demonstrations. Rude will show a technique and answer questions, and then the students try the techniques on their own. Rude wanders from lathe to lathe, offering individual instruction and encouragement. This approach also means he works with people of different skill levels within one group.

Projects are also an important part of every workshop. Rude noticed that beginners are often reluctant to take the plunge at designing their own pieces, so he shows them plenty of things to imitate. Dozens of finished and in-progress works fill his large, lathe-littered shop. Consequently, most students complete a couple of projects in a weekend and have something concrete to show off when they get home. Currently, most workshops are held at his home shop, a site he affectionately calls "Poverty Ridge." He used to travel around the country to workshops, but he now prefers to hold them in his own shop where he has enough lathes, wood, and inspiration to stimulate even the most timid student. Also, at his age, Rude believes most students enjoy the traveling more than he does.

The first projects for students tend to involve green wood because it offers less resistance to turning tools. Also, the first projects are likely to be weed pots turned from wood that looks as if it came from the firewood pile. That's because Rude doesn't want students to be intimidated by the fear of ruining an expensive piece of rosewood.

The basic cuts for students begin with large roughing-out gouges and spindle gouges. After watching Rude demonstrate the cuts, each student has a chance to practice cutting coves, beads, and shoulders until each can do

base too large. Once you have the base sized, you can turn the rest of the piece to conform to it. You want the piece to look as if it's coming up from the surface, not squatting on it."

Here's a hint from Rude: When sizing the base, as a rule of thumb, make it about a third the diameter of the top or rim. Sound simplistic? Try it, and I think you'll see the difference.

After the students feel comfortable with spindle turning, they begin making shallow, functional bowls.

In his courses, Rude also helps students sidestep the problem of sharpening by demonstrating a simple system of grinding and honing. "If your tools aren't sharp, you compensate with additional force, and that's when you lose control of the cut. Even if you're within several minutes of finishing a project, it is much better to resharpen than to force a dull tool."

The quality of that cut is important, after all. Every surface must be finely finished. "The piece should feel smooth and warm to your touch. My experience tells me that if a piece doesn't feel good, it's probably not good and it won't sell." It's hard to dispute that kind of remark from a guy who has

sold thousands of pieces and has his work in some of the major craft collections in the country. ▲



Rude has taught turning since the 1930s. Though he's held workshops internationally, he now prefers to teach at his own workshop in Berea, Kentucky.

a nice, clean cut. It doesn't matter whether the students are scraping or shear cutting—that merely depends on the angle of the tool to the work as it's spinning—but cutting techniques are encouraged. "The thing I try to get them to do is eliminate tear-out as much as possible. Sheer cuts leave ridges but no tear-out. Once students get used to the tools, they rarely need anything coarser than 100-grit for sanding final surfaces, and then they can quickly progress through the finer grits up to 400-grit."

At the same time, he stresses the use of calipers and the dimensions of the lathe components, such as the drive-center diameter, as guides for sizing pieces and experimenting with proportions. "The important thing is to want a piece to look as aesthetically pleasing as possible and not make the

FOR INFORMATION

For more information about turning workshops with Rude Osolnik, contact Rude at Box 422, Berea, KY 40403, (606) 986-4440.



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PHOTOS BY DICK BURROWS

DRAWBORING

Some time ago, a humble-looking 18th-century drop-leaf table was brought into my shop. Gray and battered, and without a top, it had obviously led a hard life, but I was impressed that its leg-and-apron joints were still tight. This piece had withstood the test of time, and it deserved a first-class restoration.

I began by hand-fashioning a beautiful bookmatched top, using my last four wide walnut boards. Unfortunately, I miscalculated and made the top $\frac{3}{16}$ in. too narrow, and the leaves would not fully fold down.

Overcoming mistakes is part of the

The holes in the mortise and tenon are offset slightly to make the pegs pull the joint tightly together.

art of woodworking, so I spent several evenings searching for a dodge to make that top act wider. In a flash, I decided to dismantle the frame and make it narrow enough to fit the top.

Suddenly, I was cursing those wonderfully tight leg joints. Wrenching apart old glue joints is always risky. I envisioned myself trapped with three legs off, the table in semiruin, and the last leg obstinately refusing to move.

Because the legs appeared to be secured with pegs as well as glue, I started by drilling out the pegs. To my surprise, the joints fell apart. Nary a drop of glue had been used. The pegs

B Y J O N A T H A N C L A R K E

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were holding the thing together. It was a very convincing lesson on the durability and strength of glueless, pinned joints. Since then, I've pinned all my leg-and-apron joints whenever the visible peg heads wouldn't clash with the style of the piece.

Drawboring Applications

Pegged joints are ideal for all types of mortise-and-tenon applications, from rails and stiles on doors, to arms and crest rails of chairs. For maximum joint strength, though, these pegs must be installed in a special way called drawboring.

With drawboring, the peg hole is not bored straight through both the mortise and tenon. Instead, the holes in the two pieces are bored separately and slightly offset, so by driving a peg through the joint, it pulls the assembly together. The tension on the pegs keeps the joint together while the pegs remain flexible enough to help compensate for seasonal wood movement. A pegged joint may loosen over time but it will not come apart.

The best old-time woodworkers had a knack for whittling tapered pegs and drilling holes freehand, but that takes practice. To reduce the risk of ruining the job—and to ensure a neater appearance—I came up with a more reliable method. It capitalizes on the accuracy of a drill press and the drawing power of handmade cylindrical pegs with square heads.

Cutting the Mortise and Tenon

The first step in drawboring a joint is to cut the mortise and tenon; the method you use doesn't matter as long as the pieces fit together well. It is essential that the tenon shoulders be square and on the same plane all around—drawboring can't make up for bad joinery.

The most vulnerable part of a pegged joint is the area between the holes and the end of the tenon, which traditionally has been called the "relish." You want this area to be as long and strong as possible. I make the relish about 1 in. long on a typical leg-and-apron joint, and I generally set the pegs at least $\frac{3}{16}$ in. away from the other tenon edges. The section of the



After boring peg holes through the mortise, author inserts the tenon and lightly marks the peg-hole center with a brad-point drill. He then disassembles the joint and drills the hole in the tenon $\frac{1}{16}$ in. off center toward the shoulder.

mortise wall between its bottom and the shoulder is under compression when the joint pulls tight, reducing the danger of breakout. About $\frac{1}{4}$ in. would be fine for most applications.

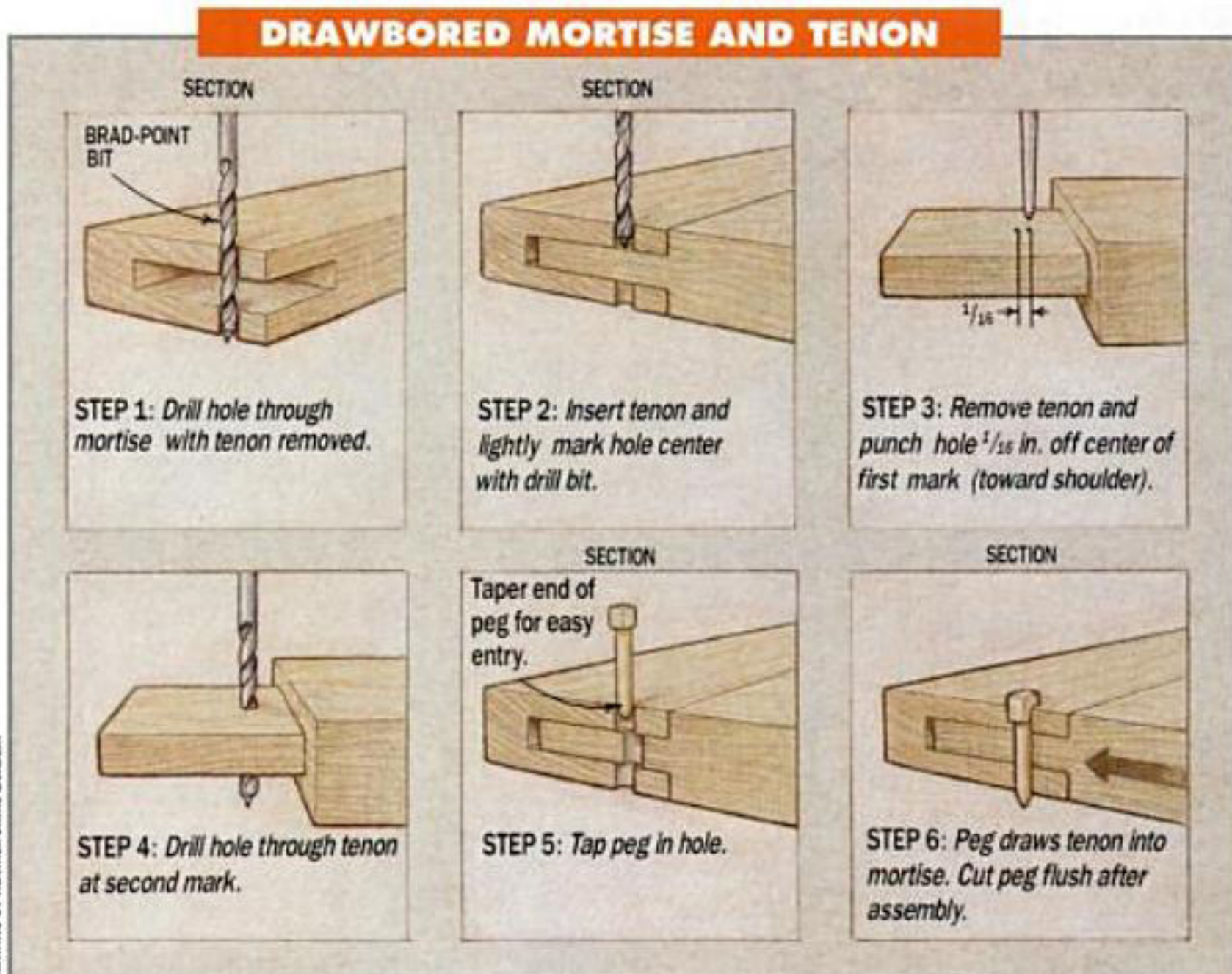
Boring Offset Holes

As Fig. 1 shows, begin drawboring by drilling through the mortise with the tenon removed. For maximum strength, I use a pair of pegs on each joint. Mark the hole positions exactly

with a prick punch or an awl, and drill the hole with a brad-point drill chucked in a drill press. It's a good idea to fit scrap wood into the mortise and back up the piece with another scrap to prevent tear-out as you bore through. Next, insert the tenon into the mortise and clamp it in place to make sure it's fully seated. Reinsert the brad-point drill into the hole on the face side of the mortise. Tap the end of the bit lightly to mark the center of the hole. (See photo.)

Disassemble the joint to drill the hole in the tenon. Remember, the hole must be closer to the shoulder to draw the joint together when the peg is inserted. To do this, I locate a second center hole a scant $\frac{1}{16}$ in. away from the first mark left by the drill bit. Always offset on the side closest to the tenon shoulder. Make a good dimple on this second mark to guide the drill point when you bore the hole in the tenon. Again, back up the piece with scrap to avoid tear-out that would weaken the tenon.

This boring is pretty straightforward, even on leg-and-apron tables where tenons meet at right angles. I usually stagger the pegs to pass through the mortise without encountering one another. If the leg isn't large enough to allow this, you can position the pegs at



DRAWING BY HEATHER BRINE LAMBERT



After whittling the end of the square peg stock to a blunt, tapered point, author shaves off the corners of the stock to make it easier to scrape the section to a smooth cylinder.



The square peg heads fit snugly into the round peg holes and create a decorative touch.



Author trues up the peg with a modified steel cabinet scraper. As he rotates the stock, he pulls the scraper along the peg until the piece is straight and smooth.

the same level, drive in one set, and run a drill through the second set of mortise holes (without the tenon inserted) to cut the first pegs short.

Making the Pegs

I first rip out square, straight-grained strips of peg stock on my tablesaw. Generally, I make the pegs out of the same wood as the rest of the piece and cut the squares to make the length of each side equal the diameter of the peg hole (for example, a $\frac{1}{4}$ -in. square peg for a $\frac{1}{4}$ -in. dia. hole).

Next, I take a length of peg stock about 12 in. long and whittle one end to taper the first $\frac{1}{2}$ in. or so to a blunt point. (See photo.) The next step, scraping the pegs to size, will be easier if you whittle off the corners of the peg stock for a length slightly more than the thickness of your joint. Remember, you don't want the whole piece round—the peg section that will be visible on the surface will look and fit better if it's square.

My shop-built tool for smoothing the round section of the pegs is a steel

cabinet scraper with a hole bored near one corner. The diameter of the hole equals the size of the peg I want. After boring through the steel, I filed away half the hole to make a kind of scratch stock much like those used to scrape sections of molding to shape.

I twirl the peg stock with one hand and drag my peg tool along the wood several times until I have a smooth cylinder. (See photo.) Hold the piece up to the light to check your work. When the peg looks straight and smooth, test fit it in a peg hole with the tenon removed. It should press in snugly. If the fit is good, remove the peg and cut it off $\frac{1}{2}$ in. beyond the point where it goes from round to square. I make this cut with a miter box, but you could do it freehand because the end of the peg will be trimmed after installation.

Assembling the Joint

The rest is all fun. In fact, I find tapping the peg home to pull a joint tight to be one of the most satisfying experiences in woodworking. Make

sure each tenon is well home before starting a peg. To make installation easier, wax the peg with paraffin. As you tap the peg in, its point will begin to catch the half-moon hole visible in the tenon. As it's driven deeper into the joint, it will pull the tenon in and lodge securely in the hole through the far side of the mortise. Once the square section of the peg reaches the front of the peg hole, give the peg a couple of good raps. The square section should then fill up the hole. Cut the peg ends off carefully with a fine-toothed saw and pare the pegs flush with a sharp chisel. The decorative touch of the square peg head really comes alive when you apply a finish. ▲



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PORTABLE PLANERS

A BUYER'S GUIDE

Sooner or later most woodworkers begin to think about buying a thickness planer. The ability to smooth rough boards and machine stock to a desired thickness in your own shop opens a lot of design options you lack without a planer.

Until recently, your only option was to buy a stationary thickness planer. The trouble was, even the smallest stationary planer cost more than \$700. Ryobi brought more affordable planing to the small shop when it introduced the model AP-10, 10-in. portable planer a few years ago. Other companies soon followed with 12-in. portable planers. Today, there are more than a dozen portable planers available in the \$350 to \$750 price range (discount prices).

To find out how well these small planers perform, the editors at AMERICAN WOODWORKER tested eight models. (See photo, next page.) We set up the planers, adjusted the knives, and surfaced 10-in. wide oak boards in a number of tests. We also measured the noise level, and evaluated the

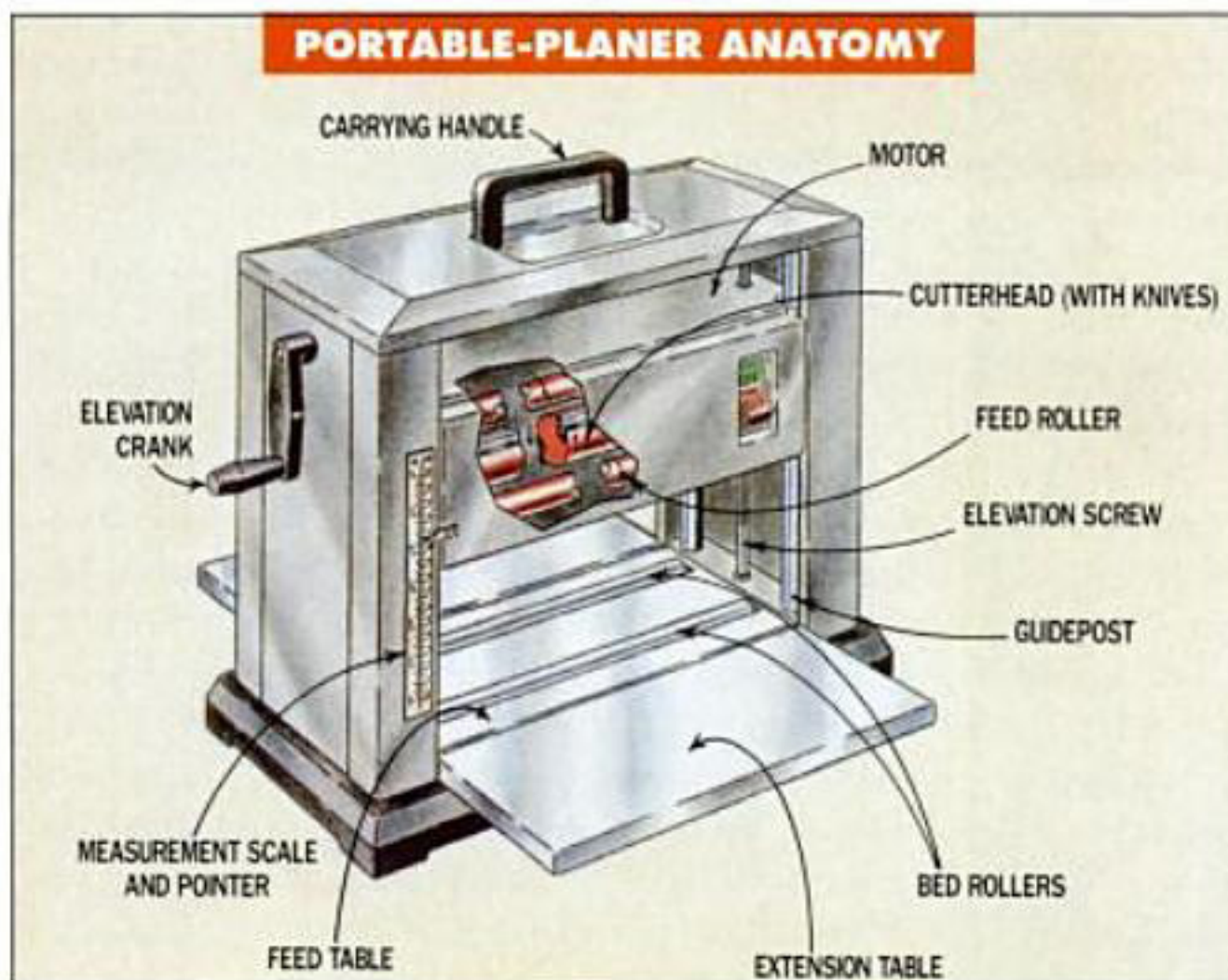
portability and the ease of changing the knives on each machine.

We found that all of these planers can smooth and thickness wide boards as well as larger stationary planers can, and they should meet the needs of most serious woodworkers. The main differences among the planers are in

sheet steel, aluminum, and plastic to cut weight. Three of the planers we tested (the Chiu Ting, Jet, and Bridgewood) are virtually identical—all are Taiwanese-built machines that are sold by at least six importers under different brand names.

Cutterhead assembly and feed

table—All the portable planers tested employ a cutterhead assembly that includes the cutterhead, motor, and feed rollers. The cylindrical cutterhead has lengthwise slots that hold two adjustable knives. The cutterhead and knives rotate at approximately 8,000 rpm (10,400 rpm on the Hitachi). The wood is moved under the cutterhead by a motor-driven, spring-loaded feed roller on both the infeed and outfeed side of the planer.



DRAWING BY MARIO FERRO

their features, which we cover individually in the boxes on the following pages.

Portable-Planer Features

The portable planers are similar in design and make use of materials like

The stock moves over a feed table beneath the cutterhead. The Delta, Makita, Grizzly, and Ryobi planers have a stainless-steel plate that covers their feed tables. The Hitachi has a steel plate covering its feed table. The Bridgewood, Chiu Ting, and Jet planers



PHOTOS BY MITCH MANDEL



Steel guideposts support the cutterhead assembly on the Delta (shown), Grizzly, and Hitachi planers. Elevation screws adjust the cutterhead assembly up and down.

have two steel bed rollers in the feed table to decrease the resistance of very rough or heavy boards going through the planer. Bed rollers require a separate adjustment. If not adjusted properly, sniping can result (shallow gouges are left at the ends of boards).

Depth-of-cut—The main limitation

of any portable planer is its depth-of-cut. The portables we tested planed a maximum of about $\frac{3}{64}$ in. on a full-width hardwood board on each pass without bogging down or straining the motor. You can take up to a $\frac{3}{32}$ -in. cut on narrower softwood stock. By



DAVE SELLERS

To adjust the depth-of-cut, a hand crank raises or lowers the cutterhead assembly. The Makita crank (shown here) has a knob to lock the depth adjustment.

comparison, the smallest stationary planer can make a $\frac{1}{8}$ -in. cut on a full-width board.

Motor—It's important not to overwork portable planers because they have a *universal* motor, which burns out more quickly under load than the induction motor on most stationary machines. Check the motor brushes after 10 to 15 hours of operation, and replace them when worn because severely worn brushes can damage the motor. The motors on our test planers have ratings ranging



Most portable planers have a removable key to lock the on/off switch when not in use. (Makita shown.)

from 12 amps to 16 amps, but we found they all have adequate power.

Extension tables—Each planer except the Hitachi has short extension tables to support the stock on the infeed and outfeed side. The Hitachi has an extra-long feed table instead of extensions. The Ryobi has rollers on its extension tables, and all the others have extensions made of flat, pressed steel. All the extension tables, except the Delta's, fold up to make carrying

KEY TO RATINGS: **** = Excellent

PRICE: \$379
WEIGHT: 62 LBS.
MOTOR AMPS: 16
MAXIMUM CUT
 Width: 12½ in.
 Height: 6 in.
SMOOTHNESS OF CUT: ****
SNIFE: ***
KNIFE-CHANGING EASE: *
PORTABILITY: **



BRIDGEWOOD 8W12P

FEATURES: Bed rollers, one top handle
OPTIONS: Dust hood, stand

Wilke Machinery Co.
 3230 Susquehanna Trail
 York, PA 17402
 (717) 764-5000

PRICE: \$369
WEIGHT: 62 LBS.
MOTOR AMPS: 16
MAXIMUM CUT
 Width: 12½ in.
 Height: 6 in.
SMOOTHNESS OF CUT: ****
SNIFE: ***
KNIFE-CHANGING EASE: *
PORTABILITY: **



CHIU TING CT-318

FEATURES: Bed rollers, one top handle

Sunhill Woodworking Machinery
 500 Andover Park E.
 Seattle, WA 98188
 (206) 575-4131

the planers easier. The extension tables on the Delta are actually small sheet-steel "platforms" that require support on a flat benchtop. The other extension tables cantilever from the sides of the planers. The Delta extension tables detach and nest together on the feed table for transporting.

Adjusting thickness-of-cut—On most portable planers, the thickness-of-cut is adjusted by moving the cutterhead assembly up and down with respect to the feed table. On the Makita and Hitachi planers, the feed table moves up and down, while the cutterhead remains stationary. We didn't notice any advantage to either of these arrangements. However, it's more of a hassle to use auxiliary infeed and outfeed support stands (a good



▶ The Grizzly has a moving tape-measurement scale under a clear-plastic window with a cross hair pointer.

idea when handling long boards) on the planers with feed tables that move up and down.

On the Ryobi, Bridgewood, Chiu Ting, and Jet planers, the cutterhead assembly is supported at its outer corners by the pressed sheet-steel side cover on each machine. The feed table on the Makita is also supported this way. The Delta, Grizzly, and Hitachi

PRICE: \$595/\$400
WEIGHT: 60 LBS.
MOTOR AMPS: 15
MAXIMUM CUT
Width: 12½ in.
Height: 6 in.
SMOOTHNESS OF CUT: ****
SNIPE: ***
KNIFE-CHANGING EASE: **
PORTABILITY: **



DELTA 22-540

FEATURES: Four guideposts; double-edged, reversible knives; removable extension tables; two top handles
OPTIONS: Dust hood, stand

Delta International Machinery Corp.
246 Alpha Dr.
Pittsburgh, PA 15238
(800) 438-2486

CIRCLE NO. 607 ON PRODUCT LITERATURE CARD

planers have four steel guideposts (see photo, previous page) that support the cutterhead assembly near its corners. We noticed no apparent difference in performance on the machines with the guideposts, but we believe this design will prove to be sturdier over time.

Safety—Every planer except the Ryobi has a removable key that locks the motor's on/off switch. (See photo, previous page.) There aren't any other design features purely related to safety, though most of the planers are plastered with the government-mandated stickers cautioning you not to stick your hand into the rotating cutterhead, and so on.

Measurement scale—Each planer has a measurement scale and adjustable pointer to indicate the stock thickness *after* planing.

The Makita planer has the most readable scale with big numbers graduated in both 1/16-in. and 1-mm increments. The Delta and Ryobi scales are also easy to read, but the Ryobi is only graduated in 1/8-in. and 1-mm increments. The Grizzly planer has a flexible-plastic scale (graduated in 1/32-in. and 1-mm increments) that moves under a cross hair in a window on the top of the machine. The cross hair makes this scale the most accurate of all. We found the small numbers on the Hitachi, Bridgewood, Chiu Ting, and Jet scales difficult to read. However, the Hitachi gets good marks for providing an additional cutting-depth gauge showing the thickness of the wood that will be taken off in fractions

▶ The Hitachi has a cutting-depth gauge that shows the depth-of-cut in fractions of an inch.



DAVE SELLERS

of an inch. (See photo.) The Makita also has a cutting-depth gauge but the gauge lacks marked fractions—it simply gives you a quick visual approximation of the depth-of-cut.

Measurement scales are a good, general guide for setting cutting depth. But to make fine, accurate adjustments for a desired depth-of-cut on a given pass through the planer, we found it easier to count turns of the elevation crank. Because the thread pitch on the



▶ The big, readable numbers on the Makita measurement scale tell how thick the stock will be *after* planing.

elevation screws is constant, this method is more accurate than eyeballing the pointer on a numerical scale. On all the planers except the Makita, *one* turn of the crank raises or lowers the cut exactly 2 mm (3/16 in.). We recommend adjusting the crank with half-turn increments for a 1-mm

PRICE: \$385
WEIGHT: 75.5 LBS.
MOTOR AMPS: 16
MAXIMUM CUT
Width: 12½ in.
Height: 5½ in.
SMOOTHNESS OF CUT: ****
SNIPE: ***
KNIFE-CHANGING EASE: *
PORTABILITY: **



GRIZZLY G1017

FEATURES: Four guideposts, moving depth scale, two side handles

Grizzly Imports Inc.
P.O. Box 2069
Bellingham, WA 98227
(206) 647-0801

CIRCLE NO. 606 ON PRODUCT LITERATURE CARD

PRICE: \$1185/\$725
WEIGHT: 74.6 LBS.
MOTOR AMPS: 15
MAXIMUM CUT
Width: 12½ in.
Height: 6½ in.
SMOOTHNESS OF CUT: ****
SNIPE: ***
KNIFE-CHANGING EASE: ***
PORTABILITY: **



HITACHI P12R

FEATURES: Four guideposts, cutterhead lock; bed moves up and down, highest rpm, grip feed table to carry
OPTIONS: Carbide knives, dust hood, stand, jointer-table accessory

Hitachi Power Tools USA Ltd.
4487-E Park Dr.
Norcross, GA 30093
(404) 925-1774

CIRCLE NO. 608 ON PRODUCT LITERATURE CARD

PRICE: \$645/\$379
WEIGHT: 62 LBS.
MOTOR AMPS: 16
MAXIMUM CUT

Width: 12 1/4 in.
Height: 6 in.
SMOOTHNESS OF
CUT: ****

SNIDE: ***

KNIFE-CHANGING

EASE: *

PORTABILITY: **

FEATURES: Bed rollers, one top handle

OPTIONS: Dust hood, stand



JET JWP 12

Jet Equipment & Tools Inc.

P.O. Box 1477

1901 Jefferson Ave.

Tacoma, WA 98401

(206) 593-1283

CIRCLE NO. 609 ON PRODUCT LITERATURE CARD

(approximately 1/32-in.) depth-of-cut. For more gross adjustments, 13 turns of the crank is approximately 1 in. The Makita planer has a coarser thread on its elevation screw, and one revolution produces a 4-mm (5/32-in.) depth-of-cut, which is too much for one pass. We'd recommend a quarter turn on the Makita for a 1-mm depth-of-cut.

Dust collection—Six of the planers have optional dust hoods—Delta, Hitachi, Makita, Ryobi, Bridgewood, and Jet. These hoods attach to the cutterhead assembly and allow you to hook up a hose from your shop vacuum or dust-collection system.

Portable-Planer Performance

Our tests showed that all the portable planers performed well when used within their designed capacity. Here are some specific observations we made on the planers' performance. The ratings are summarized in the separate planer boxes, with four stars indicating excellent performance. Two prices are listed for some planers: list



Installing the Makita's knives is a snap. A pair of magnets keeps the knife and its holder aligned automatically as they're inserted into the cutterhead.

price and a typical discount price.

Smooth surfaces—Straight out of the box, seven of the eight planers produced a very smooth surface when taking a 1-mm cut on a 10-in. wide oak board. We had to sharpen the knives on the Delta to get it planing as smoothly as the others.

Snipe—All the planers produced moderate snipe. We found the amount of snipe had more to do with how the operator handled the boards and provided proper infeed and outfeed support than with any differences among the planers. (See sidebar: Tips for Trouble-Free Planing.)

Evenness of cut—All the planers cut evenly across the width of a board. Our test boards deviated less than 1/64 in. in thickness from one side of the board to the other.

Changing knives—A much-used



Adjusting the knives on the Delta takes some hand coordination. A double-ended setting gauge positions each spring-loaded knife, and gib screws lock it in place.

planer needs to have its knives sharpened frequently, making the ease of changing and adjusting the knives an important consideration.

The Makita has the most convenient system. Its knives are double-edged and disposable. You reverse the knives to get a new, sharp edge, and you buy a new set when both edges are dull. (Makita doesn't recommend resharpening the knives.) A lengthwise slot down the knife aligns it automatically when you bolt the knife holder in the cutterhead. A pair of magnets keeps the knife and knife holder together during installation. (See photo.)

One AMERICAN WOODWORKER editor disliked the "throw-away" concept of



The Ryobi's knives are aligned with their holder with a plastic setting gauge before the holder is bolted into the cutterhead.

disposable knives, preferring the option of resharpening the knives.

The Hitachi system also uses magnets to ease installation and alignment of its knives, but the knives, which can be resharpened, don't automatically lock into alignment like they do on the Makita. Changing knives on the Ryobi planer is accomplished with a plastic setting gauge (supplied) that aligns each knife with its holder, then the holder is bolted into the cutterhead. (See photo.) It's fairly easy, but not as foolproof as the Makita system.

On the other planers, you set the knives by holding a small setting gauge (supplied) against each knife edge (one side at a time) while adjusting a jack screw in the cutterhead with an allen wrench. You then lock the knife in place with gib screws, much like those on stationary planers. This system requires a lot more fussing to get the knives set properly. The Delta also has gib screws to lock the knives, but the process is a little easier because springs push the knives against a double-ended setting gauge that spans the cutterhead. (See photo.)

Stalling—The feed rollers on portable planers are covered with

PRICE: \$794/\$350

WEIGHT: 53.5 LBS.

MOTOR AMPS: 13

MAXIMUM CUT

Width: 10 3/8 in.

Height: 5 in.

SMOOTHNESS OF

CUT: ****

SNIDE: ***

KNIFE-CHANGING

EASE: ***

PORTABILITY: ***

FEATURES: Auxiliary support rollers,

cutterhead lock pin, one top handle

OPTIONS: Dust hood, stand, carbide blades



RYOBI AP-10

Ryobi America Corp.

1424 Pearman Dairy Rd.

Anderson, SC 29625

(800) 323-4615

CIRCLE NO. 610 ON PRODUCT LITERATURE CARD

rubber. Sometimes these rubber feed rollers tend to slip, especially when planing rough, heavy boards, and the stock stalls on its way through the planer. The cause is usually dirt on the rollers. One manufacturer we talked to recommended cleaning the rubber feed rollers with paint thinner or lacquer thinner when the rollers start to slip.

We did not have stalling problems with any of the planers during our testing.

Portability—The portability of these planers is a real convenience. You can easily move them around the shop or carry them to a job site. We rated the portability of each planer based on a combination of its weight and the convenience of the handle design. We found that planers with a handle on the top can be carried at your side like a suitcase. However, it was a strain to lift them onto a benchtop by the handle. Delta's two top handles allow you to carry the planer securely against your body, but it's still hard to lift high.

We preferred the side handles on the Makita and Grizzly planers. You can grasp these machines near the base

and carry them comfortably against your chest, and they're easier to hoist onto a benchtop. The Hitachi has no handles at all—you grasp the planer by the ends of its long feed table on each side. This works as well as the two side handles.

Noise—Excessive noise can be

produced about 90 decibels with the motor running. The noise level increased to more than 100 decibels (over twice as loud) while the planer cut a 10-in. wide board. Variations in noise level among the planers were insignificant when compared to the high levels they all generated. The Occupational Safety and Health Administration requires mandatory ear protection for workers exposed to an average level of 90 decibels for eight hours. For noise at an average level of 100 decibels, OSHA requires mandatory ear protection for exposure beyond two hours. We strongly recommend ear protection at all times when you operate any planer.

Best Buy

Any of these portable planers would do a fine job of handling the small shop's planing needs—we found no noticeable difference in performance. Overall, we chose the Makita 2012 planer as a "Best Buy." With a typical discount price of about \$460, the Makita was not the least-expensive planer we tested, but we liked the mix of features it

offered, especially the convenient knife-changing system. ▲

DAVE SELLERS
is assistant editor of *AMERICAN WOODWORKER*.



MAKITA 2012

PRICE: \$913/\$460

WEIGHT: 52 LBS.

MOTOR AMPS: 12

MAXIMUM CUT

Width: 12 in.

Height: 6 in.

SMOOTHNESS OF CUT: *****

SNIBE: ***

KNIFE-CHANGING EASE: *****

PORTABILITY: *****

FEATURES: Double-edged, reversible, disposable knives; bed moves up and down; automatic cutterhead lock; depth-adjustment lock; two side handles

OPTIONS: Dust hood, stand

Makita USA Inc.
14930 Northam St.
La Mirada, CA 90638
(714) 522-8088

CIRCLE NO. 611 ON PRODUCT LITERATURE

harmful as well as a nuisance. To find out how loud the portable planers were, we used a decibel meter to measure the noise level from 3 ft. away at the front, back, sides, and top of each planer. Each of the planers

TIPS FOR TROUBLE-FREE PLANING

To minimize snipe:

- Support the stock on infeed and outfeed side of the planer.
- Butt one board behind another as you feed them through the planer.
- Keep table, knives, and feed rollers clean.
- Take shallow cuts.

To plane warped, twisted, or cupped stock:

- Flatten stock on the jointer first.
- Rip wide stock lengthwise before planing. Joint and plane narrow pieces, then edge glue together.
- Place a wide, cupped board concave-side down on top of a

2 x 4; run them through the planer together to flatten one side of board, then plane the other side.

For smoother cuts:

- Take shallow cuts.
- Keep knives sharp.
- Run boards through the planer *with* the grain.
- Use dry wood (less than 20% moisture).

To equalize knife wear:

- Alternate narrow stock along entire width of planer knives.

To reduce warp after planing:

- Plane equal amounts on each side of stock.

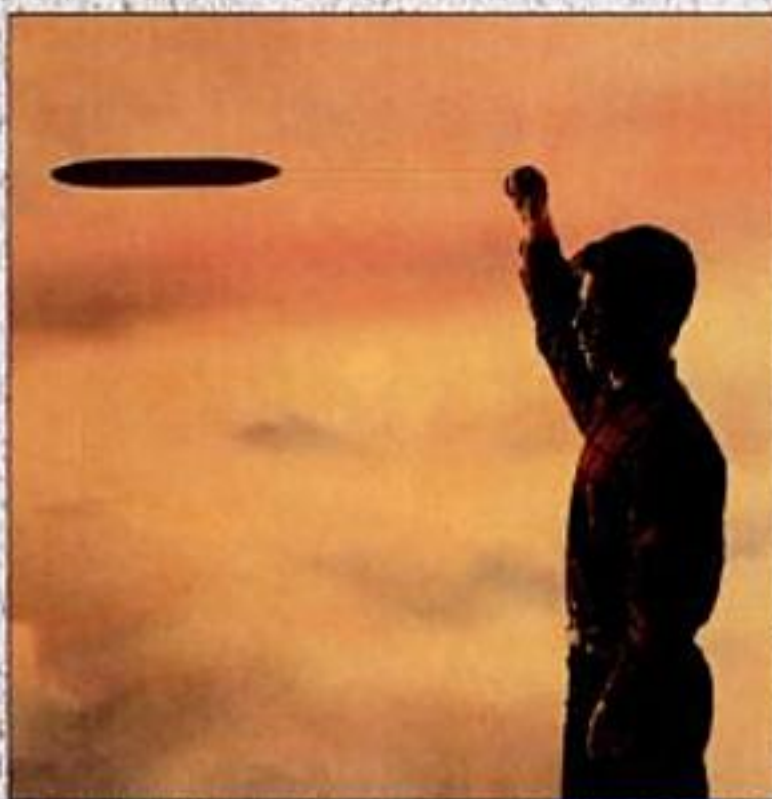
*An Ancient Wind
Instrument You Can
Make in Five Minutes*

BULL ROARER

The bull roarer is a primitive wind instrument whose origins go back to the dawn of prehistory. It's nothing more than a thin, flat piece of wood up to 18 in. long with a string tied at one end. When swung around through the air, the bull roarer produces a deep whirring sound that is eerie and unforgettable.

The bull roarer has mystical and religious significance for the Australian aborigines as well as primitive peoples in Papua, New Guinea and South America. The bull roarer was even used in ancient Greece where it was called the *rhombos* and played a ritual role in Dionysian ceremonies.

The bull roarer spins as it whirls around, producing sound by disturbing the air. Because the sound waves occur in unenclosed air (instead of inside an air column as in a trumpet or a tuba), the bull roarer is technically known as a *free aerophone*.



▲
The bull roarer is a primitive wind instrument used by the Australian aborigines. It's simply a thin, flat piece of wood on a string. It makes a deep whirring sound when it's swung through the air.

BY DAVID SLOAN

Primitive bull roarers are often pointed at each end, as shown in the photo. Squared-off ends work just as well. Any species of wood is fine, and dimensions aren't critical. I got good results from a piece of oak about 1/4 in. thick, 2 1/4 in. wide and 10 in. long.

Drill a hole in one end and tie a stout string to the bull roarer with a *secure* knot. Whirl it around (outdoors, please) and enjoy the sound. As the bull roarer spins, the string twists tighter and tighter. After awhile, the string winds so tight that the bull roarer can't spin. When this happens, simply swing the bull roarer in the opposite direction to untwist the string. I did away with the problem by tying on a heavy-duty, ball-bearing fishing swivel several inches from the bull roarer. With this setup, the bull roarer can spin forever without twisting the string. ▲

T PENNSYLVANIA ALL CLOCK

B Y P H I L G E H R E T



Clocks are so common these days that it's hard to imagine that they were an expensive luxury in colonial times. The grandest of all was the tall clock, or "grandfather" clock, as it's known today. With its ornate casework and fancy, painted dial, the tall clock was a status symbol only the wealthy could afford.

Many antique tall clocks are too tall to fit into a modern house with standard 8-ft. ceilings. A few years ago,

Part 1: *Building the Base, Waist, and Feet*

I found a relatively short tall clock that was just the right height for a standard ceiling. Built around 1790, the clock was made of walnut and had been signed by Daniel Rose (1749-1827), a clockmaker who worked in Reading, Pennsylvania. Except for the height (7 ft. 6 in.), it's typical of the Germanic-style clocks that were built in

Unlike many tall clocks, this walnut reproduction of a 1790 original will fit in a room with standard 8-ft. ceilings.

ONE SQ. = 1 IN.

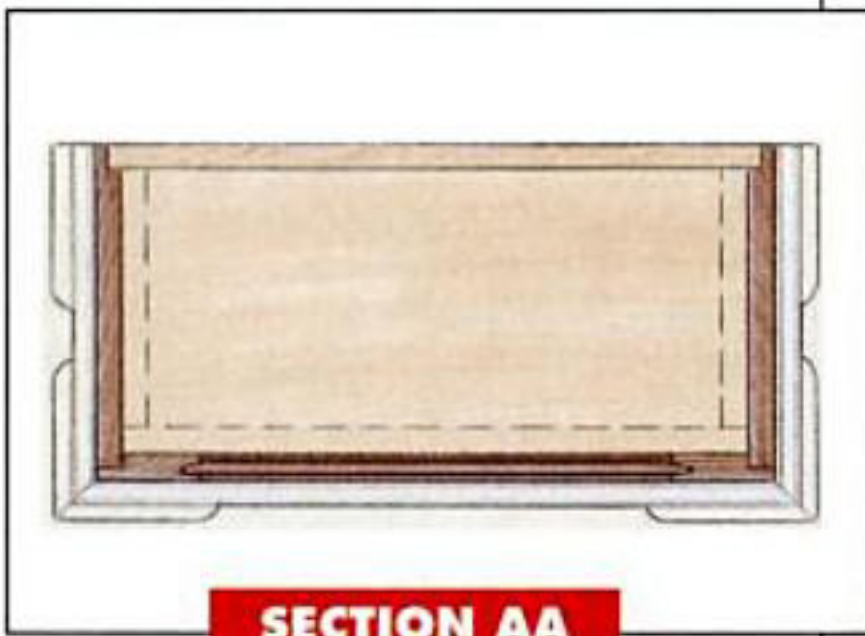
southeastern Pennsylvania in the late 18th and early 19th century.

In this article and a second article to follow next issue (AW, #26), I'll explain how I built a reproduction of the original Daniel Rose clock. In this first article, I'll concentrate on the base, waist, and feet of the clock. I'll devote the second article to building the bonnet and installing the works.

Thoughts on Construction

Before I get technical, I'd like to make a few points. First, a tall clock isn't as complicated as it looks. The trick is to think of the clock case in sections: the base, the waist, and the bonnet. (See Fig. 2.) If you then break

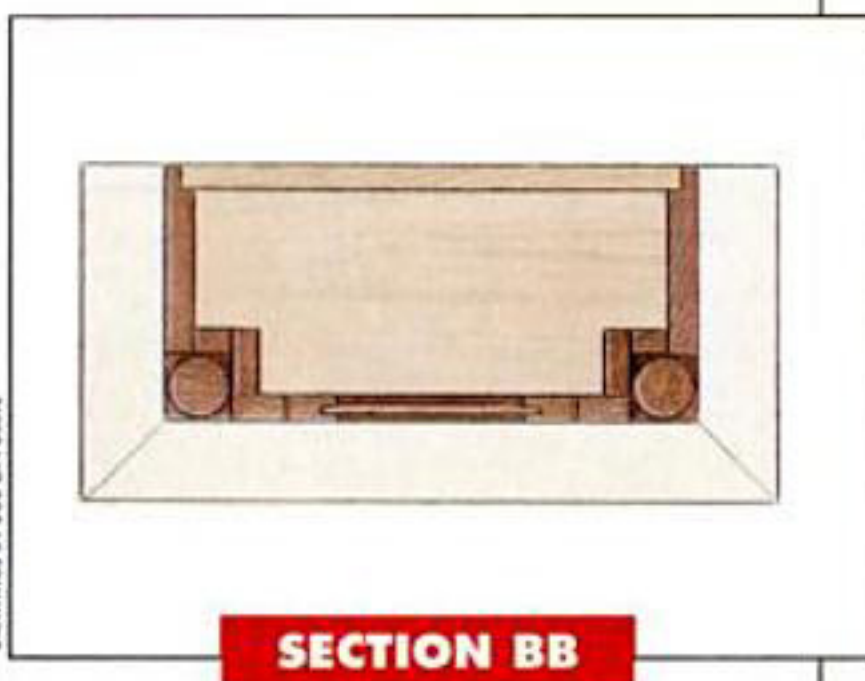
FIGURE 1



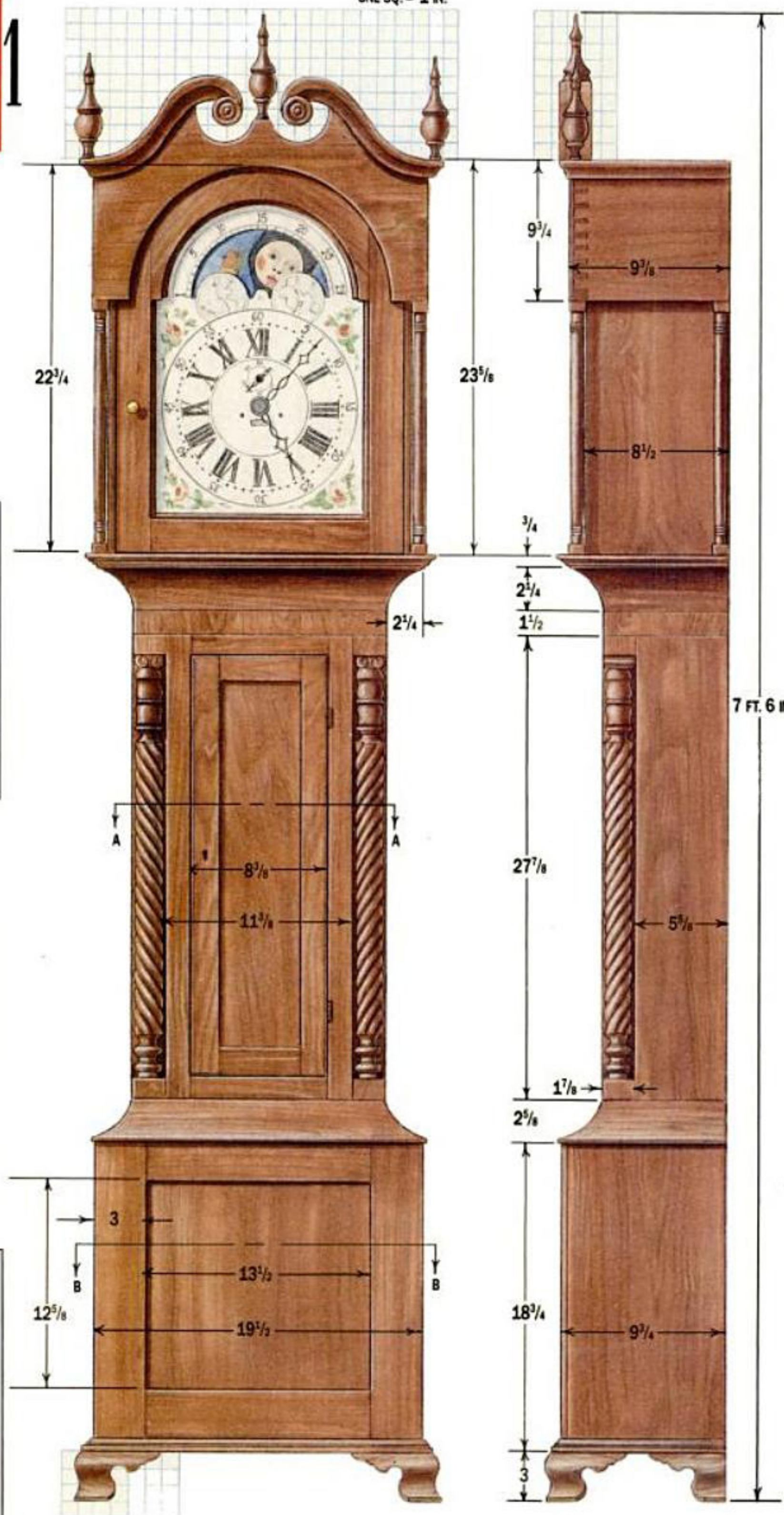
SECTION AA

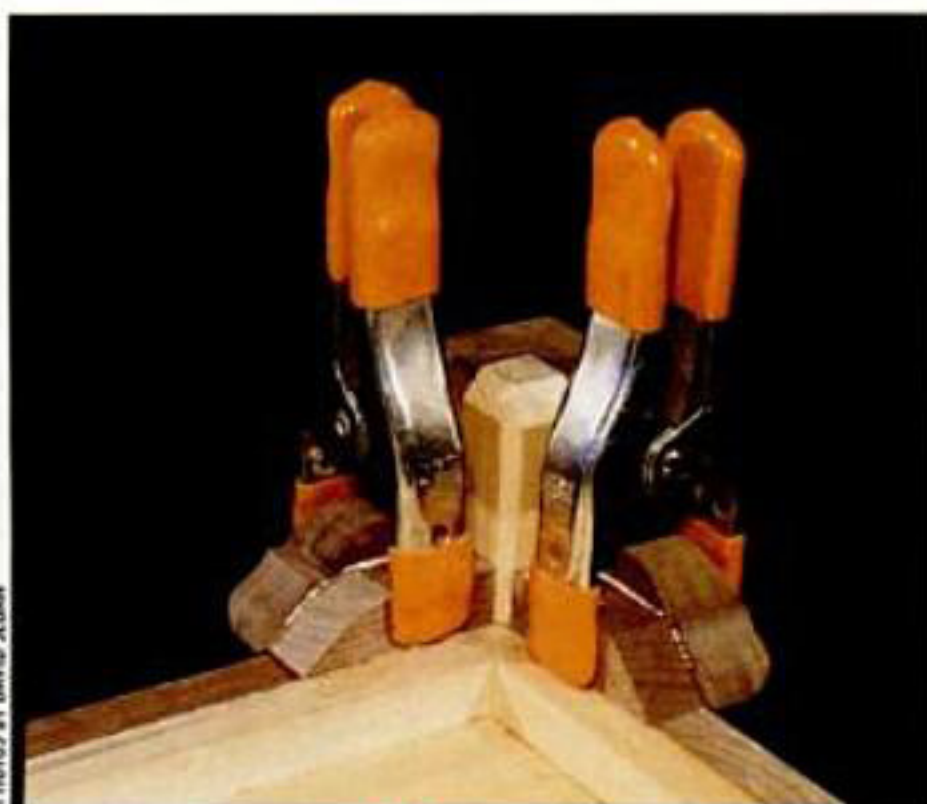
down each section into its separate parts, you'll see that most of the pieces are simple to make. Don't get hung up on the dimensions in the drawings. Use them as a guideline. Building a tall clock is a lot like building a house. You start at the bottom and work your way up, cutting each part to fit what you've already built.

Second, making a tall clock will test your ingenuity and patience—especially if you don't know much about mechanical clocks. My clockworks didn't come with instructions. I had to enlist the help of



SECTION BB





Only the visible sides of the rear feet have the ogee profile. The back pieces are flat so the clock can sit against the wall. The back pieces butt against the side pieces and are supported by poplar glue blocks shaped to match the feet.

a local clockmaker to get the movement set up and running right. You may want to do the same.

Finally, while my reproduction clock is a close copy of the original, I changed a couple of construction details to suit my equipment and the way I work. Although I respect the old ways of working, some techniques that made sense when this clock was built simply don't seem practical with the power tools available today.

Movement and Dial

Original tall clocks were rarely (if ever) the work of one person from start to finish. The clockmaker, the cabinetmaker, and the dial painter were specialists, and each of them played an independent part in the clock-building process. A customer would order the movement and the dial, and commission a cabinetmaker to build the case.

In keeping with that tradition, I bought the movement and an [unpainted steel dial to fit](#). (See [Sources, page 42](#).) I then took the dial to a professional dial painter who did a wonderful painting job on the dial. (See [Sources](#).)

The movement I chose is weight driven and made of brass with a bell that strikes the hour. It was an expensive movement, but I wanted the best I could afford. There are plenty of other good movements

available that cost a lot less than mine did. Some people may prefer a musical chime to the bell, but the bell strike is more traditional for an 18th-century tall clock.

The steel dial that fits my movement came with a moon wheel and date wheel installed, but I had to buy hands to fit. (See [Sources](#).) At 13¼ in., the dial is wider than other modern "grandfather-clock" dials. In fact, it was the only modern dial I could find that was as wide as the dials on most original tall clocks. I checked all the mail-order clock catalogs, but for some reason, all of their dials are narrower than the old ones. A narrow dial results in a clock with a narrower bonnet that doesn't look authentic.

All of the dimensions in the drawings are based on the movement and dial specified in [Sources](#). If you buy a different movement, be sure to get a dial that fits your movement. No matter



The waist section fits 1 in. below the top of the base and is supported on six ¾-in. plywood brackets screwed to the inside of the base front and sides. Spacers account for the offset between the base frame and panel.

which movement and dial you choose, it's very important to buy both of them before building the case. Many of the case dimensions are determined by the size of these parts.

The Base

I built the base of the clock first. I began with the frame-and-panel

front of the base. (See [Figs. 1 and 2](#).) The ¾-in. thick panel is flat, and the frame is joined with haunched mortise-and-tenon joints. After gluing up the frame, I milled a ¾-in. by ¾-in. rabbet along the right and left edges of the frame to accommodate the sides of the base.

After cutting the sides of the base to size, I milled a ¾-in. by ¾-in. rabbet along the back edge of each side for the ¾-in. thick back panel.

I made the bottom of the base from ¾-in. poplar. It rests on ¾-in. square poplar strips glued to the inside front of the base frame and nailed to the sides of the base.

To assemble the base, I glued the sides of the base to the front frame. I then installed the bottom, gluing it to the front strip and nailing (not gluing) it to the side strips with a few finishing nails.

Installing the feet—The ogee bracket feet come next. (See sidebar, [Making Ogee Bracket Feet, page 43](#).) With the base upside down on my bench, I fastened the feet to the bottom of the base with glue blocks and screws. The two front feet required small walnut glue blocks. The back feet required small walnut glue blocks on the sides of the case and larger poplar glue blocks in the back. (See photos.)

After installing the feet, I made a molding on the router table, and glued and tacked it around the bottom to complete the base, mitering the pieces at the corners.

The Waist

The waist section fits 1 in. into the base and is supported on six ¾-in. plywood brackets screwed to the inside of the

base front and sides. (See photos.)

First I made the frame that forms the front of the waist. The opening in this frame houses the door to the pendulum and weights. The stiles and rails of the frame are joined with haunched mortise-and-tenon joints. There are two tenons on each side rail of this frame.

While the frame was in the clamps, I



milled stock for the two waist sides and the four narrow, 38-in. long pieces (two on each side) that form the corners where the turned columns will be glued to the waist. It's important to cut the waist sides longer than necessary—at least 44 in. long. They'll be trimmed later when it's time to install the works.

The waist frame is glued to the other waist parts with butt joints. When the waist was assembled, I cut the six plywood brackets that support it (plus the weight of the movement and bonnet) and screwed them to the inside of the base. I then set the waist into the base and screwed the waist to the brackets. The bottom of the waist sits 1 in. below the top of the base. (See Fig. 2.)

Turning the columns—The turned columns on this clock are unusual because they're full-diameter turnings. Most tall clocks have quarter-round columns. The spirals are a nice decorative touch, but simple turned columns would look just as good.

The column blanks are $1\frac{7}{8}$ in. square and 35 in. long. I turned the columns on the lathe before cutting the spirals. The spirals twist in opposite directions—one clockwise, one counterclockwise. The original spirals were carved by hand after turning, but I cut the spirals with a router and a Craftsman Router Crafter, as shown in the photo. Sears just reintroduced this router accessory and it makes short work of cutting spirals, fluting, and other similar details. I used a $\frac{3}{32}$ -in. "point-cutting ogee" router bit to cut the spirals (Craftsman #9HT 26323 available from Sears).

After cutting the spirals, I carved the little scrolls that decorate the top of each column with a gouge.

Attaching the columns—The columns are simply glued to the waist assembly. I sanded and varnished the turned sections of the columns before installing them. I also varnished the corners in the waist where the columns will go (except for the top and bottom areas where the column will be glued). It's impossible to finish these areas once the columns are in place. When the varnish dried, I glued the square sections of each column to the waist.



Author cut the spirals on the columns with a Craftsman Router Crafter. The spirals on the columns turn in opposite directions.

Cove moldings—The cove moldings at the top and the bottom of the waist are identical. (See Fig. 2.) I made them on the tablesaw with the angled-fence technique explained in the sidebar on making the feet.

The cove moldings fit into $\frac{1}{4}$ -in. deep rabbets routed in the front and sides of the waist. (See Fig. 2.) The rabbet at the top is wider than the



Author carves the scrolls at the top of a column with a gouge. He outlines the scroll with a vertical cut, then dishes out the scroll.

rabbet at the bottom because it must also accommodate a $1\frac{1}{2}$ -in. wide cross banding just below the cove molding.

To rout one edge of these rabbets, I guided the router against a straightedge clamped across the waist. (See photos, page 42.)

To rout the opposite edges, I placed a wooden spacer against the straightedge and guided the router base against the spacer. I then routed out the remaining area between these two cuts freehand.

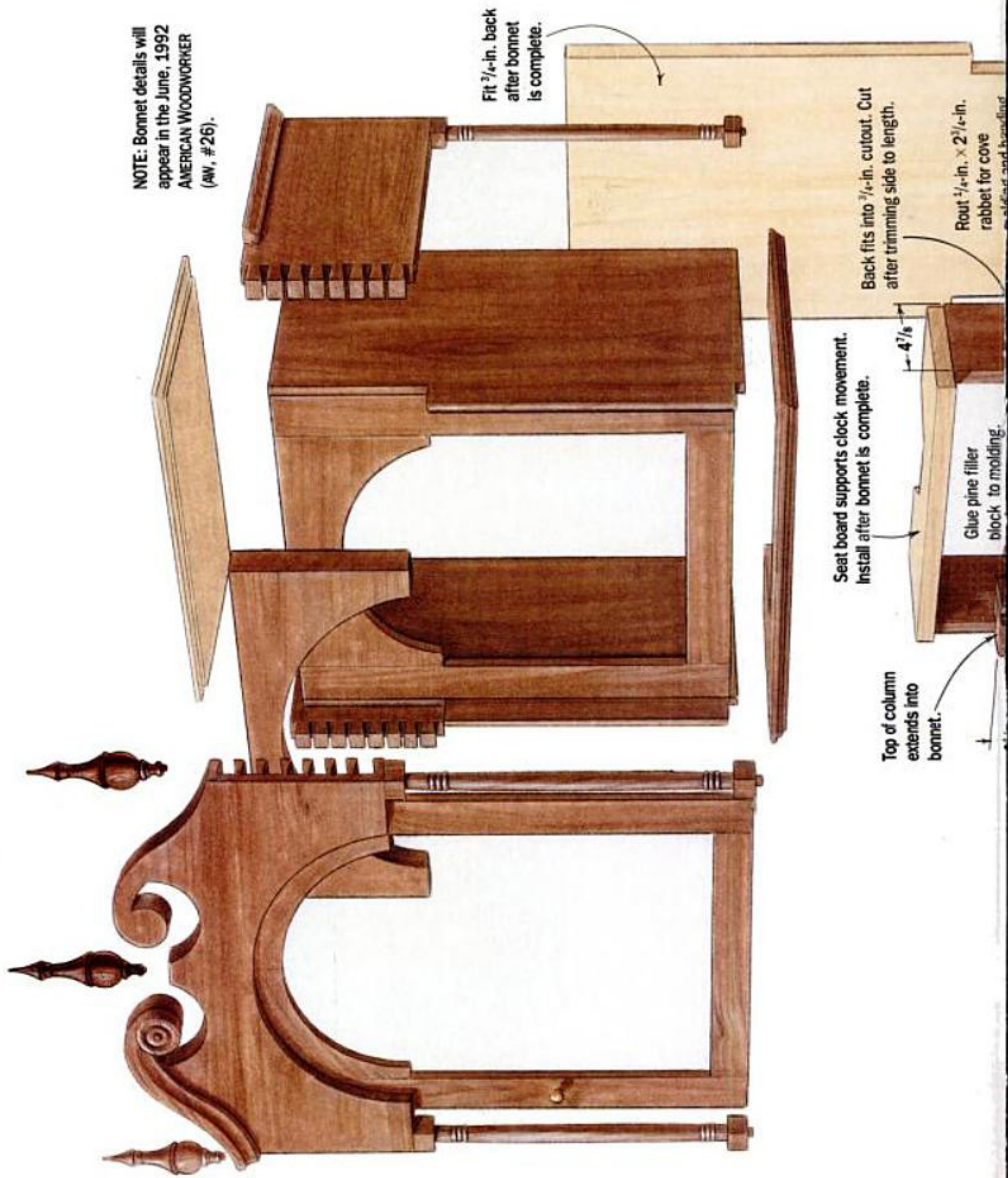
Installing the cross banding—I planed a wide piece of walnut down to a $\frac{1}{4}$ -in. thickness and crosscut pieces of $1\frac{1}{2}$ -in. wide banding. I glued the cross banding along the bottom edge of the upper rabbet in the waist. I mitered the corners of the cross banding where the sides and front meet.

Installing the cove molding—With the waist screwed into the base once again, I got ready to install the lower cove molding. I rounded the bottom edge of the molding where it



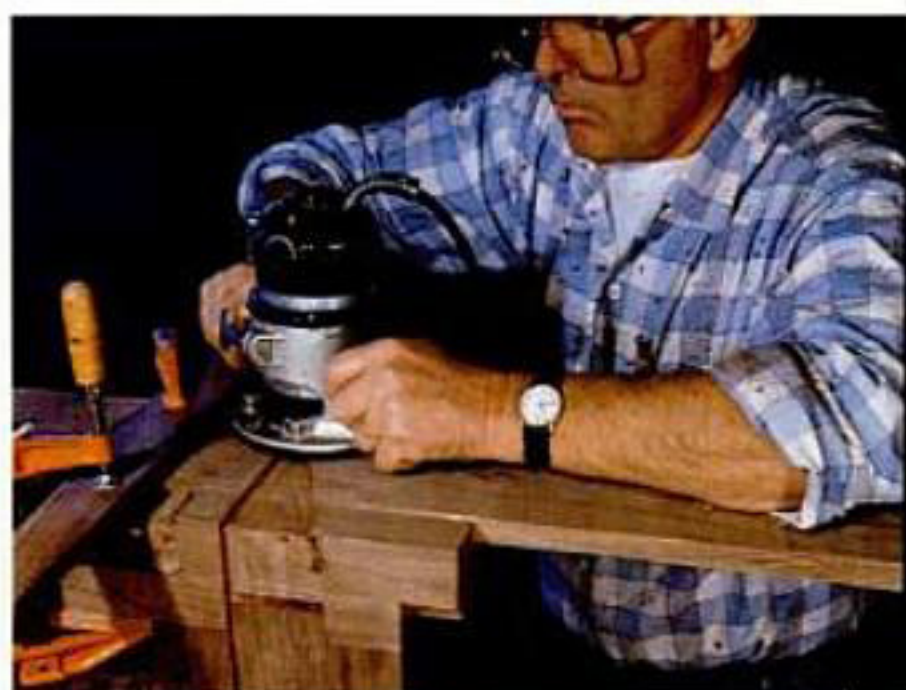
The waist frame is glued to the other waist parts with butt joints. Extra-long waist sides will be trimmed to length after the bonnet is complete.

PENNSYLVANIA TALL CLOCK
(EXPLODED VIEW)





▲
The cove molding at the top and bottom of the waist fits into $\frac{1}{4}$ -in. deep rabbets routed in the waist front and sides. Author guides a router against a straightedge to rout the top edge of the bottom rabbet. A $1\frac{1}{4}$ -in. wide spacer guides the router to cut the bottom edge of the rabbet.



▲
Author uses the same technique to rout the rabbet at the top of the waist. The top rabbet is $2\frac{3}{4}$ in. wide to accommodate both the cove molding and a $1\frac{1}{2}$ -in. wide cross banding beneath the molding. The cross banding is glued along the bottom edge of the upper rabbet in the waist.



overhangs the base slightly, and then mitered the corners and glued the molding into the lower rabbet, holding it with pipe clamps. The upper cove molding has to support the weight of the bonnet, so I beefed it up by gluing a piece of pine behind it. (See Fig. 2.) I then cut the miters and glued the molding into the upper rabbet.

Waist Door

The door on the original Daniel Rose clock has a thin molding around the outside of the frame. This molding was glued into a rabbet cut after the frame was assembled. I decided to keep this detail on my reproduction.

I measured the opening in the waist and sized my door frame to fit. The frame is assembled with mortise-and-tenon joints, and the flat $\frac{3}{8}$ -in. thick panel fits into grooves in the stiles and rails.

After gluing up the frame, I cut a $\frac{1}{2}$ -in. by $\frac{1}{16}$ -in. rabbet for the molding around the frame. I then milled some $\frac{1}{2}$ -in. thick stock for the molding. I rounded one edge with a $\frac{1}{4}$ -in. beading bit and glued the molding in place, mitering it at the corners.

Hinges and latch—The waist door swings on two brass butt hinges mortised into the door and the edge of the waist frame. The latch is surface mounted and screwed to the back of the door. The latch bolt engages behind the waist frame.

The original clock didn't have a metal escutcheon plate over the keyhole. I drilled a $\frac{1}{4}$ -in. dia. hole through the door and shaped the keyhole with a narrow saber-saw blade and a file.

That completes the base and waist of the clock. In the next issue (AW, #26) I'll explain how I made the bonnet, set up the works, and installed the back of the clock. ▲

SOURCES

The Pennsylvania tall clock was built with the following parts. Unless otherwise noted, parts are available from Merritt's Antiques Inc., R.D.#2, Douglassville, PA 19518, (800) 345-4101. When ordering, please refer to the AMERICAN WOODWORKER Tall Clock to be sure parts are compatible. The clock dial was painted by Angela Wendling, 5799 Buckeye Rd., Macungie, PA 18062, (215) 966-5331.

Movement #P-54 with pendulum, weights and cables (\$620)
 $13\frac{1}{4}$ -in. by 19-in. steel dial (unpainted) #P-54 (\$175)
Hand set #GFK (\$77) and second hand #P-2 (\$2.25)
Bonnet door hinges #P-325 \$1.50 pair
Door latch #TGB-101 \$10.85 available from Ball & Ball, 463 W. Lincoln Hwy., Exton, PA 19341, (215) 363-7330



P H I L G E H R E T
is a cabinetmaker in the AMERICAN WOODWORKER design shop.

MAKING OGEE BRACKET FEET

Ogee bracket feet are common on tall clocks, drop-front desks, and other high-style furniture from the 18th century. Ogee is the name of the molding on the sides of the feet. Only the two front feet and the visible sides of the rear feet have the ogee molding—the rear feet are



▲ The ogee molding starts with a cove cut on the tablesaw. To set up for the cut, author adjusts the opening in a shop-made parallel rule to the width of the cove. He adjusts the angle of the rule until the teeth touch the rule at both front and back. He then draws a pencil line on the table to mark the angle for the fence, and clamps a fence 1/4 in. from the pencil line.

usually flat in the back so the piece can sit against the wall.

Ogee bracket feet are easy to make. The first step is to rip a piece of stock as wide as the height of the foot and about 10 times longer than its length. You'll shape this piece into an ogee molding and cut it into six pieces. The



▲ After clamping a fence along the pencil line, author cuts a cove by running the stock diagonally over the blade.

extra length is cheap insurance.

Making the ogee molding—Mill a cove in the stock by running the piece diagonally across the blade of a tablesaw. To do this, you have to clamp a wooden fence across the tablesaw at an angle. I use a shop-made parallel rule to determine the proper angle for the fence. (See photo.)



▲ With the cove cut complete, author forms the top edge of the ogee molding with a 3/4-in. radius round-over bit.

I raise the blade to the height of the finished cove and adjust the opening in the parallel rule to the width of the cove I want to cut. I then place the rule over the blade and adjust the angle of the rule until the teeth touch the rule at both the front and back of the blade. With a pencil, I draw a line on the table. This line establishes the angle where the fence should go.

I clamp a wooden fence parallel to and 1/4 in. away from this pencil line. This measurement accounts for the



▲ A scraper, block plane, and sandpaper smooth up the ogee molding.



uncovered section at the bottom of the foot. I lower the blade and make a pass, guiding the stock against the fence. I then raise the blade about 1/8 in. and make another pass, followed by

additional shallow passes until I've completed the cove.

After cutting the cove, I round off one edge of the molding to form the tops of the feet. I do this on the router table with a 3/4-in. radius round-over bit.

With the ogee roughed out, I clean up the molding with a scraper, a block plane, and sandpaper.



▲ Author cuts feet from the finished molding and miters the corners. He then glues on a paper pattern and saws out the foot on the bandsaw.

Cutting the feet—I make a full-sized drawing of the foot and photocopy it to make six full-sized paper patterns. I cut the feet to length, mitering the ends of the four front pieces where they'll meet at the corners, and I cut the two back pieces square at the ends. I then glue the paper patterns to light cardboard with



▲ The miter joints at the front feet are reinforced with glue blocks that support much of the weight.

spray adhesive. I glue a pattern to each foot piece and saw out the shapes on the bandsaw. I clean up the bandsawn edges with sandpaper and files.

When I install the feet, I reinforce the joints with 3/4-in. square glue blocks, which help support much of the weight. I glue and screw the finished feet to the bottom of the carcass.—P.G.

SANDING BY HAND

*There's More to It
Than Back and Forth*

Of all the skills required by woodworkers, sanding is the one most frequently overlooked by the beginner. No one expects to cut a crisp dovetail, fit a door, or apply a flawless film of varnish on the first try. We know that each of these skills takes hours or days, sometimes months, to master. But sanding seems so obvious. What's to learn, anyway?

Fortunately, there's not a lot. You needn't grow old perfecting your sanding techniques. However, while the basics are simple, they're important. Careless sanding can prevent an otherwise impeccable piece from reaching its full potential. Good sanding brings out the best in the wood's surfaces while maintaining the crispness of the design's details and shapes.

As with many basic skills, I think it makes a lot of sense to start by learning hand techniques. Handwork is the most direct way to get a feel for a tool and its uses. Humble as it is, sandpaper is a tool. Knowledge of a

few simple hand-sanding techniques will help you make more effective use of power-sanding equipment, from pad sanders to stroke sanders. I find that a bit of hand sanding after machine sanding often produces the best surface, and there are many instances (working narrow pieces, removing difficult blemishes) when hand sanding is more effective and efficient than machine sanding.

Why Sand?

Sanding is most frequently done to improve the surface quality of previously dimensioned and shaped pieces in final preparation for receiving a finish. Although there are sanding machines that can shape or thickness wood, hand sanding is just too inefficient and inexact for all but the smallest, simplest shaping tasks. Therefore, the first rule of hand sanding is: Don't use sandpaper as a substitute for another tool. The time you spend mastering the hand plane, spokeshave, or cabinet scraper will be



PHOTOS BY JOSEPH KINGSLEY

A sanding block makes it easier to hold the sandpaper and helps maintain the flatness of the surface. Inner-tube rubber and thin carpet backing glued to the blocks help prolong the life of the paper.

BY ROGER HOLMES

a fraction of what you'd spend trying to get the same result with sandpaper.

However, edge tools have their limits. Even the sharpest hand plane or scraper will tear some wood fibers as it slices along, particularly where the grain changes direction. These rough spots affect what we see on a wooden surface much like scratches on glass affect what we see through a window. A few scattered scratches go unnoticed; a dense swirl of them obscures part of the view and draws our attention to the blemish.

The process of sanding wood, like that of polishing glass, involves grinding away at the surface with a series of increasingly finer abrasives. Large, deep scratches are worn down and replaced by small, shallow scratches left by the abrasive. Eventually, as the abrasives become finer, the scratches become so small that they no longer interfere with the view through the window or obscure the color, grain, and figure of the wood. (It's important to remember that clear finishes for wood do not hide flaws in the surface. If anything, finishes exaggerate blemishes.)

Before we consider how to sand specific kinds of surfaces, let's take a look at the equipment you'll need.

Sanding Equipment

Woodworkers whose budgets suffer from purchases of tools they feel they can't do without will find relief in hand-sanding equipment. Sandpaper, a sanding block, a dust mask, and some elbow grease are all you need.

Sandpaper—There is a surprisingly large range of sandpapers in a confusing array of abrasives, backing materials, and adhesives. Fortunately, the 9-in. by 11-in. sheets of paper-backed aluminum-oxide sandpaper carried by most hardware stores are sufficient. If you do a lot of sanding, check out mail-order suppliers; it's much cheaper to buy in bulk.

Sandpaper is rated by grit—the number of abrasive particles per square inch of the paper's surface. The higher the number, the finer the sandpaper. (Instead of grit numbers, some papers are labeled fine, medium, coarse, and so on.) For furniture and cabinet work, I keep a supply of 100-



▲
Blemishes require additional strokes as you work through the coarser sandpaper grits. A torn spot is found on a piece of cherry that's come straight from the planer.



▲
A few strokes with a sharp hand plane remove the deepest tears but add a few shallow ones.



▲
Most of the tears are gone after work with 100-grit paper, though the one indicated by the pencil will require more work.



▲
The same surface is shown after additional sanding with new sheets of 120-grit and 150-grit and "burnishing" with a worn piece of 150-grit. Wiping with linseed oil brings out the color but also highlights what remains of the small tear shown above.

grit, 120-grit, 150-grit, 180-grit, and 220-grit paper.

Sanding block—A sanding block makes it easier to hold the sandpaper, helps maintain the flatness of the surface you're sanding, and prolongs the life of the paper. The block should be slightly resilient. I think the best sanding blocks are pieces of cork, but a wooden block faced with a piece of rubber works well, too. Cut the block to fit your hand comfortably; I like mine about 2½ in. wide, 4½ in. long, and 1 in. thick. A block this size holds a quarter sheet of sandpaper.

Changing Grits

With hand sanding, knowing when to move on to the next grit is a matter of experience. In general, when the whole surface has a uniform look and feel, it's time to change. A good test is to pick out the worst blemish and work on it with the new grit. The surface should quickly become clearer as finer scratches replace the coarser ones of the previous grade. However, if sanding reveals some deeper scratches, go back to the previous, coarser grit and work these scratches out. (You'll rarely need to rework the entire surface with the previous grit. I often work back and forth between two sequential grits as needed.)

It's important to work systematically through the grits: 100 to 120 to 150 (or 180) to 220. Skipping a grit makes for a lot more work. In general, I find the jump from 150 to 220 acceptable for some open-grained woods like oak. Close-grained or highly figured woods may benefit from a hit with 180. I think grits higher than 220 make sense only for sanding highly figured woods.

Changing Paper

I like to start each grit with a fresh piece of paper. As sandpaper wears, it cuts more slowly and finely, and can even begin to burnish the wood. If you have a large surface or a lot of blemishes to rub out, change to fresh paper regularly. When you think you need to change grit, let the paper wear down. The slightly polished surface produced by the worn paper makes it easier to see remaining scratches and judge whether it's time to change to the next grit.

Raising the Grain

Some woodworkers advocate wiping the wood surface with a damp rag, usually during work with the finer-grit papers. The moisture swells the fibers and raises the wood's grain. Subsequent sanding is supposed to nip off the raised fibers and produce a smoother surface. I think raising the grain creates more work, not a better surface, so I don't do it. Give it a try, and see what you think.

Removing Blemishes

Blemished spots require additional strokes as you work through the coarser grits. (See photos, previous page.) Be sure to extend enough of these strokes into the surrounding area so you don't create a depression. (A finish will bring out even small surface indentations.) As you work, frequently examine the blemish. Move on only when the scratches remaining are those left by the sandpaper. It can be tedious to sand out even relatively shallow pitting or tear-out, and the deeper the blemish, the greater the likelihood of creating a depression. It's better to use a plane or scraper on the blemish and its surrounding area. Follow with hand sanding.

Hand Sanding Large, Flat Surfaces

Tabletops, carcass sides, door panels—these are the surfaces that most often show off beautiful wood. Properly sanded, the figure, color, and grain of crotch walnut, curly maple, quilted cherry, and more ordinary woods can be revealed with glowing clarity. Even if your design calls for an expanse of subdued wood—a creamy slab of pear or quartersawn ash—you want to display the quality of the wood, not the vestiges of edge tools and abrasives you used (though, there may be times when you want a tooled surface).

First be sure that you've gone as far as you can with edge tools. Skim the surface with a finely set, razor-sharp hand plane. Follow with a cabinet scraper to smooth blemishes.

Ideally, the surface should look—at a glance—almost good enough to finish *before* you begin to sand. Resist



When sanding a narrow surface, concentrate on the center area, and the edges will take care of themselves. Sometimes it helps to skew the block and apply pressure on the leading corner.

the temptation to wipe over a few rough spots with fine paper and be done. Sanding, like treatment with antibiotics, can't be started in the middle. I almost always begin with 100-grit paper. (If the blemishes seem bad enough to require a heavier grit, I go back to the hand tools.)

Work over the entire surface several times with even, overlapping strokes of a comfortable length. Always sand parallel to the direction of the grain, never across it, not even at a slight angle. Press hard enough to create some resistance, but don't struggle—additional pressure won't make a better job. Initially, the handsome sheen left by the edge tools will vanish and become uniformly dull and dusty. As you work systematically through finer and finer grades of sandpaper, the sheen will return.

When working near the edges and ends of a surface, take care to keep the sanding block flat on the surface. If you roll it over the edge, you can lose the crispness of the arris—the intersection of two flat surfaces. I try not to push the block more than a quarter or a third of its length beyond the arris while shifting pressure to the portion of the block still on the surface. If an area near an arris needs extra work, put pressure on the front of the block and work right up to the arris, but don't roll over it.

Sanding Narrow Surfaces

The chief difference between

sanding a narrow surface and a wide one is the extra care required to keep the narrow surface flat. Only part of the block will contact the surface (unless the surface is wider than the block). I often work near the block's ends or edges, and skew it to the surface and work with the front corner. (See photo.) However you hold the block, you can apply pressure with your fingers to just part of it, precisely controlling where it sands. This is particularly important for very narrow surfaces such as the edges and ends of a carcass, door, or drawer front. I concentrate on sanding the center of these surfaces, and the areas near the arrises seem to take care of themselves.

The Final Surface

If you really want to show off everything the wood has to offer, the final sanded surface should almost shine, as though there were a subtle finish on it already. (Burnishing the wood might interfere with subsequent finishes, but you can get close.) Areas where the grain changes direction or rises obliquely to the surface, like around knots or a crotch figure, should be smooth as glass. (Don't get too carried away caressing the surface unless your hands are wood-dusty; the oils from your skin can also interfere with finishes.)

Of course, only special surfaces require this lavish attention. For all secondary surfaces (door backs, for example), you may not need to go beyond 180-grit or even 150-grit paper. Or, if you're like me and hate to sand at all, you'll learn to love hand-planed surfaces. Still, when I'm confronted with an especially handsome piece of wood, I find myself picking up the paper and submitting to sanding because the result, if not the process, is so satisfying. ▲



ROGER HOLMES
is a contributing editor of AW. He works wood in western Connecticut.

SANDING DUST AND YOUR HEALTH

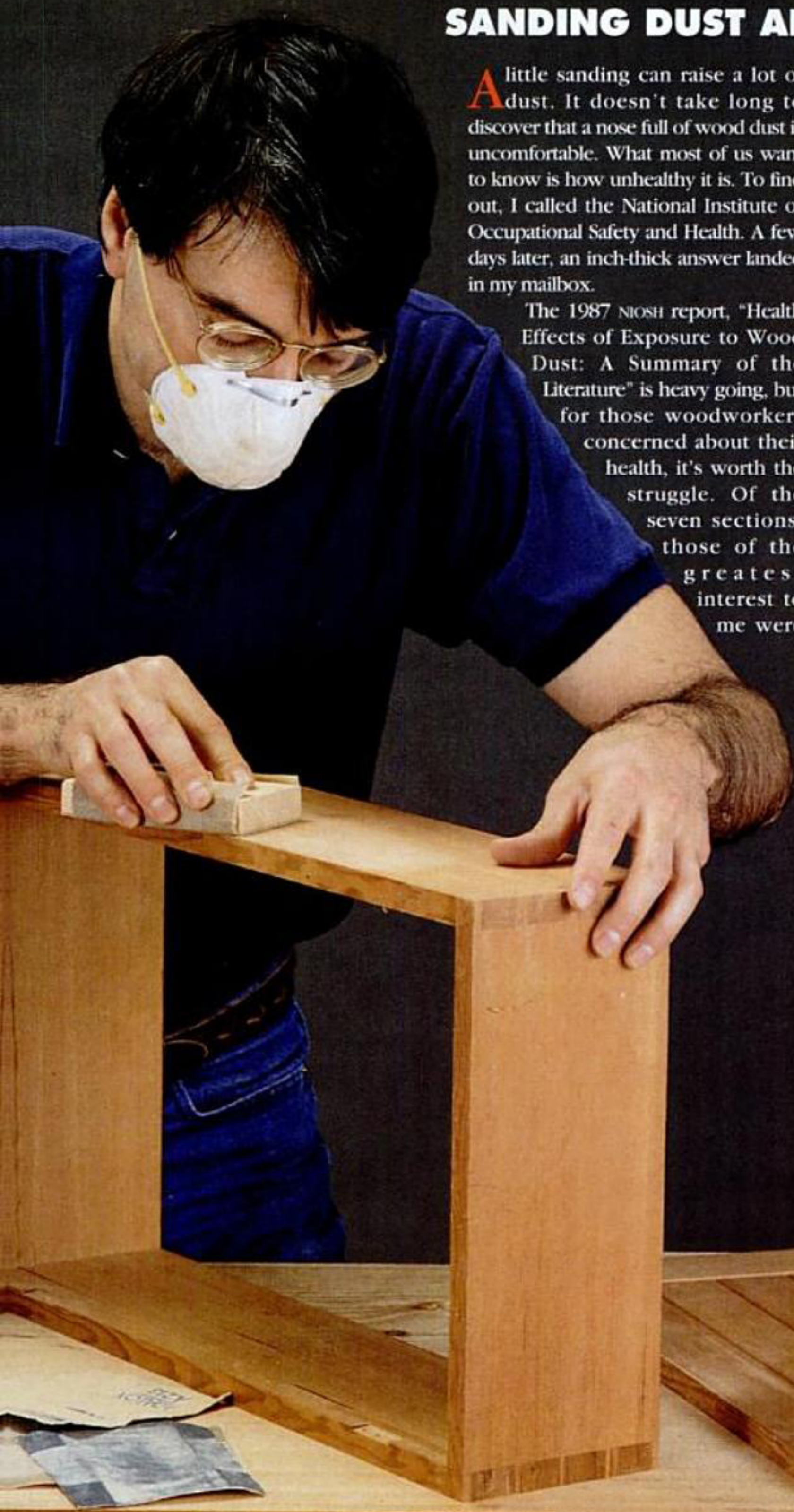
A little sanding can raise a lot of dust. It doesn't take long to discover that a nose full of wood dust is uncomfortable. What most of us want to know is how unhealthy it is. To find out, I called the National Institute of Occupational Safety and Health. A few days later, an inch-thick answer landed in my mailbox.

The 1987 NIOSH report, "Health Effects of Exposure to Wood Dust: A Summary of the Literature" is heavy going, but for those woodworkers concerned about their health, it's worth the struggle. Of the seven sections, those of the greatest interest to me were

discussions of the effects of wood dust: dermatitis, allergic respiratory effects, mucosal and non-allergic respiratory effects, and carcinogenicity. There's also data on the concentration of wood dust associated with various woodworking operations and some talk about dust-control technology.

I admit to skimming my way through (serious study would require a medical dictionary if not a medical degree). Even so, I discovered that irritation of the skin and eyes by wood dust is common. (One table lists more than 40 culprits implicated in dermatitis, another provides a dozen summaries of reported cases.) Similar case studies are presented for allergic respiratory effects—asthma being the most common. The summary of mucosal and non-allergic reactions ticks off the following symptoms: nasal dryness, irritation, bleeding, and obstruction; coughing, wheezing, and sneezing; sinusitis and prolonged colds. Sound familiar? Even more alarming, the following section states that there is "*sufficient evidence*" for linking wood dust and nose cancer. The following 37 pages document, country by country, findings on possible connections between wood dust and various cancers. (The jury still seems to be out on wood dust and cancers other than nose cancer).

Sobering stuff. I have decided to wear a disposable particle mask for quick sanding jobs and a respirator with filters for prolonged bouts. I'll don a mask for other dust-producing operations, too. The NIOSH report is worth any woodworker's time—and it's free. To request a copy, call 800-35-NIOSH (356-4674).—R.H.



*A condo for
the birds.
Purple
martins live
in colonies
and like a
friendly
neighbor.*





MARTIN MANSION

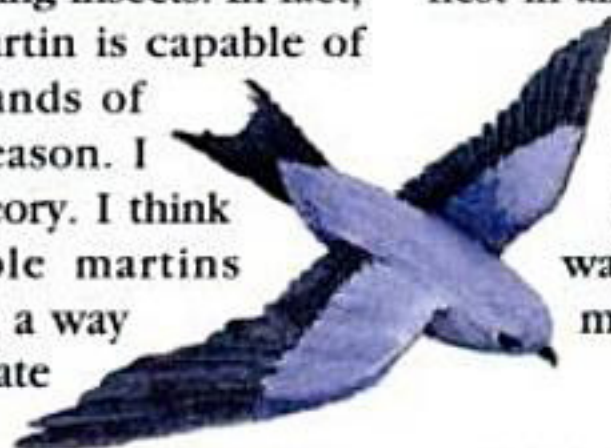
People like purple martins because they live in a way that people can relate to—they enjoy each other's company, and live, play, and work in communities.

The purple martin is one of America's most beloved birds. Many say it's because these beautiful aerobats are so beneficial—their diet consists solely of flying insects. In fact, a single purple martin is capable of consuming thousands of mosquitoes in a season. I have a different theory. I think people like purple martins because they live in a way that people can relate to—they enjoy each other's company, and live, play, and work in communities.

East of the Rockies, people erect purple-martin houses to attract colonies of the birds. Once the martins have colonized a site, they are said to return year after year. Because they're such voracious insect eaters, they nest where their food is plentiful, typically,

near fields and water.

While purple martins also migrate to some of the Western states, including my home state of Oregon, they don't nest in all parts of the country. Before you build this birdhouse, I suggest that you pick up a field guide on birds at the library or contact a local bird-watchers society to see if purple martins visit your area.



Design Guidelines

Because purple martins live in colonies, martin houses must offer many nesting sites under one roof. My birdhouse consists of a main tower with 20 individual nesting boxes and two attached "wing" towers that contain three nesting boxes each, for a total of 26 separate nesting boxes.

As an architect, I've always found

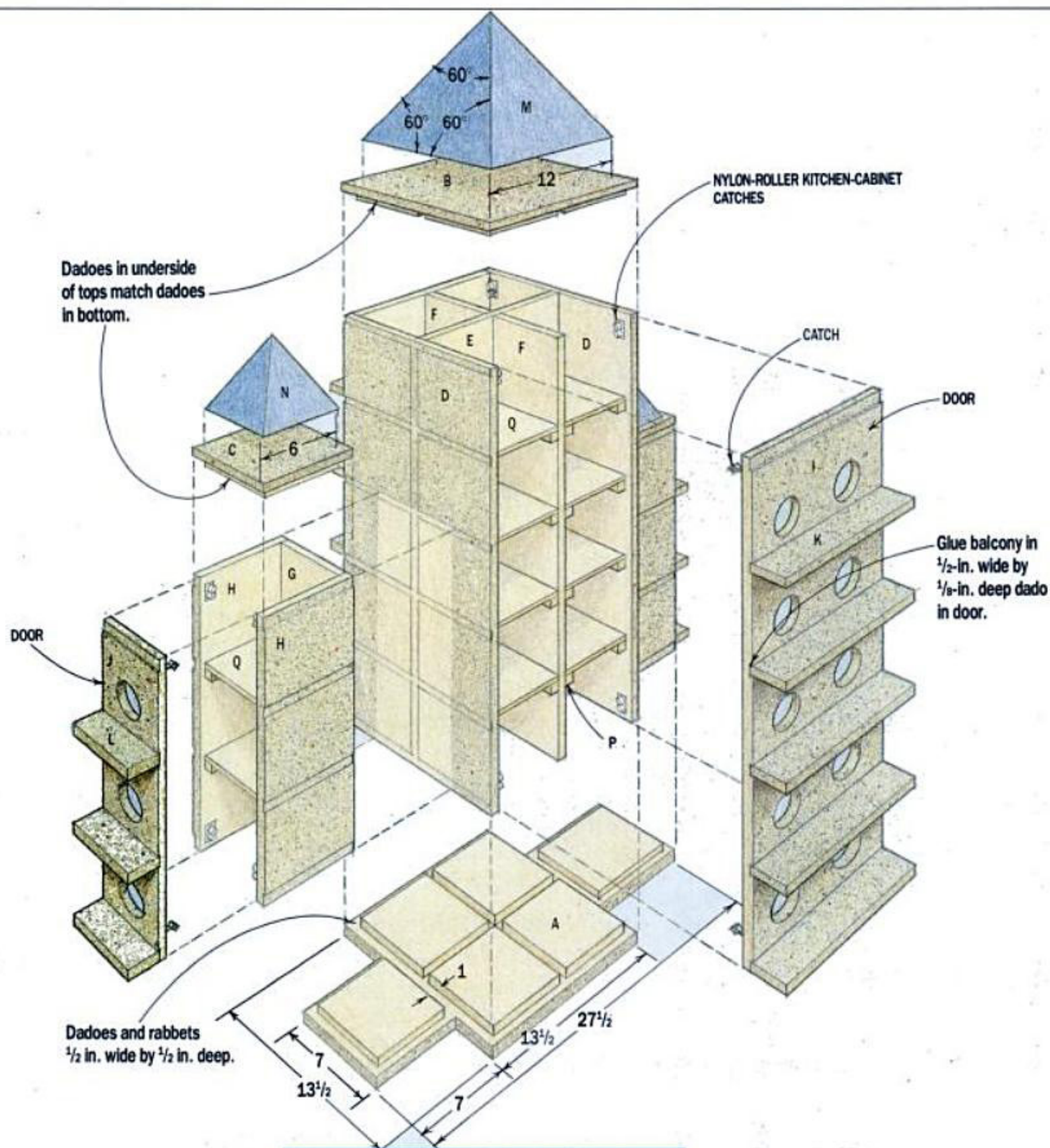
B Y C H A R L E S L I N N

FIGURE 1

Purple martins, like humans, have certain basic requirements in their housing. I tried to incorporate most of these requirements in this design. (See Fig. 1.) If you modify it, please keep the following guidelines in mind. Each individual nesting box should be at least 6 in. high by 6 in. wide by 6 in.

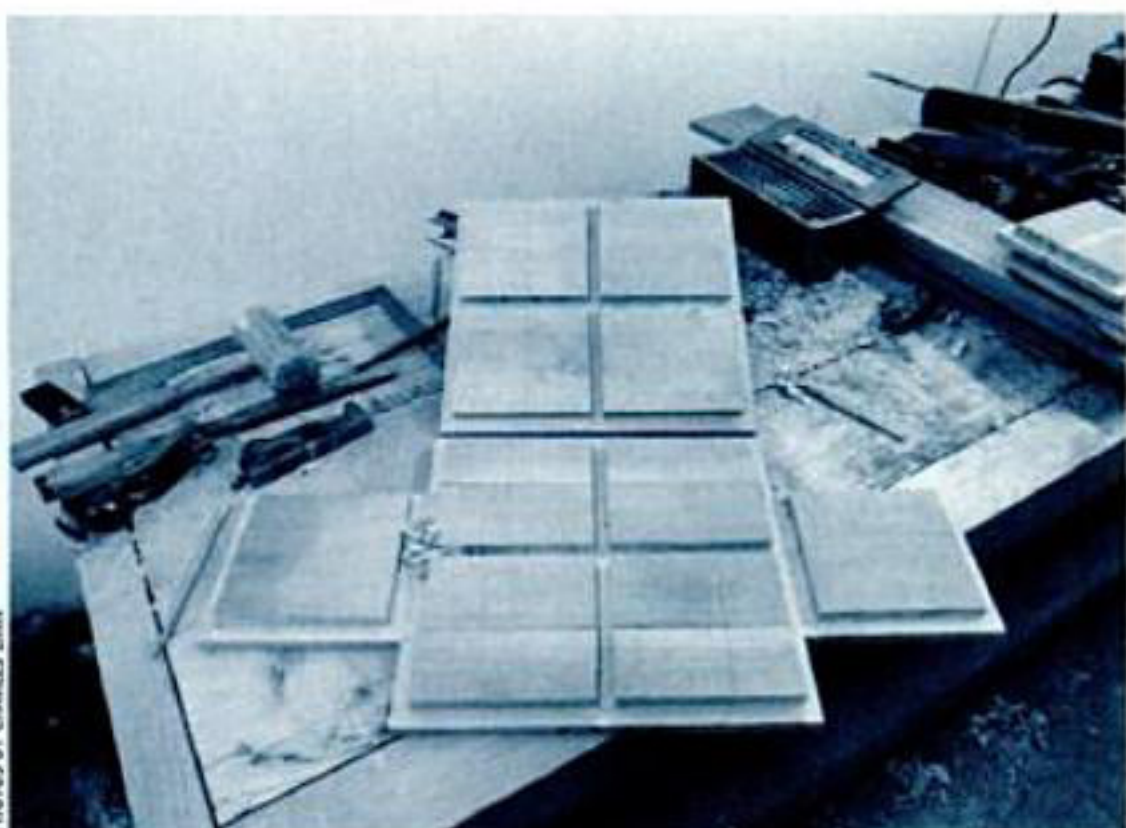
Easy access to the inside of each nesting box is important for cleaning purposes, and for evicting unwanted starlings and sparrows that may

colonize the house before the purple martins have a chance to move in. (It's very important to discourage other birds from nesting in the birdhouse until the purple martins have established their presence.) On my house, the front exterior wall, or "door," to each set of nesting boxes can be pulled off to gain access. (See Fig. 1.) The birdhouse shouldn't be too heavy or you'll have a hard time mounting it. Mine weighed more than 40 pounds. (My father and I had to erect scaffolding to mount it atop its pole.)



BILL OF MATERIALS

PART	QUANTITY	DIMENSIONS	PART	QUANTITY	DIMENSIONS
A. Base	1	1 1/4" x 13 1/2" x 27 1/2"	L. Balcony	6	1/2" x 2" x 6"
B. Main top	1	1 1/4" x 13 1/2" x 13 1/2"	M. Roof triangle	4	1/2" x 12" x 12" x 12"
C. Wing top	2	1 1/4" x 7" x 7"	N. Roof triangle	8	1/2" x 6" x 6" x 6"
D. Main wall	2	1/2" x 13 1/2" x 33"	O. Mounting base	1	1 1/2" x 9 1/2" x 9 1/2"
E. Partition	1	1/2" x 12 1/2" x 33"	P. Floor cleat	40	1/2" x 1/2" x 6"
F. Partition	2	1/2" x 6" x 33"	Q. Floor panel	20	1/4" x 6" x 6"
G. Wing wall	2	1/2" x 6" x 20"	HARDWARE		
H. Wing wall	4	1/2" x 7" x 20"	1 pc. 4-in. i.d. x 48-in. ABS pipe		
I. Main door	2	1/2" x 12 1/2" x 33"	1 pc. ABS toilet flange to fit pipe		
J. Wing door	2	1/2" x 6" x 20"	2 pcs. 1/2-in. dia. x 1/4-in. carriage bolt		
K. Balcony	10	1/2" x 2" x 12 1/2"	4 pcs. 1/2-in. x 1/4-in. lag screw		
			16 sets of nylon-roller kitchen-cabinet catches		



Rout rabbets and dados in base and top pieces of the towers to receive the exterior panels, interior partitions, and doors.



After making all the parts for the main tower and attaching the cleats for the floor panels, apply glue and assemble, as shown here.

Mount the house out in the open atop a sturdy pole, anywhere from 11 to 20 feet above the ground to discourage predators. You may find it easier to maintain this house if you mount it lower rather than higher.

Finally, the pole should have some form of predator guard on it to keep predators from raiding the house. A 4-ft. piece of 4-in. i.d. ABS plastic pipe installed around the pole at the bottom or top is one solution.

Materials

I built the exterior panels and interior partitions of the birdhouse from red cedar (see Fig. 1) because it's lighter than plywood. However, I chose 1/2-in. exterior A/C plywood for

the roof pyramids because it was easier to cut and plane the compound angles on the triangular pieces that make up each roof. I used fir for the base and top pieces, and 1/4-in. A/C plywood set on cedar cleats for the floor/ceiling panels of the nesting boxes.

I planned to paint the box (purple martins prefer white or light-colored houses), so the difference in color and grain of the woods I used posed no problem. Whatever woods you select, make sure they're weather resistant. Same goes for the glue. I recommend resorcinol (except on the roof pyramids, which are difficult to clamp; on these I used five-minute epoxy).

Building the Birdhouse

STEP 1: Cut out the base and top pieces for the main tower and the two wing towers on a tablesaw. I used 1 1/4-in. fir. (See Fig. 1.) Bandsaw the cross-shaped base. Rout the rabbets in the base and top pieces to receive the exterior wall panels. Cut the dados in the base and main top piece to receive the interior vertical partitions. (See photo.) The top pieces for the wings are rabbeted only.

STEP 2: Cut out the exterior side panels and interior partitions on the tablesaw. I used 1/2-in. cedar. (See Fig. 1.) Before I assembled the exterior panels, interior partitions, and base to form the birdhouse, I routed a series of 1/16-in. by 1/2-in. grooves on the exterior panels. These grooves are purely ornamental to simulate a cut-stone look and to provide a sense of scale. I also glued and nailed the cleats that support the nesting-box floor panels onto the partitions and inside surfaces of the

exterior panels. (See Fig. 1.) I left the floor panels loose to make them easier to remove to clean the birdhouse at the season's end. Besides, if any part of this birdhouse will ever have to be replaced, it's the floor panels.

STEP 3: Glue and nail the birdhouse together. Dry assemble first to determine how many clamps you'll need and where to place them. Check also that the birdhouse is square. I glued up the main tower first—the base and roof, the two biggest side panels, and the interior partitions. (See photo.) For peace of mind, I reinforced the accessible glue joints with 1-in. brass-wire brads. It's a good idea to have a helper during glue-up to lend a hand with glue and clamps. Once the glue on the main tower set, I glued and nailed the wings to the sides of the main tower.

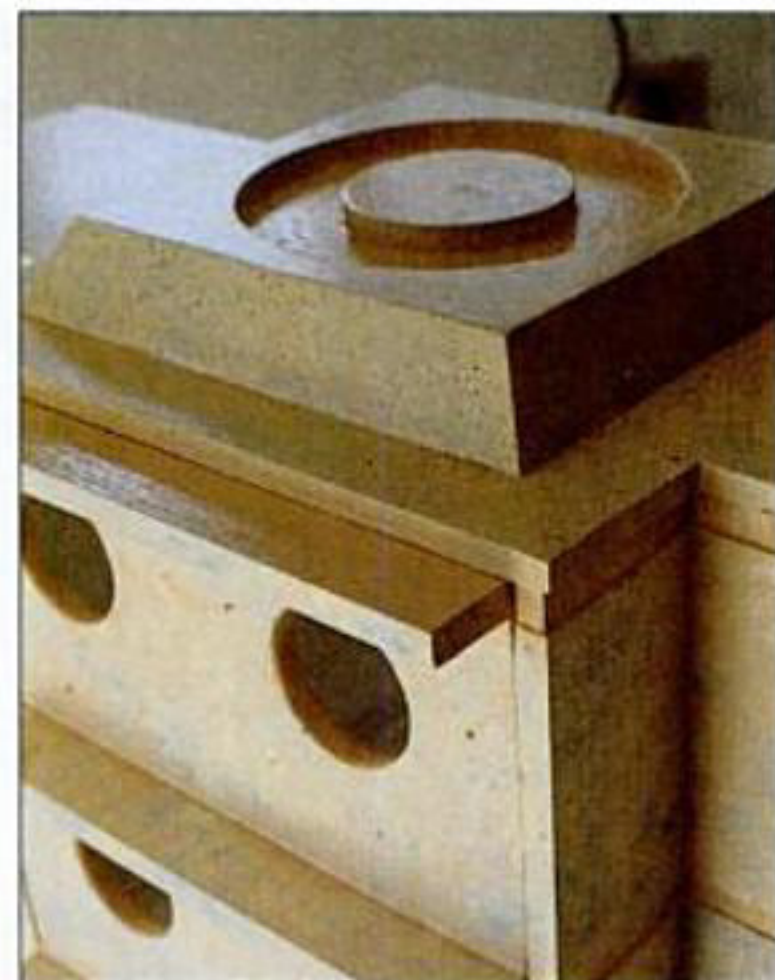
STEP 4: Make the doors. Each bank of nesting boxes on the main tower and two wings is covered by a single door with balconies (entrance perches) attached. (See Fig. 1.) Cut out the doors on the tablesaw, and rout the dados for the balconies. Bore the entrance holes. I did this with a brace and expansion bit, boring halfway through from each side to keep the panel from splintering when the bit broke through.

You can hinge or fasten the doors any number of ways, but make sure you can open them to clean out the nesting boxes. I used two pairs of nylon-roller kitchen-cabinet catches for each door (available at any hardware store) to allow the door panels to simply snap into place. (See Fig. 1.)

STEP 5: Saw and assemble the beveled triangles that make up each roof pyramid. The pyramids are purely decorative elements, made of 1/2-in. exterior A/C plywood, as mentioned. (See Fig. 1.) To make each of them, cut out four equilateral triangles and bevel their edges to 55° (tilt tablesaw blade to 35°). Gluing each pyramid together is a bit tricky. Fig. 2 shows the jig I made for holding the pyramids in shape during glue-up. Because I couldn't easily clamp the pyramids, I glued them with five-minute epoxy. Once the epoxy dried, the pyramids were glued directly to the top pieces of the birdhouse.

STEP 6: Make the mounting base. Attaching the birdhouse to the pole takes a bit of planning. (See Fig. 1.) I found the answer at the local plumbing-supply store. I first cut a mounting plate out of fir on the bandsaw, and then, as shown in the photo, I routed a recess in the plate to inset a 4½-in. i.d. ABS plastic toilet flange (available from any plumbing-supply store). I glued the mounting plate to the birdhouse and then secured the flange to the plate and birdhouse with ½-in. dia. by 3½-in. long carriage bolts.

STEP 7: Finish the birdhouse. Some birdhouse books note that painting the inside of the birdhouse



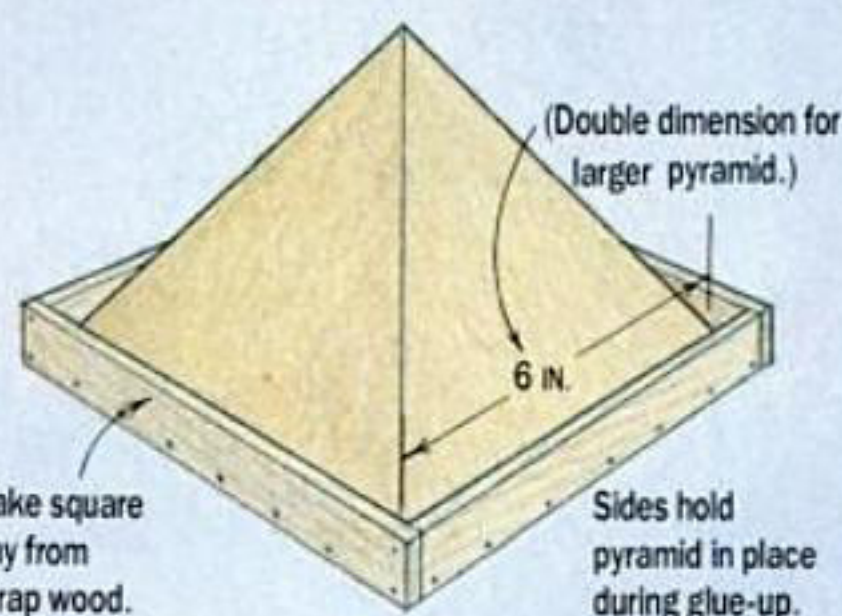
▲ To attach the birdhouse to its pole, author routed a recess in the mounting base and inset a toilet flange. After routing the recess, he flipped the birdhouse upside down and glued the mounting base to the birdhouse base.

white will discourage some undesirable species from nesting, most notably starlings. While I can't verify this from personal experience, it wouldn't hurt to try it.

Because I originally set out to design my birdhouse to look like a skyscraper, I decided to apply a "spattered" finish that would imitate stone. After priming the wood with an oil-based gesso, I applied a base coat of pink oil-based exterior enamel,

PYRAMID GLUE-UP JIG

FIGURE 2



followed by splashes of yellow and light-blue paint applied with a sponge. After this dried, I splattered on some light-gray and dark-gray, yellow, red, and maroon paint. The splotch and spatter coats were a mixture of inexpensive artist's oil colors thinned with alkyd-oil painting medium to make the colors semitransparent (this medium also reduces drying time). All supplies are available from your local art-supply store.

To create the spatter effect, I dipped a stiff bristle brush into the paint, then holding the brush upside down and several inches from the painted surface, I whisked a stick across the end of the bristles to make the paint spatter in small droplets onto the surface. (See photo.) After the spatter coats dried, I applied several coats of exterior water-based polyurethane. I chose this finish because it doesn't yellow as oil-based exterior varnishes and polyurethanes have a tendency to do.

STEP 8: Mount the birdhouse on a sturdy pole. Be sure to choose a pole that's sturdy enough to withstand the weight of this house, and one that won't sway in high winds.

My civil-engineer father (who has never been accused of under-designing anything structural) mounted the birdhouse atop a 6-in. dia., 20-ft. long wooden utility pole. He shaved down the top end with a drawknife so a 4-ft. long piece of 4-in. dia. ABS pipe could be driven onto it. The pole was set into a 4½-ft. deep hole. Once the concrete set, my father erected scaffolding to mount the birdhouse atop the pole. He applied ABS cement to both the ABS pipe atop

the pole and to the ABS toilet flange. He then put the birdhouse in place. This connection was reinforced with ½-in. dia. by 2-in. long lag screws driven through the sleeve of the flange, through the ABS pipe, and into the pole.

If you decide to use a utility pole, remember that although they're sturdy, they're also easy for scavengers to climb. Be sure the predator guard you choose works.

Another pole option is a 3-in. dia. steel steam pipe with an integral flange. This would save you the trouble of making the mounting assembly



▲ Apply spatter finish by dragging a stick over a paint-charged, stiff-bristle nylon brush.

described earlier. You can often find steam pipes at junkyards.

For more information about purple martins, contact the Purple Martin Conservation Association, Edinboro University of Pennsylvania, Edinboro, PA 16444, (814) 734-4420. ▲



CHARLES LINN
is an architect, editor and woodworker. He lives in Oregon.



"Wading Egrets"

PHOTOS BY DARREN FERRERA

WOODCUTS

A Carving Project That Pays Off in Print

Woodcut is the process of carving a block of wood, inking it, and printing it on paper; the print that results is also called a woodcut. The art of woodcut is as old as the hills, originating in ancient China. In fact, woodblocks (as the carved blocks are called) were widely used right up until this century in the printing of books and newspapers.

The process is quite simple. You draw a design on the long grain of a block of wood and carve away any areas on the surface of the block that you don't want to print. Next, roll ink across the carved surface of the block, lay a piece of paper over the block, and rub the back of the paper.

WOODCUTS BY ANDREA RICH



"Ravens"

When you peel the paper off the inked block, you'll find the carved design printed on the paper. Pretty basic. Children do it every day with potatoes! Of course, it gets more complicated when you begin adding colors to your design.

Woodcuts can be complex or simple, delicate or coarse, black and white or vibrant with color. No matter what effect you are trying to create, with a little patience and some ingenuity, you can probably achieve it in a woodcut.

In this article, I'll explain how to carve a woodblock and make a one-color woodcut print. In the sidebar, Making a Multicolor Woodcut, on page 57, I'll cover the

BY ANDREA RICH

process of printing a woodcut of several colors.

Carving the Woodblock

The woodcut process requires a few supplies found at most art-supply stores. The sidebar, Carving and Printing Supplies, on page 58 explains the items you'll need. Once you have all your materials and your woodblock is sanded smooth, begin by making your drawing.

A woodblock prints in reverse of the image you carve into it. To ensure that the drawing is oriented properly, it's helpful to start with a drawing on tracing paper that you can turn over and transfer onto the woodblock with carbon paper. (See photos, next page.) If your drawing is on opaque paper, you'll have to trace it and then flip it. (Flipping the tracing is an important consideration if there are letters or numbers in your design.)

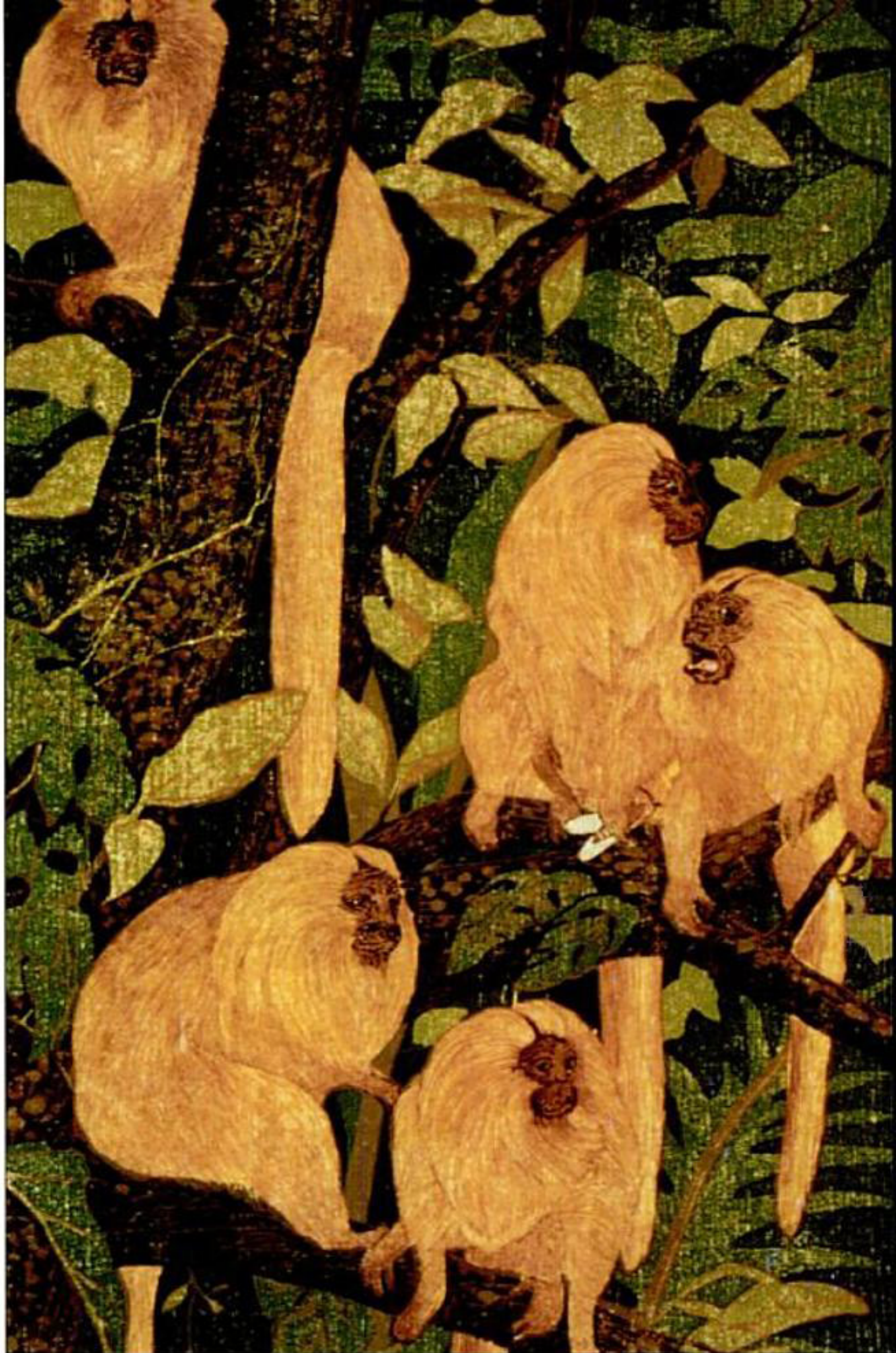
Make your drawing fairly detailed. Indicate on the drawing the textures you plan to use. Some textures that are simple to carve are hard to draw; don't worry about it. Just make your drawing as close as possible to how you want the finished print to look. Transfer the drawing to the wood.

You don't need to carve very deep because the only part of the woodblock that prints is the surface. (See photo, next page.) Clamp down your block while carving to prevent it from sliding. Don't clamp it in an area that's part of the print because the pressure from the clamp will leave a ring that will show on the print.

Don't try to carve the whole block from one direction. Unclamp it and work from all sides. To avoid injury, always cut away from yourself. Also, whenever possible, try to carve away from finished, detailed areas to avoid leaving gouges in your design if your tool slips.

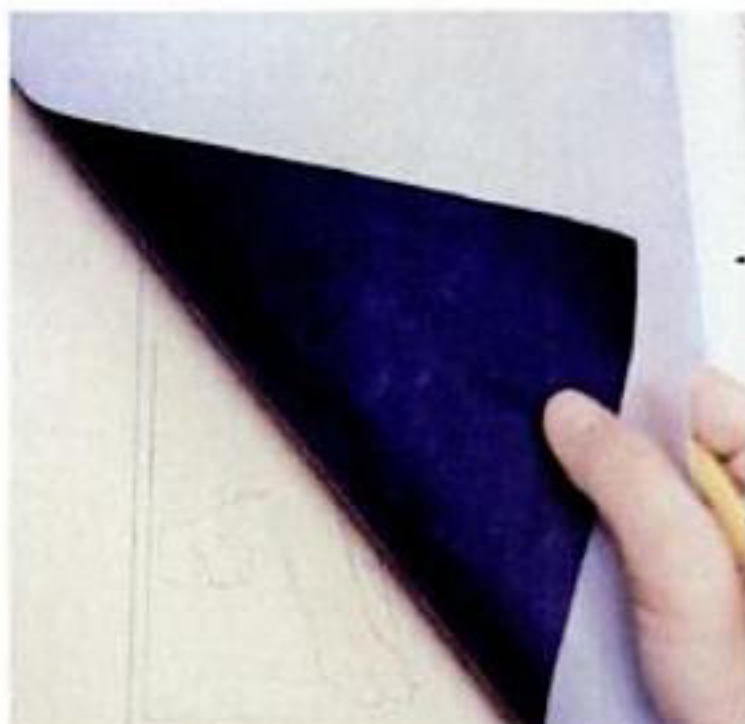
Every so often, make rubbings of the woodblock by laying paper over it and rubbing the back of the paper with a pencil or crayon. This will give you an idea of how the print will look.

Knives and gouges are not the only tools you can use on your woodblock. To create different effects and textures, use anything that will leave a mark in the wood. Nail holes, scratches, marks from gravel pressed into the wood and then brushed off, and dents from a hammer are a few



"Lion Tamarins"

*The colorful prints you see
here are all woodcuts printed
from carved woodblocks.*



Woodblocks print in reverse of the initial drawing. To orient the drawing correctly on the block, draw the design on tracing paper, flip the paper over, and transfer it to the woodblock with carbon paper.



The carving needn't be very deep because the surface of the woodblock is the only part that prints.

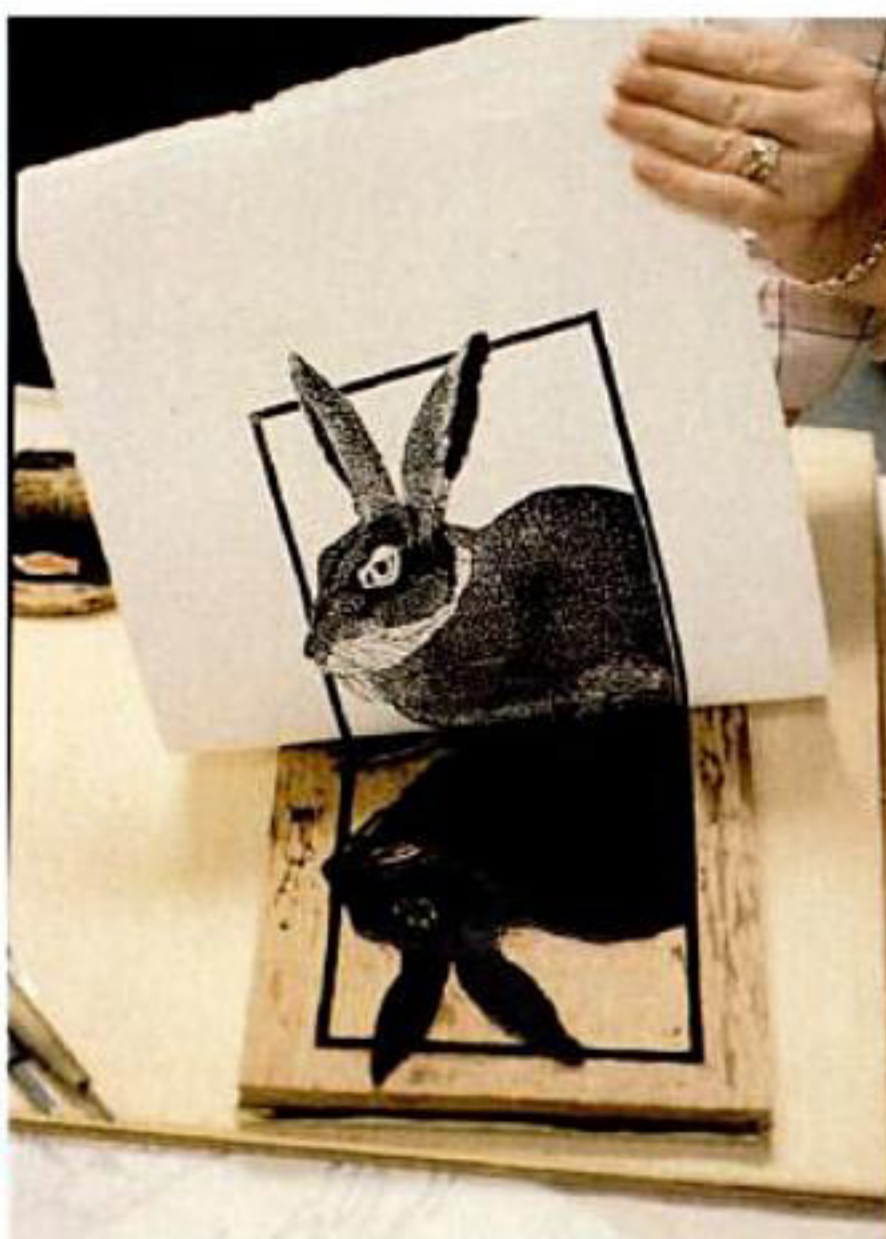


Apply ink to the woodblock with the roller. Cover the surface of the block with a light, even coat of ink.



To make a print, lay the paper over the woodblock. Rub the entire back of the paper with a baren or wooden spoon until the ink is evenly transferred.

Once the ink has transferred to the paper, peel the paper off the woodblock.



possibilities. Feel free to experiment. I recommend you try all experiments on scrap wood first, then check the results with a crayon rubbing on a piece of paper.

Printing the Block

Once you've finished the carving, apply ink to the carved block with a roller. (See supplies sidebar for information on ink and rollers.) Make sure you cover the surface of the woodblock evenly. When you have the correct amount of ink on the block, the texture resembles velvet. Don't get too much ink on the block or the print will turn out muddy.

To print the woodblock, lay the paper over the carved surface. Printing paper is smoother on one side than the other. The smoother side of the paper prints sharper; make sure you place that side on the block. Rub the entire back of the paper with a baren (see supplies sidebar) or a wooden spoon until you think the ink is evenly transferred. (See photo.) If you're not sure, you can lift one corner carefully and check the ink. When it looks good, remove the printed paper.

You're finished! All that's left to do is sign your prints. The professional way of signing a print is to write the print title in the lower-left corner and the print number under the center of the print. (This is done in fraction form, with the lower number indicating the total number of prints in the edition and the upper number indicating which print it is in the total sequence; for example $\frac{1}{10}$ indicates the first print out of a total of 10). Prints are numbered only if the block is not to be used again after the last print in the edition. The artist's name is then signed in the lower-right corner.

Those are the basics! Remember, there are no absolutes in art, so experiment, expand, and have fun. ▲



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MAKING A MULTICOLOR WOODCUT

If you'd like to print your design in more than one color, the process is a bit different than it is for a single-color print. Though there are several ways of making a multicolor woodcut, I'll cover only the traditional key-block method.

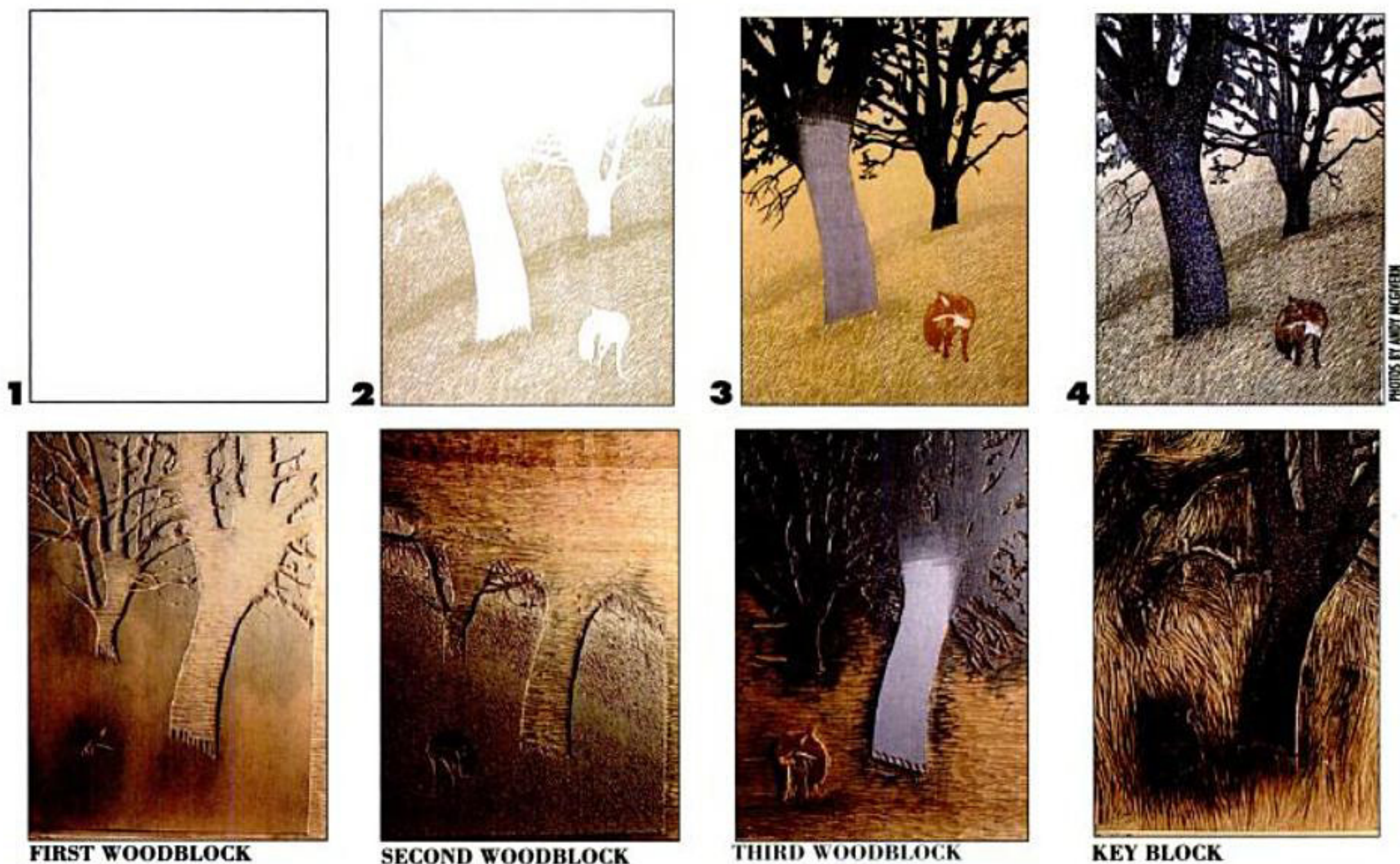
With this method, you carve the initial block as you would for a one-color print. This block is called the key block (the one that contains the most

print with a blue sky, a blue lake, a green field, and a red bird, you'll have four blocks: a blue block for the sky and lake, a green block for the field, a red block for the bird, and the key block (usually the black block with the outlines of all the items in the print).

A detailed drawing is especially important when you do a multicolor print. Note on your drawing where each color will be.

block. Repeat this transferring process with each of the uncarved color blocks, using a new piece of non-absorbent paper every time.

Once you've transferred the lines of the key block to the uncarved color blocks, you'll carve away the portions of each color block that you don't want to print; for example, on the blue block with the sky and lake, carve away all but the sky and the lake.



Prints with several colors require more than one woodblock—usually one color per block. The blocks shown here have been printed in sequence to show the print as it develops. Photo #4 shows the actual print.

detail). You then need to carve additional blocks of the same size—one for each color you wish to include in your print. (Actually, you can use more than one color per block, as shown in the third block above. I recommend using one color per block until you're familiar with the process.) When printing, you will superimpose, in sequence, each supplementary block and the key block, on the same print.

For example, if you're making a

Transferring the drawing to each color block with carbon paper would be tedious and inaccurate. Instead, carve the key block first.

Next, transfer the design from the key block to each uncarved color block. To do this, ink the key block and print it on a non-absorbent paper like waxed paper or tracing paper. Place this transfer print over one of the uncarved blocks and rub the back of it to transfer the lines of the print to the

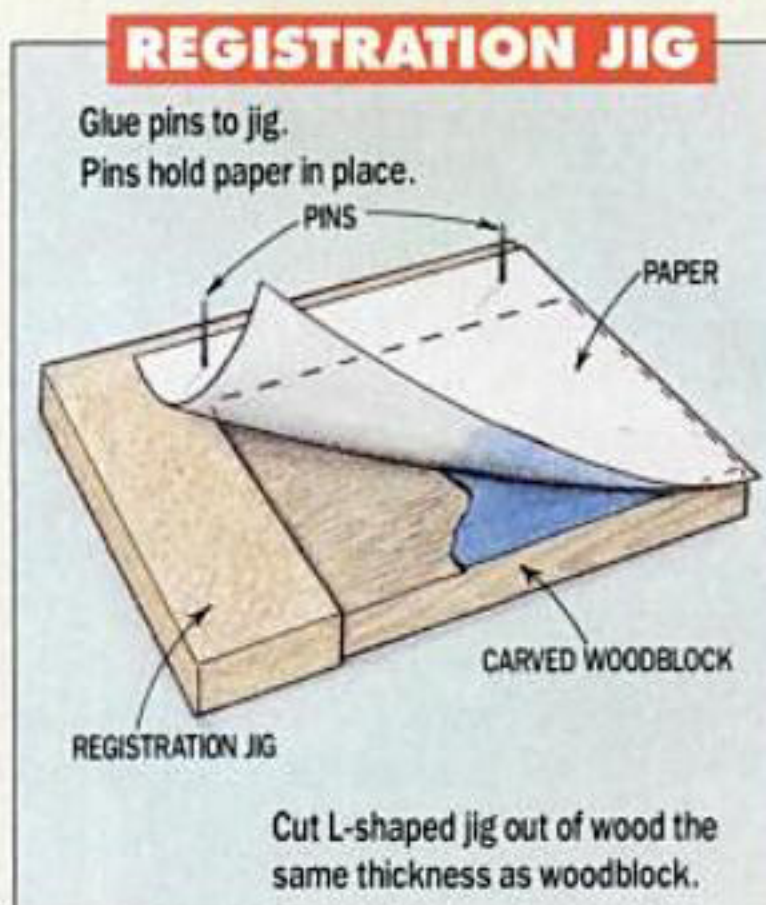
Study your drawing carefully and plan all your color blocks before you carve. To avoid white, uncolored lines between different areas of color, carve your color blocks so the colors slightly overlap the outlines of the key block.

You can also overlap colors if you like. Keep in mind that printing one color over another does *not* yield the same result as mixing inks would. In general, a darker color will cover up a lighter color, but a lighter color will

not cover up a darker one. I find that printing the color blocks from light to dark is a good way to ensure that unintentional overlap is obscured.

Registration

Because a multicolor print is the product of several blocks, the success of the print depends on the precise alignment of all the blocks on the paper. That's where the registration jig you see in the drawing comes in. This jig is simply an L-shaped scrap of wood the same thickness as your woodblock with two pins projecting along one side. The pins hold the print paper in one place as you position your woodblock in the crook of the L-shaped jig. When using the jig, be sure



DRAWING BY GLENN HUGHES

to orient all the blocks for a print in the same direction.

Use the registration jig when you transfer the design from the key block to the color blocks and when you make the final prints.

Printing

After carving all the color blocks, make the final prints by inking and printing the color blocks in sequence. Print the key block last.

If you have enough rollers to print all the colors at once, go ahead and ink all the blocks. Print as you did the one-color print, except make a print from start to finish with each of the blocks in the sequence before you begin the next print.—A.R.

CARVING AND PRINTING SUPPLIES

You'll need a few basic supplies to carve and print a woodcut. You can find most of these items at an art-supply store, or order them by mail from Daniel Smith, 4130 First Ave. S., Seattle, WA 98134, 800-426-6740.

Drawing paper, tracing paper and carbon paper—Any kind will do.

Wooden block—Many kinds of wood are suitable for carving. Pine, boxwood, mahogany, or cherry are all good choices. Cherry works well for highly detailed designs because it is fairly even grained, making carved lines less likely to chip off. Hardwoods like maple and oak are not suitable for woodcut.

The block should be slightly larger than your drawing and does not need to be more than ½ in. thick. A block less than ¼ in. thick may warp.

Clamps—You'll need a couple of C clamps to hold the block while you carve.

Carving tools—You can carve your entire woodblock with only a



"Guardian"

knife and a U-shaped gouge. However, for versatility, I recommend using a knife, two or more sizes of V-shaped carving tools, and two or more U-shaped gouges. The tighter the details in your design, the smaller the gouge you will need.

There are two basic styles of woodblock carving tools: One has a straight handle, the other a rounded handle that fits against your palm when cutting. Either type is fine.

Inks—You can use either water-based or oil-based inks. Both have advantages. Water-based inks clean up with water and don't have smelly

fumes. Oil-based inks won't dry out as fast if you're making many prints. I prefer the bolder, brighter quality of the oil colors to the more delicate water colors.

Rollers—Rollers are used to apply ink to the carved block. Speedball rollers available from most art-supply stores work well. Which size you use depends on the size of your block. Get one for each color you plan to use.

Paper—Almost any quality of paper will work, from typing paper on up. I like to use oriental papers that are light in weight but very strong. Kozo, Hosho, and Mulberry are some of my favorites.

Baren, wooden spoon—A baren is a cardboard or wooden disc that is padded and covered with bamboo. It's the traditional Japanese tool for rubbing the back of the paper to print a woodblock. Barens are inexpensive and found in most art-supply stores. A wooden spoon will do the job just as well, but don't rub too hard or you'll tear the paper.—A.R.

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then plug the Automater into a standard 120-volt AC outlet. The model DC-2500 Automater (shown) is for a 15-amp circuit. Other models are available for higher and lower current ratings or for permanent wiring into the circuit. (Price: \$69.95, model DC-2500)

R. F. St. Louis Associates Inc., Dept. AWT, Box 232, Mountain Lakes, NJ 07046, (800) 526-0602.

CIRCLE NO. 601 ON PRODUCT LITERATURE CARD



MITCH MANDEL

Precision Adjustable Triangle

The AngleWright cuts accurate angles on a tablesaw or radial arm saw. This tool is an extruded-aluminum triangle with two arms that can be locked to any angle between 0° and 90°. You read the angle on a crosshair indicator over a clear scale. Once the angle is set,

you position one arm against the radial arm saw fence or tablesaw miter gauge and the other arm against the wood. The tool can also set blade bevel angles on tablesaws and radial arm saws. The AngleWright is well made and is finished with a black epoxy-powder coating. (Price: \$81) *AngleWright Tool Co., Dept. AWT, Box 25632, Los Angeles, CA 90025, (310) 471-7432.*

CIRCLE NO. 602 ON PRODUCT LITERATURE CARD



If you're like me, you don't relish the job of edge gluing boards to make wide panels. Edge gluing is a simple process, but it often turns out to be a frustrating job—racing against time to get the boards in place and the clamps tight before the glue begins to set.

My attitude changed when I tried out the Plano Vertical Glue Press. The Plano is a new clamping system that holds and clamps the boards in a vertical plane instead of a horizontal one. The system consists of a series of anodized-aluminum clamping bars that mount on a rail attached to a wall.

To use the Plano system, put glue on the boards, then place the boards edgewise on top of each other in the clamps, stacking from the bottom up. You then close the clamp bars and tighten a knob on the top of each clamp. The Plano exerts even clamping pressure on both the edges and the faces of the panel. The

Plano Vertical Glue Press

TESTED BY GLENN HUGHES



MITCH MANDEL

boards are aligned and centered automatically. Simple.

Compared to my old pipe clamps, the Plano press significantly reduces the time and effort needed to set up

and edge glue flat panels. The even pressure on the sides as well as the edges of the panel prevents the boards from sliding around as the clamps are tightened. The result is a nice, flat panel that needs less planing and sanding. And mounting the Plano press on a wall frees up valuable benchtop space.

The Plano standard set (shown) contains one horizontal rail (39 in. long) and three vertical clamp bars to handle panels up to 5 in. thick by 42 in. wide by 40 in. long. Optional bars are available to handle panels up to 48 in. wide. For gluing up longer panels, add more rails and clamp bars. They're available individually or in larger sets.

The Plano Vertical Glue Press is a bit pricey. But if you glue up a lot of panels or merely get frustrated with the old pipe-clamp-on-the-benchtop method of edge gluing, the Plano system is worth the cost. (Price: \$429, standard set)

Advanced Machinery Imports, Dept. AWT, Box 312, New Castle, DE 19720, (302) 322-2226.

CIRCLE NO. 603 ON PRODUCT LITERATURE CARD

JUST FINISHING

"I never stain wood. Period," I overheard the craftsman announce with a hint of smug pride. "I leave the wood as it is because that's the way Mother Nature *intended* it to be."

"Maybe so," remarked the woman he had addressed, "but if Mother Nature *intended* that wood to be a table, why did she grow it in the shape of a tree?"

Certainly there are cases when a beautifully hued and figured wood looks best *au naturel*, but with much of the most attractive exotic and domestic species becoming scarce, many of us are turning to more common woods for both ethical and fiscal reasons. To me, this is an invitation to let creativity fly with the use of stains.

Defining Stains

Stains consist of some sort of colorant mixed into a liquid "vehicle." The colorant and type of vehicle determine how the stain performs. Once you understand the difference between stains, deciding which one to use is easy.

The colorant—There are two types of colorant used in stains: dyes and pigments. Knowing the difference between these two colorants will help you predict the final appearance of the stained wood.

Dyes are crystals that *dissolve* evenly in a solvent. They are translucent, they penetrate into the wood, and enhance rather than hide the subtle natural patterns of the wood, maintaining clarity and depth as they impart color. Because the dye crystals are completely dissolved, dyes color uniformly on wood with large or small pores, and on both the end grain and flat grain.

In addition to ready-to-use liquid dye stains, you can buy dyes in powdered form and mix them yourself. Powdered dyes come in three solvencies: water soluble, oil soluble, and alcohol soluble. Of the three, water-soluble powder dyes are the safest and easiest



BY MICHAEL DRESDNER

COLORING WOOD

to use, they penetrate the deepest, and tend to be the most lightfast.

Nevertheless, almost all dyes fade in strong sunlight—some colors sooner than others. Dye stains should not be used for exterior work, on windowsills, or in other areas with high exposure to the sun.

Pigments are opaque particles of colored material that are merely

suspended (not dissolved) in liquid, and they have a tendency to settle to the bottom of the can. Pigments are the same colorants used in paint; pigmented stains are actually thinner versions of paint.

Because pigment particles do not dissolve when mixed into a vehicle, they sit on top of the wood rather than penetrate it. They tend to wipe off of dense woods, such as maple, but settle heavily in end grain and the large pores of species like oak and ash. Because pigments are opaque, they will hide the wood if they are put on too heavily.

Like dyes, pigments are available as ready-to-use stain. Powdered pigments are also available. However, mixing the powder into a vehicle is difficult, often requiring some form of mixer to break down the clumps of pigment.

Although some pigments do fade, many are lightfast. In general, you'll find a wider choice of lightfast pigments than dyes.

Like paint, *all* ready-to-use pigmented stains contain some sort of binder (a protective film-forming resin). Because the binder resins are polymers (binding molecules), these stains are sometimes referred to as "polymeric stains." (Dye stains may or may not contain a binder, but do not *require* one.) The most commonly used binder for stains is linseed oil.

The vehicle—The liquid portion, or vehicle (solvent, binder, etc.), of the stain affects how the stain handles and whether or not it is polymeric. You can mix any color stain with any other color stain if the vehicle is the same: water with water, alcohol with alcohol, oil with oil. If you are not sure what the vehicle is, mix only colors of the same brand and type. To mix colors of dry-powder stains, again, combine only colors that have the same solvent. It is best to mix these dyes after each has been separately dissolved so you are mixing liquids together.

Continued



The board above shows the difference between a similar color of pigment stain (right) and dye stain (left). The board is glued up from four strips of wood (pine, maple, poplar, and oak). Note the differences in the way various species of wood accept the two stains.

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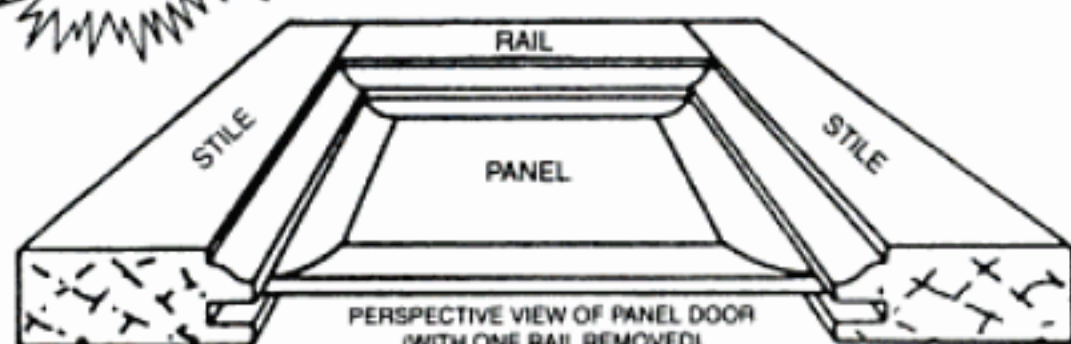
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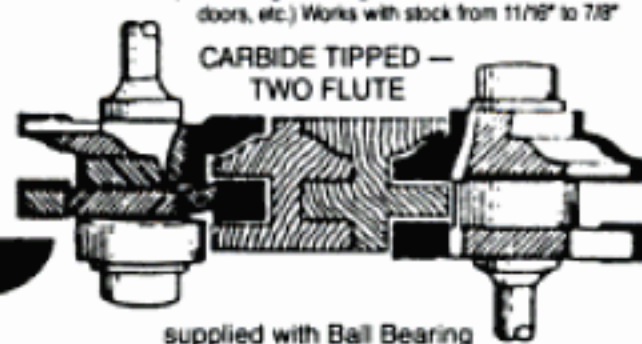
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JUST FINISHING

Knowing whether or not a stain is polymeric will tell you a lot about how the stain will behave on wood as well as your options for applying and manipulating it. How can you tell? If the stain contains *pigment* or *oil*, if it is *self-sealing*, or if it is a *finish/stain* combination, then it is *polymeric*. If the stain contains *dye and solvent* but has no binder (resins or oils), then it is *non-polymeric*.

How to Use Stains

If there is one universal rule for using stains, it is "flood and wipe." If you apply the stain very liberally and wipe it *all* off before it dries, you will get the most even "take" on the wood. This method is the easiest approach to staining, and it works with *all* types of stain. In fact, it is the *only* method to use with binderless (non-polymeric) dye stains.

Non-polymeric stains—Binderless dye stains are the original user-friendly finishing materials; they color uniformly, don't require "presealing" or "wood conditioners," and work well on virtually any wood. They are "self-regulating" in that the wood takes in a certain amount of dye and that's it—it won't take any more. Adding another coat of the same dye won't change the color, providing you flooded the surface with sufficient dye in the first place.

As non-polymeric dyes dry, the wood surface may look pale or chalky, but don't let that disturb you; the true color will return when you apply a clear top coat. (Binderless dyes should always get a top coat of a clear finish.) The only other thing to remember is that you have to wipe off *all* the dye that will come off, or you can end up with "streaky" or uneven color under the top coat.

Polymeric stains—Although you *can* handle these stains the same way (the flood-on/wipe-off method), there are other options open to you as well. Because a dried coat of polymeric stain is actually a very thin coat of finish, you don't *have* to wipe it all off. Instead, you can leave it on heavier or wipe it off selectively, depositing more colorant on one area of the wood than another. This technique requires practice but can be rewarding.

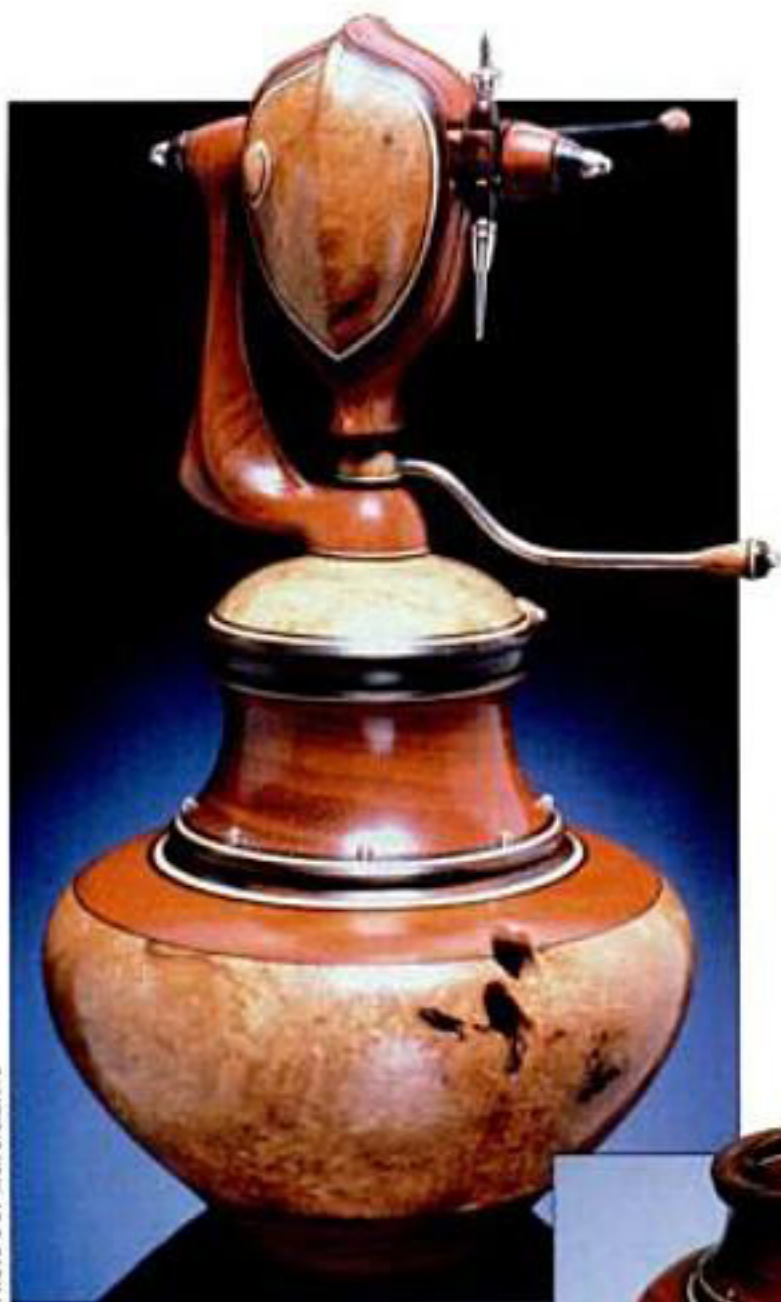
Once a polymeric stain has dried, each successive coat will add more color. Unfortunately, you may also obscure more of the wood. This can be a particular problem with pigment stains. Too many coats, and you have a layer of paint that completely hides the wood below.

Have some fun with stains—put pigment over dye or mix some wild colors—and you'll find the final stage of your woodworking project can become more than "just finishing."

LOOKING FOR STRAIGHT ANSWERS?

Send your questions about finishing problems, materials, and techniques to: Michael Dresdner, AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098.

GALLERY



PHOTO'S BY RICK SICILIANO

▲
"Cabinet on Jar Answering the Phone" (1981). Cherry burl, padauk, holly, East Indian rosewood, stainless steel. Dimensions: H: 12 in., Dia.: 6 in.



Giles Gilson brings new life to the term multimedia. Though wood provides the bass note in his work, metals, plastics, and lacquers carry the tune. With a background in both industrial and fine arts, Gilson finds his work an excellent vehicle for self-exploration. That, and a strong sense of play, have landed Gilson's work in numerous galleries and museum collections.

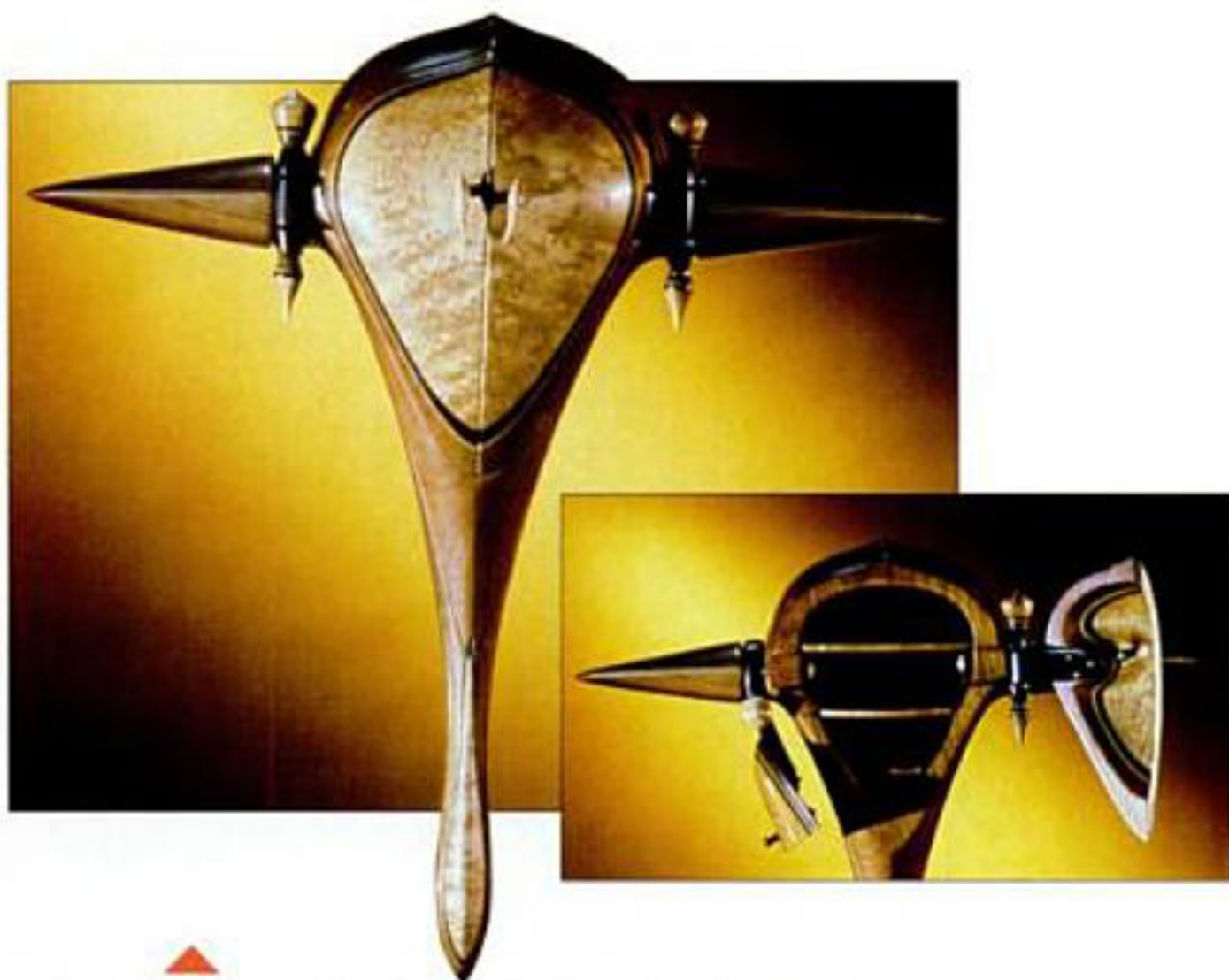


▲
"Interpretation #3" (1981). Domestic and exotic hardwoods. Dimensions: H: 6 in., Dia.: 8 in.



▲
Feathered container sculpture (1987). Lacewood, ebony, holly, basswood, silver, aluminum, acrylic, stainless steel, East Indian rosewood, manzanita burl. Dimensions: H: 21 in., W: 13 in., L: 16 in.

GALLERY

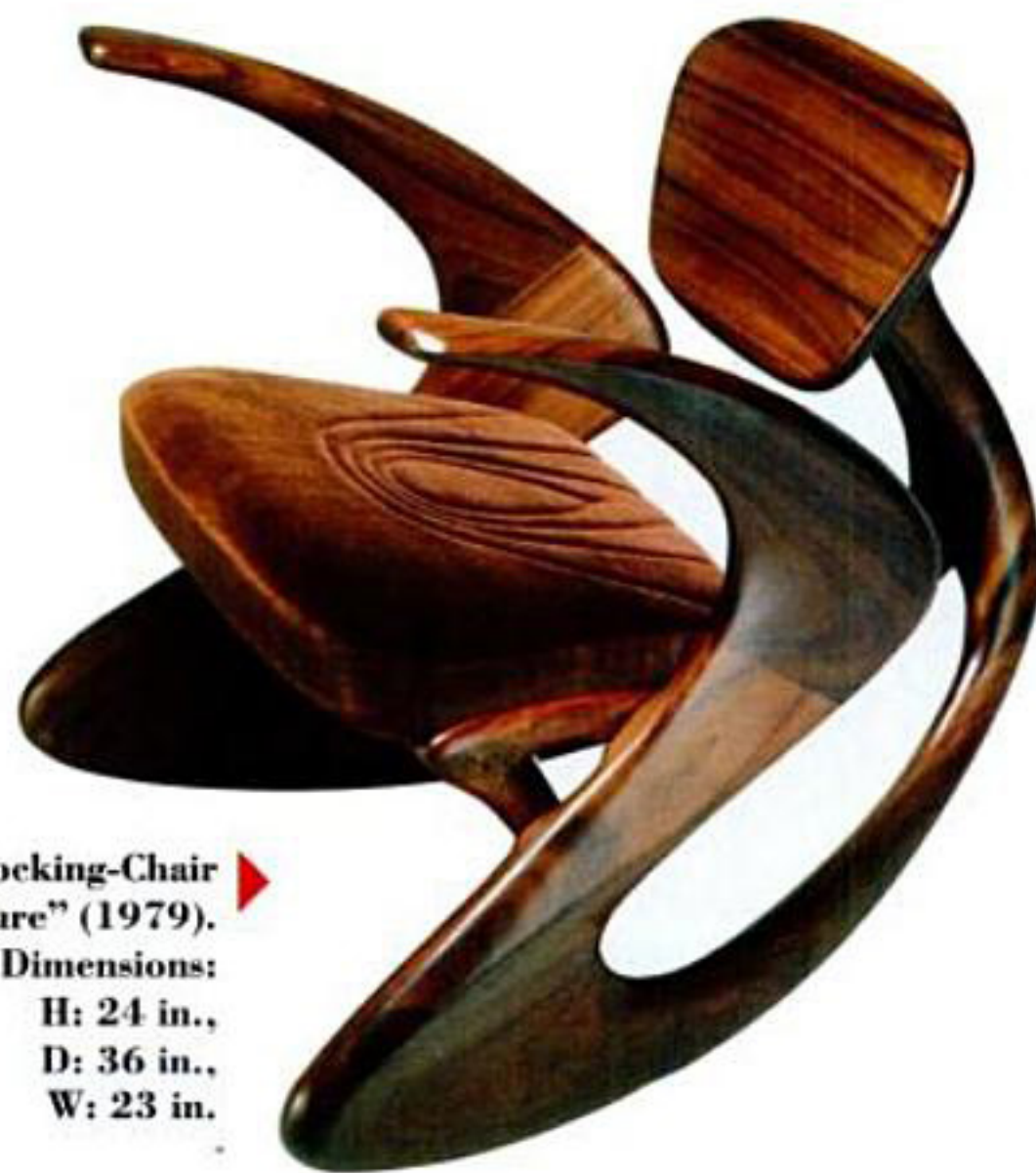


Wall cabinet (1980). Walnut, bird's-eye maple, East Indian rosewood, holly, stainless steel. Dimensions: H: 10 in., W: 18 in., D: 6 in.



Feathered container (1983). Walnut, curly maple, ebony, holly, East Indian rosewood, pearl lacquer, stainless steel. Dimensions: H: 14 in., W: 9 in., D: 6 in.

"Fibervase" (1988). Walnut, fiberglass. Dimensions: H: 14 in., Dia.: 7½ in.



"Rocking-Chair Sculpture" (1979). Padauk. Dimensions: H: 24 in., D: 36 in., W: 23 in.

Want to see your work in Gallery? Send color slides or color transparencies to *Gallery*, AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Please include: materials, dimensions, name of photographer, your name, address, and phone number. Enclose a self-addressed envelope for return of photos.



A Quilt of a Different Color

Ellis Miller is a traditionalist. . . and it shows in his work. Miller makes wooden "quilts." His inspiration lies in his Amish heritage.

As a boy, Miller was smitten by the intricacy of his mother's hand-sewn quilts. Years later, after training as a carpenter, he drew from these childhood impressions to create his wooden quilts.

Why wooden quilts? Miller explains that they combine his culture with the big world out there, they're unique, not readily duplicated—and they sell.

Miller models each design on a traditional Amish quilt pattern, cutting small diamonds, squares, and triangles from redwood or cedar lapsiding. He



then paints the pieces. Miller pieces the quilt, like a jigsaw puzzle, on a lauan plywood backboard, gluing as he goes. He finishes his "quilt" with a matte sealer and frames it in pine or oak.

Miller's wooden quilts range in size from 7 in. by 9 in. up to 27 in. square, and he also does custom orders. They cost from \$20 to \$400. For information write: Ellis Miller, Box 818, Kalona, IA 52247, (800) 798-6295.

FINAL PASS

Woodworking Database

For woodworkers with a computer, Infodex Services of Richmond, Virginia has produced a computerized index of articles from *AMERICAN WOODWORKER* and nine other woodworking magazines. The database, called Infoware, includes direct references to more than 5,000 articles.

You don't need to be a computer expert to run the program. To retrieve information, simple key words call up all related references. The software package, priced at \$44.95, comes with a 56-page manual. Quarterly updates are available for a fee.

Infoware comes on 5.25-in. and 3.5-in. disks, and runs on IBM-compatible computers with 512K memory.

For more information on Infoware, contact: Infodex Services, 10609 King Arthur's Court, Richmond, VA 23235, (804) 320-4704.

No-Defect Drying?

A fiercely independent experimenter claims he's developed a method of drying whole logs that eliminates the checking and cracking that's plagued timber harvesters. He further claims he can dry wood of any species and size without chemicals at 25 cents a log.

Sound too good to be true? The guys at the U.S. Forest Products Laboratory in Madison, Wisconsin thought so until they tested wood samples from this fellow. They found the cell structure didn't shrink like it normally does when water is removed by conventional wood-drying methods. "What he's doing is real, not a hoax," says Kent McDonald of the Forest Products lab. "It's just a matter of figuring out what it is."

They want to know more, but the developer won't reveal his secret. Stay tuned. We're in hot pursuit of the answers, and we'll bring you the news when (and if) it breaks.



Entry form for design competition.

Design Contest

Louisiana-Pacific Corp., a maker of industrial wood products, has announced its first furniture-design contest, Dream On.

Submission deadline is March 31, 1992. Designs must demonstrate the quality and versatility of Louisiana-Pacific's wood products, some of which are hardboard, particleboard, hardwood veneer, redwood, MDF, and oriented strand board. All entries must focus on one of these materials.

The contest is divided into three categories—professionals, hobbyists and design students. First prize in each field wins an all-expense-paid trip to the 1992 International Woodworking Fair in Atlanta, Georgia. The winning pieces will be displayed at the fair. For information write: Louisiana-Pacific Dream On Contest, 111 S.W. Fifth Ave., Portland, OR 97204.

COMING NEXT ISSUE:

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