

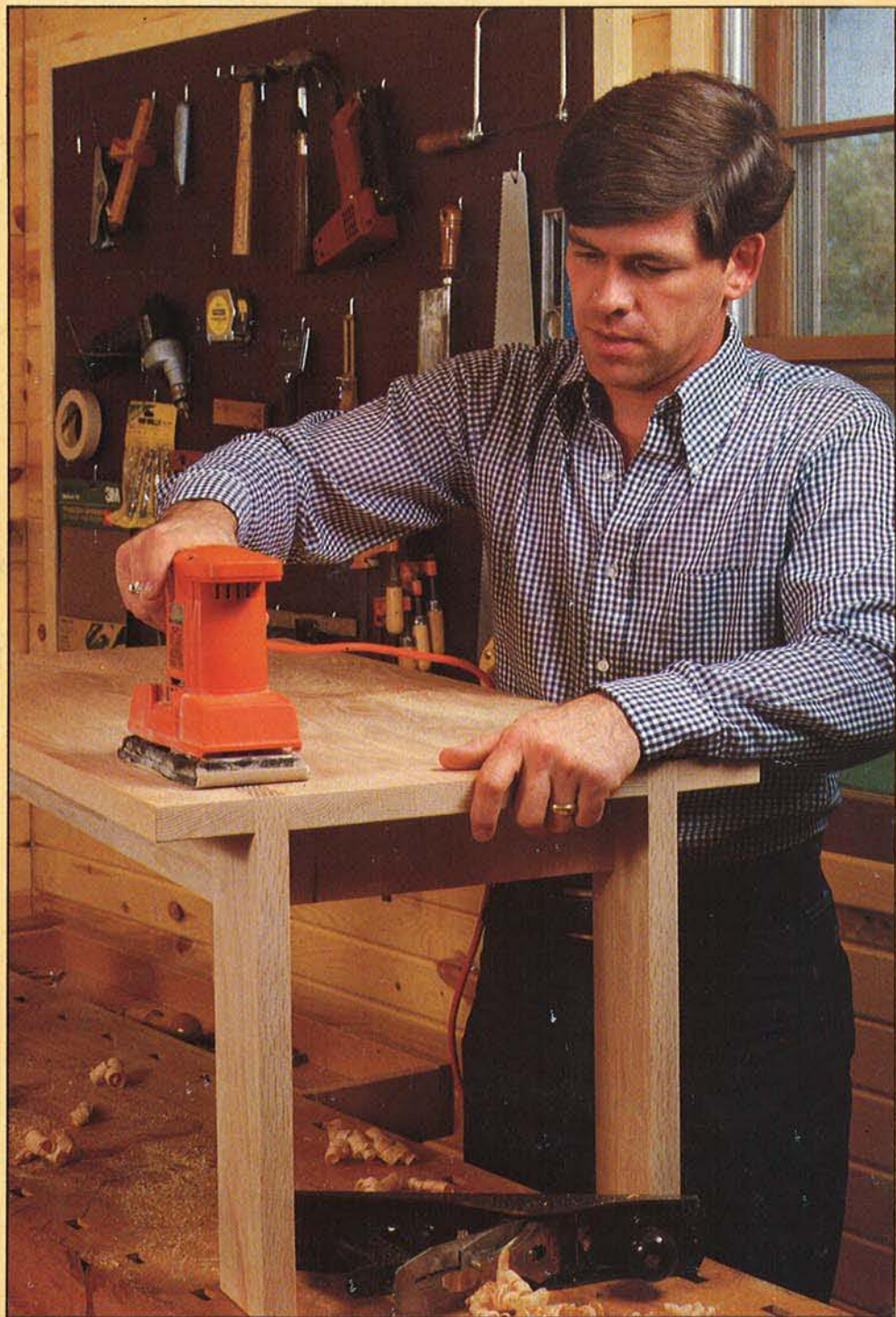
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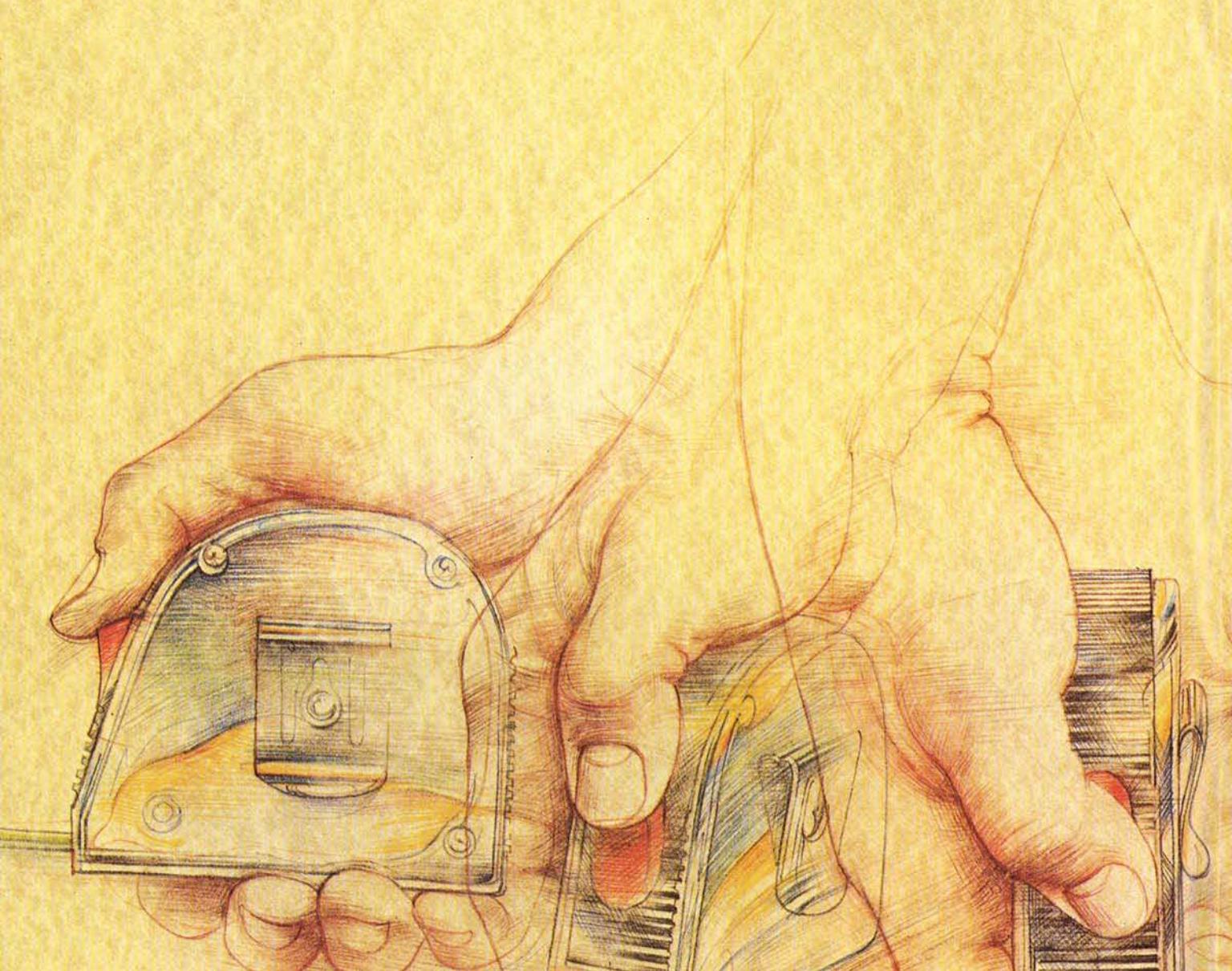
# WOOD

SEPT/OCT • 1984 • ISSUE NO. 1

THE MAGAZINE FOR HOME WOODWORKERS

- **ROUTERS**  
WOOD tests  
8 best-selling  
models
- **11 great projects**  
complete plans
- **Step-by-step**  
to edge-joining  
boards
- **Make a classic**  
our brass-bound  
marking gauge
- **Paste varnish**  
a tough, easy-to-  
apply finish
- **Build**  
The "Sunshine  
Express" kid's  
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*Gierning 9/83*

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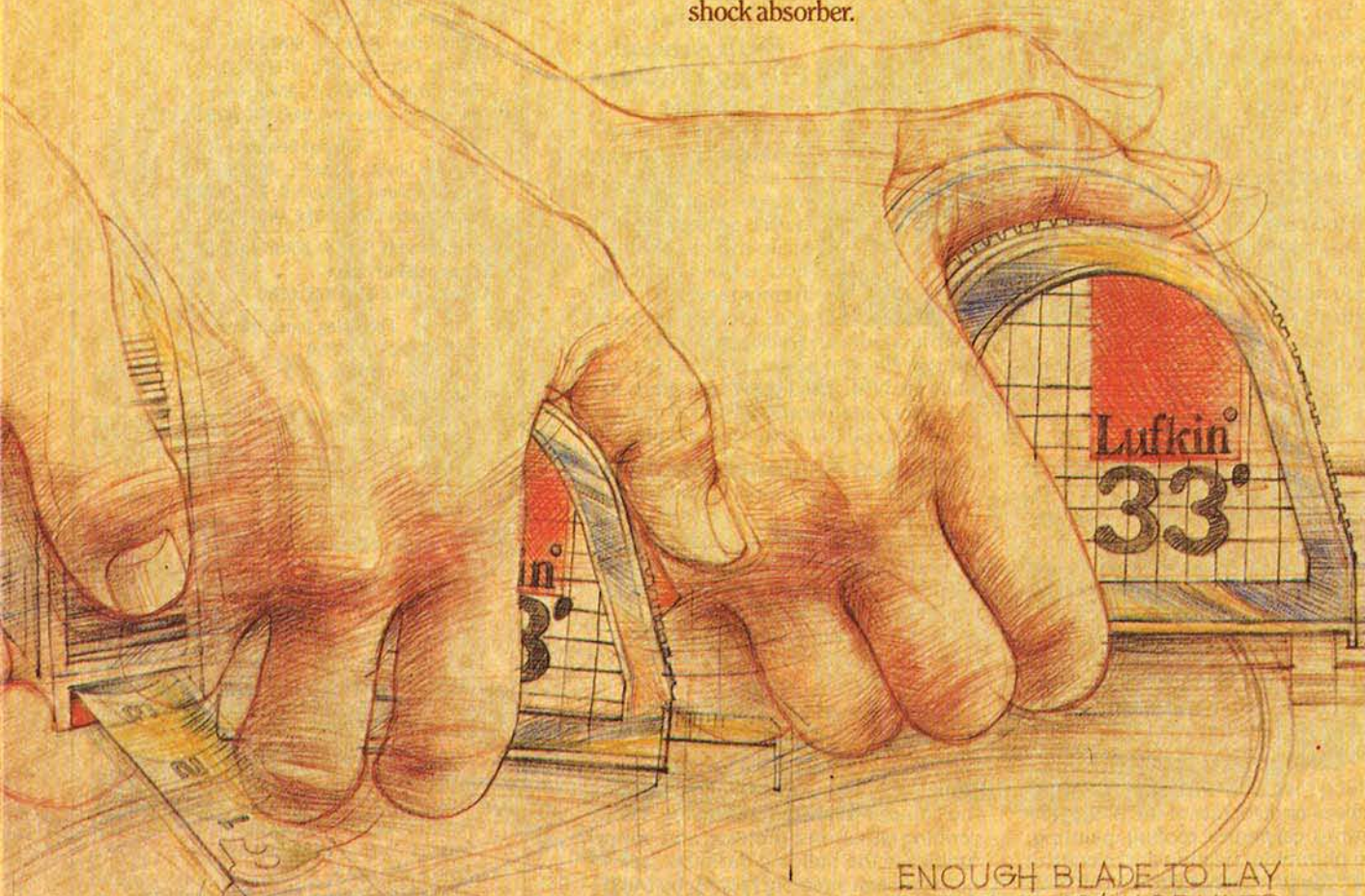
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## Better Homes and Gardens® WOOD

THE MAGAZINE FOR HOME WOODWORKERS

Sept./Oct. 1984 Issue No. 1

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# WOOD

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**A message to the readers of Wood Magazine from Las Vegas entrepreneurs, Richard Malott and Junior Sealy**

## WE HIT THE JACKPOT IN LAS VEGAS



### WHEN WE BOUGHT THE AUSTIN HARDWOODS FRANCHISE

#### Facts

- Started August, 1980 in the depths of the recession
- Began showing profit after four months
- Sales first year \$370,000
- Sales second year \$725,000
- Recovered entire initial \$90,000 investment in 20 months
- Doubled our warehouse capacity July, 1983 from 6,000 to 12,000 square feet
- Sales this year \$1,000,000 plus!

#### Opinions

We couldn't have done it without the flexibility and expertise provided by the Austin Hardwoods program. The parent company has worked hand-in-hand with us, keeping us abreast of changing market conditions, new products, and effective marketing techniques. Their program allows the franchise owners to tailor their operation towards any ratio of retail/wholesale and hobbyist/commercial sales, and to grow as fast as they are able. Sure there was a lot of hard work, but the record speaks for itself. Our Austin Hardwoods franchise turned out to be a sure bet.

Details are too numerous to list. This is a tremendous opportunity to make money either as an owner/operator or as an investor. If you happen to love dealing in fine woods, all the better. Current total investment is approximately \$90,000. Please let us hear from you.



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## The Editor's Angle



**W**elcome to Issue 1 of *WOOD*—the magazine for home woodworkers. I'm glad to have you with us, and I hope you find our initial effort to your liking.

As a home woodworker, you know the satisfaction you can derive from creating things with wood in your shop. What you may not know is that you're involved in a hobby that is quietly sweeping this country. Woodworkers are literally everywhere, and they're produc-

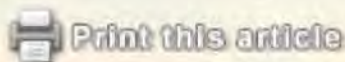
ing a lot of surprisingly good-quality work. We are all part of a renaissance of interest in quality, in things made by hand, and in the self-satisfaction that can come from doing things yourself.

The goal of all of us at *WOOD* is to heighten your enjoyment of and increase your abilities in this fascinating hobby. We'll do this by providing you with lots of well-designed, useful projects and shop-tested woodworking techniques . . . all presented step-by-step . . . and a host of other material designed to enlighten, inform, and entertain.

I'm serious about being of service to you. That's why I've assembled a staff of practicing woodworkers, equipped an on-location shop where we can practice what we preach, made arrangements with a group of nationally respected subject area specialists to help us, and asked the network of *Better Home and Gardens*® editorial scouts to scour America for well-designed projects, interesting woodworking personalities, and for anything else of interest to woodworkers. In addition, the staff and I plan to spend as much time as possible with woodworkers in all areas of the country to find out what they're up to.

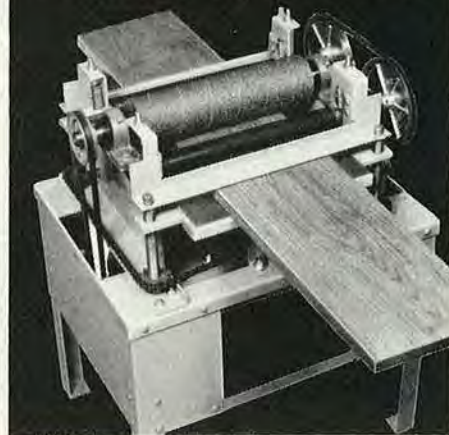
I do need your help, though. For *WOOD* to live up to its full potential, it has to be *your* magazine as well as ours. If you would, I'd like you to fill out the questionnaire on pages 103-104 so that I can more clearly determine your woodworking wants and needs. Also, I'd like to ask you to share with us and the rest of our readers your favorite shop tips, slides of some of your woodworking efforts, humorous experiences you've had while woodworking, and suggestions for articles you'd like us to present in *WOOD*. Naturally, if we publish your tips, slides of your handiwork, or use your humorous anecdotes, we'll acknowledge you in print and pay you for your effort. See pages 23 and 61 for how to submit tips and slides.

Once again, welcome to *WOOD*! Here's to a long and satisfying woodworking relationship between us.



*Larry Clayton*

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# oak dry sink

 Print this article


**In this series of articles featuring a random selection of kits from various manufacturers, we will present our opinion of the kit based on our experience in having assembled it in our shop. In each case we also will evaluate the product on the following: quality of assembly instructions, quality of materials furnished in the kit, and how well the parts are machined.**

Anyone who has ever assembled anything knows the importance of easy-to-understand assembly instructions. (Sometimes, it seems like the maker of the product is out to get you.) The folks at Craftsman's Corner obviously recognize this because they provide a set of clear, concise instructions that walk you through the project one subassembly at a time. We also appreciate the fact that they stamp each of the parts of the kit with a number. This helps immensely when it comes time to match the parts to those that are shown in the illustrations. The instructions don't, however, include an exploded-view sketch or cutaway drawing of the dry sink, which we think would prove quite useful to the customer who wants to see how all of the kit's parts fit together. Before assembly, we carefully inspected all of the kit's parts and found them to be of uniform good quality. The edge-joined pieces were well-machined and flawlessly glued, and we didn't detect any members that were warped or bowed. In addition, the parts were free of major defects such as loose-fitting knots, checks, and splits.



While not perfectly machined in every instance, most of the pieces fit together surprisingly well. We did have to sand and scrape a few of the joints to get them to fit together correctly, but this is almost universally true of kit products. Anticipating this, the manufacturer provided several sheets of sandpaper. We also encountered a couple of minor predrilled hole alignment problems, but nothing serious enough to require drilling new holes.

We feel that most people would find this kit easy to assemble, and be satisfied with the results. Our finished piece looked just as nice as the one pictured above. In addition to a few common hand tools and woodworker's glue, the person assembling the kit should have at least two bar or pipe clamps to ensure a good bond when gluing the pieces together. Be prepared to spend more time with the project than you might expect at first because of the time that is needed to glue and clamp the subassemblies together.



*The oak dry sink kit is available from Craftsman's Corner, Inc., Woodcraft Collection, 4012 NE. 14th St., Box AP, Dept. BH, Des Moines, IA 50302. Telephone number: (515) 265-3239. Cost of the kit: \$198.95 plus \$21.00 postage and handling. A free illustrated catalog is available on request.*

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### tool safety tips

**P**racticing tool safety regularly is one of the first habits to develop in the home workshop. Use common sense, and the guidelines below, to add to the many hours of woodworking enjoyment ahead of you in the shop.

- Always unplug a power tool before servicing or adjustment. Let moving parts come to a standstill.
- Never wear loose-fitting clothes or dangling jewelry when using power or hand tools.
- Check the condition of a tool before you use it. Inspect power cords for cracks or frays, cutting edges for sharpness, and handles for stability.
- Don't tamper with or remove safety mechanisms from power tools — they're there for your protection.
- Use the proper tool for a job. Read and understand all instruction manuals that apply to a tool before you use it. Find out what it was meant to do as well as what it can't do.
- If there is even a remote possibility of eye injury in a particular situation, don't hesitate to wear safety goggles.
- Keep onlookers, especially children, a safe distance away while you're working with tools. Always instruct others in the proper use of a tool before letting them use it.
- Work in good light. Use bulbs of sufficient wattage and have extra clamp-on lights available as needed.
- Never work with tools when you're in a hurry, tired, or in a bad mood.
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## BOOKS WORTH READING

### **A Guide to American Wooden Planes and Their Makers**

by Emil and Martyl Pollack.

The Astragal Press,  
One South St.,  
Morristown, NJ  
07960. 1983.



335 pages.  
\$15

Whether you are a serious collector of wooden planes or just want to learn a little more about these intriguing American artifacts, you'll find this book helpful and quite interesting. The authors begin with a brief history of American plane making, then go on to discuss in detail the different types of wooden planes that were commonly made and how each was used. Diagrams, along with dozens of profiles of the most common molding planes, help amplify the points being made.

Next, the Pollacks offer a chapter on the value of American wooden planes. Using criteria such as the type of plane, the material it's made from, regional preferences, charisma of the maker, and condition of the tool, they give the reader a feel for the worth of what he has, or what he might expect to pay for something he wants.

By far, the majority of the book, however, is devoted to the identification of the American wooden plane. To the delight of collectors, the Pollacks have put together a directory of over 700 rubbings of makers' imprints, with the known information on each maker. And for those who want to delve more deeply into the subject, the authors provide a bibliography for further reading and an intensive reference listing of clubs and organizations across the nation that have an interest in tools and collecting.

Print this article

**"It is still possible to buy good, ordinary planes for as little as \$10. But rare 18th century planes, as well as choice 19th century ones, frequently sell for \$500 and more and it's seldom that an 18th century plane by a known maker will sell for less than \$100!"**

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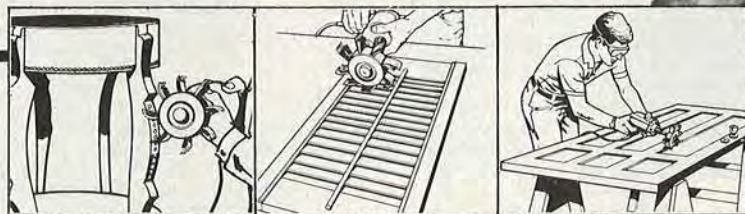
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WOOD MAGAZINE SEPT./OCT. 1984

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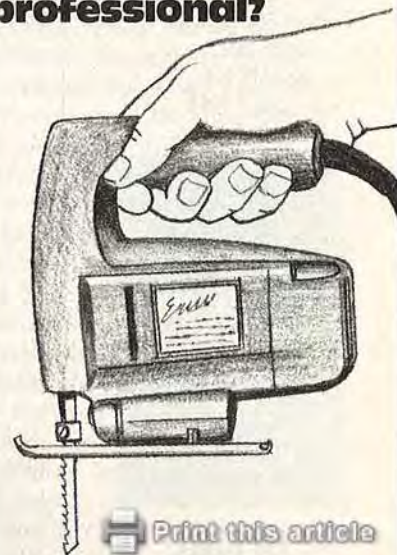
The professional way to sand paint, moldings, furniture, carvings is now made easier. New lighter weight Sand-O-Flex weighs only 9.5 oz. Designed for power drills it's perfectly balanced, easier to handle. Revolving brushes cushion slashed abrasive over curves and detail, without gouging. Wheel has hi-impact-resistant plastic body and yards of longer lasting, industrial cloth abrasive 1" wide. Turning cover feeds out new abrasive as needed.

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## SOUND ADVICE

### POWER TOOLS what's the difference between consumer and professional?



**M**ost people know that tool manufacturers produce more than one line of a product for varying consumer needs. What they may not realize is how these tools differ in their manufacture, and what it is that makes one drill, for example, cost \$25 and another "similar" one cost \$125. We explain some of the points of difference here.

**Design.** The professional power tool is designed to be more powerful, last longer, and perform better under continuous-use conditions than consumer models. For occasional, around-the-house situations, you may prefer a less-expensive consumer tool.

**Electrical cords.** On most consumer tools, the electrical cord is 6 feet long or less. With the professional models, 8- and often 10-foot cords are the norm. With this length of cord, a worker doesn't have to use an extension cord in most situations.

Cord materials vary, too.

*Continued →*

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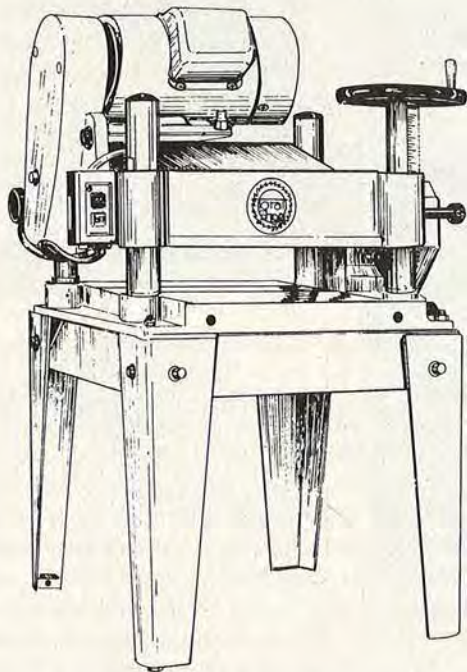
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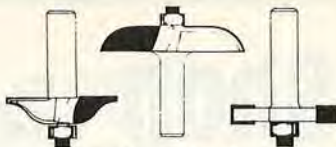
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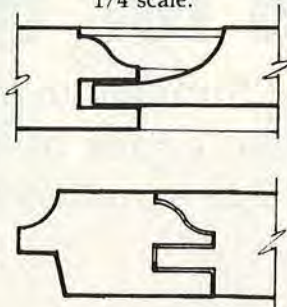
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SOUND ADVICE

Continued from page 12

POWER TOOLS

With tools designed for professionals, who may have to work outside, it's important for the cord to remain flexible during cold weather. To protect the tools, natural rubber or high-cost elastomer jackets are used. Less-costly cords are sheathed with polyvinyl-chloride (PVC) material.

In addition, on the pro tool the cord protector leading into the tool is separate from the cord to facilitate replacement. On the consumer tool, the protectors are molded onto the cord.

**Switches.** Dust and frequent usage are the enemies of tool switches. Since professional tools are subjected to more of both, switches need to be heavy-duty and protected from dust.

**Motors.** Professional-quality tools have motors designed to generate more power and sustain overloading for longer periods than consumer tools. At the same time they must be light enough for tradespeople to use for a long time. To guard against short-circuiting at high temperatures and speeds, manufacturers coat the windings of better-quality motors with epoxy.

More-expensive tools have copper windings rather than aluminum ones because, while copper costs more, it makes the motor more powerful.

Precise positioning of the carbon brushes, which transfer electricity from the electrical outlet to the motor, also sets professional tools apart from consumer tools. On the former, the brushes are held by close-tolerance brass holders rather than by the high-impact plastic ones on the latter.

Another difference is the type of bearings used. Gener-

Continued on page 94





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Working an entire edge with a pattern. The collar and pattern are in the lower position. The work is held to the pattern with several brads driven through the bottom of the pattern.

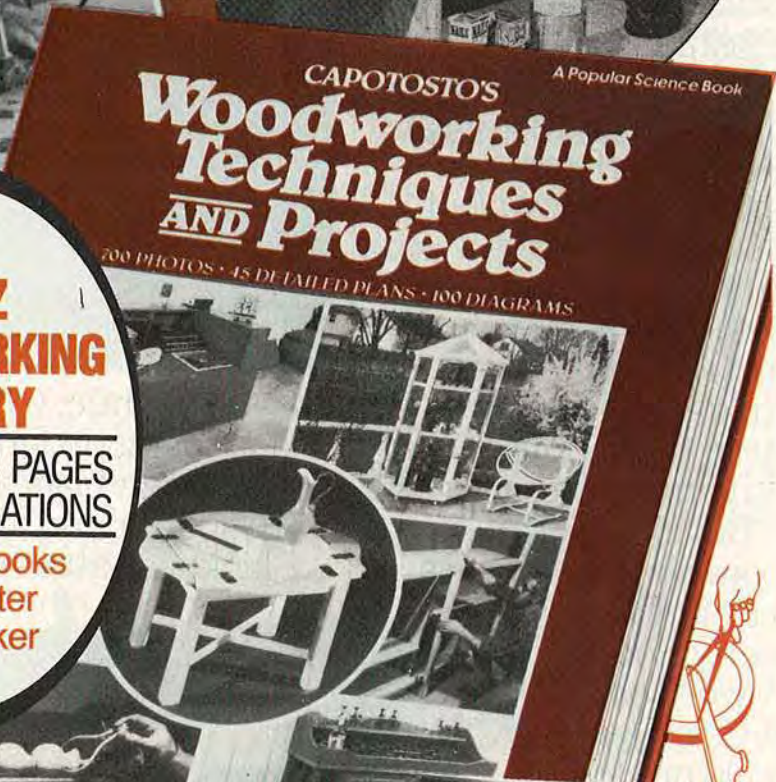
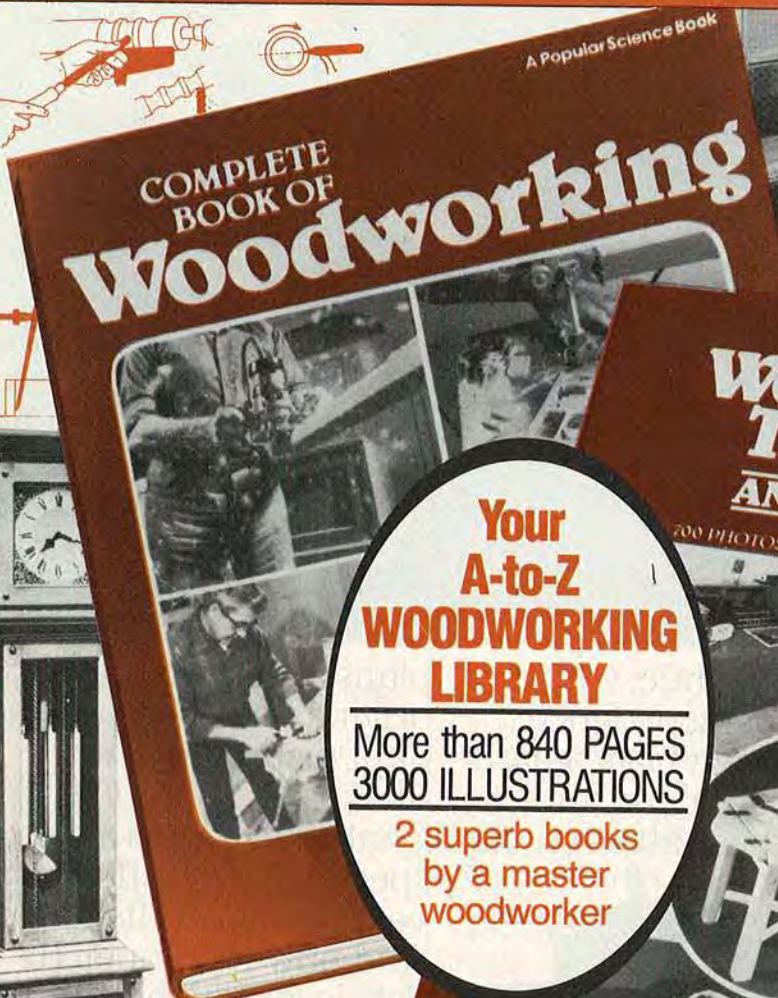


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## planning your home workshop

Having a specific place to do your woodworking makes sense. As with any other hobby, you'll need an area that's convenient, comfortable, well-organized, and with sufficient space for work and storage. Depending on your experience level, the number of tools you have, and the size of most of your projects, that space can be great or small, basic or elaborate, but you'll need a definite area for a workshop to call your own.

### Finding The Space

Available space, and your needs, will dictate where to locate your shop. The most likely places are basements, garages, and seldom-used rooms, but even closets and attics can be candidates. A basement, though, has several distinct advantages over other areas. It's out of the normal family traffic pattern, so your work won't be disrupting. More often than not, it has lots of unused space that can be put to immediate service as well as allow for expansion. And, basements make a comfortable working atmosphere — cool in summer and reasonably warm in winter.

There are, however, two limiting factors in using a basement: accessibility and dampness. First, you have to be able to get materials in and out without much difficulty. And if you can't control dampness by waterproofing or dehumidifying, you'll have to locate other shop space.

### Planning For Your Needs

Once you've found the site for your shop, take some time to plan on how to best equip it. The following pointers can help you decide on what to include, space permitting, of course.

- Selecting the right workbench for your situation is an all-important step since it will be the center of your woodworking activity. Full-size workbenches typically measure 6' to 8' long

and from 24" to 36" deep, with a height between 32" and 42". Because of space limitations, a bench in these sizes may not work for you. Or, standard heights may prove uncomfortable. So, obviously, you'll have to do some tailoring. A good rule of thumb to remember is that working height should be about even with your hipbone, but decide what will be best for you.

You can either buy or build a workbench that suits your needs. Ready-built ones, in kit form, are available from the simplest made of steel and particleboard to the most elaborate of joined oak or maple.

If you build your own, no matter what its finished size, use sturdy materials and strong fasteners that result in a durable, steady work surface.

- Storage for tools and liquids as well as many of the other supplies you'll accumulate is a must. Otherwise, they'll quickly clutter up the shop and make any project more difficult. Store small hand tools within easy reach on a rack made of perforated hardboard. Use inexpensive plastic organizers to hold screws, bolts, and other hardware. Flammable and toxic liquids, such as thinner, glue, and paints, as well as power tools, should be stored in locked cabinets or other safe places away from curious young ones.

- Plan for proper lighting. Have one or two overhead lights for general illumination and several more concentrated fixtures for task lighting.

- A minimum electrical supply for power tools and lighting is one 20-amp circuit with ground fault protection. Larger shops should have one circuit for power tools and another for lighting. Position outlets around the shop so power is never far away.

- An exhaust fan capable of changing shop air every four minutes provides adequate ventila-



Continued on page 22

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**SOUND ADVICE**

*Continued from page 21*

**planning your home workshop**

tion. Determine the size fan you need by figuring the cubic feet in your shop (length×width×height). You'll welcome this addition when gluing and finishing.

- Keep emergencies in mind. For warning against fire, you'll want to install a smoke detector. If one starts, have a good-size ABC-rated fire extinguisher handy. Battery-powered lights should be within reach in case of power failure. And a fully equipped first-aid kit will help you deal with injuries should they occur.

- Keeping the shop clean adds to safety and work efficiency. A broom and large dustpan are minimum. A shop vacuum is better. You'll also need a metal trash container with a tight-fitting lid to hold all the waste material you'll generate from project to project.

- A pair of sawhorses are a necessity for supporting bulky sheet goods and lengths of lumber while sawing or measuring. If space will be at a premium, consider buying the hinged, metal leg horses or the metal bracket type, both of which are easily disassembled for storage. You can build your own of scrap wood easily, and they'll be sturdier, but they will take up room.

- Lumber, hardwood, and sheet goods require storage, too. All wood should be kept off a concrete floor or it will take in moisture. Construct flat racks for your woods if you have the space. Otherwise, sheet goods can stand on edge, file card fashion, if propped so they won't bend or bow. Floor space may be limited, so look above for the possibility of overhead storage.

Once set up with the basics, you'll be able to work comfortably and efficiently, adding touches as you go along to complete your workshop.

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## TIPS FROM YOUR SHOP (AND OURS)

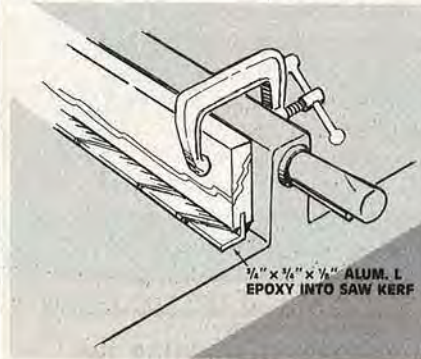
In woodworking, no one knows it all. But through experience, we all have run onto better, safer, faster, or easier ways to do things. When we come up with interesting tips or techniques, we'll show them to you in this column. And when you share your favorites, we'll pay you \$25 for each submission we publish. Send your tips to:

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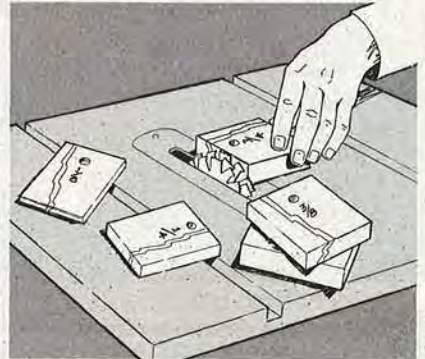
### Thin stock rip guide

Plastic laminate and other thin stock has a tendency to slip under the rip fence of your table saw while you're making the cut. TIP: Build this easy-to-make barrier that clamps to the fence. Run a centered groove along the length of a piece of 1X material; the stock should be almost as long as your rip fence. Use epoxy to glue in a strip of 1/8" x 3/4" x 1/4"-inch aluminum angle. Use C-clamps to hold the guide in place against the fence while sawing.



### Handy blade-height gauges

Measuring the depth of cut for various wood thicknesses on a table saw involves a lot of adjusting and readjusting. TIP: Gather scraps of plywood or other stock in common thicknesses you normally use, then cut them into uniform squares. Label each for permanent reference. Keep them handy by drilling a hole in each and hanging on a peg, or string them up necklace-style. They're a real time-saver.



Continued on page 24

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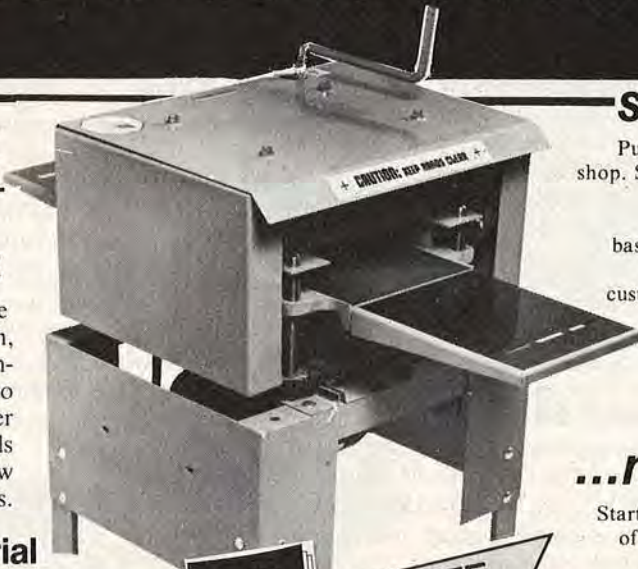
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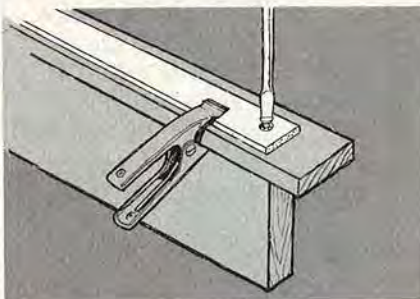
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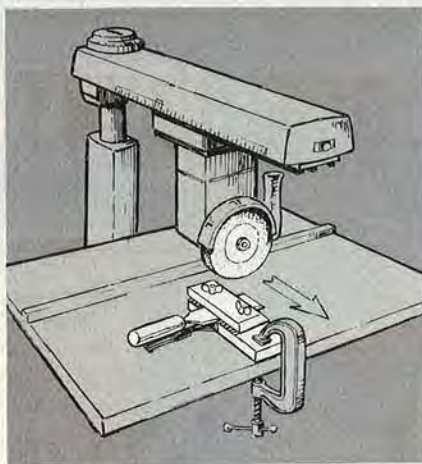
## TIPS FROM YOUR SHOP (AND OURS)

### Finish protector



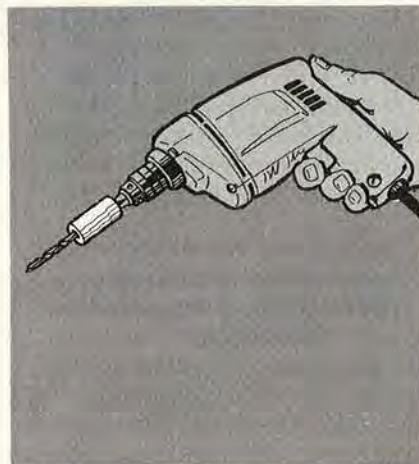
Ever have a finely sanded or finished surface disfigured by just one slip of a screwdriver? TIP: It need not happen again if you remember this trick. Simply drill a hole the exact size of the screwdriver you're using in a piece of thin stock ( $\frac{1}{4}$ " plywood works well for this), then clamp it in place over each hole before you begin fastening.

### Radial arm sharpening jig



Chisel and plane blades are tough to hone because they require a hollow or concave bevel that keeps edges sharp. Even if you use a grinder it's hard to be true. TIP: Build a jig, as shown, from plywood or other scrap and two bolts fitted with wing nuts. Fasten a grinding wheel to your radial arm saw, then adjust the position of the jig and the grinding wheel height to achieve the proper angle. Controlled passing of the radial arm does the rest.

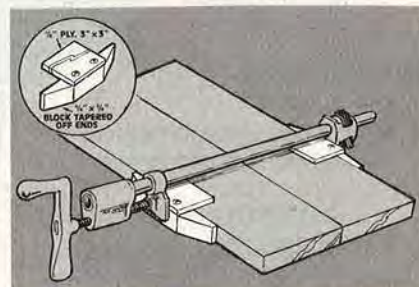
### Depth-of-hole control



Without a drill press, accurate control of hole depth with a hand-held electric drill is difficult at best. TIP: Drill a hole in a short length of dowel that's large enough in diameter that it won't split and fits snug on the bit. To adjust for depth of hole, vary the dowel's length and the placement of the bit in the chuck. You can make several of these for a variety of depths to keep on hand, or toss it when finished.

### Stay-in-place clamp pads

When clamping glued-up stock, the pads you use between the clamp jaws and the stock fall out before you can tighten the clamps. TIP: Add top flanges to your pads as shown to form L-shaped devices that ride on top as well as against the material you're clamping. Make several, using hardboard or thin plywood glued and screwed to your normal pad material. Keep them handy for the times you use pipe or bar clamps.

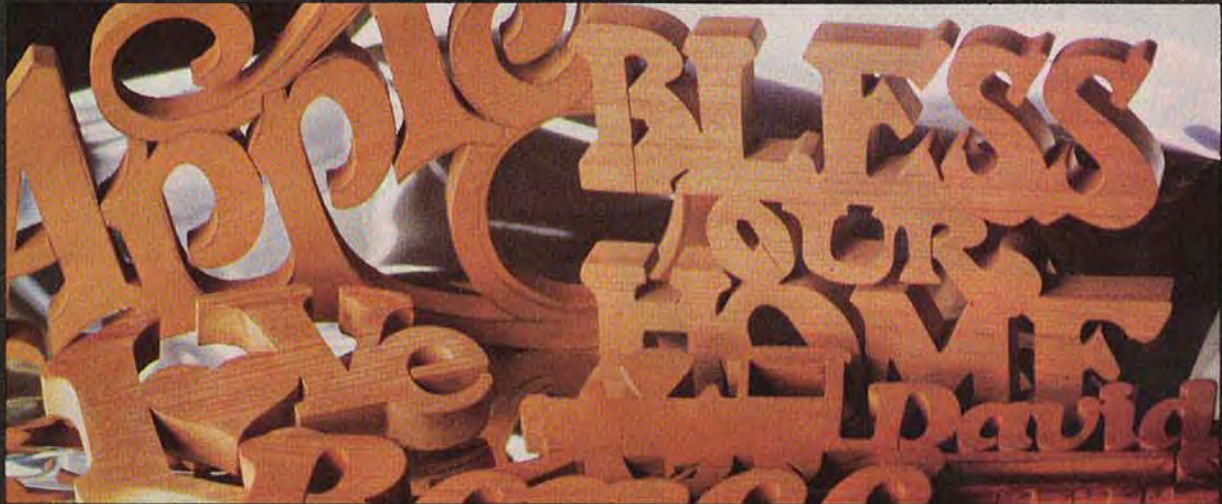


Continued on page 27

WOOD MAGAZINE SEPT./OCT. 1984



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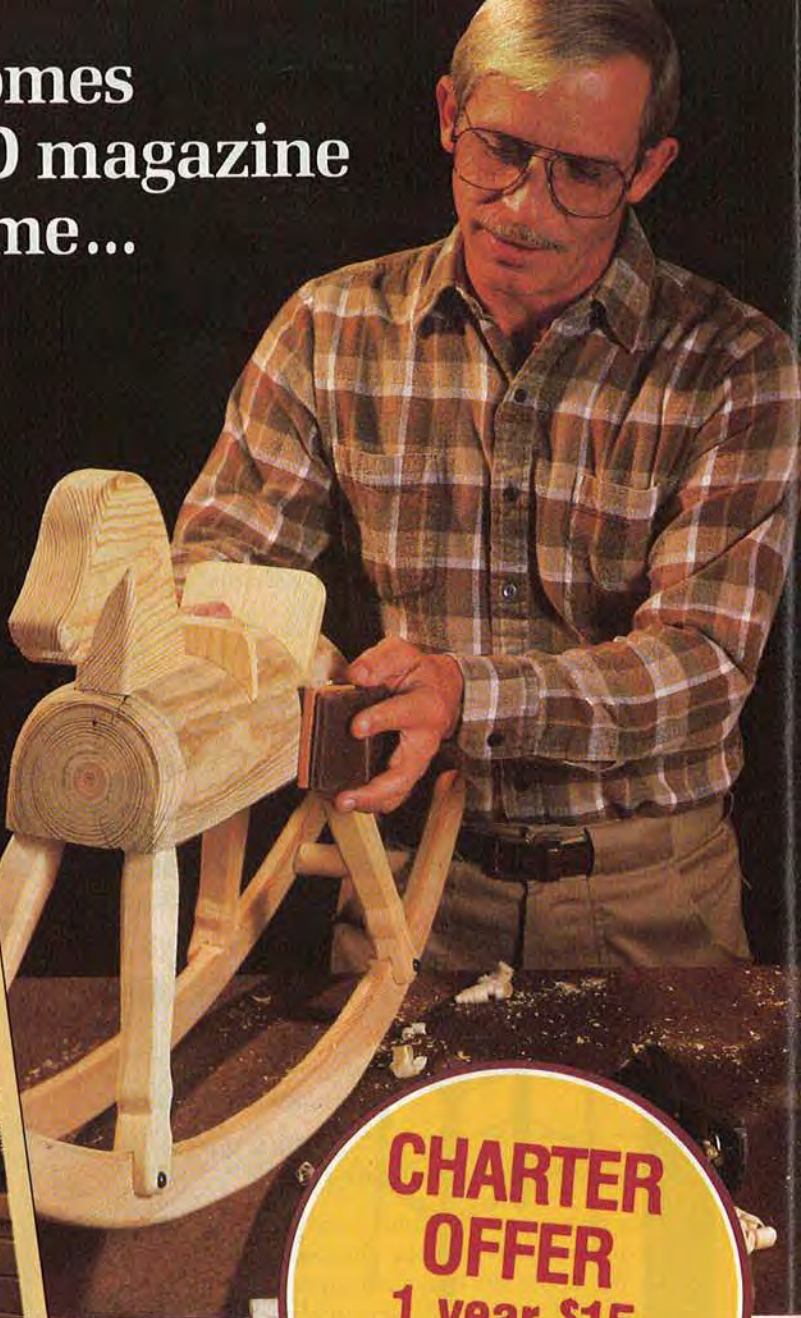
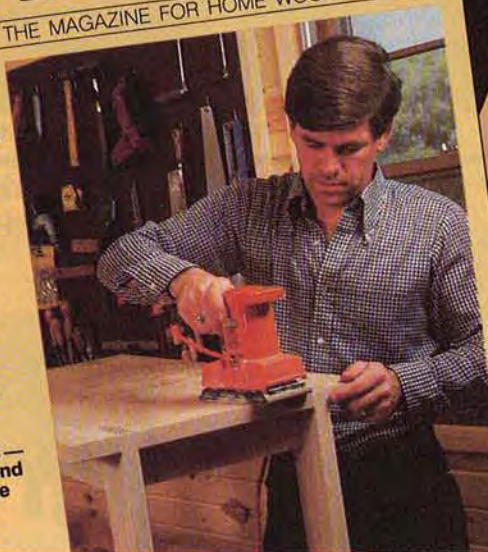
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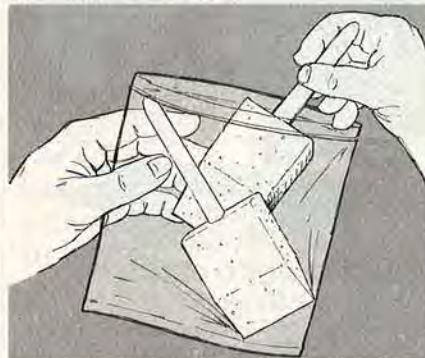


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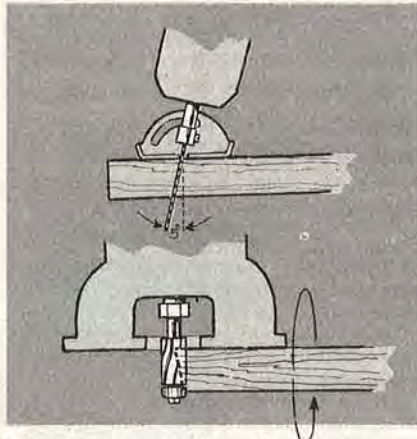
## TIPS FROM YOUR SHOP (AND OURS)

Continued from page 24  
**Airtight storage**



Those little foam brushes are great, but they dry out between coats. TIP: Store them for the second coat in zipper-locking plastic freezer bags. They're airtight, so they will keep the brushes pliable until you need them.

**Trueing curved cuts**



Curved cuts made with a saber saw aren't top-to-bottom square because the blade leans. TIP: Use both a saber saw and router for a true edge. Make the cutout with the saber saw blade set at an angle away from the piece. Turn the board over and rout away excess with a carbide straight cutter bit. Set the bearing guide to protrude halfway below the board.

**Brush away buildup**



Resin and contact adhesive build up on router bits, reducing cutting efficiency. TIP: To clean yours, apply lighter fluid, or gum and pitch remover, and scrub them with a toothbrush. Apply periodically.

Continued on page 29

# STERLING HOMECRAFTSMAN BOOKS

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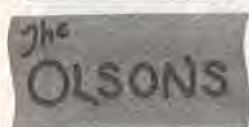
by **Richard Blizzard**

The ultimate toy book—more than 50 toys are in this oversized project book for every level of woodworker—from simple to complicated toys, large scale riding toys to miniatures.

Every project includes a detailed cutting list, careful directions and clear large drawings, plus almost every one is illustrated in gorgeous full color. The toys are fabulous—they move, turn, spin, roll or they create a miniature world—and will bring hours of happiness for any child. Discover how to make:

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- ★ Techniques for making and fitting carving designs on wood surfaces and creating panels, cabinets, doors and wood signs
- ★ Routing techniques for dovetails plastic laminates joints and surfaces as well as the use of templates and patterns
- ★ Money-saving ways to make jigs and fixtures that will help in unusual routing techniques and production carving machines
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Whether you own or are buying any plane—block, rebate, plow, combination or multi circular router, power or even a scraper—this book has all the information, even down to comparisons between manufacturers and models. Nothing is omitted, no basic operating procedure or specialized technique—making this a shop reference you can't afford to be without. 192 pages, 8 × 10, over 250 photographs, drawings and diagrams, bibliography, glossary, index **Paper \$9.95**

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Plus, in the second section practical examples of all these techniques—goblets, egg cups, peppermills, cheese and chopping boards, tables, lamps, dishes, jars, containers of all sizes and shapes, and dozens of other designs. He even covers woodburning and laminated and checkered turning. **BONUS:** Turning with unseasoned wood, wood selection, and even making copies of pieces you admire. 256 pages, 7½ × 9¾, 140 photographs and 10 line illustrations, index

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### MAKING WOOD DECOYS

by **Patrick Spielman**

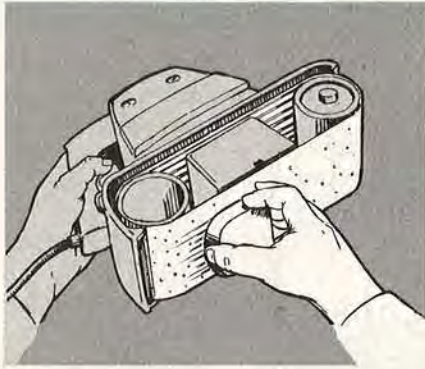
Both beginners and advanced woodworkers can now turn out classic working and decorative wood decoys from the easy, step-by-step directions of an expert craftsman. Over 200 photos (15 ducks in full color) and 24 popular scaled patterns help illustrate how to draw, carve, paint, and finish your decoys. Includes types of wood, essential equipment (decoys can be made with both hand and machine tools), the intricacies of feather detailing and shaping techniques, as well as tips and advice on how to develop your own style when creating these classics. Bonus features:

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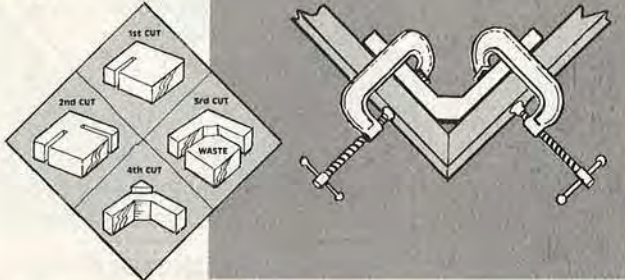
## TIPS FROM YOUR SHOP (AND OURS)

### Sander belt revitalizer



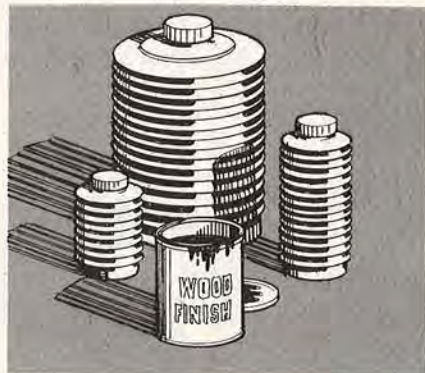
Sander belts clog up quickly and need replacing. TIPS: An old, hard, crepe-soled, shoe heel does a great job of removing resin and sawdust buildup. Hold it against the moving belt and watch the belt come clean.

### Miter clamp blocks



Sometimes, clamp blocks become glued to the miter joint. TIP: Cut practically glue-proof ones from blocks of scrap plywood or hardwood. Make your cuts in the order shown here. The fourth cut is a chamfer that provides space between the block and the joint so squeeze-out won't adhere.

### Collapsible varnish storage



Partially filled varnish cans tend to "skin over" quickly. TIP: Pour the remaining unused varnish into a plastic, bellows-type container obtainable from photographic equipment suppliers; it allows you to squeeze out any air that's inside before capping. The less air, the less reaction.

Continued on page 30

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305/561-1716

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Highland Hardware  
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Atlanta, GA 30306  
404/472-4466

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House of Tools  
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Downers Grove, IL 60515  
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### INDIANA

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South Bend, IN 46637  
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Davenport, IA 52806  
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Paxton Beautiful Woods  
Frank Paxton Lumber Co.  
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Des Moines, IA 50309  
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Woodworking Supplies  
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Louisville, KY 40204  
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Rogers, MN 55374  
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St. Louis, MO 63042  
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Richardson, TX 75081  
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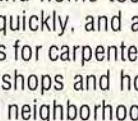
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3105 Cut Saw	170.00	109.50	10.00	99.50
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3330	1 HP Router	99.95
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DR-10	Cordless Screwdriver	98.50
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D6V	1/4" Var. Speed Rev. Drill	171.00
D10V	3/8" V Sp R Drill	74.95
D13V	1/2" Var. Sp. Rev. Drill	99.75
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F1000A	Planer/Jointer	1375.00
JG-60A	Jig Saw	103.50
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SO-110A	1/2 Sheet Sander w/dust bag	119.95
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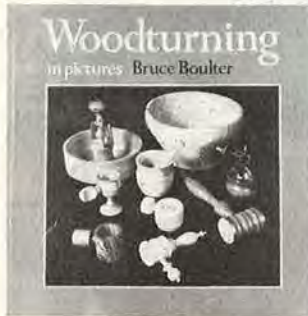
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	60	1.05 ea	.92 ea
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	40	1.10 ea	.97 ea
3"x24"	120,100	1.20 ea	.93 ea
Assortment of 10	80	1.22 ea	.97 ea
	60	1.26 ea	1.12 ea
	50	1.31 ea	1.15 ea
	40	1.34 ea	1.18 ea
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Assortment of 10	80	1.73 ea	1.51 ea
	60	1.78 ea	1.64 ea
	50	1.85 ea	1.70 ea
	40	1.89 ea	1.76 ea



## BOOKS WORTH READING

### Woodturning in Pictures

by Bruce Boulter.  
Sterling Publishing Co., Inc.,  
Two Park Ave.,  
New York, NY  
10016. 1983.



144 pages.  
\$12.95

An informative, inspirational book for woodturners of all abilities. Bruce Boulter combines lessons learned in thirty years of woodturning with nearly 500 photographs to compile a practical guide to lathe work. With a familiar and encouraging style, Boulter offers his methods and ideas without becoming bogged down in technical or artistic discussions. Most pages have three to four photographs that illustrate the author's concise, step-by-step instructions on proper turning technique. While the quality and number of these illustrations are certainly the book's strength, they also present a problem. Boulter has neglected to somehow identify each of his photographs, and this makes the references in the text confusing.

The author begins with two brief sections on sharpening—an important topic often not given enough attention. Next, he talks about preparing stock for the lathe, and then devotes a chapter to each of the principal turning tools. Boulter neatly guides the reader through the fundamentals of turning between the centers while he is discussing the tools. He then addresses bowl turning with the same thorough and enlightening approach.

One he has laid this groundwork, Boulter explores a broad range of turning possibilities. He describes dozens of turning projects, from nutcrackers to goblets to sandglasses, and reveals his methods for each.

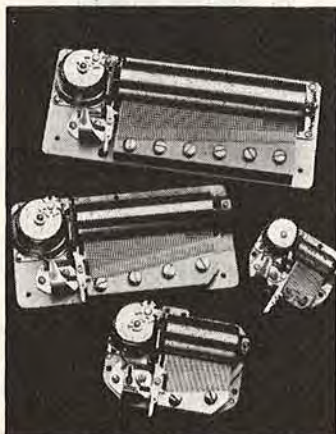
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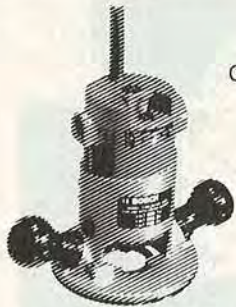
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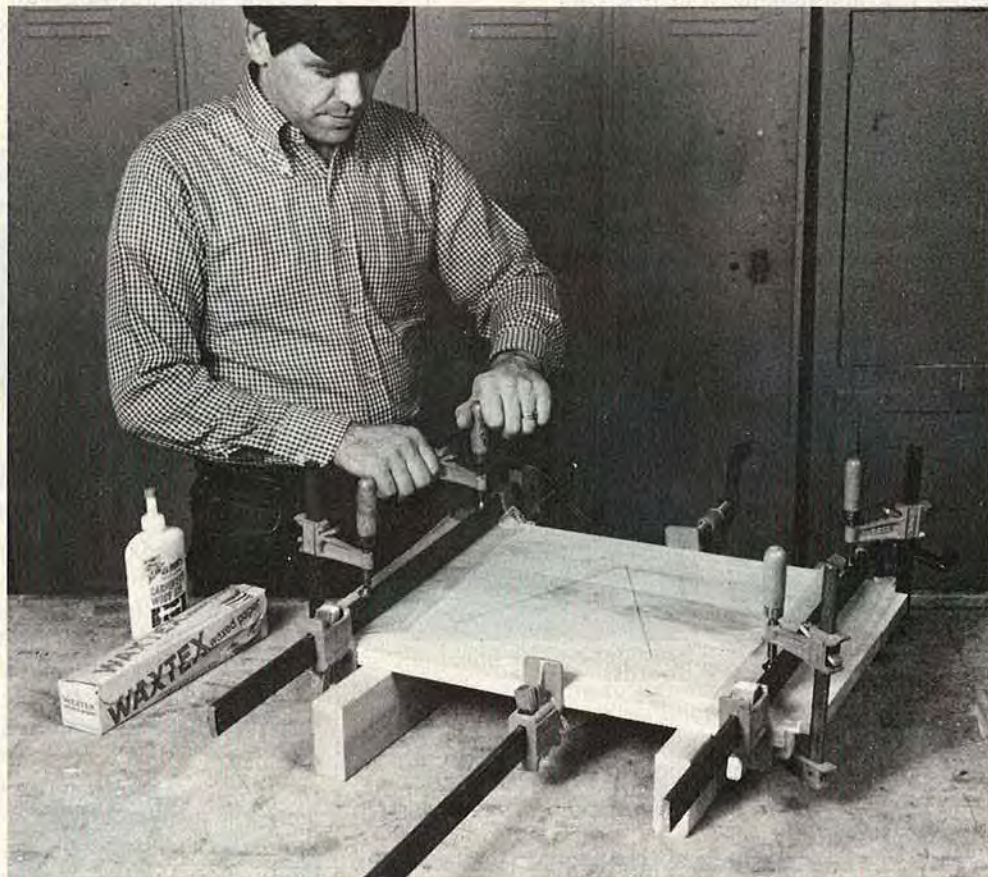
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# how to edge-join boards

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**Knowing how to edge-join boards brings with it a couple of advantages every woodworker should have. First, this know-how allows you to build larger items from solid wood than otherwise would be possible. And second, by gluing up stock, you can use boards that might otherwise be relegated to the scrap bin, and by doing so save the money you'd spend purchasing additional material.**



**W**hile there are numerous (and more difficult) other ways to join wood edge-to-edge, we've opted to focus on three good (and relatively easy) ones—butt joints, dowel joints, and spline joints. Why? Two reasons, actually. We believe that in most all woodworking situations, one of these will yield good results. And further, none of the techniques requires a lot of expensive equipment.

## PREPARING THE BOARDS FOR JOINING

As with most other things, how successful you are at joining boards depends greatly on how well you prepare—the mating edges in this case. No amount of clamping pressure will make up for an edge that's either uneven or out of square. In fact, you should never have to apply more than moderate pressure to any boards being glued up.

## Selecting the Board(s)

First, determine how much lumber you need for your glued-up surface. No two boards have the same color and grain characteristics, and each board will react differently to humidity and temperature swings. For these reasons, it's best, *if possible*, to get all of the pieces you need from one board.

When selecting the stock, make sure it isn't bowed or cupped and that it has a grain pattern and coloration you like. If you have to get more than one length, make sure they're compatible with each other.

## Rough-Cutting the Boards to Length

Maneuvering a long length of stock isn't easy even in the open, much less in a crowded, and usually under-

*Continued*

sized shop. So, it makes good sense to cut it down to size right away. Start by checking the board for splits, squaring off one end beyond the split portion as shown below, left, and making your first cut.

Now, using a tape measure, make cutoff marks at the appropriate points along the board. You'll want each board to be an inch or so longer than the finished length. This allows you to make minor alignment adjustments, square up the finished surface, and have enough length. Crosscut the stock as shown below, right.

**NOTE:** If the lumber you're using has been surfaced on three (S3S) or four (S4S) sides, you can skip the next section and continue with the heading Ripping the Stock to Width.



### Straight-Line Ripping the Boards

As a customer service, some lumber suppliers surface three or more sides of boards because many customers don't know how to straight-line rip boards. Actually, it's a straightforward technique you can master the first time you try it.

You'll need a piece of scrap plywood or lumber that has at least one straight edge and that is as long or longer than the stock you're ripping. Place the scrap on the piece you'll be ripping so the scrap extends out beyond the edge of the board by a ¼ inch or so. Tack the scrap in place with 4-penny finish nails, as near the ends as possible so the nail holes will be cut off when you cut the boards to the finished length.

Now, measure the distance from the straight edge of the scrap piece to the intended cutoff line. Set the rip fence that same distance from the blade of your table saw. After tightening down the rip fence, check the distance from either edge of the miter gauge slot to the rip fence as shown in the next column, top left photo, to ensure that the fence is parallel to the blade.

**Comment:** Some woodworkers prefer to position the far end of the rip fence slightly farther away from the blade than the near end. They say it relieves the wood after it passes through the blade and results in less heat buildup of the blade and less burning of the edge of the stock. You may want to test this theory and see what you think.

Then, raise the saw blade to its highest position and check to make sure it is set at 90 degrees to the cutting surface. Lower the blade to its cutting height (slightly higher than the thickness of the material), then feed the

stock through the saw as shown below, right. (For photographic clarity, we've shown the blade guard off.) If you're straight-line ripping narrow stock, it's best to run the stock through with the scrap piece against the tabletop rather than the way shown. This procedure gives you greater control against tipping the stock.

The above procedures also work well if you're using a radial arm saw instead of a table saw.



### Ripping the Stock to Width

Once you have one of the board's edges straight, you can then rip the stock to the correct width. To do this, first set the rip fence the correct distance from the blade. If you plan to run the edges of the boards through a jointer later, allow in your calculations for the thickness that will be shaved off. Then, with the straightened edge against the rip fence, run the lumber through the saw again as shown here. Be sure to use a push stick to help feed the material through, and take care to keep your hands away from the blade.



**Comment:** Most woodworking experts agree that to minimize the problems associated with wood's tendency to cup, it's advisable to construct joined surfaces with boards no wider than 6 inches. Some prefer to work with boards in the 3- to 5-inch range.

### Making Up for Width

Lay the ripped lengths of stock next to each other, arranging them in such a way as to achieve the best grain and color match. If knots or other defects don't preclude this, lay the boards with the end grain of adjoining pieces alternating. Doing this helps prevent the joined surface from warping.

Now, on a flat surface, check the boards for a snug fit against each other. Turn all of them over and make sure all is well on the back side too. If you detect any irregularities, you will have to readjust your saw blade so it cuts at 90 degrees and run the boards through again, or if you have a jointer, run them through it. (Remember, you can't bully the boards into alignment.

even with extreme clamp pressure, if the edges of the boards aren't true.)

Turn the boards right side up again and make alignment marks on the face of the boards so you can realign them later. We use an "invert-V" system (see photo at right), though you can mark them however you wish. These marks also help you identify the front side of the boards.



*Comment:* Up to this point the procedures are the same no matter which of the three joinery methods you plan to use. But from here on out, there are differences. If you plan to butt-join the boards together, you can skip the next two sections and pick up the text again at the head **CLAMPING THE STOCK.**

### THE SPLINE JOINT — FURTHER EDGE PREPARATION AND GLUING UP

You can cut grooves in the edges of a board several different ways. Here, we show you how to do it with a router and slotting cutter and with a table saw fitted with a dado blade. We also talk about making the grooves with your table saw blade.

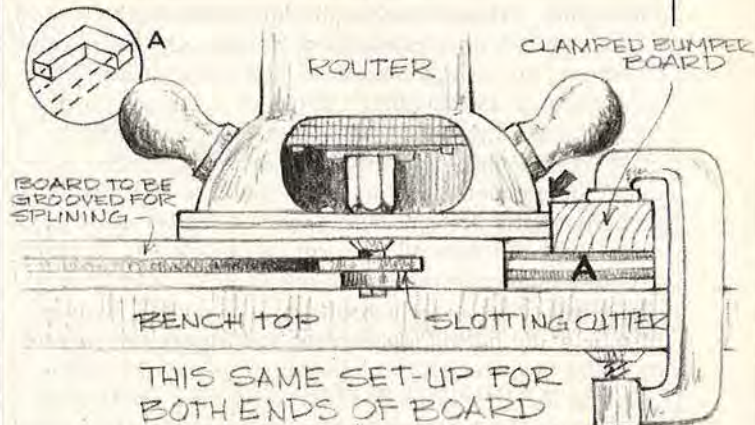
**If you have a router and a slotting cutter** with a ball-bearing pilot (the Bosch model we purchased cost around \$24), set the depth of the cutter so the groove will be in the center of the board's edge. The photo here shows a good way to make sure of your setting. You should double-check the setting by running the cutter through a piece of scrap before trying the real thing.



Once you're satisfied with your adjustment, clamp the board to be grooved to a bench top. (Make sure you know which edges need grooves and which ones don't. We goofed once and had to rip another board and reshoot another photo of this step.)

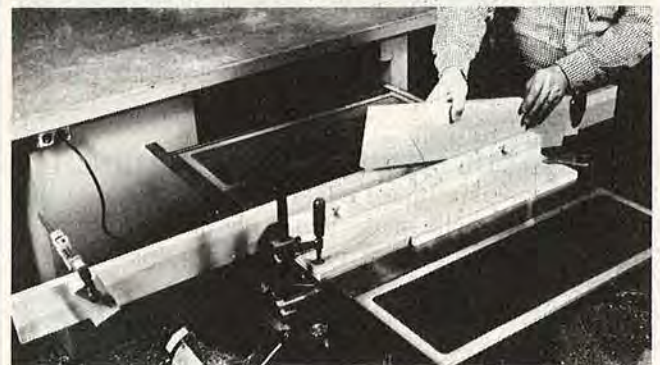
Most times, you'll want to stop the groove short of each end so the spline won't show at the ends of the joined surface. The sketch at the top of the next column shows how we accomplished this without too much difficulty. We made a plywood and scrap lumber jig that not only keeps the board from moving back and forth while being grooved but also provides for positive start and stop positions for the groove. Simply clamp the jigs in place and you're ready to rout the groove as shown in the photo beneath the sketch.

**To cut grooves with a table saw,** first fasten an auxiliary fence to the rip fence and fasten stop blocks to the auxiliary fence to provide positive stop and start positions for the grooves. To keep the board from enter-



ing the blade at an angle, we clamped our resawing jig to the table, allowing just enough room for the board to pass between it and the auxiliary fence.

With the arrangement shown below, the only way you can make a mistake is to lower the wrong edge of the board into the blade. Here again, you would be wise to test your cut on a scrap first to make sure the groove is centered. Typical groove depth is  $\frac{1}{2}$ "; in  $\frac{3}{4}$ " material, the width can be  $\frac{1}{8}$ " or  $\frac{1}{4}$ ". As mentioned earlier, there are a couple ways to do the grooving with a table saw. If you cut  $\frac{1}{8}$ "-wide grooves, your table saw



blade will do the job just fine. However, if you make your grooves  $\frac{1}{4}$ " wide, a dado set or blade is the best way to go. Otherwise, you'll have to run all the boards through once, then adjust your fences and make another pass.

*Comment:* Make sure you run all of the boards through with either the front side or the back side facing the rip fence. By doing this, you can compensate for not having centered the grooves, if that's the case.

Continued

## SHOP TESTED TECHNIQUES

The **spline material** used as the link between the boards can be either plywood or hardboard. To make the splines cut several lengths of material that are  $\frac{1}{16}$ " narrower than the combined depth of the grooves. To accommodate the arc-shaped cut that circular cutters make as they enter and leave a material, you need to shape the ends of the spline material so it will seat properly in the bottom of the grooves. Saber saws, jig-saws, and band saws all perform this task easily.

Before gluing up the boards, be sure to insert each spline and check it for a good fit. The splines should fit snugly, but not impossibly so. You may find it helpful to round over the edges of the spline material before inserting it.

**To glue up the boards**, start by running a bead of glue down each side of one of the mating grooves. This ensures adequate glue coverage. Insert the spline into



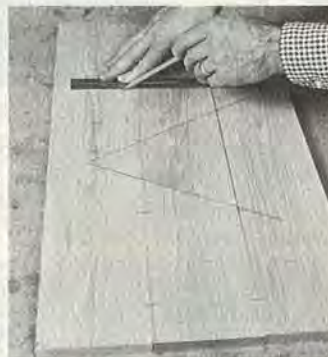
the groove as shown above. Now, spread an even coat of glue along the edge of the board. Repeat the same gluing procedure with the groove and edge surface of the mating board. Fit the boards together, carefully aligning the marks you made earlier on the face of the boards.

That's all there is to it. Now you can skip over to the head **CLAMPING THE STOCK**.

### THE DOWEL JOINT — FURTHER EDGE PREPARATION AND GLUING UP

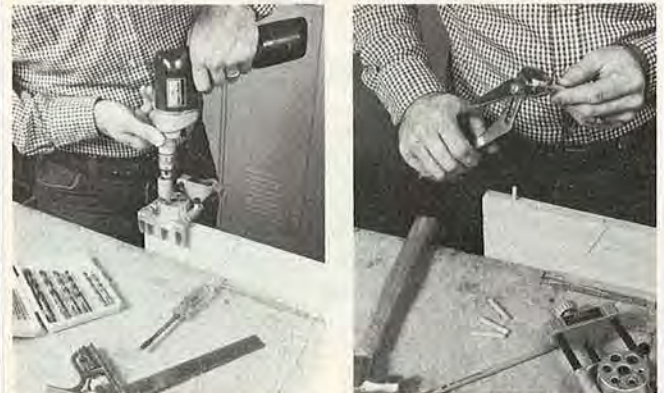
**To further prepare board edges** for gluing up, start by carefully aligning the marks you made on the face of the boards. Then, using a square or other straightedge, make a series of pencil marks as shown here. Make one set of marks an inch or so in from each end of the finished surface and several other sets equidistant from each other. Space the marks from 8 to 12 inches apart. These marks serve as register marks for a doweling jig or drill press.

Now, clamp each board into your vise, and align the register mark on the doweling jig with the marks



on the board's face. (Each of the doweling jigs we've used operate somewhat differently, so you'll have to read the directions that come with each to find out exactly how it works.)

Fasten the jig to the board you're working on, then drill the hole as shown below, left. Notice that we



have a depth-gauge collar fastened to the drill bit. This stops the bit at the correct depth, which is  $\frac{1}{16}$ " deeper than half the length of dowel pin you're using. (A piece of electrical tape wrapped around the drill bit will work, too.) Prepackaged hardwood dowels generally come 2 inches long in a variety of diameters.

For this project, we fashioned our own dowel pins from  $\frac{1}{4}$ " dowel rod. As you can see, above, right, we fluted the pins with a slip-joint pliers to allow for escape of glue that can build up. Failure to allow for this can cause the wood to split when put under pressure.

After drilling the first hole, drive one of the dowel pins into it to make sure your depth setting is correct. If it is, drill the remainder of the holes.

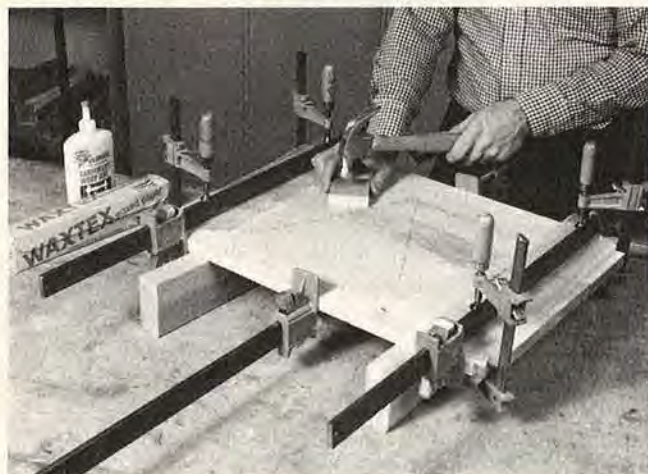
**To glue up the boards**, begin by dropping a bead of glue down each side of each mating hole. Insert the dowel pins and tap them home. Spread an even layer of glue on the edge of each mating board, then align the holes and tap the boards together as shown below. Don't worry too much about driving them completely together at this point; the clamps will take care of that later.



*Comment:* Some glues, most notably woodworker's (aliphatic resin) glue, set up rapidly, so don't waste much time between applying the glue and clamping the project. In fact, you should have everything necessary to clamp the boards together ahead of time.

### CLAMPING THE STOCK

Ultimately, the glue you use will hold the boards together, but to get them into tight contact with each other, you need to clamp them for a time. How much time is a subject of discussion among woodworkers. Manufacturers of woodworker's glue often recommend that you clamp the project for 30 minutes. We clamp our projects for at least several hours, and sometimes overnight, before further machining.



The photo above depicts the way we handle the clamping procedure when gluing up stock. Note that to allow access beneath the work for clamps, the boards rest on a pair of 2x4s. Once the register marks are aligned, you can begin clamping. Start at one end, and separate the clamp from the wood with a piece of waxed paper. If you don't do this, the metal and the glue can react to each other and stain the wood.

Tighten the first clamp only enough to draw the boards fully together, then move down 12 inches and position another clamp on the opposite face of the boards. Tighten it and the remainder of the clamps as before.

Now, check the surface of the joined boards to make sure they are aligned. The closer the boards are to being flush with each other at this point, the less sanding or scraping you'll have to do later. If you've used butt joints, you may be able to tap them into better alignment, as shown in the above photo.

Tighten the clamps, but don't overdo it. Too much pressure can actually cause distortion of the joined boards—something you want to avoid at all costs.

Note that we have quick-action clamps secured to each end of the end bar clamps. This helps ensure against bowing of the surface. You can also use wood screws or scrap secured by C-clamps to get this same job done. Note also that we have scrap wood strips

between the clamps and the stock we're joining. These strips not only protect the wood surfaces but also help apply equal pressure along the joint lines. Hardwood scraps work best because of their strength.

When you draw the clamps tight, the excess glue will squeeze out from between the joints. When you clean up the squeeze-out is a matter of personal preference. We like to let the glue set up for 15 to 20 minutes (or however long it takes the glue to form a tough skin), then use a chisel or scraper to pry up the semisolid glue. We've found that the skin that forms after several minutes' exposure to the air helps make this the ideal time to remove excess glue.

### PREPARING THE STOCK FOR FINISHING

Lots of woodworkers dread this part of any project, but if you let down here, you run the risk of botching the whole project. Remember that preparing the stock for finishing is every bit as important as the actual construction of the project itself. It's also time-consuming, but rest assured that your efforts will show through in the final product.

#### Removing Glue Squeeze-Out

If you elected to let the glue squeeze-out harden before removing it, scraping the surface with a paint scraper works well and quickly. The photo below depicts an easy way to secure the workpiece while you're scraping it. Two quick-action clamps hold a length of scrap at the end of the workbench. This same setup works well also when using a cabinet scraper or a belt sander.

Once you have the glue removed, cut the joined boards to finished length. Large workpieces can be tricky to cut square, so work carefully when feeding your project into the saw.



#### Smoothing the Surface

To even out the height discrepancies between joined boards, start by belt-sanding first with 60-grit open-coat abrasive, then with 100-grit, or using a cabinet scraper. If you belt-sand, hold the sander at a slight angle to the direction of the grain as shown in the top photo, next column, and keep the sander moving to avoid taking off too much wood in any one area.

Some people prefer to use a cabinet scraper instead

*Continued*

## SHOP TESTED TECHNIQUES



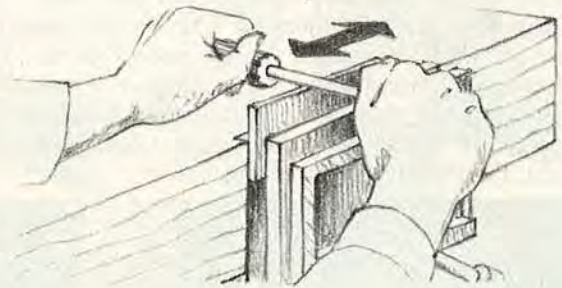
of a belt-sander to begin the smoothing process. And that's fine, but we think you can achieve the same results more quickly using a belt-sander.

To get rid of scratches that remain after belt-sanding, we use a 3"×5" hand scraper as shown below. The



key to hand scraping success is to have the scraper properly sharpened as you drag it across the surface of your project.

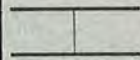
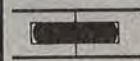

To sharpen (or "burnish") a hand scraper (even brand-new scrapers need this), start by clamping it in your vise. Then square off the edge of it with a file, and smooth off any file marks and wire burrs with an oil



stone. To effect the hooked edges that actually do the cutting, draw a screwdriver shank along both sides of the cutting edge several times as shown in the sketch. Commercial burnishers are available that do the same thing.


Hand-scraping will further smooth the surface, but it does leave hardly visible nicks in the wood where it begins each pass. So after hand-scraping, finish-sand with a straight-line or orbital sander fitted with 120- or 150-grit abrasive. And to round off the sharp edges of your projects, or to sand contours, use a sanding block with a soft surface under the abrasive.

### When to Use Which Joint

Joint Type	Common Applications	Tools Needed	Comments
<b>Butt</b> 	Tabletops, corners of case goods, raised panel doors, cutting boards, and other small edge-joined surfaces	Table or radial arm saw with a sharp, preferably carbide-tipped blade	Sharp tools a must. Edges have to be at 90° to achieve good results. This joint requires the least amount of machining of any joint.
<b>Dowel</b> 	Cabinet face frames, door stiles and rails, chair legs and stretcher rails, tabletops and case goods	Table or radial arm saw, doweling jig or drill press or dowel centers and a drill guide, drill bit (ideally a brad-point drill bit)	Easy joint. Good alternative to the more difficult mortise-and-tenon joint. Dowel pin size shouldn't be less than 1/8 the thickness of the stock being joined, nor more than 1/2 the thickness.
<b>Spline</b> 	Bench tops and tabletops, joining plywood to solid stock, end-joining materials, edging solid material to laminated material	Table or radial arm saw, dado set or dado blade, or sharp saw blade or a router with a slotting cutter	Best results are obtained by either a dado set or blade or a router and slotting cutter rather than with several passes with a regular saw blade.



# NOW YOU CAN BUILD IT

 Print this article

On the previous several pages, we talk about how to join wood edge-to-edge. Here, though, the focus shifts to a few of the good-looking, practical things it's possible to build using your knowledge of edge-joining.

We'll bet you can't get by building just one of the cutting boards shown here, especially after people start seeing your handiwork. Each and every one of the boards is a people-pleasing gift you're bound to get more requests for.

Not only are the boards quick and easy to build, but they are also very economical—you can fashion any of them using scrap wood you probably already have around your shop. For more information on how to build these beauties, just turn the page.


And if you're feeling a bit more ambitious sometime, you may want to try your hand at our contemporary oak coffee table. Though it's a larger project than the cutting boards, the table doesn't pose any construction problems most woodworkers couldn't handle.

We've styled it in such a way that it should fit into a variety of decors. And as we mention on the opening page of the project (page 50), its crisp lines allow for rescaling in the event you want to make matching end tables and sofa tables as well as the project we feature.

Designer: David Ashe; Photographers: Al Elder, David Jordan



# SIX CLASSY

 Print this article

# cutting boards



## The leaf

**1** Prepare parts A, B, and C by ripping the stock to width. Make sure your table saw is correctly set and that you're using a good, sharp, preferably carbide-tipped, saw blade. (We did not joint the edges, but you may want to.) Next, crosscut the pieces but leave an extra  $\frac{1}{2}$ " on the length to allow for squaring up later.

**2** Using resorcinol glue, glue up the alternating cherry and maple strips (A and B) as shown, and clamp securely. After the glue has formed a skin (about 20 minutes), remove any excess glue with a chisel or knife. Allow the glue to dry overnight.

**3** Sand the laminated stock smooth, then cut it to length, making sure that the ends are square.

**4** Cut the board on the diagonal (see the plan view) on a band saw or jigsaw. Sand smooth. If you joint the diagonal edges, make very shallow passes ( $\frac{1}{64}$ ") to avoid chip-out at the completion of each pass. Glue the remaining maple strip (C) to one of the halves.

Looking for a great gift idea you can build in a hurry? Relax! These intriguing designs are guaranteed to please any host or hostess.

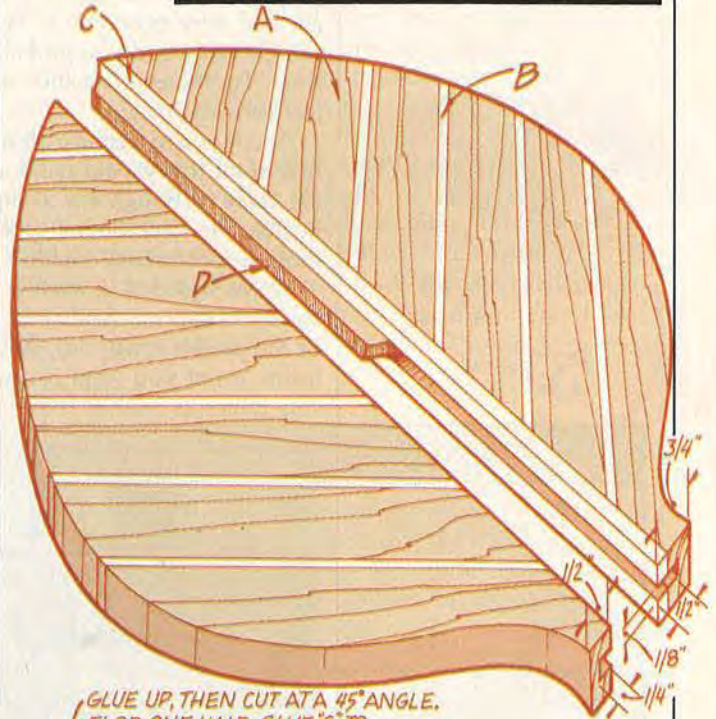
**5** Flop one of the halves and mark the top side of each half with an X. With the top surface of each triangle facing the rip fence of your table saw, cut grooves along both diagonal edges to accept the spline (D). You'll need a  $\frac{1}{8}$ "-wide  $\times$   $\frac{1}{2}$ "-deep groove in the half with the added maple piece; and a  $\frac{1}{8}$ "-wide  $\times$   $\frac{1}{4}$ "-deep groove in the other half. Apply glue to the spline, grooves, and edges, then clamp the two halves together. Let the glue set up briefly, then remove the excess. Allow the glue to dry overnight.

**6** Make a cardboard leaf pattern and trace it onto the glued-up stock. With a band saw or jigsaw, cut out the shape. Sand the outside edge smooth.

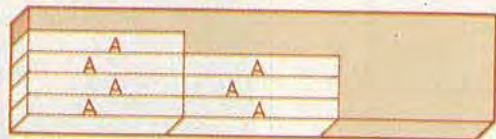
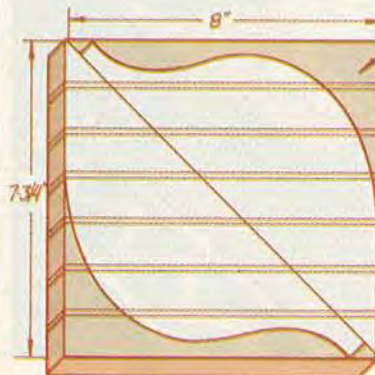
**7** Finish the cutting board with salad bowl finish or mineral oil.

Bill of Materials					
Part Name	Finished Size			Material	No. of Pieces
	T	W	L		
A	$\frac{3}{4}$ "	1"	8"	cherry	7
B	$\frac{3}{4}$ "	$\frac{1}{8}$ "	8"	maple	6
C	$\frac{3}{4}$ "	$\frac{1}{4}$ "	12"	maple	1
D	$\frac{1}{8}$ "	$\frac{3}{4}$ "	12"	hardboard	1

**Supplies:** Resorcinol glue, salad bowl finish or mineral oil



GLUE UP, THEN CUT AT A 45° ANGLE. FLOP ONE HALF, GLUE C TO ONE EDGE, THEN GROOVE



$\frac{3}{4}$ "  $\times$  5- $\frac{1}{2}$ "  $\times$  24" CHERRY



$\frac{3}{4}$ "  $\times$  3- $\frac{1}{2}$ "  $\times$  12" MAPLE

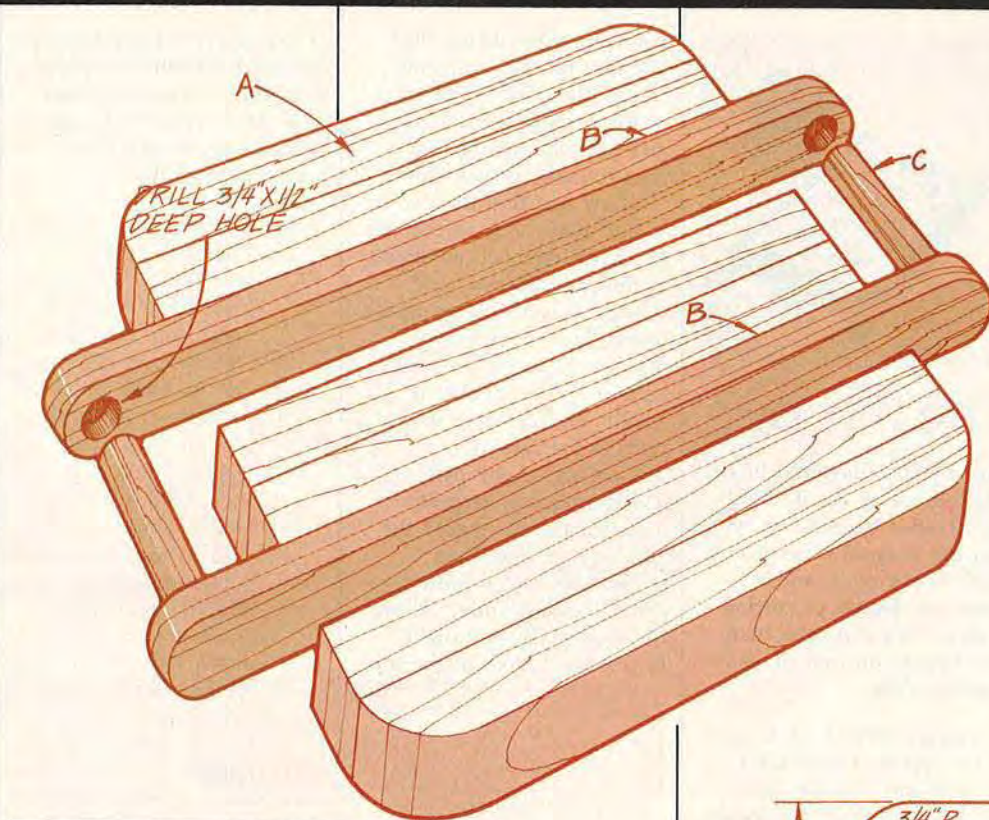
**Cutting diagram**



## The tray

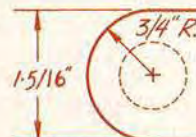
The lucky recipient of this handsome cutting board will have a reminder of your handiwork for years to come. It's built to last. And it's large enough to double as a serving tray when the need arises.

- 1 Prepare the six pieces of maple stock (A) on your saw. Rip the stock to width first, then crosscut to length, plus  $\frac{1}{2}$ ". Glue and clamp these boards together two at a time, alternating the grain direction, to make three sets. Use resorcinol glue and remove any excess after the glue forms a skin. Allow these sets to dry overnight.
- 2 Cut the two pieces of walnut (B) to size on the table saw. Locate a point on each of these pieces that's  $\frac{3}{4}$ " from each end and on the centerline. With a compass, draw a  $\frac{3}{4}$ " radius from each of these points. Then, using these same points, drill a  $\frac{3}{4}$ "-diameter  $\frac{1}{2}$ "-deep hole in each of the ends. Set the walnut pieces aside.
- 3 Sand the maple sets smooth and cut them to length, making sure the ends are square. Take two of the maple sets and mark a  $1\frac{1}{2}$ " radius on each of the outside corners. Then, using a band saw, jig saw, or coping saw, cut the round contours on the ends of the walnut and maple pieces. Sand the sawn edges smooth.
- 4 The handles (C) for this project are made of walnut

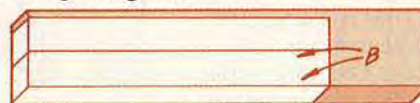


Bill of Materials					
Part Name	Finished Size			Material	No. of Pieces
	T	W	L		
A	$1\frac{3}{16}$ "	$1\frac{1}{2}$ "	$13\frac{3}{4}$ "	maple	6
B	$\frac{3}{4}$ "	$1\frac{5}{16}$ "	18"	walnut	2
C	$\frac{3}{4}$ " dia.		4"	walnut dowel	2

**Supplies:** Resorcinol glue, salad bowl finish or mineral oil



### Cutting diagram

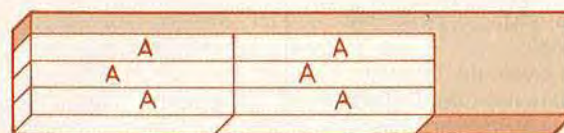


$\frac{3}{4}$ " X  $\frac{3}{16}$ " X 24" WALNUT

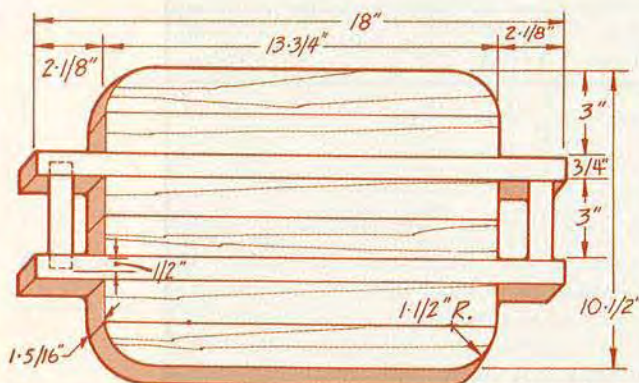
dowel. You can purchase walnut dowel rod through woodworker's specialty stores or catalogs. Or, if you have a lathe, you can turn the dowels. Cut the dowels to length.

5 Dry-assemble the entire project to check for fit. Disassemble, then glue all parts of the tray, using resorcinol glue. Before applying final pressure with the clamps, make any final adjustments necessary to make sure all parts are properly aligned.

6 Allow the glue to dry overnight, then sand the tray smooth. Use salad bowl finish or mineral oil to finish the project.



$1\frac{5}{16}$ " X  $5\frac{1}{2}$ " X 36" MAPLE



Continued

# NOW YOU CAN BUILD IT



## The hot one

This Mexican-inspired board has lots going for it. With the ceramic tile side up, you can use it as an elegant hot pad. Flip it over, and it's ready for plenty of cutting action. You can even hang this beauty on one of your kitchen walls.

1 Prepare parts A, B, C, and D by ripping walnut stock on your saw. (Note: You'll need to resaw part C—shown on the cutting diagram—into two  $\frac{1}{4}$ "-thick  $\times$   $\frac{7}{8}$ "-wide pieces.) Then, crosscut the pieces to their finished length. (Note: Our tiles measured  $3\frac{3}{4}$ " $\times$  $3\frac{3}{4}$ ". If yours differ, this will affect the dimensions shown.)

2 Using a compass, scribe a  $1\frac{1}{2}$ " radius on one end of part A and then drill a  $\frac{3}{4}$ " hole through the center point. Scribe and cut a  $1\frac{1}{8}$ " radius on the opposite end; set aside.

3 To create the serrated decoration on the B pieces, make a light pencil line across the width,  $\frac{7}{8}$ " from

one end. Now, divide the line into four  $\frac{3}{8}$ " segments. Extend the lines to the end of the board. This should give you enough reference lines to make your pattern.

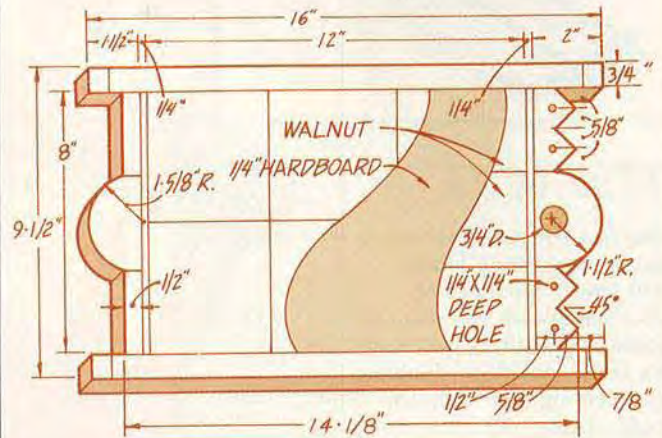
4 Locate and drill the two  $\frac{1}{4}$ " $\times$  $\frac{1}{4}$ "-deep holes in the end of each B member, as shown in the plan drawing.

5 Using a band saw or jigsaw, round the ends of part A, then cut out the serrate pattern on the ends of B. Finally, chamfer each end of both of the sides (D).

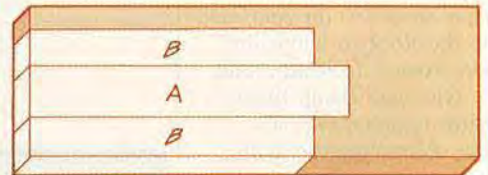
6 Glue and clamp parts A and B using a waterproof glue (resorcinol). Allow the glue to skin over, then remove any excess with a chisel or sharp knife. Allow the glue to dry overnight.

7 Complete the board by installing the tiles, using tile or panel adhesive.

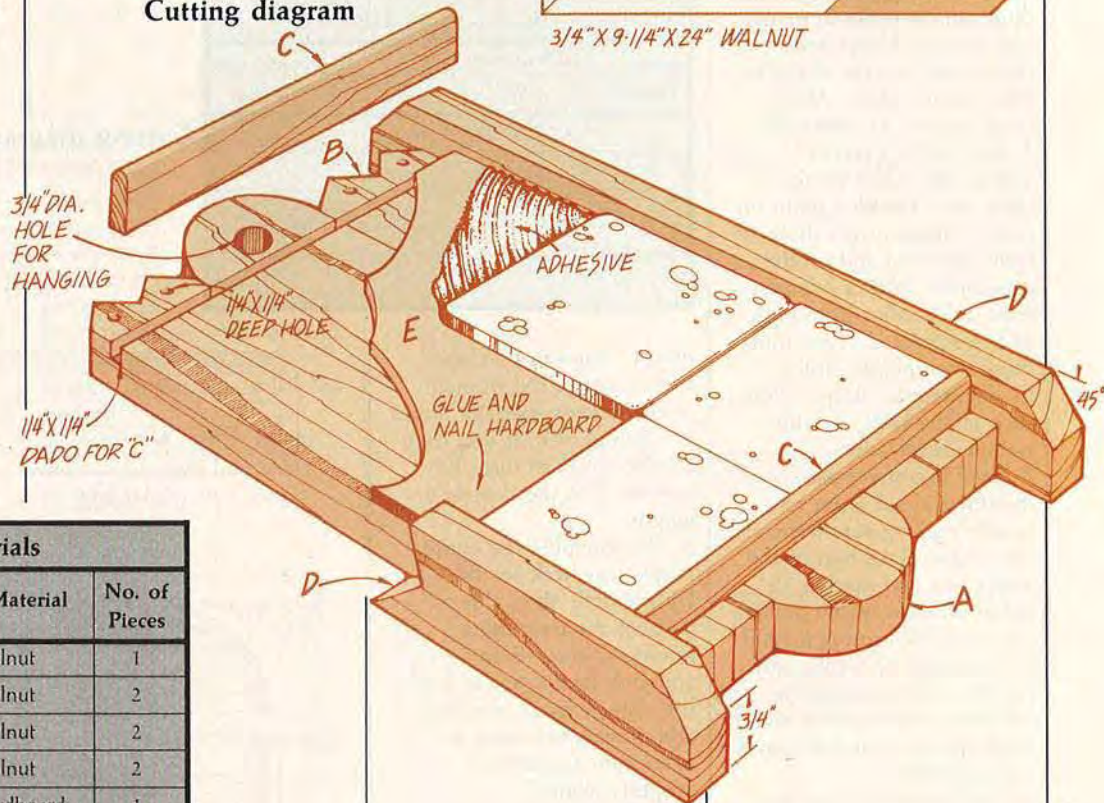
Apply finish to the wood, and after the finish has cured, grout the tile.



Cutting diagram



3/4" X 9-1/4" X 24" WALNUT



### Bill of Materials

Part Name	Finished Size			Material	No. of Pieces
	T	W	L		
A	$\frac{3}{4}$ "	3"	16"	walnut	1
B	$\frac{3}{4}$ "	2 $\frac{1}{2}$ "	14 $\frac{1}{8}$ "	walnut	2
C	$\frac{1}{4}$ "	$\frac{7}{8}$ "	8"	walnut	2
D	$\frac{3}{4}$ "	1 $\frac{1}{2}$ "	16"	walnut	2
E	$\frac{1}{4}$ "	8"	12"	hardboard	1

Supplies: 6—ceramic tiles ( $\frac{1}{4}$ " $\times$  $3\frac{3}{4}$ " $\times$  $3\frac{3}{4}$ "), resorcinol glue, tile or panel adhesive, grout, salad bowl finish or mineral oil.



## The bonus board

Having a beautiful cutting board is one thing, but having a knife handy when you need it is quite another. Here's a nifty solution—a cutting block with a built-in knife!

- 1 Begin by ripping then crosscutting parts A–D to length. With a jigsaw or band saw, slice the  $\frac{1}{16}$ "-wide pieces (E, F, G) off the outside of the blade.
- 2 Select two pieces of maple (A) and cut a  $\frac{3}{4}$ " radius on two corners of each. Glue and clamp the other two maple pieces together, using resorcinol glue. After the glue has formed a skin, remove the excess with a chisel or sharp knife. Allow the glue to dry overnight.
- 3 The knife for this project slips into a pocket that's formed in the lamination (see plan). Lay out the knife pocket on part F, then cut out the pocket using a band

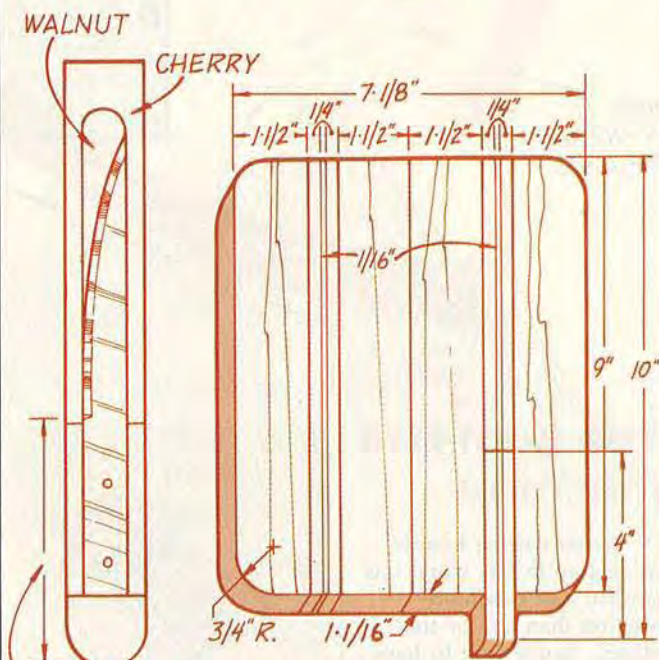
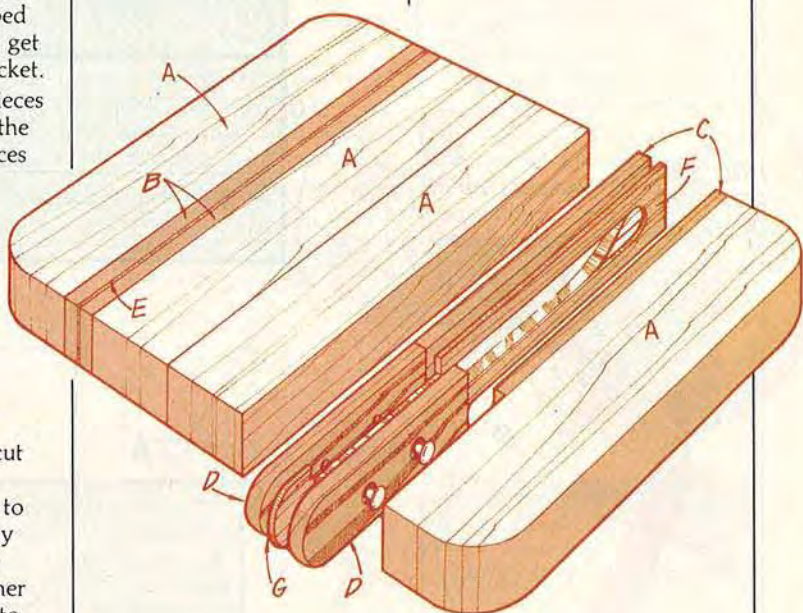
saw, jigsaw, or coping saw. Glue the laminated parts (B, C, E and F), using the same gluing method as described above. Be careful to not get any glue in the knife pocket. 4 Glue and clamp all pieces except D and G. After the glue dries, sand all surfaces smooth.

5 To make the knife handle, you must first check the thickness of the knife blade. If the blade is narrower than  $\frac{1}{16}$ ", you'll need to sand part G to a thickness equal to the blade. Lay the blade shank on part G, trace around it, and cut out the shank pocket.

Apply resorcinol glue to parts D and G and epoxy glue to the knife shank. Clamp these parts together and allow the assembly to dry overnight.

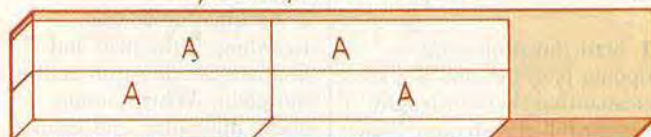
6 Drill two  $\frac{1}{4}$ "-diameter holes through the handle and blade. If the blade is stainless steel, you'll need to use a special bit. Insert pieces of brass rod into the  $\frac{1}{4}$ " holes and expand the rod by tapping it on an anvil with a hammer. You can substitute rivets for the rod, if desired.

7 With a rasp, round the end of the knife handle. Sand the handle (including the brass rivets) smooth. Apply two or three coats of a nontoxic finish such as salad bowl finish or mineral oil to all surfaces.



KNIFE HANDLE Cutting diagram

1-1/16" X 3-1/2" X 24" MAPLE



1-1/16" X 3-1/2" X 12" WALNUT



1-1/16" X 1-1/2" X 12" CHERRY

### Bill of Materials

Part Name	Finished Size			Material	No. of Pieces
	T	W	L		
A	1 1/16"	1 1/2"	9"	maple	4
B	1 1/16"	1/4"	9"	walnut	2
C	1 1/16"	3/4"	6"	walnut	2
D	1 1/16"	1/4"	4"	walnut	2
E	1 1/16"	1/16"	9"	cherry	1
F	1 1/16"	1/16"	6"	cherry	1
G	1 1/16"	1/16"	4"	cherry	1

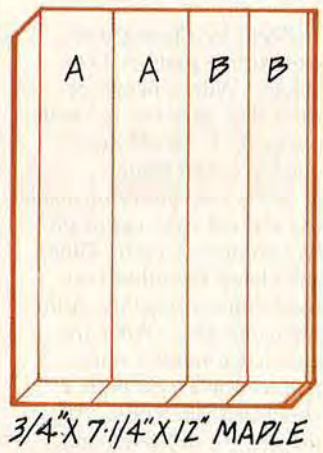
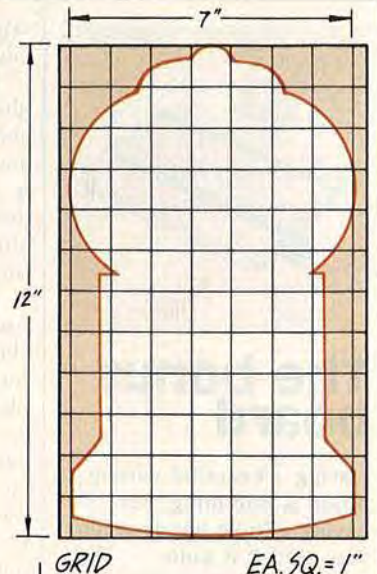
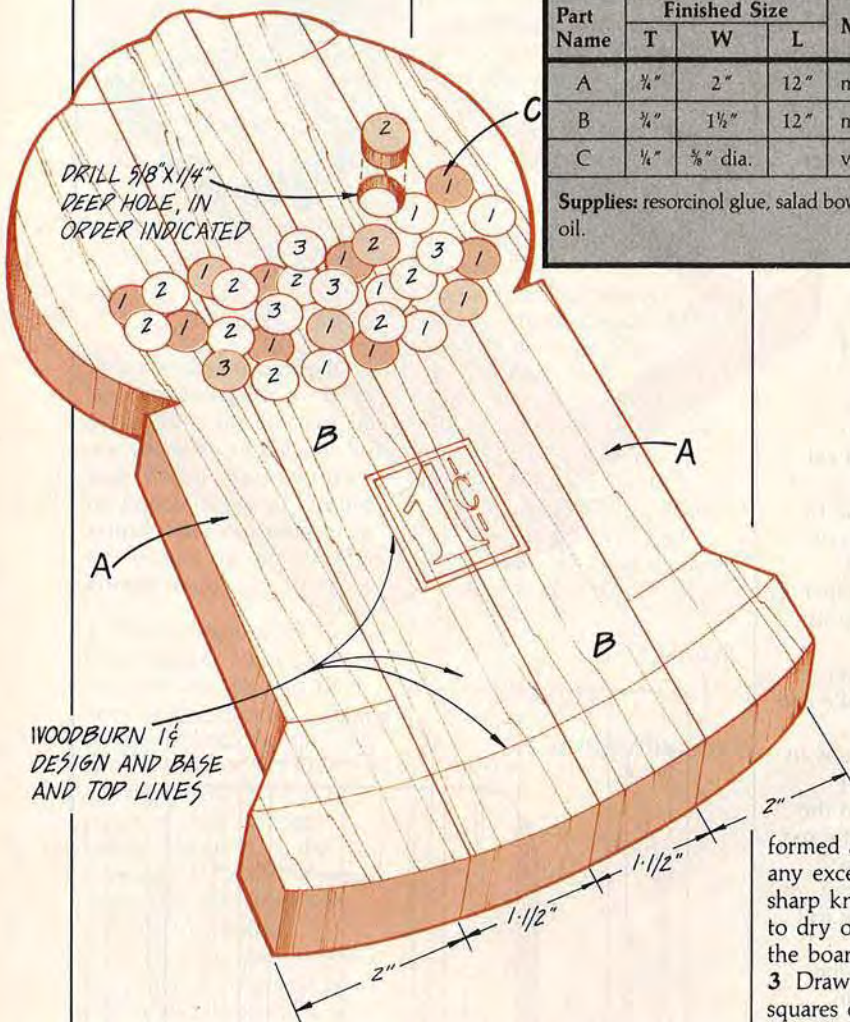
**Supplies:** Knife blade (about 5" long × about 3/8" wide), 2 pcs.—1/4" × 1/4" brass rod, resorcinol glue, epoxy adhesive, salad bowl finish or mineral oil.

Continued

# NOW YOU CAN BUILD IT

Bill of Materials					
Part Name	Finished Size			Material	No. of Pieces
	T	W	L		
A	3/4"	2"	12"	maple	2
B	3/4"	1 1/2"	12"	maple	2
C	1/4"	3/8" dia.		various	31

Supplies: resorcinol glue, salad bowl finish or mineral oil.



## The gum-ball machine

Of the six cutting boards we feature in this story, this fanciful one gets more reaction than any of the others. You're sure to have everyone asking how you got all those gum balls in there.

1 Start this project by ripping pieces A and B and crosscutting them to length (see the bill of materials). Make sure your saw is properly aligned and that the blade you're using is sharp.



2 Arrange the boards according to the plan and alternate the direction of the end grain. When joining stock, alternating end grain greatly reduces the chances of warping.

Next, glue and clamp the maple strips together, using waterproof glue (resorcinol). After the glue has set up and

formed a tough skin, remove any excess with a chisel or sharp knife. Allow the glue to dry overnight, then sand the board smooth.

3 Draw a grid of one-inch squares on a sheet of paper. Transfer the pattern from the plans to this grid, then transfer this pattern onto the board with tracing paper.

Using a band saw or jigsaw, cut the outside contour of the board. Sand the edges smooth.

4 Locate the centers of the gum balls on the board. Refer to the plans and mark each gum ball with a 1, 2, or 3. Gum balls that appear to be under other gum balls are drilled first.

If you're planning on producing more than one of these boards, make a template out of 1/8" or 1/4" hardboard and drill 1/16" holes

to locate the centers of the gum balls.

5 Drill all the holes marked with a "1." Use a 5/8"-diameter drill bit (a Forstner or brad point is best) and make the holes 1/4" deep.

Then, using a 3/8" plug cutter, cut plugs out of various hardwoods from your scrap bin. Glue these plugs into the series of holes you drilled and sand them flush after the glue has been allowed to dry. Repeat this entire process for the "2" and "3" holes.

6 Final-sand the entire project smooth and use a woodburner for the line decoration. Apply a nontoxic finish such as salad bowl finish or mineral oil.



## The bent corner board

Want to add variety to a simple laminated cutting board . . . fast? Just try this easy technique. You'll love the comments from people who enjoy an unusual treatment of a commonplace item.

**1** Prepare hardwood stock for this board by first ripping then crosscutting parts A and B to length, plus  $\frac{1}{2}$ ". We used cherry and walnut to provide an interesting contrast. Be sure to rip cut the  $\frac{1}{8}$ " walnut pieces (B) on the outside of the blade, and use a push stick during all ripping operations.

**2** Next, glue and clamp the stock, alternating the woods according to the plans. Alternate the grain direction of the cherry pieces to reduce warpage. When gluing, use a waterproof glue such as resorcinol. Allow the glue to set up until it forms a tough skin, then remove any excess glue with a chisel or sharp knife.

After the glue has been permitted to dry overnight, remove the clamps and sand the board smooth.

**3** Square up the ends of the board with your saw. Before cutting the diagonal across the corner, you'll need to first attach a long 1X2 board to the miter gauge for additional support. Then, place the cutting board against this extension and make your cut across the

corner of the board starting at the third walnut strip (see plan).

**4** Flop the small triangular piece, and line up the walnut strips at a 90° angle. Check the fit. Glue and clamp the two pieces together, following the same gluing procedure as described in step 2. Sand the project smooth after the glue sets up.

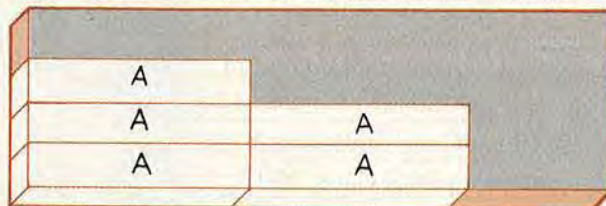
**5** The saw kerf reduced the dimensions of the triangle, so it's now necessary to even up one side and one end of the board. Rip the side of the board flush with the triangle, then crosscut the end of the board flush. Use a planer

blade or hollow-ground blade. If you even up the edges on a jointer, make shallow ( $\frac{1}{64}$ ") passes to avoid chip-out.

**6** Sand the entire project smooth, then apply a nontoxic finish such as salad bowl finish or mineral oil. You may also use some penetrating oils, but these need to

cure for about 30 days before they're rendered nontoxic.

There are many variations of cutting boards possible with this technique. Experiment by using larger or smaller boards; varying the wood selection; or by cutting off and reapplying more than one corner. The possibilities are endless.



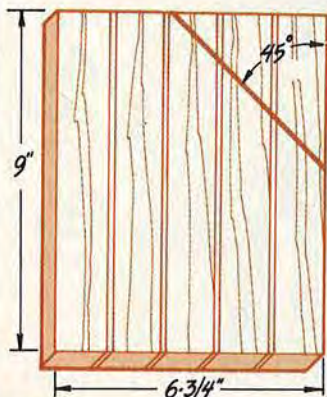
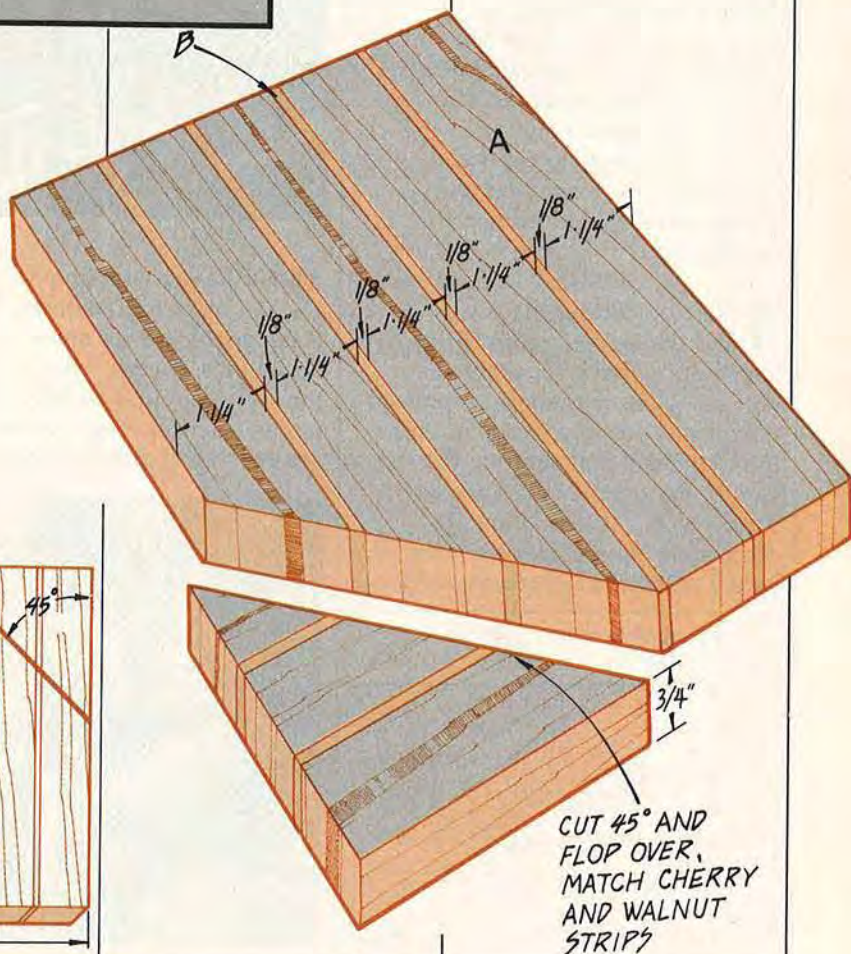
3/4" X 5-1/2" X 24" CHERRY



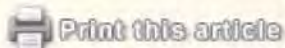
3/4" X 1-1/2" X 12" WALNUT

Bill of Materials					
Part Name	Finished Size			Material	No. of Pieces
	T	W	L		
A	3/4"	1 1/4"	9"	cherry	5
B	3/4"	1/8"	9"	walnut	4

**Supplies:** Resorcinol glue, salad bowl finish or mineral oil.



# contemporary solid-oak coffee table

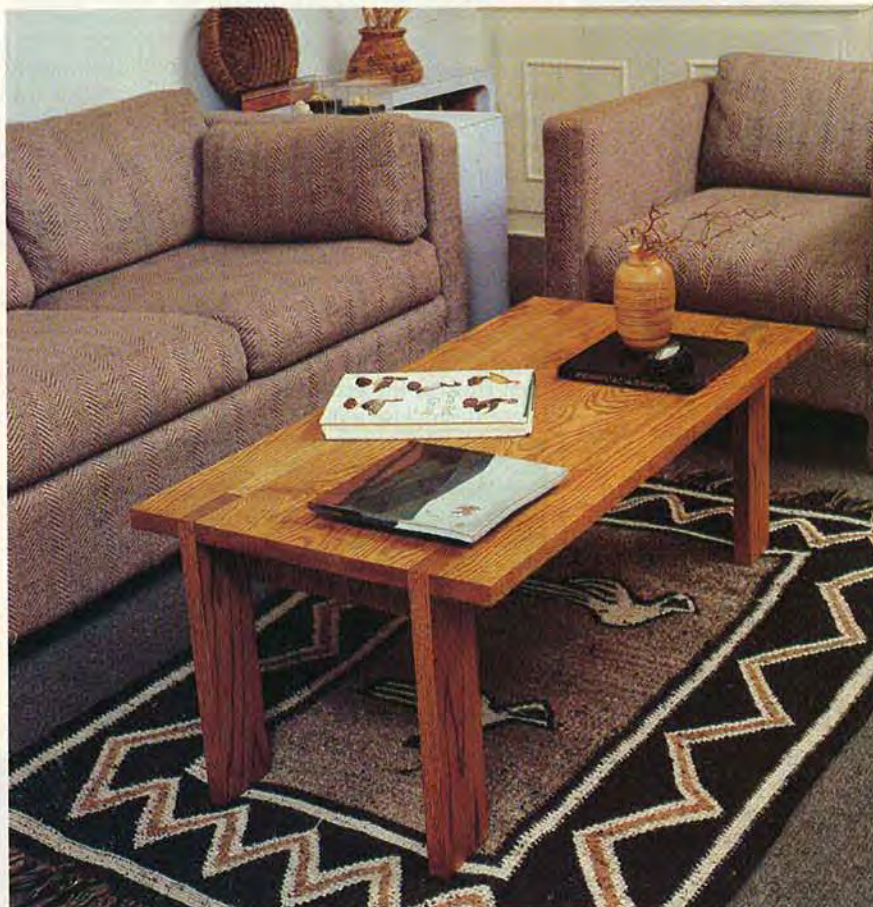


The attractive coffee table pictured at right is a rich blend of old and new—classic red oak lumber and crisp, contemporary styling. But don't let the good looks intimidate you. You can build this beauty in a couple of evenings at a fraction of the retail cost.

**D**on't overlook the possibility of rescaling the design and building a couple of matching end tables or even a sofa table.

The table has a glued-up top fashioned from a pair of leg assemblies, two 3-inch-wide leaves, and three wider boards in the center. End aprons, cut from the ends of the glued-up top to compensate for expansion and contraction, provide further stability.

**1** Start by cutting the 4 legs (A) and the 2 side aprons (B) to length and width. Chamfer the bottom edges of the legs to prevent them from possibly snagging on a floor covering and splitting the wood. We used a table saw, as shown in the sketch below, to accomplish this. Make test cuts before cutting the chamfers.



Designer: David Ashe Photographer: Al Elder

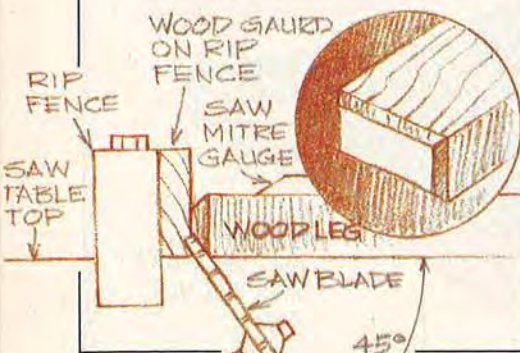
**2** Fit the legs and aprons together and mark the adjoining members for dowel holes (use 2 dowel pins at each joint). Locate the marks about 1 inch in from the top and bottom edges of the aprons. Now, drill the holes for the

dowel pins with a doweling jig, as shown here, or use a drill press or portable drill guide. (Make the holes slightly deeper than half the length of the dowel pins.

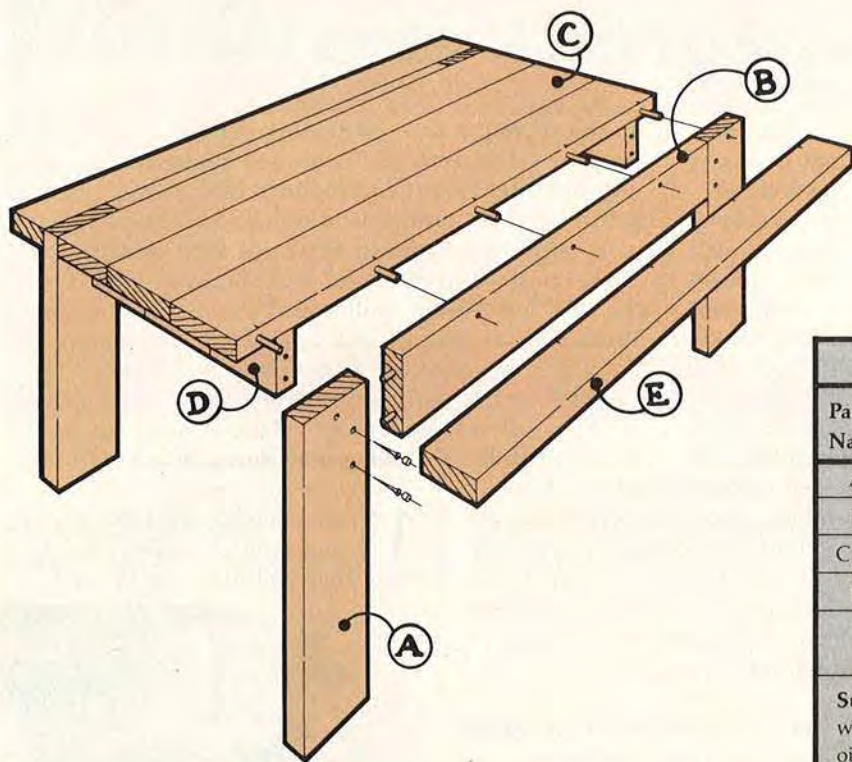
**3** Glue and clamp the leg assemblies together. Remove excess glue after about 20 minutes. Allow the glue to set up overnight.

**4** Cut the three tabletop pieces (C-D) to size. (These are long enough that you can cut the end aprons (D) from them later.)

**5** Using a square, make layout marks across the tabletop pieces for dowel holes to be drilled later. You'll want a dowel hole 1½ inches or so from each end of the finished table surface, 3 others spaced equally between these two, and 1







**Overall dimensions:**  
42"L x 20 1/8"W x 16"H

Bill of Materials					
Part Name	Finished Size			Material	No. of Pieces
	T	W	L		
A	1 1/16"	4"	16"	red oak	4
B	1 1/16"	2 7/8"	34"	red oak	2
C-D	1 1/16"	4"	50"	red oak	3
E	1 1/16"	3"	42"	red oak	2

Tabletop (C) finished length = 42"  
End aprons (D) finished length = 2 7/8"

**Supplies:** 3/8" x 2" dowel pins, 3/8" dowel rod, woodworker's glue, 8—No. 10 x 2 1/2" flathead wood screws, oil finish (or your choice)

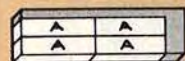
**Cutting diagram**



1-1/16" x 9-1/4" x 108" RED OAK



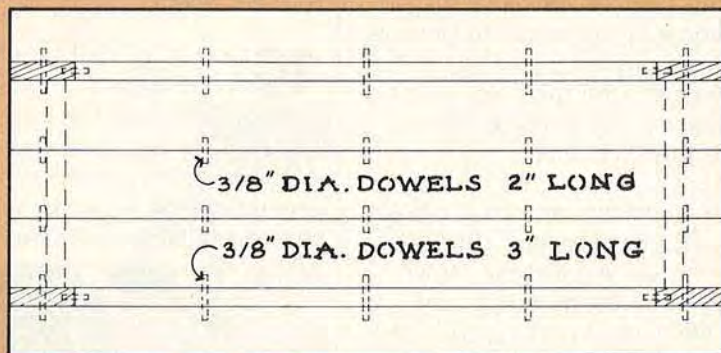
1-1/16" x 7-1/4" x 84" RED OAK



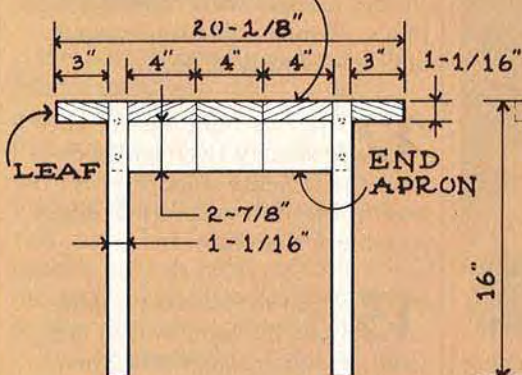
1-1/16" x 9-1/4" x 36" RED OAK

CUT OFF FOR APRON

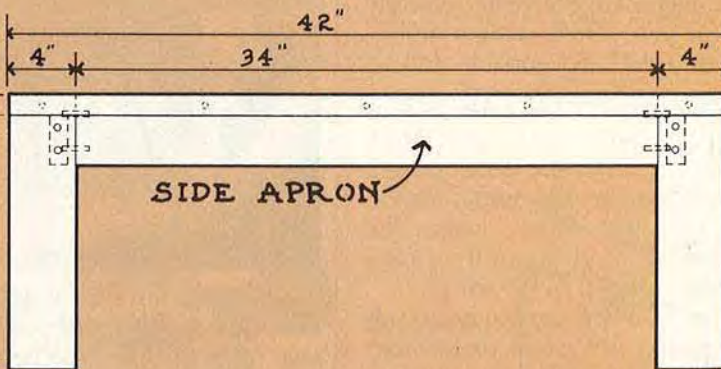
**TOP VIEW**



**TABLETOP**

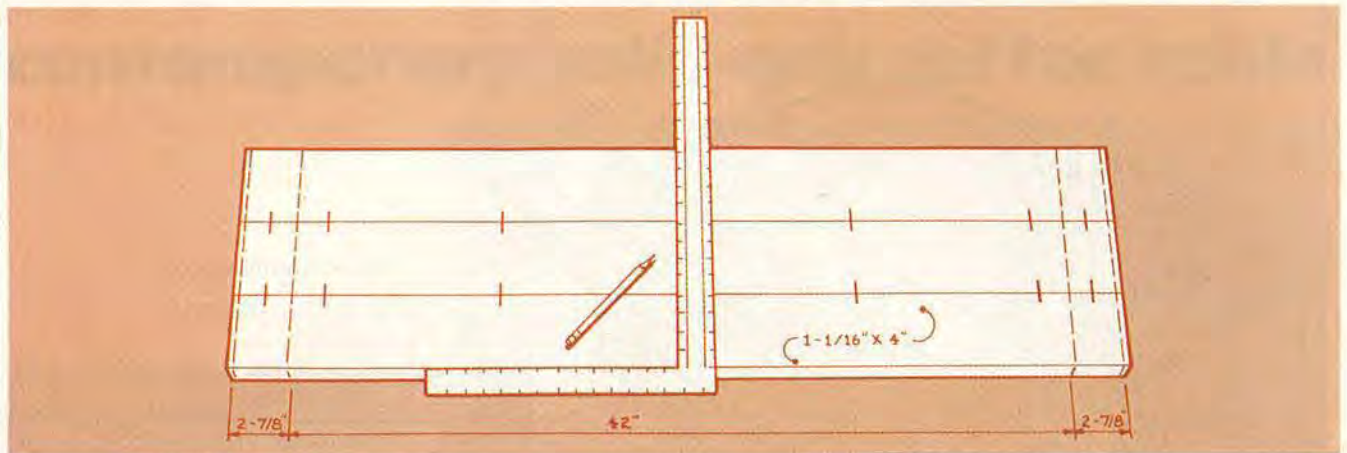


**END VIEW**



**SIDE VIEW**

## NOW YOU CAN BUILD IT



in the center of each end apron, as shown in the sketch on page 51.

**6** Drill the holes for the dowel pins as before, then glue and clamp the tabletop members together. After allowing the glue to set up overnight, cut the tabletop and the end aprons to the correct length. Set aside the end aprons.

**7** Cut the table leaves (E) to size, then clamp the leaves, leg assemblies, and tabletop together.

Using a square, make 5 equidistant layout marks to serve as guides for drilling the holes for the dowel pins. Drill the holes in the tabletop and the leaves as before and to the same depth.

**8** To accurately position the holes in the leg assemblies, make yourself a jig like the one shown here, insert a dowel center, and align the mark on the jig with each mark on the leg assemblies.

Apply pressure, and the dowel center will mark the center of each hole for you. Then, using a drill press or a drill and portable drill

guide fitted with a brad-point drill bit, drill holes through the leg assemblies. (Some doweling jigs are capable of positioning holes on the face of wide boards. If yours is one of these, you can dispense with the homemade jig and drill the holes as you normally would.)

**9** Cut ten 3-inch lengths of dowel, bevel their ends, and cut a lengthwise slot in each to allow for the passage of glue. (You'll use these to join the leg/leaf assemblies to the tabletop.)

**10** Dry-fit the table's components as shown below. (Before positioning the leaves, drill a pair of holes into each end of each end apron with a countersink/counterbore bit to accept the screws and plugs that will be inserted

drilling new dowel holes.

**11** Disassemble the table parts, and sand all surfaces except those that will make up the top.



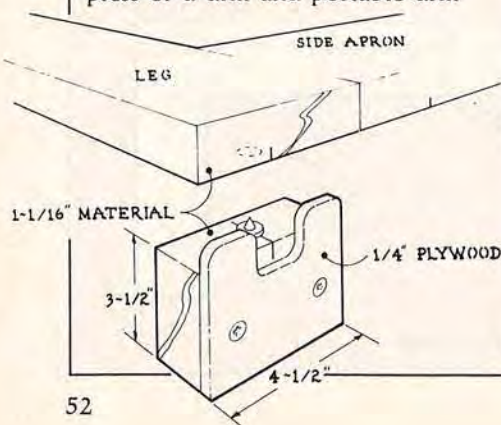
Then glue and clamp all the table's parts together. (To make the clamping process much easier, put a couple of 2x4s beneath the table's parts; you can then slip the clamps into place without fumbling around too much.) Drive screws into the end aprons as shown above, then fill the recesses with matching plugs. Remove glue squeeze-out after 20 minutes or so.

**12** After the glue has set up, preferably overnight, belt-sand the tabletop smooth. Also be sure to break (round off) all edges to remove sharpness.

**13** Clean the sanding residue from the table with a tack cloth or an air compressor, then finish as desired. We used Watco Danish Oil Finish on our table.



later.) If the top surface of the table doesn't align well, you can save some sanding time by plugging the holes that are preventing alignment, then offsetting and



# WOOD tests 8 best-selling routers

**H**ow do you compare apples with apples when the product is routers? You don't! Routers differ so much in price, power, and available features that head-to-head comparisons can be misleading. Besides, not all woodworkers have the same needs and budget. That's why we decided to take a hard look at each major manufacturer's best-selling model and give you our opinion of it. As you can see, the routers range from \$55 to \$300 and from  $\frac{3}{4}$  horsepower to 3 horsepower. Some were designed for home use; others for professionals. Note also that the models tested are not necessarily the best router each

manufacturer makes. Keep these things in mind as you read the pros and cons of the eight machines.

To find out how each performed, we used them on several projects to make cuts appropriate to their size. We did, for the sake of uniformity, put them all through two tests that even the smallest should perform without difficulty. To check for vibration, power, and handling, we cut a 3" x 5" x  $\frac{5}{16}$ "-deep dado in ash lumber with a  $\frac{1}{2}$ " carbide-tipped straight bit. And to see how well each router handles on edge work, we cut several feet of ash with a  $\frac{3}{8}$ " carbide-tipped round-over bit.

## BLACK & DECKER

**Data:** 1 hp.; 8.5 amps; 9 lbs.; cast metal base with plastic motor housing; plastic cord; rack-and-pinion depth adjustment with pinch lock; trigger switch;  $\frac{1}{4}$ " capacity.



#7613  
\$55

We were pleasantly surprised by this inexpensive router. In our dado-cutting test the 7613 plowed through the ash with no vibration or noticeable loss of power. Edge-forming with the  $\frac{3}{8}$ " bit was very easy, too. The large closed-loop handles gave us great control, and the angle of the handles was perfect to alleviate hand and wrist fatigue.

The design of this router represents a change from Black & Decker's old styling. Though

completely compatible with all the old accessories, this router has closed-loop handles, a swing-arm shaft lock mounted on the bottom of the motor shaft, and only one wrench, which stores in the base.

## BOSCH

**Data:** 1 $\frac{1}{4}$  hp.; 10.5 amps; 7.25 lbs.; cast metal base with glass-reinforced polyester motor case; neoprene cord; spiral depth adjustment with pinch lock; toggle switch;  $\frac{1}{4}$ "\*,  $\frac{3}{8}$ ",  $\frac{1}{2}$ "\*\* capacity (\*furnished).

A powerful machine in a small



#1604  
\$185



package, the 1604 has the greatest start-up torque of the routers we tested. The knobs are low on the base and large enough to give a good feeling of control when the machine is on the work. Because of the small diameter of this router, we found it easier to control by grasping the motor and base with one hand and either cutting one-handed or grasping one of the knobs with the other hand.

Dadoing the 3" x 5" hole in ash was a snap. This tool easily has the power to cut twice that deep without wincing. And edge-cutting with this router was a pleasure. We had good visibility of the bit and the cut line, and the router's balance was excellent.

Our only complaints concern the switch position and the pinch lock. With the switch near the top of the router, we couldn't grasp both knobs while turning on the machine. And we found the wing nut to be a real finger pincher.

## HITACHI

**Data:** 3 hp.; 12.2 amps; 12.3 lbs.; cast and steel base with polycarbonate motor case; plunge depth adjustment; plastic cord;  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ " capacity (furnished); rocker switch.

With the TR-12 (see the photo on the following page) you get a tremendous amount of power and versatility as well as a host of attachments — a guide bushing,  $\frac{1}{4}$

Continued

## PRODUCT TESTING

and  $\frac{3}{8}$ " shank bushings, straight-edge guide with round-edge attachment, a roller bearing guide, 2 cast-metal wrenches, and a  $\frac{1}{2}$ " two-flute carbide bit.

The TR-12 cut the dado in the ash without a hint of hesitation. In fact, we were able to cut  $\frac{3}{4}$ " deep without any problem. When we cut the ash with the round-over bit, though, we found that the large

**TR-12**  
**\$299**



opening in the base made controlling the router at the end of narrow pieces and near corners difficult.

One of the TR-12's most desirable features is its plunge-cutting ability. Instead of tipping the machine into a board, we simply placed the router firmly on the work, turned it on, and pushed down. The TR-12, like the Ryobi R-150 router (see facing page), has 3 preset depth stops so you can cut to different depths by swiveling the stop block.

The rocker switch was a little hard to reach, but we did manage to engage the motor without letting go of the handles. Since this machine has a good deal of starting torque, we would rather see a trigger switch engineered into the TR-12.

### MAKITA

**Data:**  $\frac{3}{4}$  hp.; 4.8 amps; 5 lbs.; glass-reinforced polycarbonate motor case and base with cast-metal motor/bearing support bottom cap; plastic cord; ring depth adjustment with pinch lock; trigger switch in handle;  $\frac{1}{4}$ ",  $\frac{3}{8}$ " capacity.

The 3608BK comes with its own case, 2 stamped steel wrenches, and both collets. It is small and lightweight, and the polycarbonate construction cuts dramatically the chances of breaking the case or base. This material also lets Makita mold the router in its unusual

**#3608BK**  
**\$128**



shape. The handles at the end of sloping stalks are comfortable to hold and give excellent control.

When cutting the 3"×5" dado in ash, we encountered some vibration. The motor was working hard to plow through the material. On the other hand, the edge-routing duties were performed with great ease. Our  $\frac{3}{8}$ " bit easily fit in the hole in the base plate, but the hole was not so large that it created any problems with narrow pieces or in corners.

The 3608BK is a light-duty router and should be purchased with that in mind. If you plan on cutting a lot of deep dados or working in hardwoods, you may want to go with more horsepower. Makita has two other more powerful models to choose from.

### MILWAUKEE

**Data:**  $1\frac{1}{2}$  hp.; 10 amps; 8.5 lbs.; cast base and motor case with glass-reinforced nylon handles and motor top/switch housing; rubber cord; ring depth adjustment with pinch lock; heavy-duty slide switch;  $\frac{1}{4}$ " (furnished),  $\frac{3}{8}$ ",  $\frac{1}{2}$ " capacity.

The 5660 is made for heavy



**#5660**  
**\$245**



industry and costs more as a reflection of the durability built into it.

The collet system is the same as that used in large industrial routing machines. The glass-reinforced nylon parts are highly damage-resistant, even in cold temperatures. They are also unaffected by almost all solvents used today. The switch and cord, like the rest of the router, are extra heavy duty and designed to last a long time.

We found that the 5660 performed our tests with no noticeable power drain or vibration. The controls are large and easy to use, and the handles have been shaped for easy gripping and minimal hand fatigue.

When we edge-routed with the 5660, we found it very easy to control. The baseplate hole was plenty large for the  $\frac{3}{8}$ " bit and control on small pieces was excellent.

### PORTER-CABLE

**Data:**  $\frac{3}{4}$  hp.; 6.5 amps; 7 lbs.; all cast metal construction; rubber cord; spiral depth adjustment with pinch lock; toggle switch on motor;  $\frac{1}{4}$ " capacity.



#100  
\$124

Porter-Cable has made the 100 for over 30 years. It is extremely durable with high-quality parts all around. This quality is evident when you turn it on. The motor runs smoothly and, with the power off, coasts to a slow stop on excellent bearings.

The placement of the handles low on the base allows for good control, but the knobs themselves are too small to get a good grip. On the other hand, considering the size and shape of the 100, the machine is easiest to use if you grip the motor housing with one hand.

Despite its  $\frac{3}{4}$ -horsepower rating, the 100 cut the 3"X5" dado in ash without vibration or noticeable power drag. Edge-routing did present one major problem, though. The hole in the base plate that is designed to hold guide bushings common to all Porter-Cable routers was too small for the  $\frac{3}{8}$ " round-over bit. The Porter-Cable spokesman said this is a problem they are considering, but the only answer for now is to get another base and cut the hole larger and save one for the bushings.

The screw-in type spiral depth adjustment was smooth and allowed for accurately making adjustments. We did notice, though, that every time we changed depth, the toggle switch was in a different position. Sometimes, it was awkward to turn the machine on and off.

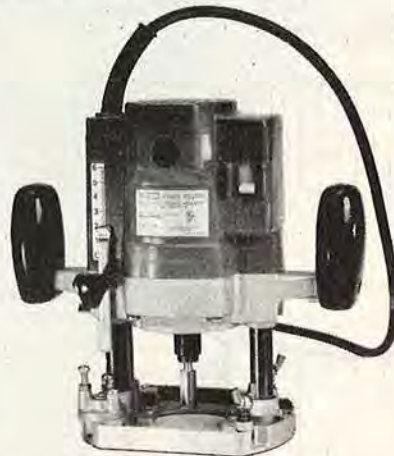
This is an excellent trimming machine, but like the Makita, it is underpowered if you plan to do a lot of dado work.

## RYOBI

**Data:** 1 hp.; 6.5 amps; 5.9 lbs.; cast metal base with steel posts and polycarbonate case; rubber cord; plunge adjustment; toggle switch,  $\frac{1}{4}$ " capacity.



#R-150  
\$120



This import has a good feel and cuts well for a 1-horsepower router. The plunge feature is excellent and designed to perform well. The motor slides smoothly on its support posts, and the lock is easy to set.

This router comes with cast-metal wrenches, guide bushing, and large, quick-to-adjust straight and curved edge guides.

The R-150 stood our dado test well. The plunge feature made cutting the dado extremely easy and safe. The motor did not appear to be unduly strained, either.

Edge-cutting was a different story. Control and stability were very good along the length of pieces wider than 3". But the large hole in the base made edge-routing on narrow pieces or in corners (especially on narrow pieces) difficult.

We also had some trouble with the slide switch. Twice, it did not shut off until we flicked it a couple of times. A much better option, we think, would be a trigger switch in one of the well-designed handles.

## SEARS

**Data:** 1½ hp.; 8 amps; 9 lbs.; cast metal base with glass-reinforced thermoset polyester motor housing; ring-depth adjustment with pinch lock; plastic cord; trigger switch in handle;  $\frac{1}{4}$ " capacity.

The 1749 had plenty of power for our dado cut through ash. But we did get vibration, which we feel came from the flexibility in the plastic housing. Edge-routing proved an easy chore.



#1749  
\$99.99




We like the built-in shaft lock on this router. Just slide it to its "lock" position, and the shaft stays put. This makes bit changing quite easy.

When working with the router, we noticed that the baseplate is not self-centering and that you have to remove this plate to attach the edge guide. Since we use guide bushings on many projects, attempting to center the baseplate on the bit each time is a nuisance.

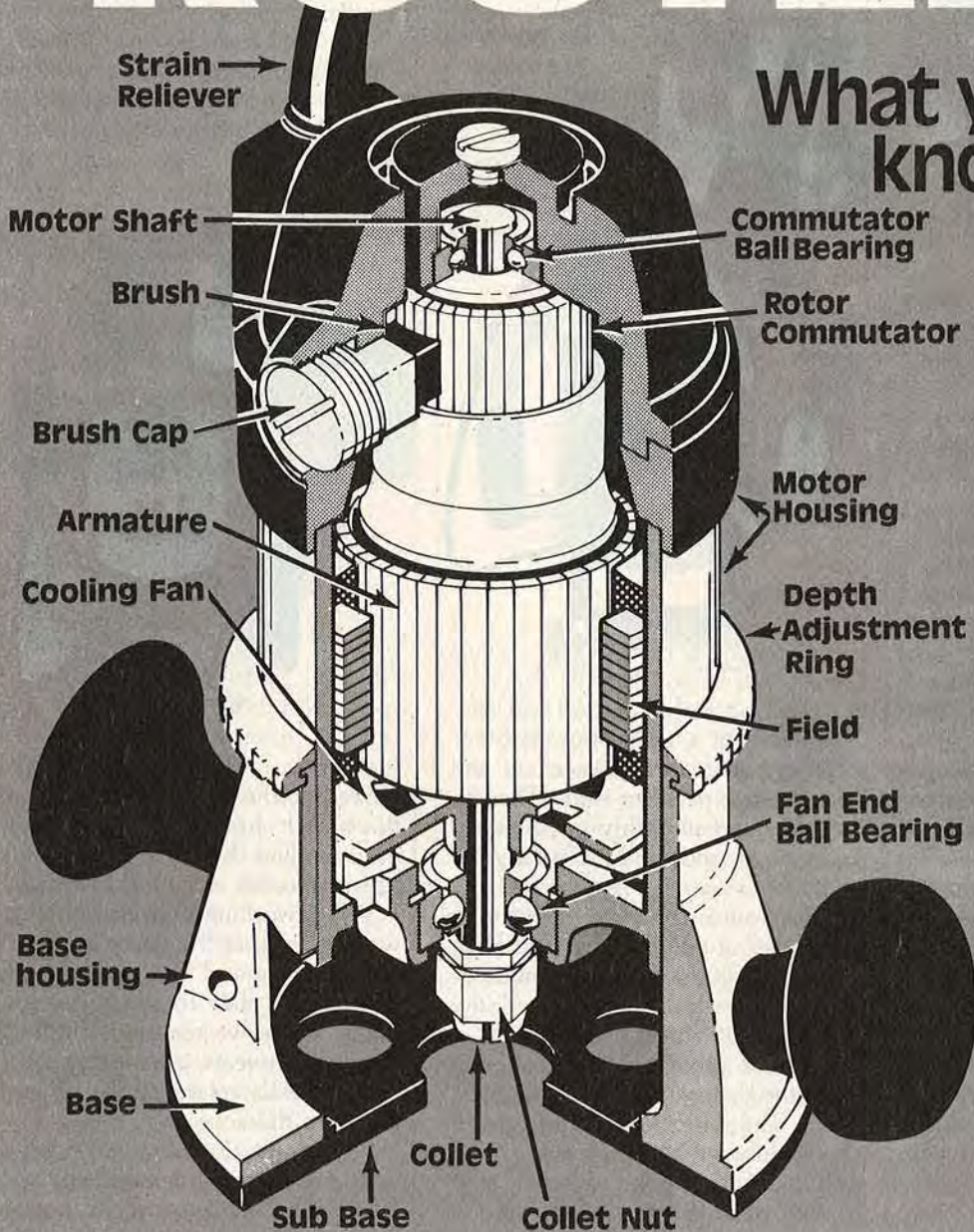
The router also has what Sears calls a colletless chuck system, which they say outperforms the old method. Basically, they drill a  $\frac{1}{4}$ " hole in the end of the motor shaft. Then, they thread and split the shaft. Put a bit in the router, tighten the tapered nut, and it is locked solidly on the shaft. We wonder about the effects of shaft wear. If a bit loosens and wears on the shaft, the entire armature must be replaced. In most routers, only the collet would need replacement.

# ROUTERS

 Print this article

## What you should know before you buy

By A. J. Hand



It's hard not to be impressed with a router's credentials. After all, with the right bits and accessories, it can cut intricate joints, make moldings, carve, make signs, rout fancy edges, cut curves, make bowls, turn wood, joint edges, and trim laminates. No other shop tool is as versatile or more fun to use.

What isn't so fun is trying to decide which one to buy. There are just too many to choose from, each with a different blend of features, each at a different price.

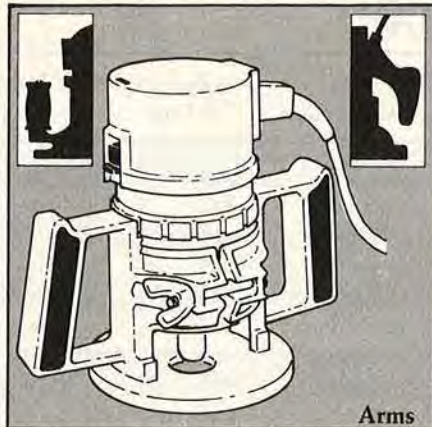
The chart on page 58 lists most of the routers currently available in this country. If you're on a budget (and who isn't), you can eliminate some of them by simply setting an upper dollar limit. Keep in mind, though, that the prices shown are retail, and often you can find the product heavily discounted.

After paring down your choices somewhat, you can then focus your attention on selecting a router with features that best suit your requirements. The following information should help you do that.

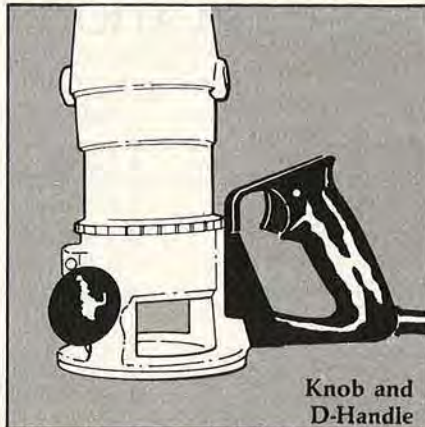
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The cutaway sketch shown above gives you a good idea of what goes on inside today's generation of routers. Various buy-points are discussed at right.

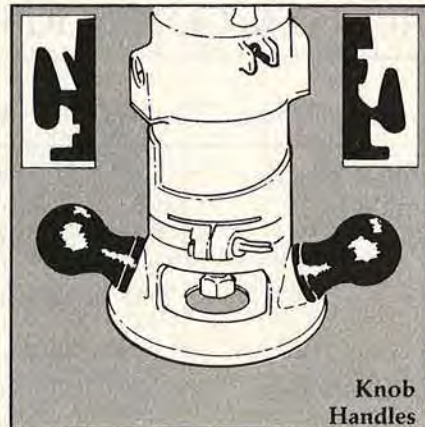
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Arms



Knob and D-Handle



Knob Handles

### Handle Configurations

### HOW MUCH HORSEPOWER DO YOU NEED?

There is no substitute for power. Sure, a light-duty router can duplicate the work of a more powerful tool by taking two or more light cuts instead of one heavy one. But multiple cuts multiply your chances for error, and resetting the depth adjustment time after time is annoying.

Horsepower also determines how effective a router will be in maintaining operating RPMs. Any router you buy will have more than adequate rpms under no load, but an underpowered tool will slow down as soon as you feed it some work. As the tool slows down, cut quality drops off, the tool begins to strain, and its life expectancy drops.

For these reasons, **buy as much power as you can afford.** Unless you are *certain* you only want your router to perform light work on softwoods, go for a *minimum of one hp.* If you know you'll be making heavy cuts such as dados,

cutting deep mortises and large tenons, or working extensively with hardwoods, I'd suggest selecting one with at least 1½ hp.

Buying power will also almost certainly assure you of higher quality throughout the tool. You'll certainly get all ball-bearing construction rather than the less expensive and less durable sleeve bearings. I've owned two sleeve-bearing routers in the past, and both burned out in a relatively short time. As you can see from the chart, most manufacturers have gone exclusively to ball bearings.

### YOUR COLLET SIZE OPTIONS

Almost any conceivable routing job you'll encounter can be handled by a router with a ¼" collet. But, if you plan to do lots of *exceptionally* heavy work, you might consider a tool with a collet big enough to take ⅜" or even ½" bits. Just make sure it will take ¼" bits as well. A few routers won't.

### OTHER BUY-POINTS TO CONSIDER

While cost, horsepower, and collet size are the big three considerations in selecting a router, you should also be familiar with the following:

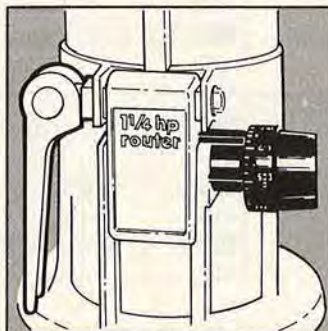
**Collet Adjustment.** Most routers require two wrenches for bit changes. One holds the motor shaft; the other turns the collet nut. Other routers have built-in shaft locks so you only need one wrench. That's one less wrench to handle, one less wrench to keep handy.

**Depth Adjustment.** All three major types (ring, rack and pinion, and spiral) work well. And almost all read out depth in the same 1/64" intervals. But if you plan to use your router upside down in a router table, you might prefer rack-and-pinion depth adjustment. With many of the others, the router motor slips down in its base as soon as you loosen the locking clamp.

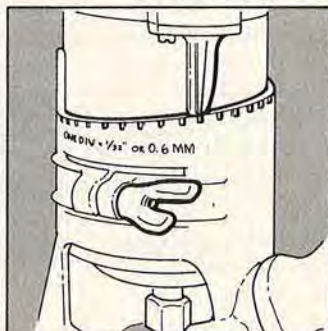
**Plunge Routing Capability.** Plunge routers are spring-loaded, with their bits retracted above the base until

*Continued*

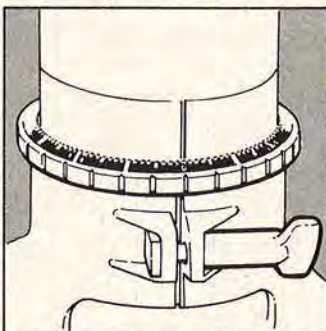
### Depth Adjustment Mechanisms



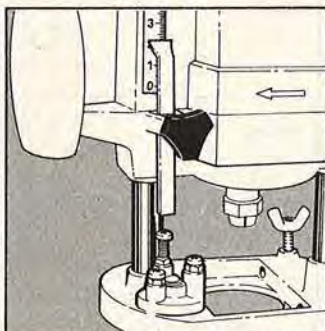
Rack and Pinion



Spiral Adjustment



Ring Adjustment



Plunge Adjustment

# TOOL BUYMANSHIP

## ROUTER COMPARISON/SPECIFICATION CHART

Manufacturer	Model	R.P.M.	H.P.	Collet Sizes	Collet Adjustment	Depth Adjustment	Bearing Type	Handle Type
<b>Black &amp; Decker</b> <i>(Consumer)</i>	7600	30,000	3/8	1/4"	2 Wrenches	Ring	Ball	Two Arms
	7604	30,000	3/4	1/4"	2 Wrenches	Ring	Ball	Two Arms
	7613	25,000	1	1/4"	1 Wrench <sup>A</sup>	Rack	Ball	Two Arms
	7614	25,000	1 1/2	1/4"	1 Wrench <sup>A</sup>	Rack	Ball	Two Arms
	7615	25,000	1 1/2	1/4"	1 Wrench <sup>A</sup>	Rack/Plunge	Ball	Two Arms
	7666	25,000	1 1/2	1/4"	1 Wrench	Rack/Plunge <sup>B</sup>	Ball	Two Arms
<b>Black &amp; Decker</b> <i>(Industrial)</i>	3310	25,000	1 1/2	1/4"	2 Wrenches	Rack	Ball	Knobs
	3335	18,000 <sup>F</sup>	3 1/2	1/2, 3/8, 1/4"	2 Wrenches	Ring	Ball	Two Arms
<b>Bosch</b>	1601	25,500	1	1/4"	2 Wrenches	Spiral	Ball	Knobs
	1603	25,000	1 1/2	3/8, 1/4"	2 Wrenches	Spiral	Ball	D & Knob
	1602	25,000	1 1/2	3/8, 1/4"	2 Wrenches	Spiral	Ball	Knobs
	1604	25,000	1 3/4	1/2, 3/8, 1/4"	2 Wrenches	Spiral	Ball	Knobs
	1600	26,000	2 1/4	1/2, 3/8, 1/4"	2 Wrenches	Ring	Ball	D & Knobs
	90303	22,000	3 1/4	1/2, 3/4, 1/4"	2 Wrenches	Ring/Plunge	Ball	Arms
	90300	22,000	3 1/4	1/2, 3/8, 1/4"	2 Wrenches	Ring	Ball	Arms
<b>Hitachi</b>	TR-8	24,000	1	1/4"	2 Wrenches	Plunge	Ball	Knobs
	TR-12	22,000	3	1/2, 3/8, 1/4"	2 Wrenches	Plunge	Ball	Knobs
<b>Makita</b>	3608BK	23,000	3/4	3/8, 1/4"	2 Wrenches	Ring	Ball	Arms
	3601B	23,000	1 3/8	1/2, 3/8, 1/4"	2 Wrenches	Ring	Ball	D & Knob
	3600B	22,000	2	1/2, 3/8"	2 Wrenches	Plunge	Ball	Knobs
	3600BR <sup>C</sup>	22,000	2	1/2, 3/8"	2 Wrenches	Plunge	Ball	Knobs
<b>Milwaukee</b>	5620	23,000	1	3/8, 1/4"	2 Wrenches	Ring	Ball	Knobs
	5660	24,500	1 1/2	1/2, 3/8, 1/4"	2 Wrenches	Ring	Ball	Knobs
	5680	26,000	2	1/2, 3/8, 1/4"	2 Wrenches	Ring	Ball	Knobs
<b>Porter-Cable</b>	100	22,000	7/8	1/4"	2 Wrenches	Spiral	Ball	Knobs
	630	22,000	1	1/4"	2 Wrenches	Spiral	Ball	Knobs
	536	23,000	1 1/2	1/2, 3/8, 1/4"	2 Wrenches	Spiral	Ball	Knobs
	537	23,000	1 1/2	1/2, 3/8, 1/4"	2 Wrenches	Spiral	Ball	D & Knob
	690	22,000	1 1/2	1/2, 3/8, 1/4"	2 Wrenches	Spiral	Ball	Knobs
	691	22,000	1 1/2	1/2, 3/8, 1/4"	2 Wrenches	Spiral	Ball	D & Knob
	514	22,000	2 1/2	1/2, 3/8, 1/4"	2 Wrenches	Spiral	Ball	Knobs
<b>Ryobi</b>	R-150	24,000	1	1/4"	2 Wrenches	Plunge	Ball	Knobs
	R-330	24,000	2	1/2, 3/8, 1/4"	2 Wrenches	Ring	Ball	Arms
	R-500	22,000	3	1/2, 3/8, 1/4"	2 Wrenches	Plunge	Ball	Knobs
<b>Sears</b>	1730	25,000	5/8	1/4"	1 Wrench	Ring	Ball & Sleeve	Arms
	1755	25,000	1	1/4"	1 Wrench	Ring	Ball	Knobs
	1756	25,000	1 1/4	1/4"	1 Wrench	Ring	Ball	Knobs
	1743	25,000	1 1/2	1/4"	1 Wrench	Ring	Ball	Knobs
	1749	25,000	1 1/2 <sup>D</sup>	1/4"	1 Wrench	Ring	Ball	Knobs
	1750	11,000 to 25,000	N/A	1/4"	1 Wrench	Ring	Ball	Knobs

Notes: A Wrench stores in router base. B Has electronic digital depth readouts. C Same as 3600B but has round base instead of rectangular base. D Has variable speeds to suit bit size and stock hardness. E Has "ramped" startup. Accelerates smoothly up to speed rather than starting with a jerk. F Has one electronically controlled speed. G Prices are approximate and may be heavily discounted, often 30 percent or more. Shop around for best prices.



Switch Type	Work-light?	Dust PU?	Approx. Price <sup>G</sup>
Slide	No	No	\$40
Slide	No	No	\$45
Trigger	No	No	\$55
Trigger	Yes	No	\$60
Trigger	Yes	No	\$70
Trigger	Yes	No	\$135
Toggle	No	No	\$196
Toggle <sup>E</sup>	No	No	\$458
Toggle	No	No	\$129
Trigger	No	No	\$185
Toggle	No	No	\$175
Toggle	No	No	\$185
Trigger	No	No	\$360
Trigger	No	No	\$650
Trigger	No	No	\$600
Rocker	No	No	\$196
Rocker	No	No	\$299
Trigger	No	No	\$128
Trigger	No	No	\$196
Toggle	No	No	\$299
Toggle	No	No	\$285
Slide	No	No	\$235
Slide	No	No	\$245
Slide	No	No	\$299
Toggle	No	No	\$124
Toggle	No	No	\$135
Toggle	No	No	\$295
Trigger	No	No	\$310
Toggle	No	No	\$179
Toggle	No	No	\$210
Toggle	No	No	\$435
Toggle	No	No	\$120
Slide	No	No	\$220
Toggle	No	No	\$265
Slide	No	No	\$40
Slide	No	No	\$80
Trigger	Yes	No	\$85
Trigger	Yes	Yes	\$110
Trigger	Yes	Yes	\$100
Trigger <sup>E</sup>	Yes	No	\$150

you "plunge" the router down by pressing downward on the grips. The bit will then drop to the depth you have preset. For certain cuts, most notably those in the field of your stock rather than along the edges, this capability comes in very handy. Without the plunge feature, you have to start your router in the air, then lower it down to the work.

**Switch Type.** A trigger switch is probably the most convenient for conventional routing for two reasons. First, you can squeeze it while maintaining two-hand control of the tool. And second, it shuts off automatically when you release it. On the minus side? You can accidentally squeeze the trigger when you pick up the tool. Not only that, but triggers also are hard to get at if you fasten your router to a router table. In addition, most trigger-switch routers have non-removable bases. This rules out freehand carving as well as the use of just the router motor.

Toggle, rocker, and slide-type switches can be almost as convenient as triggers, provided they are located where you can reach them with both hands on the router grips. They are also better than triggers for router table work, and they usually allow you to remove the router base if necessary.

**Drawbacks?** Some of these switches are poorly located. All can be accidentally left on, or knocked on when the router is unplugged.

**Handle Type.** Most routers come with a pair of handles, usually knobs. But others have two vertical armlike grips, or a pair of D-shaped handles, or a combination of D-handles and knobs.

Which type is best? It's a matter of preference, but my experience is that small spherical knobs can cause cramps in your hands. For that reason I prefer a huskier grip such as arms or a pair of D-handles. For freehand work, I like the handles low on the router so I can rest my arms on the work for better control.

**Electronic Features.** The electronic revolution is just beginning to work its way into the shop, and three routers listed in the chart have special electronic features. Black & Decker's 7666 plunge router has a digital depth-of-cut display, and

their big 3335 router gives you a choice of two speeds. The Sears Craftsman Electronic has electronically controlled variable speeds, plus indicator lights that help you feed the tool at the proper speed. If you have experience with routers, you can probably sense the proper feed speed by ear and feel, but the indicators can help if you are just learning.

**Variable Speeds.** I've found them useful, especially for making slow, finish cuts in hardwoods.

**Dust Pickup.** These work fairly well on some cuts, and not so well on others. My feeling is that if I have to sweep up *any* chips, I might as well sweep them all and be free of the clumsy vacuum hose.

**Worklights.** These can be helpful if properly located in the router. Try before you buy.

#### THINGS TO CHECK OUT AS YOU SHOP

Chances are you won't actually *use* the tool before you buy it, but you can learn a lot about it while at the store. Try changing bits. Is it easy to get your wrench on the collet nut or does the base interfere? Does the collet let go of the bit with a single turn of the wrench, or does it take two or three bites? Does the router have a flat top so you can stand it on its head for bit changes?

Check the switch? Is it easy to reach with your hands on the grips or will you have to let go of the tool to shut it down?

How is your view of the bit? Can you see where it is and where it is going? Check the power cord. Is it stiff and heavy? If so, it can drag and make freehand work difficult. Do you like the feel of the grips? Can you remove the grips if necessary to fit the router into tight spots? Can you remove the base from the router? (You may want to do this to use the motor in certain accessories, or to use it freehand for power woodcarving.)

Finally, does the router maker offer accessories to extend the usefulness of the tool and help it live up to its potential as the most versatile tool in your shop?

WHERE READERS SHOW THEIR STUFF

# Project Showcase

There's a lot of quality woodworking being done these days, and we'd like to show it off. In each issue of *WOOD*, we'll devote this space to a display of projects submitted by our readers—the ones shown here are the work of staff, friends, and acquaintances. To send in your projects, see the instructions at the end of the article.

## A. Home Office Desk

Some thoughtful detailing vaults this desk above the ordinary. Larry Clayton, of Waukee, Iowa, built two red oak base cabinets, then fashioned the door and drawer fronts by edge-joining 1 1/4"-wide oak strips rounded-over on all front edges. He covered the 1 3/16" particleboard top with plastic laminate, then faced its front edge with oak molding.

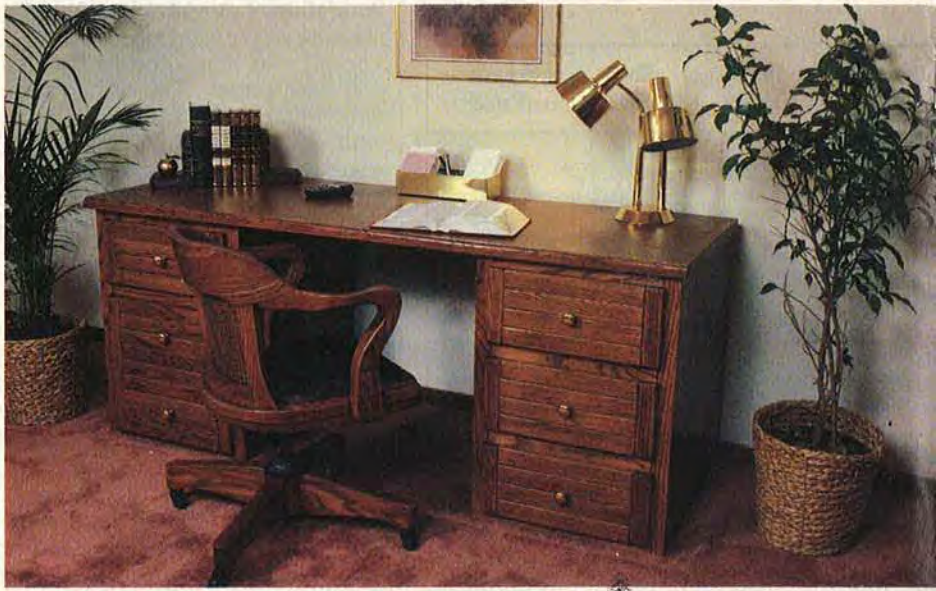
## B. Bent Wood Globe Stand

For this modern adaptation of a classic method, David Jordan, of Des Moines, Iowa, laminated 1/4" oak strips with a contrasting center of walnut veneer to form the arms and legs. Soaking them in hot water, then bending and drying them on a form enabled him to achieve the graceful lines. Solid oak "gores" fitted to the triangular spaces between arms and legs add body and strength. The rim circling the globe was bent in the same manner.

## C. Pedestal Dining Table

When Bob Hawks, of Tulsa, Oklahoma, couldn't buy a table to his liking, he built one. His solid black walnut table extends with two leaves to seat eight people and was assembled without screws. The dowel-joined pedestal is built from 2" stock. The top of 3/4" stock was

A



B



C



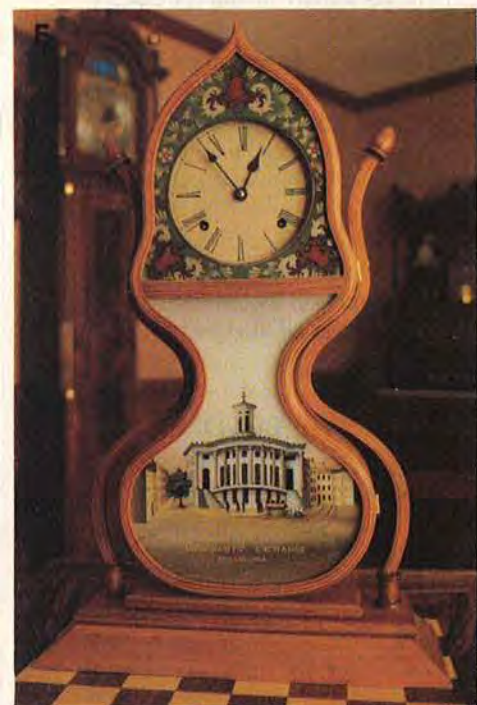
D



biscuit-splined together, then planed to 1 1/2" thickness and banded with a solid strip of walnut. For a finish, Bob applied four coats of tung oil, then added four coats of wipe-on tung oil varnish.

## D. Ornamental Parquet Table

Rosewood and black walnut in blocks of 3/4" x 2 1/4" x 7 1/8" form the pattern for this easier-than-it-looks coffee table. Lee Gatzke, Des Moines, Iowa, glued the blocks directly to 1/2" plywood underlay-ment set on ledger strips within the



mitered frame. The rosewood-veneered oak legs are rabbeted at the top to accept the frame. Lee used a penetrating oil finish.

### E. 1800s Mantel Clock Replica

Originals of this circa 1850 J. C. Brown clock number a dozen, all of which reside in museums around the nation. Working from a brochure photograph, Bill Hopkins, of Des Moines, Iowa, figured out the technique to build one. The case is made of seven  $\frac{1}{16}$ " $\times$ 2" $\times$ 62"

strips of mahogany and cherry laminated together, then formed in a two-piece plywood mold pulled together by clamps. To accept the reverse painted glass front, the case was routed. The finish is several coats of satin varnish, sanded between coats with progressions of 250- to 600-grit wet/dry paper.

### F. Onlaid Box Creations

Gumwood, ebony, holly, avodire, and bubinga are some of the 30 to 40 types of exotic wood veneers used by Alan Hoyt, Washington, D.C., in his eye-catching boxes. Onlaying veneers one at a time requires beveling each edge with a fret saw, then fitting the piece in place until the lid design is completed. A rabbeted hardwood frame surrounds the onlay and acts as a lid. The boxes shown range in size from 20" $\times$ 15" to 6 $\frac{1}{4}$ " $\times$ 4 $\frac{1}{2}$ ". A 60/40 blend of tung oil and varnish finishes his boxes.

### G. Historic Chess Pieces


At a glance you'll recognize the faces of Custer, Sitting Bull, and Crazy Horse in this handcarved butternut chess set. James Kent Melton, Springfield, Missouri, does extensive research, then makes clay models of each piece before carving. Detail and accuracy mark his work. All pieces are 2" in diameter, and the "kings" stand 4 $\frac{1}{2}$ " high. For color contrast, he stained the wood lightly with thinned oil paint.

**To Submit Your Projects:** Send a 35-mm color slide, with the project as the focal point in a simple background. No people, please! Include a capsule description — materials used, special joinery techniques, finish, etc. *WOOD* will pay \$25 for published projects. Unless otherwise requested, we will keep the slides.

**Send to:**

Project Showcase  
Better Homes and Gardens®  
*WOOD* Magazine  
Locust at 17th  
Des Moines, IA 50336

# marking gauge

 Print this article

*\*Collector's Edition*



Design: Jim Downing  
Photograph: George Ceolla

**This brass-bound creation will be a proud part of your tool collection for years to come.**

## THE BODY

**1** Resaw the walnut  $\frac{1}{2}$ " thick. Then, rip a  $\frac{1}{4}$ "-wide piece (E) and another piece 1" wide. Cut pieces A and B to size.

**2** Rip a 6" length of  $\frac{3}{4}$ " scrap lumber  $\frac{1}{2}$ " wide. (Give it a coat of wax so it won't bond to the body parts during glue up.) Using woodworker's glue, assemble the body as shown here. Clamp the

piece to ensure a good bond. Let the glue dry for several hours or overnight. Remove the spacer block after the glue is dry.

**3** With a router, or a table saw fitted with a dado blade, cut  $\frac{1}{4}$ "-wide

$\times \frac{1}{16}$ "-deep dadoes in the body as shown to accommodate the brass plates (C).

**4** Drill and countersink a  $\frac{3}{16}$ "-diameter hole through the body to accept the tightening bolt. Refer to the plan view drawings for positioning.

**5** Now cut a slot through the end of the body as shown in the plan drawing. We used a table saw equipped with a thin-rimmed blade.

**6** Cut the brass stock (C) to size. Then cut two of the pieces in half. Fit the brass into the dadoes, and drill and countersink holes for the mounting screws. Install the brass,

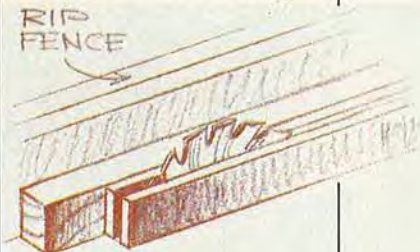
using epoxy in the dadoes and pilot holes. Also install the tightening bolt, using epoxy in the countersink to prevent movement of the bolt. Allow the epoxy to dry.

**7** File away any excess brass protruding from the ends of the dadoes, then sand all surfaces until smooth.

## THE BLADE

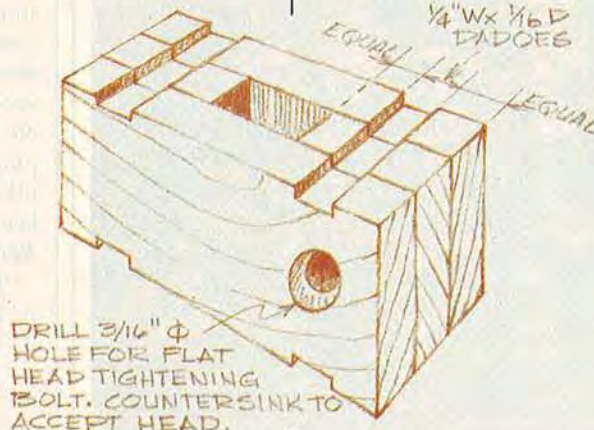
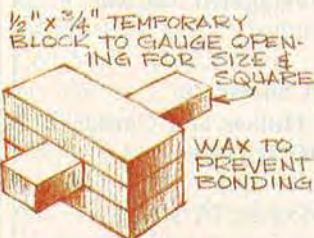
**1** Resaw the maple  $\frac{1}{2}$ " thick. Then, rip and crosscut two D pieces to size. Also crosscut E to length.

**2** Glue and clamp the walnut strip to one of the maple strips, holding



the walnut back about 1" from the end of the maple to create a slot for the lead-scribe holder. After the glue dries, rip the walnut to  $\frac{1}{32}$ " wide, as shown. Then, glue and clamp the remaining maple strip to the glued-up blade assembly. Let glue dry.

**3** Sand the blade as necessary so it will pass through the opening in the body. Then drill and countersink the hole that will accept the blade-tightening bolt. (Refer to the plan view drawings for exact hole location.) Now, using epoxy adhesive in the countersink, install the bolt. Thread the knurled nut onto the bolt to apply



some pressure, but not so much that the slot is reduced to less than  $\frac{1}{32}$ ". Then drill a  $\frac{1}{16}$ " hole into the blade to accept a lead or scribe.

**4** Cut  $\frac{1}{16}$ "-deep  $\times \frac{3}{4}$ "-wide rabbets in the opposite end of the blade to accept the brass plates (F). Cut the plates to size, then epoxy them into place. After the epoxy dries, file the brass smooth and sand all surfaces of the blade.

### LEAD/SCRIBE STORAGE

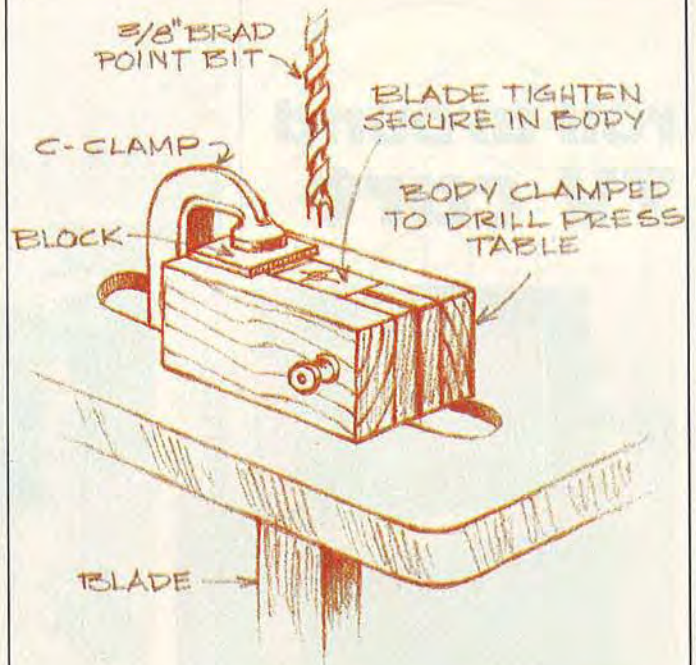
**1** Mark the center of the blade's end, then fit it into the opening in the body. If you have a drill

press, clamp the body to the table as shown. (Make sure you have the tightening bolt snugged up so the blade won't move.)

**2** Slowly bore a  $\frac{3}{8}$ " hole  $\frac{3}{4}$ " deep in the end of the blade, and a  $\frac{3}{16}$ " hole in the center of that hole,  $\frac{1}{4}$ " deep.

**3** Size the remaining brass bolt (with head removed) so it will reach the bottom of the  $\frac{3}{16}$ " hole and accommodate the knurled nut. Epoxy it into place.

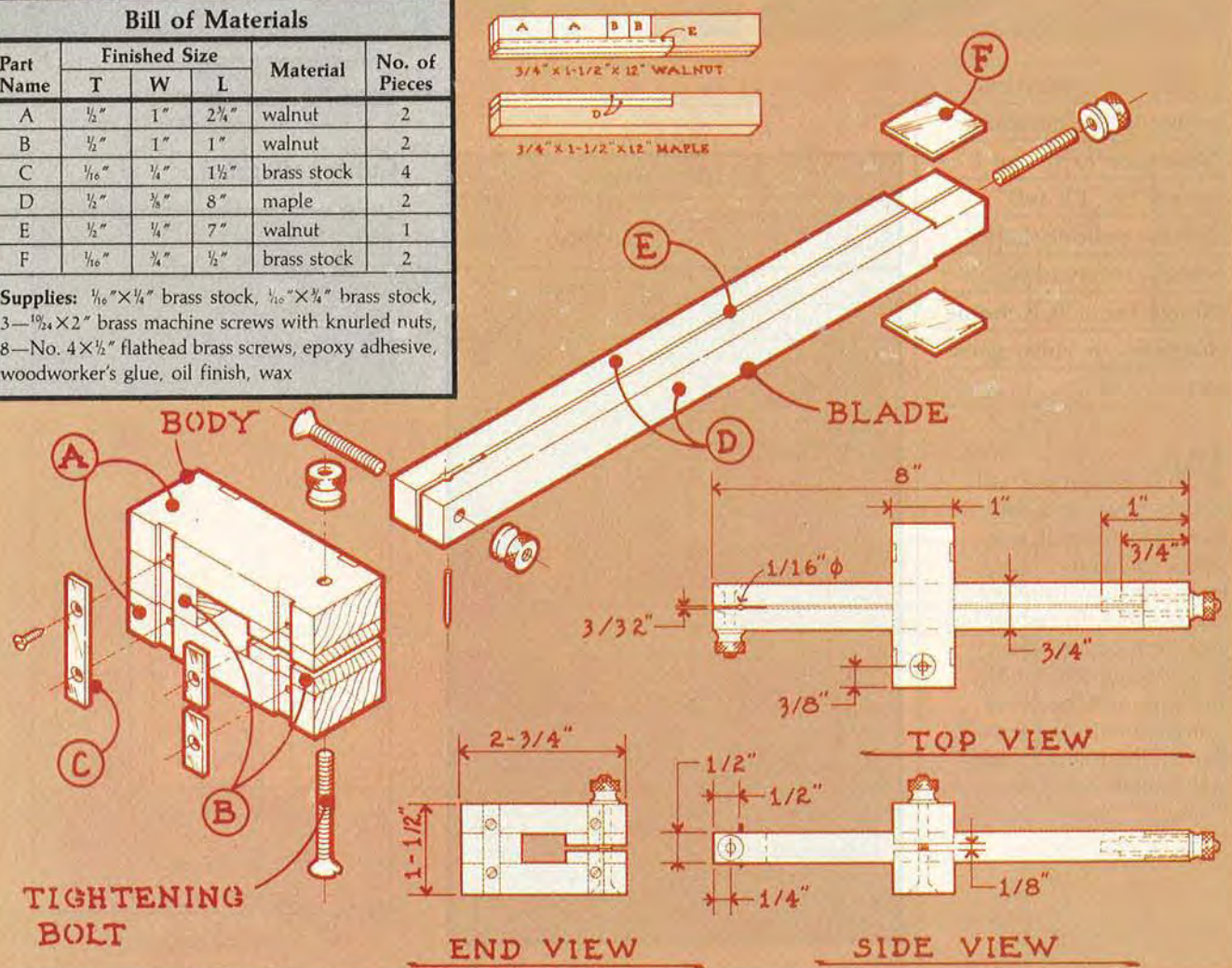
*Note: We used Watco Danish oil finish (natural) on our marking gauge. And after that dried, we applied a couple coats of paste wax.*




### Bill of Materials

Part Name	Finished Size			Material	No. of Pieces
	T	W	L		
A	$\frac{1}{2}$ "	1"	$2\frac{1}{4}$ "	walnut	2
B	$\frac{1}{2}$ "	1"	1"	walnut	2
C	$\frac{1}{16}$ "	$\frac{1}{4}$ "	$1\frac{1}{2}$ "	brass stock	4
D	$\frac{1}{2}$ "	$\frac{3}{8}$ "	8"	maple	2
E	$\frac{1}{2}$ "	$\frac{1}{4}$ "	7"	walnut	1
F	$\frac{1}{16}$ "	$\frac{3}{4}$ "	$\frac{1}{2}$ "	brass stock	2

**Supplies:**  $\frac{1}{16}$ "  $\times \frac{1}{4}$ " brass stock,  $\frac{1}{16}$ "  $\times \frac{3}{4}$ " brass stock, 3— $\frac{10}{24}$   $\times 2$ " brass machine screws with knurled nuts, 8—No. 4  $\times \frac{1}{2}$ " flathead brass screws, epoxy adhesive, woodworker's glue, oil finish, wax



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## roll-around TV cart



At last . . . a beautiful answer to the question, "Where on earth can I put my 19" TV set?" And the pullout shelf beneath offers ideal storage for a VCR, home computer, or video game player.

**W**ith this project you start by making a basic box, then cover it with plastic laminate. The transformation from rectangular box to fashionable item begins when you add the ash handles and trim, and becomes complete with the installation of the roll-out shelf and cabinet doors.



3/4" x 7 1/4" x 84" ASH



3/4" x 7 1/4" x 36" ANY SPECIES

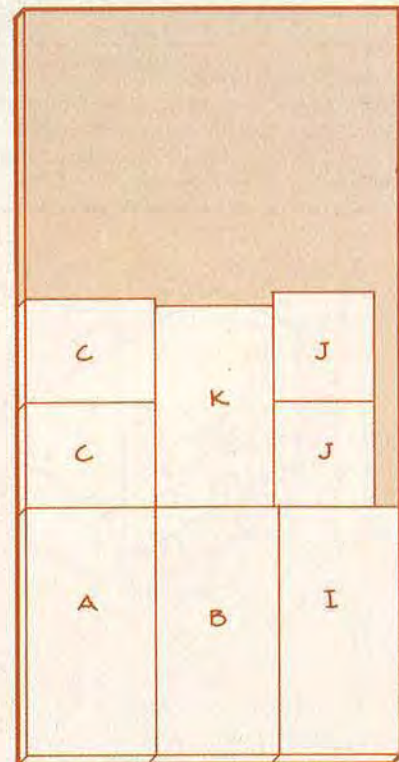
### Bill of Materials

Part Name	Finished Size			Material	No of Pieces
	T	W	L		
A	3/4"	16 1/2"	32 1/16"	plywood	1
B	3/4"	16 1/2"	30 1/2"	plywood	1
C	3/4"	16 1/2"	14 1/4"	plywood	2
D	3/4"	2"	30 1/2"	pine	2
E	3/4"	2"	27"	ash	4
F	3/4"	2"	18"	ash	2
G	3/4"	2 3/8"	17 1/4"	ash	2
H	3/4"	2"	28"	ash	2
I	3/4"	13"	28"	plywood	1
*J	3/4"	13 3/8"	12 13/16"	plywood	2
K	3/4"	16"	24 3/4"	plywood	1
L	3/4"	3"	13 1/2"	pine	2

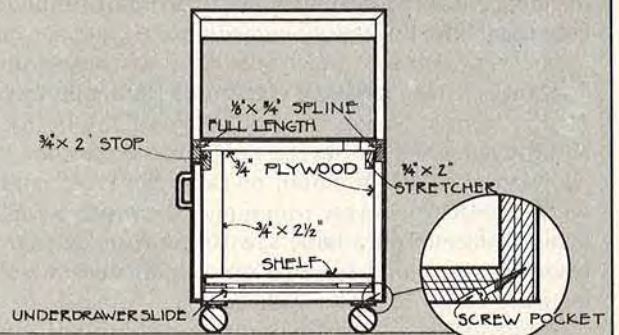
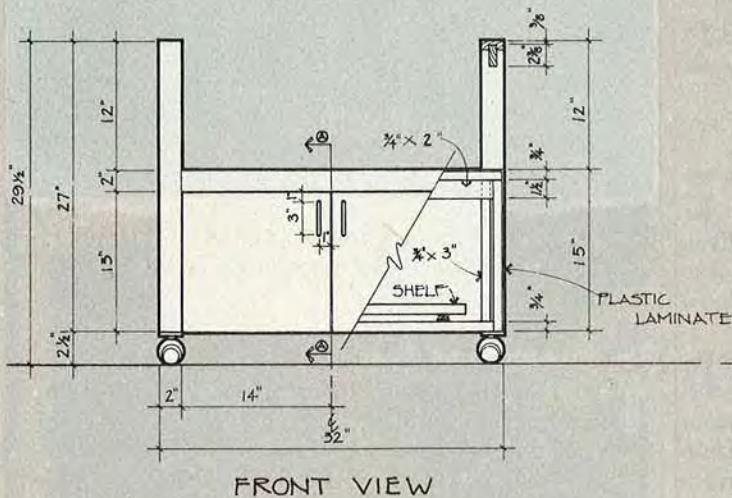
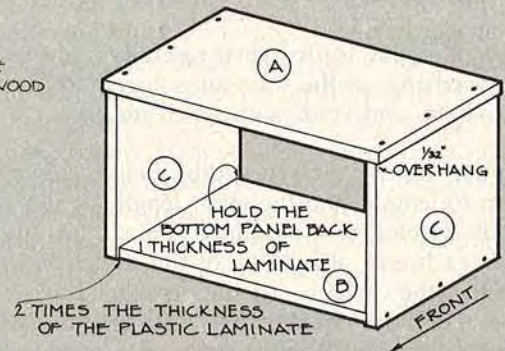
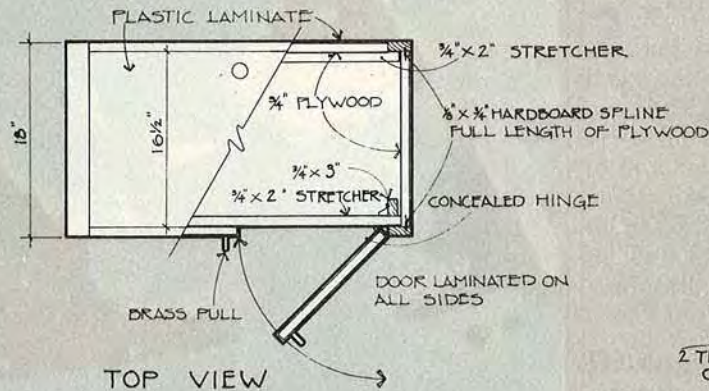
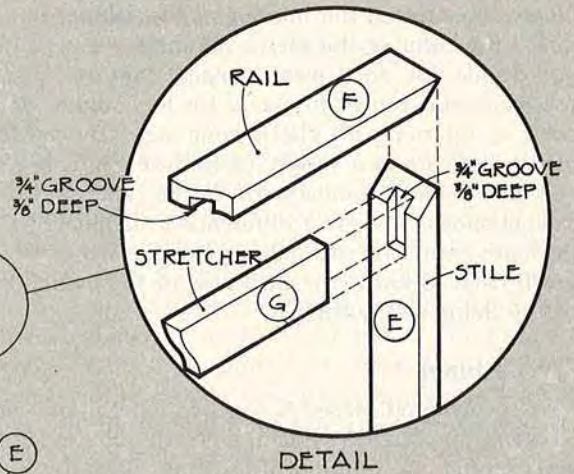
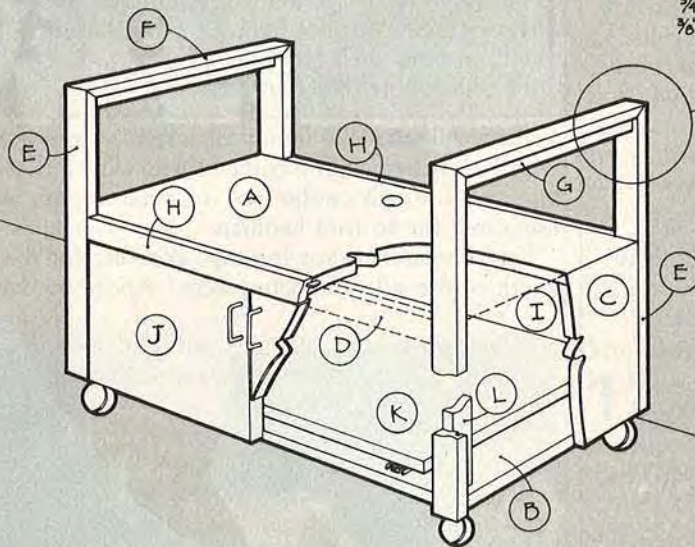
\*Length and width include thickness of plastic laminate.

**Supplies:** 1/8" hardboard cut into 1/16"-wide strips, 3' x 8' sheet of plastic laminate, 2 pair—Grass 1002 self-closing hinges and 1000-80 base plates, 1 set—2 1/2" plate casters, 1 pair—Knappe Vogt 1500 underdrawer slides, #8 x 1 1/4" flathead wood screws, woodworker's glue, contact cement, wood putty, 1 pair—3" brass wire pulls, polyurethane varnish, paint.

### Cutting diagram



3/4" x 48" x 96" PLYWOOD



Continued

## FURNITURE PROJECT

*Note:* We painted the interior of the cabinet to match the color of the plastic laminate we used. If you decide you don't want to paint, you can either use hardwood veneer plywood for the cabinet or cover its interior with plastic laminate. You can find plastic laminate in a variety of thicknesses, colors, and sizes at most lumberyards, home centers, and cabinet shops. There's a difference in laminate thickness from one manufacturer to the next, so you'll need to know the thickness of the laminate before doing any cutting.

### The Cabinet

**1** Cut plywood pieces A, B, C to length and width. Next, measure the thickness of the plastic laminate you're using and multiply it by three. Cut this amount from the width of the bottom (B) to allow for the thickness of the laminate.

**2** Arrange the plywood parts A, B, C with the best side facing toward the interior of the cabinet. Set the bottom (B) back from the front edge of the sides (C) a distance equal to two thicknesses of the plastic laminate. Also allow the top (A) to overhang the sides by  $\frac{1}{2}$ ". Assemble the box using #8 $\times$ 1 $\frac{1}{4}$ " flathead wood screws and woodworker's glue. Using screws, attach a 1 $\times$ 2 piece of scrap diagonally across the back to temporarily hold the case rigid.

**3** Allow the glue to dry, then carefully belt-sand the top overhang, so the sides are square and flush. Fill all screw holes and voids with wood putty.

**4** Rip the stretchers (D) to width. Before crosscutting them to length, find the exact length by measuring the inside opening of the cabinet. Using glue and two screws in each end, attach one of the stretchers to the top front of the cabinet. Set this stretcher back from the edge a distance equal to two thicknesses of the laminate. Make sure that the stretcher is square with the front of the cabinet. Now, attach the other stretcher to the back of the cabinet in the same manner, but set it in only one thickness of the laminate. Fill all screw holes with wood putty.

**5** You are now ready to cut the plastic laminate for the front stretcher, the front edge of the bottom, and the sides. When laying out your cutting plan, allow an extra 1" minimum on both the length and width of each piece for trimming after gluing. Cut the laminate faceup on a table saw, using a carbide-tipped blade or a plywood blade. (You can also use a hand laminate cutter to make your cuts.)

**6** Using contact cement, apply the laminate to the sides, front stretcher, and the front edge of the bottom. Be careful during this procedure because you can't easily change the position of the laminate once it's in place.

**Caution:** Contact adhesives, the older solvent types as well as the newer water-based variety, require adequate ventilation. Be sure to read and follow all manufacturer's warnings on the label and container lip. In addition, the solvent types (though no longer sold) often can be extremely flammable and set off by a cigarette or pilot light. If you still have this kind on your shelf and plan to use it, exercise caution and follow directions carefully.

After adhering the laminate, carefully trim it flush with the surface with a router fitted with a flush-trim bit or with a belt sander (see the photo.) You also can use a mill file to trim laminate.

Cut the laminate for the top, allowing for the added width of the side laminate pieces. Apply the laminate



to the top and trim it, using a router with a laminate trimmer. Be careful to not scratch the laminate on the sides.

### The Handles and Trim

**1** Rip enough ash stock for parts E, F, G, H. Miter one end of each of the stiles (E) and both ends of the rails (F) at 45 degrees. Then, crosscut the handle parts (E, F, G) to length. Set the trim pieces (H) aside for now.



**2** Cut a  $\frac{3}{4}$ " groove  $\frac{3}{8}$ " deep along the center of the bottom of the rails (F) with a dado blade or router. Next, cut  $\frac{3}{4}$ " stopped grooves  $\frac{3}{8}$ " deep in the mitered end of the handle stiles (see plan detail). Square up the stopped grooves with a chisel.

**3** The stiles (E) and trim (H) are attached to the cabinet with spline joints. Using a router with a  $\frac{1}{8}$ " $\times$  $\frac{3}{8}$ "-deep slotting cutter, rout spline grooves in the edges of the cabinet (see photo below and Section A-A in the drawings). (If you don't have a slotting cutter, you can use dowels instead of splines.) Start and stop spline grooves about  $\frac{3}{4}$ " from the edges of the cabinet. Rout matching grooves in the stiles (E) and the trim (H). *Note:* When routing the stiles, be sure you stop the groove short of the top of the cabinet.

**4** To avoid scratching the laminate with sandpaper, sand all the handle pieces before assembly.

**5** Cut the spline material needed, check for a good fit, and glue and insert them into the grooves in the cabinet. To attach the handle assemblies, start by gluing and fitting the stiles onto the spline material. Now, glue and fit the handle stretchers (G) into place, and glue and fit the rails. Clamp the assemblies and allow the glue to set up.



**6** Carefully measure for the trim pieces (H) and cross-cut them to length. Finish-sand these, then glue them into place and clamp securely.

### The Back

**1** Carefully measure the opening for the back (I). (The back will butt even with the trim and the handle stiles and flush with the bottom of the cabinet.) Cut the back a little oversize and apply laminate to it. Trim the back to its final dimensions on the table saw (laminate side up). Attach the top of the back from the inside of the cabinet, using glue and #8 $\times$ 1 $\frac{1}{4}$ " flathead wood screws. Glue and clamp the bottom edge of the back, then turn the cabinet upside down and use a  $\frac{3}{8}$ " brad-point drill bit to drill three screw pockets in the bottom of the cabinet (see detail). Install #8 $\times$ 1 $\frac{1}{4}$ " flathead wood screws into the screw pockets.

### The Doors and Shelf

**1** Measure the opening for the doors (J). Allow for plastic laminate on the door edges and for clearance between the doors and the trim. Cut the doors and the shelf (K) to size, then apply plastic laminate to both, starting with the edges. Trim off the excess, then apply laminate to both sides of the doors and the top of the shelf.

**2** We used Grass hinges for the doors of this cabinet. They mount to the back side of the door and to a hinge mounting block (L) located perpendicular to the handle trim (see plan detail). Cut the hinge mounting blocks to size, making sure to notch the top front edge to fit around the trim. Bore holes in the doors for the hinge cups. Follow manufacturer's instructions. Place shims between the mounting blocks and the ends of the cabinets, then screw the blocks to the ends. Before you install the doors, drill the mounting holes for the handles.

### Finishing the Project

**1** Drill a hole in the back or top of the cabinet for wires and cables. Sand the edges of the hole.

**2** Round-over all the exposed edges of the ash trim and handles, using a router with a  $\frac{3}{8}$ " rounding-over bit. Finish-sand the hardwood trim. We used masking tape to protect the laminate during sanding.


**3** For a finish, paint the inside of the cabinet with a primer followed by one or two finish coats that match the color of the laminate. Apply two coats of polyurethane varnish to the handles and trim. Steel-wool the varnish between coats.

**4** After the finish has thoroughly dried, install the shelf. Fasten a pair of underdrawer slides to the underside of the shelf and the bottom of the cabinet, making sure to align the slides carefully to avoid binding. Finally, set the cabinet on its back and install the casters and the wire pulls.

# The old hand ways

**"I had never handled a tool in my life, and yet in time, by labour, application, and contrivance, I found at last I wanted nothing but I could have made it."**

—Daniel DeFoe  
*The Life and Adventures of Robinson Crusoe*

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**By Roy Underhill**

*Master housewright at Colonial Williamsburg, host of the highly successful P.B.S. series "The Woodwright's Shop," author, lecturer, and master craftsman.*

When *Robinson Crusoe* was published in 1719, it was virtually the first novel written in the English language. It was a smash hit. Since that time, thousands of stories have been told and forgotten, yet this tale of a man forced to rely on simple tools and common sense has endured and is familiar to almost everyone today. What could account for its timeless appeal?

Is it just escapism? The stresses that were part of everyday life in bustling, progressive 18th-century London are still with us today — with a vengeance. Could this explain the enduring popularity of the theme of "the simple life"? Is this column devoted to "the old ways" in the world's newest wood-working magazine just more therapeutic nostalgia? No way!

The test of a classic is that it remains eternally modern. Traditional methods endure because they always have worked and they always will. Your axe will still fell a tree. Your mallet and chisel will still cut perfect dovetails. Your plane (just a block of wood with a piece of steel in it) will still give you the finest surfaces and the crispest moldings. The old ways work; and if you don't believe it, just ask yourself how we got to where we are today. There was life before electricity.

But power tools work, too, and are readily available. Why would anyone choose to work wood with old hand tools? You might as well ask why some people prefer to travel on cross-country skis rather than snowmobiles. Both will get you there; the difference is in the quality of the journey.

In this column we will explore the old paths in the way they were originally taken, not as adventuresome re-creations, but as professions that put food on the table and clothes on the kids. You know their names, you may even carry one of them yourself. Who has not

met a Cooper, a Carpenter, a Sawyer, a Joiner, a Carver, a Turner, or one of the many Wrights? Each trade with its own tools, trees, and tricks. But before there could be any of these specialized trades, there had to be a pioneer, the homesteader who laid the foundations of the civilization to follow.

## THE PIONEER—Part 1

The first thing one who seeks to live in the wilderness must do is to find protection from it. To build with trees, however, you must disconnect them from the ground. The axes and men who came over on the first boat were no match for the ancient giants of the American forest. But, as Benjamin Franklin noted when he watched the construction of a frontier fort in 1755, it was not long before they were equal to the task: "Seeing the trees fall so fast, I had the curiosity to look at my watch when two men began to cut at a pine; in six minutes they had it upon the ground, and I found it of fourteen inches diameter."

## FELLING

An operation as significant as felling a tree must be preceded by the proper diagnosis. First, you must look for any predisposition of the tree to fall in one direction caused by a lean or extended limbs. It is often better to fell the tree at right angles to this direction, even if this leaning will cause it to fall into another tree and hang up. The reason for this is that you want the tree to be cut well nigh through before it goes over. You don't want to have a lot of splintering and surprises. This is dangerous business; to stay alive, you must be in control.

The way to fell a tree with control is to hinge it down. Stand to the side of where you want the tree to fall and swing about you with the axe at full extension to be sure that there are no limbs, vines, or

people to catch your axe on.

Make the first cut on the side that faces where you want the tree to fall. You are using the axe efficiently when it feels as if you are whipping it into the tree rather than pushing it. When the first notch is more than halfway through the tree, move to the opposite side and cut the back notch a little higher up the tree than the first one. The wood that remains between these two notches is the hinge. Keep to the side when it gets ready to go over. Never stand behind the falling tree; it could on occasion kick back and would squash you like a bug.

Felling the tree is the first operation of woodworking, and the speed and ease of your axe work is



a prime example of one of the Great Secrets of Woodworking: *Exploit a wood's weakness when you work it and its strength when you use it.*

Examine the surface of any one of the chips that flew from the notch when you cut down the tree. When you are working at your best, the area of the chip that was actually severed by the axe blade will be only about one-fifth of the total surface. The rest of the surface will plainly show that it was formed by splitting. This shows the extent to which you have taken advantage of the natural planes of weakness in the wood of the standing tree.

## SQUARING

Unless you are building a far-northern style of log house, you will need to flatten your log on at least two sides before you use it. This need is not entirely based on the neurotic compulsion to impose strict geometric order on natural forms. Bringing the log to a standard rectangular section is genuinely helpful in the systematic construction of a frame building.

## LAYOUT

Although you can do it entirely by eye, even the most experienced workers usually place guidelines on the log before attacking it with their axe. There are many ways to work, but this is what I do:

First, I roll the log up off the ground onto two short cross logs. These supports have notches cut in their tops so that the log will not rock about. If the log is somewhat bent, I orient it so the curve is in the vertical plane rather than to one side. I then sit down at the small end of the log with a plumb bob, a scratch awl, and a square and begin the layout.

At the top of this end of the log, I spear the end grain twice with the scratch awl to mark out the thickness to which I want to hew the timber. From these two points I drop the plumb line and similarly mark the lower end. With the square and awl, I then scribe vertical lines that connect the top and bottom points. I get up, go to the other end, and do the same thing again.

Once I have the two ends marked out, I connect them down the length of the log with a snap line. I use the charcoal of willow wood rubbed on the string, but chalk is as old as the white cliffs of Dover. When you snap the line, it is important to strain it in the same vertical plane as the surface you want to create. If you mistakenly pull out radially from the heart of the log, the odd contours of the log's natural surface will throw your line quite a bit off.



## HEWING

Hewing is a means of getting what you want by chopping off what you don't need. Again, almost all of the wood is removed by splitting. Ideally, you could drive in a wedge at one end and split off the whole side at once. Realistically, though, you will have to shorten the length that is going to be split off. While most trees can be separated rather easily by splitting, not all trees will conform to your plans. Some trees will not split smoothly, even within the same species, so often knowledge is as important as technique.

The way to do this is to stand on top of the log and chop a series of notches into the side down to the line. Space these notches about a foot apart, unless you come to a knot, in which case you must chop



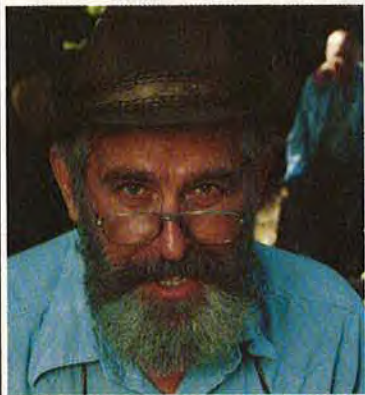
in right atop it. You then swing down with the grain and split off the chunks between the notches. (This is why you must be rid of the

*Continued on page 84*

# treenware

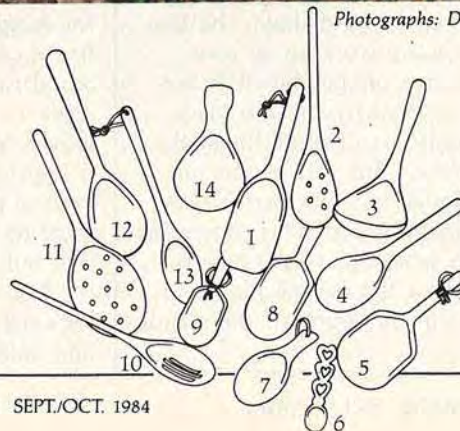
**Spoons and such from greenwood from Roger Sandstrom**

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Photographs: David Jordan

- |  |   |
|--|---|
| 1. Sassafras scoop (hand-chopped)      | 9. Apple scoop                          |
| 2. Cherry pierced spoon                | 10. Persimmon slotted spoon             |
| 3. Ash crotch ladle                    | 11. Cherry flat serving spoon           |
| 4. Sassafras flat spoon (hand-chopped) | 12. Sassafras flat spoon (hand-chopped) |
| 5. Sassafras scoop (hand-chopped)      | 13. Wild plum ladle                     |
| 6. Sugar pine carved love spoon        | 14. Maple burl hand dipper              |
| 7. Pecan skimmer                       |   |
| 8. Sassafras scoop (hand-chopped)      |   |



**A** tall, imposing man, Connecticut-born Roger Sandstrom came to his appreciation of nature at an early age. This interest was nurtured by a father who taught Roger how to use the tools of a great uncle, and later by the works of Eric Sloane.

Roger had always enjoyed working with wood, but on a trip to Missouri in 1972, he discovered a myriad of native woods there that broadened his woodworking horizons. Roger has fashioned items from a great number of species, including lilac, redbud, mulberry, wild plum, osage orange, peach, grapevine, and even

poison ivy. Bowls, spoons, and ladles made from burls are among Roger's favorite pieces.

Since moving to Missouri in 1973, Roger has devoted most of his time to his art, except for that spent exhibiting and lecturing at nature centers and schools around the country. He, his wife Mary, and their children live on a farm near Seymour, Missouri.

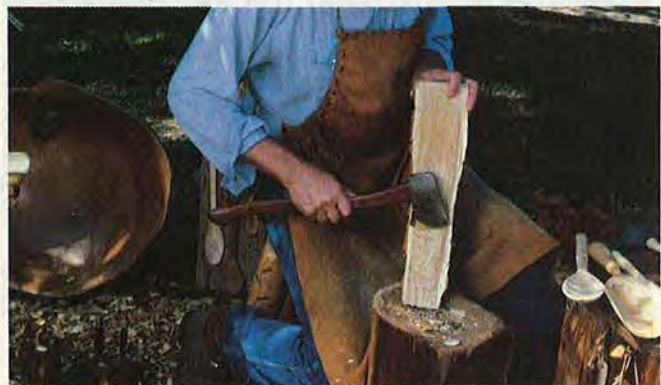
Why has he chosen the quiet lifestyle he so prizes? Because "I'm doing the things I wanted to do as a child. I'm never going to get rich, but it pays the light bill, and the price of bread, and that's all that counts."

**Hewing woodenware items from available woods was a way of life in colonial times, and before. It was the local cooper's job to make and repair containers and utensils. But sometimes it wasn't practical to wait for him to do the needed work. More often than not, people would take things into their own hands and fashion their own ladles, dippers, spoons, scoops, boxes, bowls, even cups.**

**While the making of treenware is pretty much a lost art, it is something that can be learned. And the needed tools are few: a sharp ax or hatchet, a gouge to hollow out the bowls, a knife, a file, and some sandpaper. Who knows, after watching Roger Sandstrom handcraft a stirring spoon on this and the following pages, you may be tempted to try your hand at this fascinating craft.**

For this project, Roger chose one of his favorite local woods, sassafras, a wood he likes for its workability and grain pattern. Here, Roger is "squaring up" the log with a mallet and froe. One of the splits taken off in the process will soon be shaped into a one-of-a-kind stirring spoon. You can use green or dried wood.

With his trusty ax, Roger begins to shape the front side of the bowl end of the spoon. The sycamore burl bowl in the background is the second largest in the world.



Once the contour of the bowl has been roughed out, Roger then concentrates his effort on the handle end. Truing up the surface is the aim here.



*Continued*

## CRAFTSMAN CLOSE-UP

Removing the bark from the back side of the split comes next. The natural curvature of the split makes shaping the back side of the bowl fairly easy.



To finish the rough-out stage, Roger cuts away excess material along the length of the handle. He is especially careful near the end of the split to take a like amount of wood from either side of the handle to keep the symmetry intact.



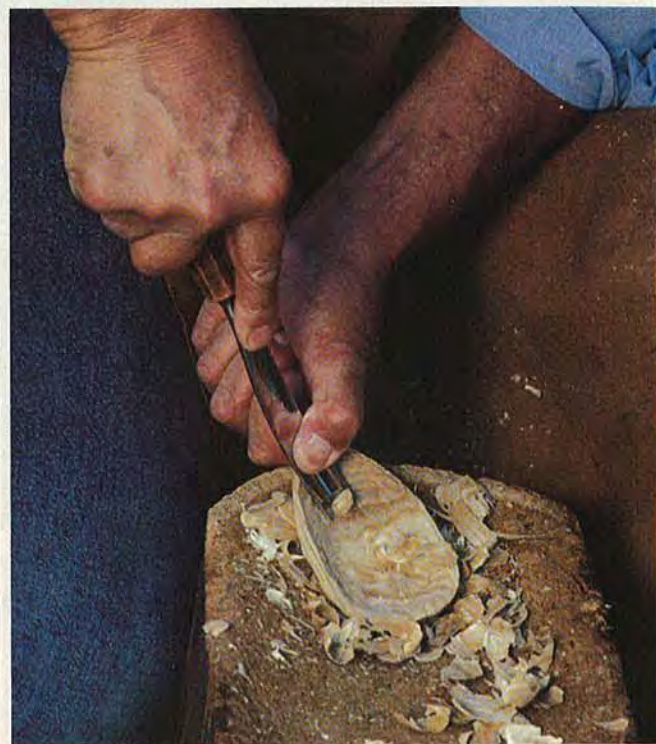
Next, Roger trades in his axe for a knife, which he uses to further define the shape of the spoon. He's also quick to point out that although he pulls the knife toward him as he works, it is not a safe practice.



To scoop out the material from the bowl, he calls on a gouge and mallet. The spoon is several inches longer than its finished length. This extra length allows Roger to vise the utensil between his legs. Again, he cautions against imitating his technique. He recommends instead using a "real" vise to hold the work.



Here, Roger works with the gouge alone to remove some of the rough spots left in the bowl. He likes to gouge the bowl down to a thickness of  $\frac{1}{4}$  inch.



Roger now cuts off the excess material at the handle end with his ax. (The length of this particular implement is 13 inches.) Then, he does some final touching-up with a knife. It took Roger about 20 minutes to fashion the spoon.



Once the shaping is complete, Roger turns the project over to his wife, Mary, who sands and applies a finish of raw linseed oil immediately to minimize splitting and cracking. Mary prefers this finish because it's nontoxic and it accepts wax well.



#### How to take care of treenware

The Sandstroms list several do's and don'ts in a flyer they give customers of their product.

- Don't expose treenware to water for long periods.
- Condition treenware you will be using by washing it with soap and water, rinsing it quickly, and letting it dry thoroughly. If the grain rises, sand smooth, wipe clean, and apply a light coat of cooking oil. Wipe away excess oil.
- With decorative pieces, a light coat of paste wax from time to time will revive their natural beauty.

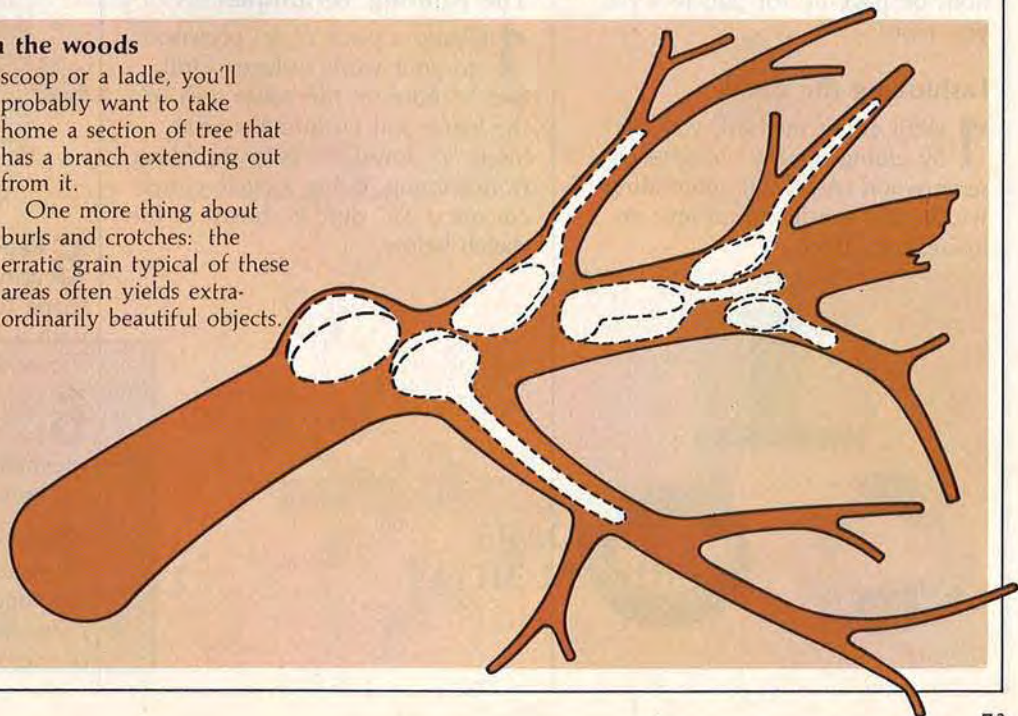
#### How to locate treenware in the woods

One of the neat things about making treenware is that the raw material is no farther away than the nearest woods. You can use almost any wood, so locating a piece won't be hard. Look for fallen portions of trees that have not begun to decay.

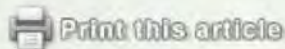
Once you find a likely tree, try to spot configurations that approach those of the item you plan to fashion. Burls—those unsightly bulges sometimes found along the trunk or branches of a tree—make ideal material for bowls and cups. And if you want to make a curved-handle

scoop or a ladle, you'll probably want to take home a section of tree that has a branch extending out from it.

One more thing about burls and crotches: the erratic grain typical of these areas often yields extraordinarily beautiful objects.



# designer bracelets

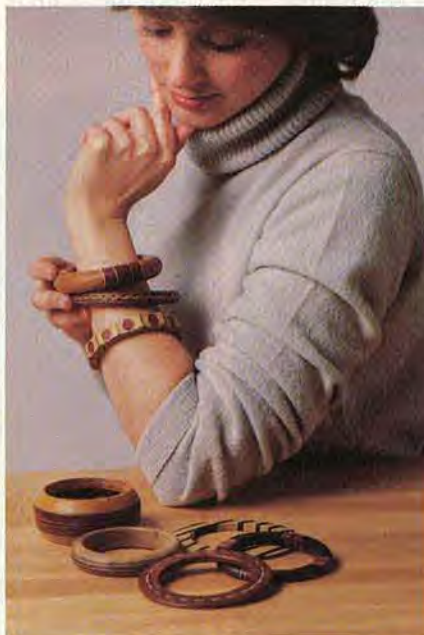
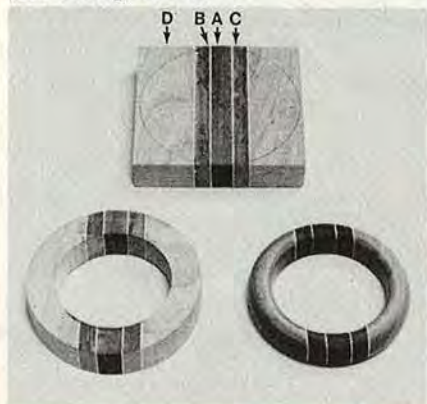


With this project, making the item is only half the fun. The best part comes when you surprise a friend or acquaintance with one of these beauties.

Not only will you be credited with being one of the world's greatest wordworkers, you'll also get high marks for your thoughtfulness. We'll show you two ways to make the bracelet that's shown below in various stages of construction. We made our first ones on a lathe, but later found out that making them is just as easy with a router. We've included a couple of design variations on page 00 for you to try if you wish.

## Fashioning the Blank

1 With either method, you start by gluing up 4½" lengths of scrap wood (A,B,C,D), alternating widths and species to achieve an interesting effect.



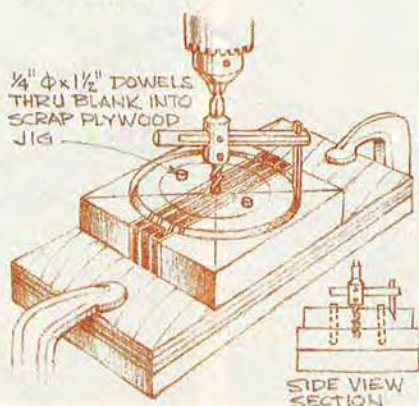
Designer: David Jordan • Photograph: George Ceolla

2 After the glue has set up, sand the front and back of the blank smooth. We used a disk sander to do this. Then cut the blank to 4" square.

3 Draw diagonal lines from corner to corner to find the blank's center. Then, using a compass, scribe a 3½" circle to define the perimeter of the bracelet.

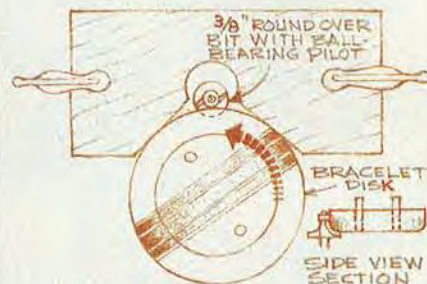
## The Routing Technique

1 Clamp a piece of ¼" plywood to your work surface. Drill two ¼" holes in the waste area of the blank and on into the scrap. Insert ¼" dowels to keep the blank from turning. Using a circle cutter, cut out a 3½" disk as shown in the sketch below.

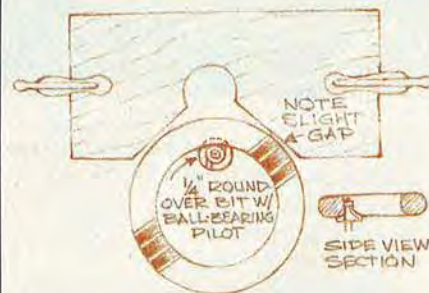


2 Make a routing jig like the one shown in the drawing below, using ¼" plywood. Clamp the jig to your router table, position the disk as shown in the sketch, and round-over both outside edges.

3 Thread a bolt through the center hole of the disk, then chuck it into a drill and sand the surface smooth.



4 Put the disk back onto the ¼" plywood you used in step 1, and secure it with the ¼" dowels. Adjust the circle cutter and drill a 2½" (or larger) hole.



5 Reposition the routing jig, then using the jig as a steady rest, shape the bracelet's inside edges with a ¼" rounding-over bit as shown in the sketch above.

6 You'll have to do some sanding to bring the bracelet to its finished smooth shape. We used 120-grit sandpaper to do this.

7 Finish the bracelet with several coats of penetrating oil finish. We used Deftoil natural Danish oil. After the oil dries, apply two coats of paste wax.



## The Turning Technique

**1** Start by making a mandrel like the one shown in the sketch below. We used a 3" Philippine mahogany turning square. First, turn the square round between centers, then cut off the length required for the mandrel. Drill a  $\frac{3}{4}$ " hole  $\frac{3}{8}$ " deep in one end with a spade bit.

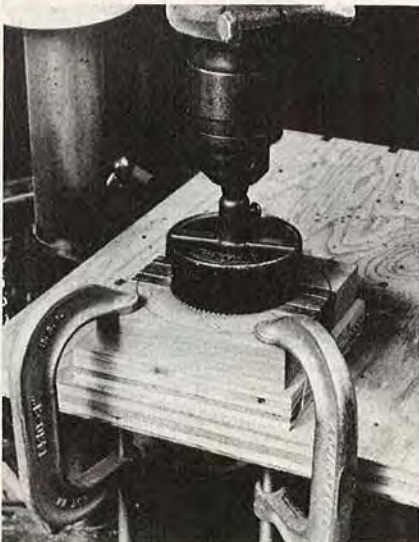
Drill a  $\frac{5}{16}$ " $\times$ 2"-deep hole in the center of the first hole. Then, flip the cylinder over, and drill a 1 $\frac{1}{2}$ "-diameter hole to within 1" of the other end of the cylinder.

Insert a  $\frac{5}{16}$ " T-nut into the end of the mandrel, and screw the mandrel to a faceplate. Turn the last inch or so of the mandrel down to the inside diameter of your bracelet (ours is 2 $\frac{1}{2}$ ", but you may want a larger (or smaller) inside diameter). Hollow out the end of the mandrel so it will accommodate the wooden plug. Using a band saw or jigsaw, cut four saw kerfs in the mandrel.

Fashion a plug like the one shown. Drill a  $\frac{5}{16}$ " hole in the plug's center, then run a bolt and washer through it.

**2** Repeat Steps 1, 2, and 3 under "Fashioning the Blank."

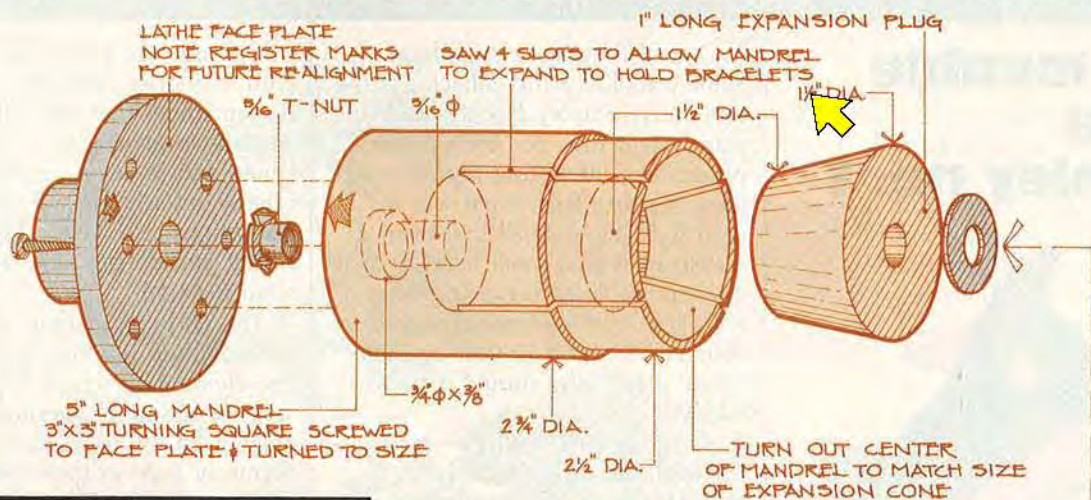
**3** Using a hole saw or a circle cutter, cut a 2 $\frac{1}{2}$ " (or larger) hole from the center of the blank as shown below. Round off its corners with a band saw or jigsaw, then mount your blank on the mandrel. Tighten the bolt to expand the mandrel to hold the blank.



**4** With your lathe set on a slow speed, turn the blank until it is round (see the photo below). We used a gouge to do this. Then round-over the edges and finish the sides with a skew chisel.



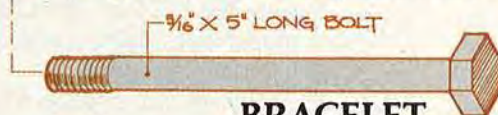
**5** Once you have the desired shape, sand the bracelet smooth and apply several coats of penetrating oil finish, followed by a couple coats of paste wax. We sanded the outer surfaces of the bracelet on the lathe, and the inner ones with a sanding drum.



### Bill of Materials

Part Name	Finished Size			Material	No. of Pieces
	T	W	L		
A	$\frac{3}{4}$ "	$\frac{1}{2}$ "	4 $\frac{1}{2}$ "	padauk	1
B	$\frac{3}{4}$ "	$\frac{3}{16}$ "	4 $\frac{1}{2}$ "	holly	4
C	$\frac{3}{4}$ "	$\frac{1}{8}$ "	4 $\frac{1}{2}$ "	purpleheart	2
D	$\frac{3}{4}$ "	1 $\frac{1}{2}$ "	4 $\frac{1}{2}$ "	cherry	2

Supplies: woodworker's glue, penetrating oil finish, paste wax,  $\frac{1}{4}$ " dowel

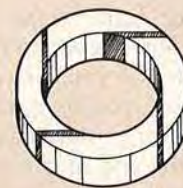
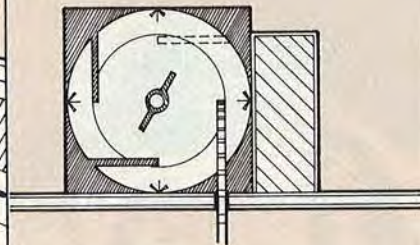
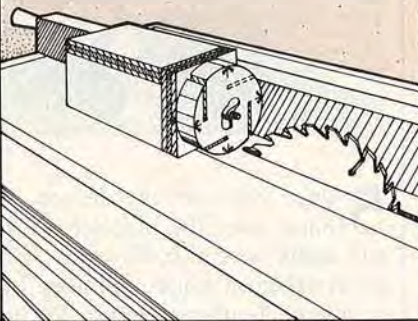
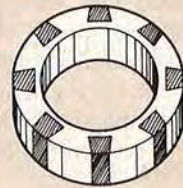
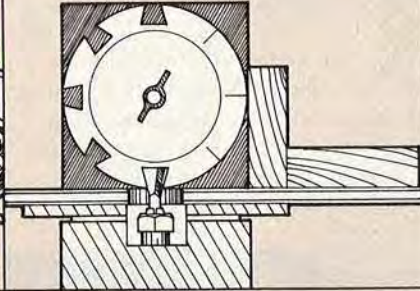
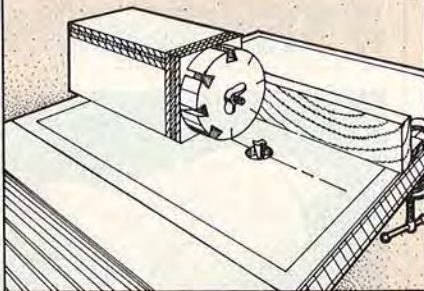


**BRACELET  
LATHE MANDREL**

Continued

## SCRAP WOOD PROJECT


### Two more design ideas to try



## TOOLS AND TOOL COLLECTING

### the lovable little Stanley no. 1



 [Print this article](#)

**S**tanley tools represent a major category of collectible tools, and can form the basis for a rewarding and stimulating hobby.

One of the most desirable of Stanley tools for the collector is the diminutive Stanley No. 1 bench plane. This tiny, 5½"-long plane poses some interesting mysteries for the collector. First, what was it used for? It's so small that even a craftsman with a small hand finds it uncomfortable to use. And second, for a tool that was manufactured in abundance over a 73-year period (1870-1943), why should it be so scarce?

As to the first mystery—its size—the explanation is relatively straightforward. These planes were designed for use by elementary school woodworking classes, and were used in the introduction to the proper care and use of woodworking planes.

The second mystery requires a more hypothetical explanation. With the advent of U.S. involvement in W.W. II came the need for scarce raw materials by factories involved in the rapidly increasing

war production industries. Those with memories reaching back that far remember that not only were civilians in general involved in paper- and fat-saving drives, among others, but schools and other institutions also were called on to collect and donate large amounts of scrap material.

The widespread draft also was a factor. Shop teachers, especially at the elementary school level, came into short supply overnight, thus freeing up the tools and materials formerly used in their courses as vital scrap. Since the majority of No. 1 planes produced were to be found in schools, a large number of these planes were absorbed by the wartime scrap drives.

In case you're thinking of purchasing a Stanley No. 1, be prepared to pay between \$400 and \$650 for an example in good or better condition. Also be sure to buy from a reputable dealer who will guarantee the plane is genuine.

**Brief History**

The Greeks and Romans used oak to construct their seagoing vessels because of its strength, toughness, and durability. The Saxons in England fattened their hogs with acorns, and ground the acorn for use as a seasoning. During this same period, landowners used the acorn as part of their daughters' doweries.

In Europe, many great halls and castles were paneled with oak wainscoting and almost all furniture there was made of oak.

Today, the oak provides food, tanbark for tanning leather, dyes, ink, even commercial cork.

**Wood Identification**

Though there are 14 oak species of commercial importance grown in the U.S., they're marketed either as red oak (*Quercus rubra*) or white oak (*Quercus alba*).

Red oak has a pinkish red cast to it, large pores (you can blow smoke through one end of a piece of red oak and it will come out the other), and is quite hard.

White oak, on the other hand, is a tannish brown wood, has smaller pores, and is somewhat harder than red oak.




Paul L. McClure

Wood technologist, lecturer, owner of Wood World, a retail hardwood store in Tempe, Arizona, woodworking instructor, and former exotic hardwood buyer.

# OAK

## The world's number one hardwood

Some woodworkers may dispute the above assessment. But sales figures show that without doubt, more oak passes from manufacturer to retailer to consumer each year than any other hardwood. Let's take a closer look at this best-seller to see what's behind oak's long-standing popularity.

 Print this article



**Woodworking Properties**

Both red and white oak are moderately stable before and after working, and both work well with hand and power tools. Because white oak contains an abundance of tylosis (a membrane that seals cells), it is waterproof.

Oak accepts finishes well. With built-up finishes, you may want to use a paste filler to fill the pores. This isn't necessary with oil finishes.

**Uses in Woodworking**

With these woods, the list goes on and on. You can use them for furniture, flooring, interior trim, paneling, turning, carving, and woodenware. White oak has two other important applications. It's highly prized as a material for making barrels and other watertight vessels, and it's one of the best woods for steam-bending wooden furniture parts.

**Cost and Availability**


One of the most commonly available of all woods, oak falls into the medium price category, with white oak somewhat higher than red. You can purchase oak in several different forms: lumber, plywood, interior trim, flooring, turning blanks, and veneer.

**Source of Supply**

Over 50 percent of the oak logged annually comes from the southern states. However, if you can get hold of some that's been grown in the Appalachians or the northern states (it's sold as northern oak), buy it. Because it grows more slowly than southern oak, it has a finer texture, more uniform color, and it works better.

# the sunshine express

Most toys are used for awhile, then forgotten. That won't happen with this little charmer. If properly cared for, it will delight special little folks for generations.

 [Print this article](#)

As we were watching this fanciful project take shape in our shop, we began to realize how special it really is. We think you will agree. Its classic lines and sturdy construction guarantee you a project that will stand the test of time. You might even want to sign and date this heirloom to record your considerable efforts for those who will appreciate them in years to come.



Design: Jim Downing Photograph: George Ceolla

**Note:** Many of the pieces used in this wagon must be planed down or resawn to their finished thickness. If you have one, a surface planer is the best tool for reducing thickness. You can also resaw with a band saw or table saw. Whichever tool you use, be sure to exercise all due caution when using it.

### The Wagon Bed

**1** Cut pieces A and B to size, plus 1" in length, then glue and clamp them together, using epoxy glue. Allow glue to dry overnight.

**2** Cut the bed to its finished length, making sure the ends are square. Now, mark the location of the openings for the sideboard

stakes. Cut pieces C, D, and E to size and glue and clamp them to the bed.

**3** Cut a  $\frac{1}{8}$ " groove  $\frac{1}{2}$ " deep along the length of each end of the bed. Then, cut pieces F and G to size (be sure to notch each end of F as shown in the plan). Fashion a  $\frac{1}{8}$ " $\times$  $\frac{1}{2}$ "-long tongue along the edge of F and G. Glue and clamp both pieces to the bed as shown here.



**4** Cut both H pieces to size. Temporarily clamp them to the

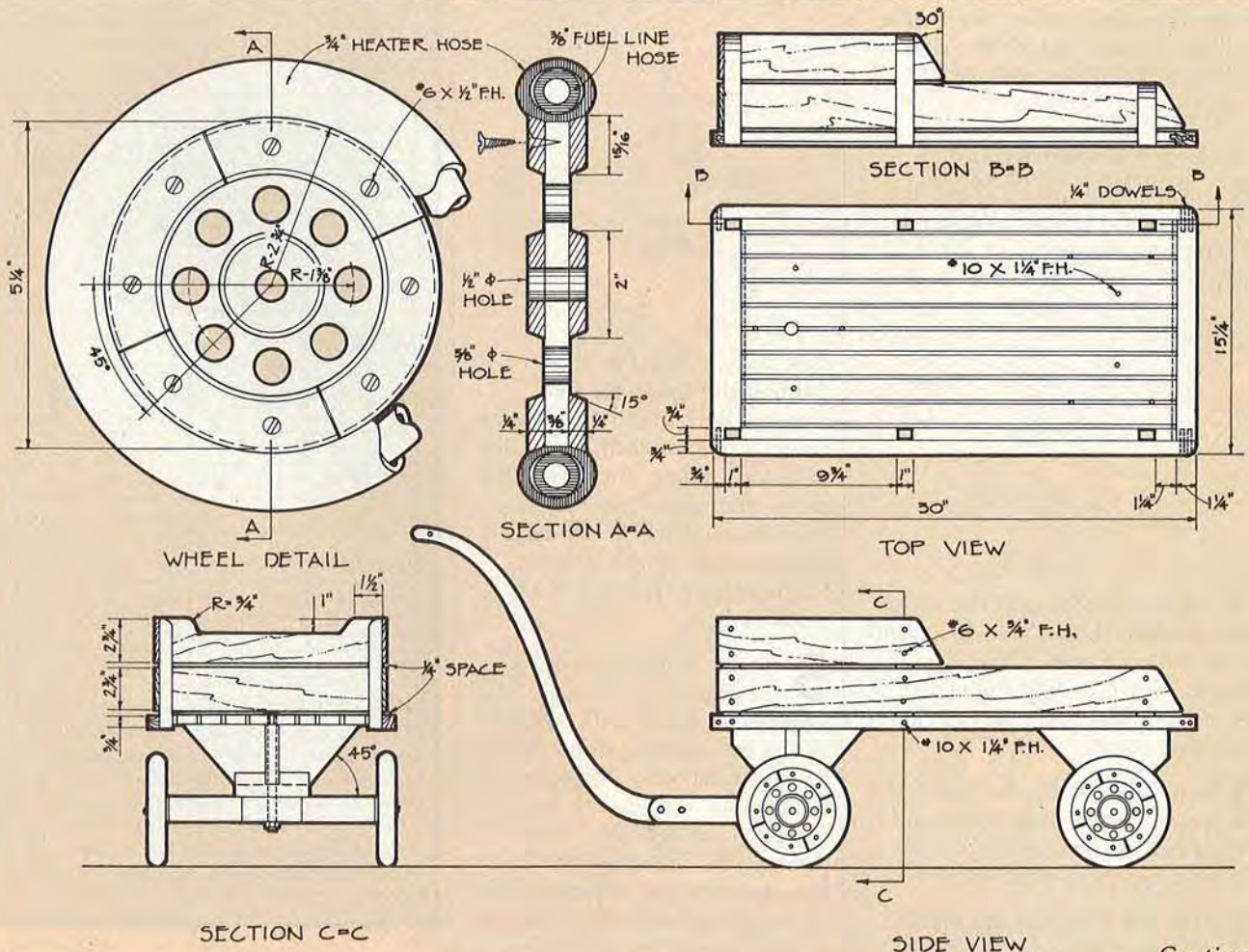
bed and drill  $\frac{1}{4}$ " holes for dowels as shown in the plan. Glue and clamp both H pieces to the bed. Glue and drive the dowels in, too.

**5** After the glue sets, scribe a  $\frac{3}{4}$ " radius at each corner of the bed. Then, rough-cut the radii with a band saw or jigsaw. Smooth all surfaces with a belt sander.

### The Side Boards

**1** Resaw enough  $\frac{3}{4}$ " $\times$  $2\frac{3}{4}$ " white oak to make the six  $\frac{1}{4}$ " boards needed. We ran our lumber through the table saw, then smoothed each piece with a belt sander.

**2** Cut one end of pieces I and J at a 30° angle, then scribe and cut a  $\frac{3}{4}$ " radius at the top rear edge of each. Cut a section out of one of the front boards (K) — see the plan.



Continued

## KID'S STUFF

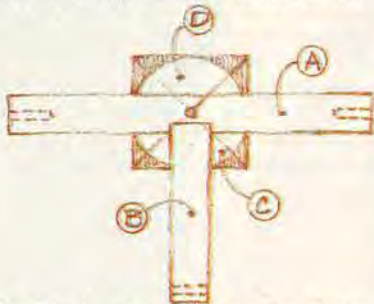
**3** Cut the side board stakes (L and M) to length. Then, scribe and cut a  $\frac{3}{4}$ " radius on the inside top edge of each stake.

**4** Fasten the front boards (K) to two of the longer stakes (L) with #6 $\times\frac{3}{4}$ " wood screws, making sure the ends are flush with the stakes. Allow a  $\frac{1}{4}$ " space between the front boards. Check to make sure the stakes fit properly in their holes. You want a snug fit here.

**5** With the front boards in place, position the long side boards (J) on the wagon bed so the squared end covers the end grain of the front board. (As a design variation, we cut the side boards  $\frac{1}{4}$ " shorter than shown in the bill of materials and inserted a length of walnut in the space between the front and side boards.) Mark the placement of the remaining stakes. Lay the shorter side boards next to the longer ones and transfer the marks to these boards. Attach the side boards to the stakes with #6 $\times\frac{3}{4}$ " screws.

### The Front Undercarriage

**1** Cut the front axle (N) and the tongue (O) to size. We used  $2\frac{1}{4}$ " turning squares. Cut a  $1\frac{1}{2}$ " dado  $\frac{3}{8}$ " deep in the center of the



axle. Fit the tongue into the dado, then position the  $1\frac{1}{2}$ " blocks (P and Q) as shown above. Draw diagonal lines as shown to find the center of the axle, then scribe a  $4\frac{1}{2}$ " circle from that point.

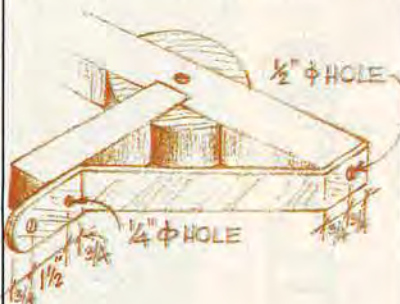
**2** Rough-cut the blocks to the proper shape, then finish-sand with a belt or disk sander. Glue the axle members together.

**3** After the glue sets up, preferably overnight, drill  $\frac{1}{2}$ " holes

through the axle and into each end of it as shown in the photograph below.



**4** Cut the metal strapping (R) to length, then shape it as shown in the sketch below.



Bore two  $\frac{1}{4}$ " holes as shown through the strapping and tongue. Bore a  $\frac{1}{2}$ " hole through the strapping at each end of the axle, too. Prime, then paint the metal strapping. You may also want to paint the  $\frac{1}{4}$ " fender washers. Secure the strapping to the tongue with a  $\frac{1}{4}$ " $\times$ "2" machine bolt.

**5** Cut the three S pieces to size, then glue them together to create a  $4\frac{1}{2}$ " square. When the glue has dried, locate the exact center of the square. Scribe a  $4\frac{1}{2}$ " circle with a compass and drill a  $\frac{1}{2}$ " hole through the center point. Find the center of two adjacent sides of the square and cut  $\frac{3}{4}$ " dados  $\frac{3}{4}$ " deep across the width and

## Bill of Materials

Part Name	Finished Size			Material	No. of Pieces
	T	W	L		

### Wagon Bed

A	$\frac{1}{2}$ "	$\frac{1}{4}$ "	27"	walnut	9
B	$\frac{1}{2}$ "	$1\frac{1}{4}$ "	27"	white oak	8
C	$\frac{1}{2}$ "	$\frac{3}{4}$ "	$1\frac{1}{4}$ "	white oak	3
D	$\frac{1}{2}$ "	$\frac{1}{2}$ "	14"	white oak	2
E	$\frac{1}{2}$ "	$\frac{3}{4}$ "	9"	white oak	2
F	$\frac{3}{4}$ "	2 $\frac{1}{4}$ "	13 $\frac{3}{4}$ "	white oak	1
G	$\frac{1}{2}$ "	$1\frac{1}{4}$ "	13 $\frac{3}{4}$ "	white oak	1
H	$\frac{1}{2}$ "	$\frac{1}{2}$ "	30"	walnut	2

### Sideboards

I	$\frac{1}{4}$ "	2 $\frac{1}{4}$ "	13 $\frac{3}{4}$ "	white oak	2
J	$\frac{1}{4}$ "	2 $\frac{1}{4}$ "	28 $\frac{1}{4}$ "	white oak	2
K	$\frac{1}{4}$ "	2 $\frac{1}{4}$ "	13 $\frac{3}{4}$ "	white oak	2
L	$\frac{1}{4}$ "	1"	6 $\frac{1}{4}$ "	walnut	4
M	$\frac{1}{4}$ "	1"	3 $\frac{1}{4}$ "	walnut	2

### Front Undercarriage

N	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	12 $\frac{1}{2}$ "	white oak	1
O	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	6 $\frac{1}{2}$ "	white oak	1
P	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	white oak	2
Q	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	4 $\frac{1}{2}$ "	white oak	1
R	$\frac{1}{2}$ "	$1\frac{1}{2}$ "	14"	metal strapping	2
S	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	white oak	3
T	$\frac{1}{2}$ "	3"	11"	white oak	1
U	$\frac{1}{2}$ "	3"	9"	white oak	1

### Rear Undercarriage

V	$1\frac{1}{2}$ "	$1\frac{1}{2}$ "	12 $\frac{1}{2}$ "	white oak	1
W	$\frac{1}{2}$ "	5 $\frac{1}{4}$ "	9"	white oak	2
X	$\frac{1}{2}$ "	4 $\frac{1}{4}$ "	9"	white oak	1

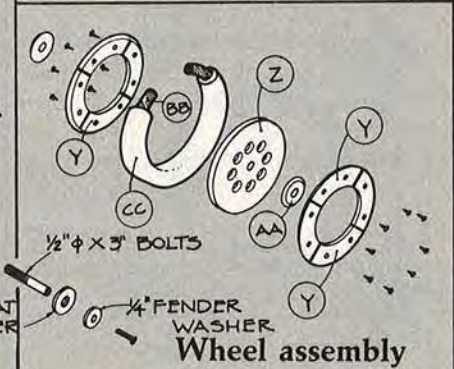
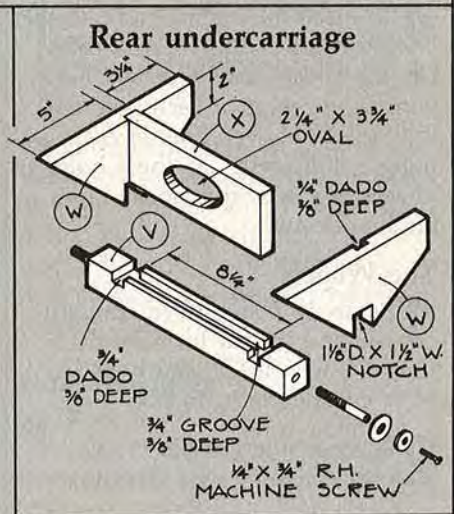
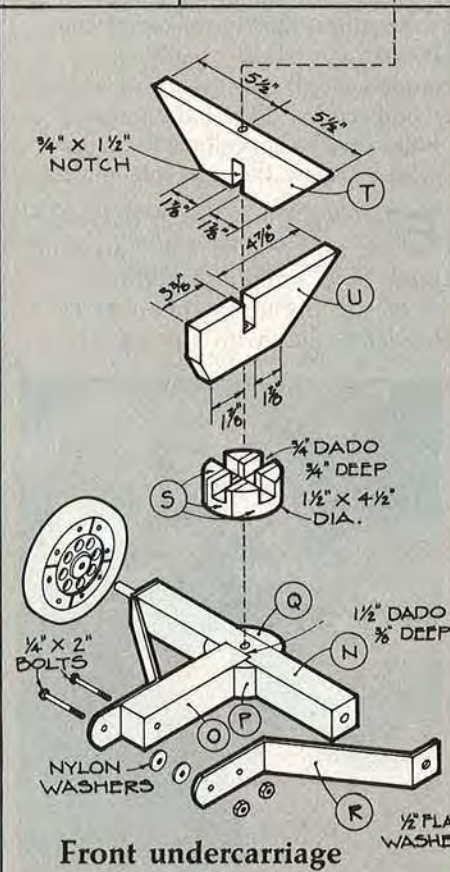
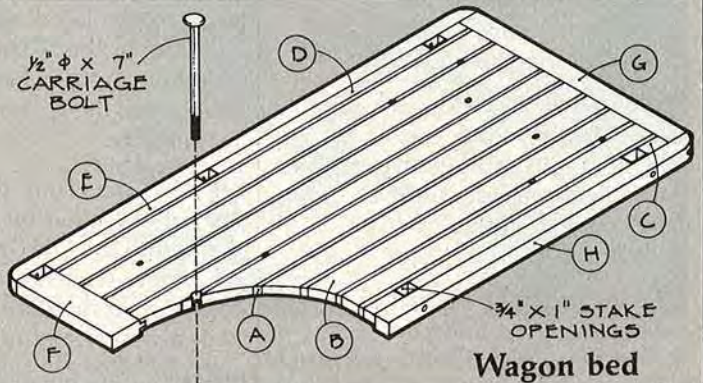
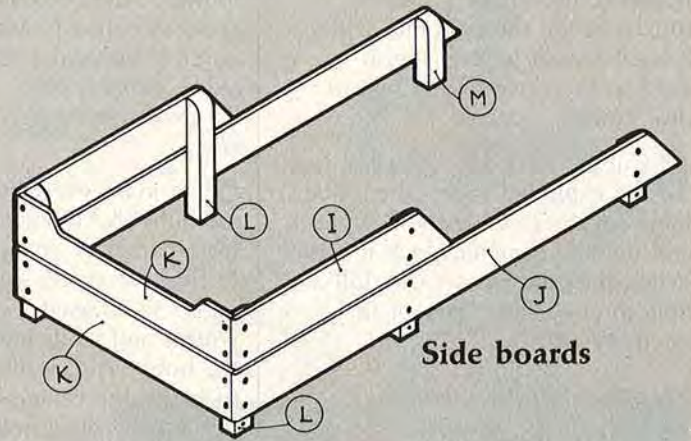
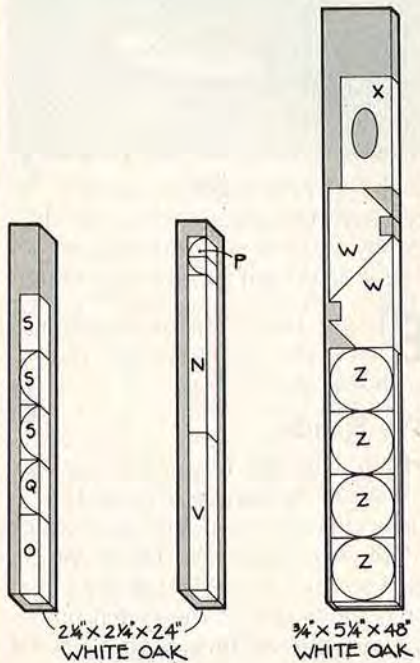
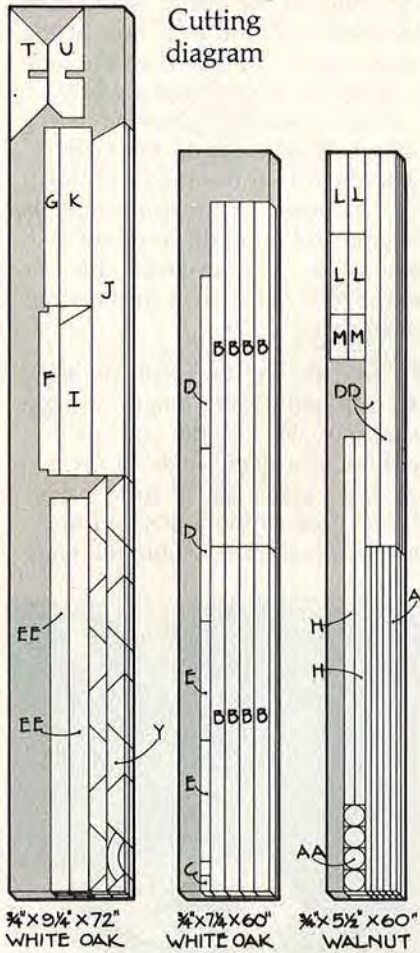
### Wheels

Y	$\frac{1}{4}$ "	$1\frac{1}{2}$ "	5 $\frac{1}{4}$ "	white oak	32
Z	$\frac{1}{4}$ "	5 $\frac{1}{4}$ "	5 $\frac{1}{4}$ "	white oak	4
AA	$\frac{1}{4}$ "	2"	2"	walnut	8
BB	$\frac{1}{2}$ " dia.		19"	fuel line hose	4
CC	$\frac{1}{2}$ " dia.		19 $\frac{1}{4}$ "	heater hose	4

### Handle

DD	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "	32"	walnut	6
EE	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "	32"	white oak	6
FF	$\frac{1}{2}$ " dia.		3 $\frac{1}{2}$ "	white oak dowel	1

**Supplies:**  $\frac{1}{4}$ " and  $\frac{1}{2}$ " white oak dowel rod, 28—#6 $\times\frac{1}{4}$ " flathead wood screws, 2— $\frac{1}{4}$ " $\times$ "2" machine bolts with self-locking nuts, 4— $\frac{1}{2}$ " $\times$ "3" bolts, 4— $\frac{1}{4}$ " $\times\frac{3}{4}$ " roundhead brass machine screws, 65—#6 $\times\frac{1}{2}$ " flathead wood screws, 1— $\frac{1}{2}$ " $\times$ "7" carriage bolt and self-locking nut, 16—#10 $\times$ "1 $\frac{1}{4}$ " brass flathead wood screws, 4— $\frac{1}{2}$ " flat washers, 4— $\frac{1}{4}$ " fender washers, 2— $\frac{1}{4}$ " nylon washers, epoxy or resorcinol glue, cyanoacrylate glue, penetrating oil finish, polyurethane varnish, paste wax.



length of the square. Then, rough-cut the square round with a band saw or jigsaw. Finish shaping the circle with a belt or disk sander.

**6** Cut pieces T and U to size (see the exploded view), then glue them together. Glue the X-support and the 4½"-diameter block together. When the glue has set up, drill a ½" hole through the center of the assembly.

## The Rear Undercarriage

**1** Cut the rear axle (V) and the support pieces (W and X) to size. Further shape W and X as directed in the exploded view.

**2** Now, cut ¼" dados ⅜" deep 1½" in from each end of the axle. Cut a like-size groove between the dados you just cut to accept piece X. Also cut an oval out of piece X.

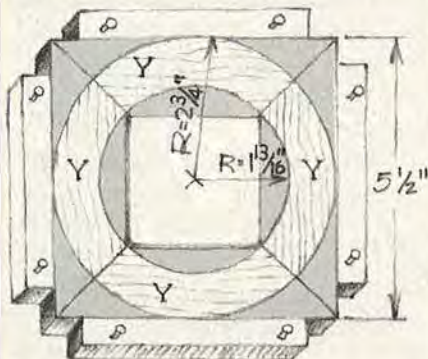
**3** Glue pieces V, W, and X together. Set aside this subassembly.

**4** To make the metal axles, cut the heads off of four ½"×3" bolts. File the ends square and flat. Now, punch the center of each bolt and drill a ⅞"×1"-deep hole in each, using a drill press. Tap these holes to accept ¼"×⅜" roundhead brass machine screws.

## The Wheels

**1** Resaw or plane down enough oak and walnut to make the rims (Y), wheels (Z), and hubs (AA). Now cut the pieces to size.

**2** To make the rim pieces (Y), place them in a jig like the one



shown at the bottom of the previous column. Mark a 1⅜" inside radius and a 2¾" outside radius on each piece, then cut away the excess material with a band saw.

**3** To make the wheels (Z) and the hubs (AA), draw diagonal lines from corner to corner of each piece to find the center point. Then, scribe 5¼"-diameter circles for the wheels and 2"-diameter circles for the hubs. Also scribe a 1⅝" radius to locate the centers of the decorative wheel holes. Locate placement of these holes by referring to the plan drawing. Drill the ⅝" holes in the wheels and the ½" axle hole in the wheel and hubs. Trim away the excess material with a band saw.

**4** Glue and clamp the wheels and hubs together by threading them onto a ½"×5" machine bolt in the proper sequence and by applying pressure at the other end with a washer and nut.

**5** When the glue has set up, position the rim pieces so they overlap the wheel equally all around. Drill pilot holes for #6×½" wood screws. Offset the screw holes on the opposite side of the wheel. Screw the rims into place.

**6** To bevel the edges of the hubs and rims, mount a 4½"-diameter piece of ¼" scrap plywood to a faceplate. Secure the faceplate to the lathe, then with a pencil find



the center of the circle. Remove the plywood, and drill a ½" hole at the center point. Counterbore the hole to accept a ½"×2" machine bolt.

Now, mount the plywood and the wheel assembly to the faceplate; then turn the rims and the hubs as shown at the bottom of the previous column. (If you have a lathe arbor, you can fasten the wheel to it rather than to the scrap plywood.)

**7** To make the tires, cut the hoses (BB and CC) to length, using a band saw. We cut the ends of the ¼" hose at a slight angle to get a good fit. Insert the ⅜" hose inside the ¼" hose so the joints end up opposite each other. Glue the ends



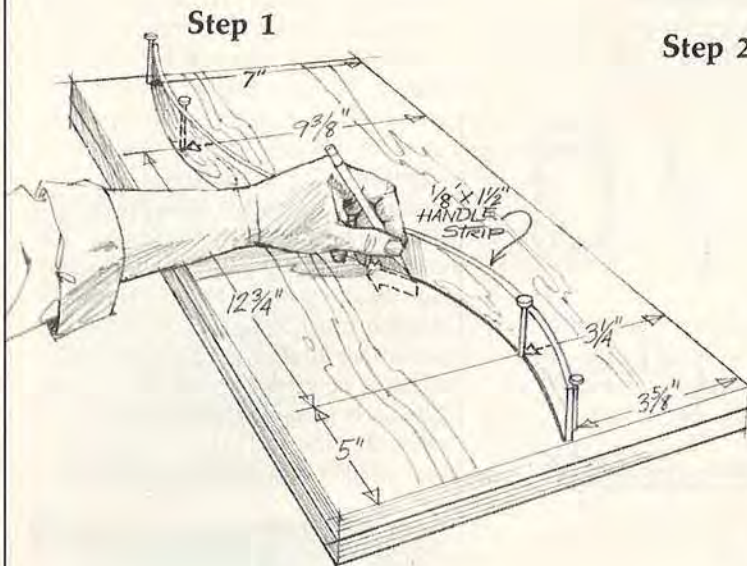
of the ¼" hose together, using cyanoacrylate glue. (It's a good idea to buy extra heater hose in case things don't turn out the first time.)

**8** Fit the tires onto the wheels and screw the rim pieces into place as shown above.

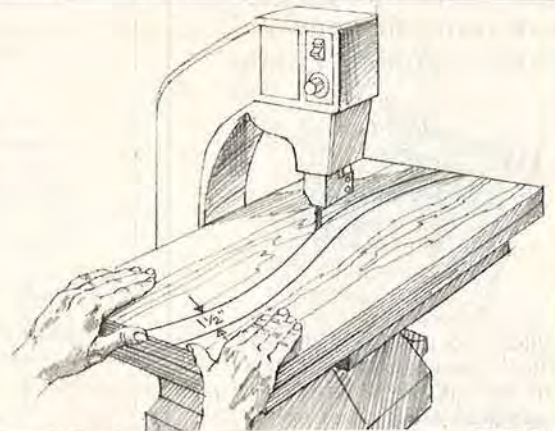
## The Handle

**1** To make the form necessary to shape the handle, glue and clamp two 12"×24" pieces of scrap ¼" plywood together. When the glue sets up, drive nails at the points indicated in the sketch on the facing page, then bend a strip of hardboard around the nails to create a smooth curve. Draw a line





**Step 1**



**Step 2**



**Step 3**

along this curve. Then scribe a line  $1\frac{1}{2}$ " to one side of the line you have just drawn and cut along both lines with a band saw.

**2** Cut DD and EE to size, then laminate them, using epoxy or resorcinal glue. Clamp the handle in place as shown in the photo at right and allow the glue to set up overnight.

**3** Remove excess glue with a belt sander, then draw (freehand) a contoured slope on the handle, decreasing the width from  $1\frac{1}{2}$ " at the bottom to  $\frac{3}{4}$ " at the top. Also mark a  $\frac{3}{4}$ " radius at the bottom and a  $\frac{5}{8}$ " one at the top.

**4** Shape the handle with a band saw, and smooth the surfaces with a belt or disk sander. Drill holes at the center point of each radius. Now, insert the  $\frac{1}{2}$ " dowel (FF) into the hole in the handle and secure it there with a  $\#6 \times \frac{1}{2}$ " flathead wood screw.

### Assembling the Wagon

**1** Start by sanding all surfaces smooth.

**2** To fasten the front undercarriage to the wagon bed, center the X support between the edges of the bed, making sure the front edge of the support (the blunted end) meets the back edge of the  $\frac{3}{4} \times 2\frac{1}{4}$ " piece (F). Secure the undercarriage to the bed by gluing and driving  $\#10 \times 1\frac{1}{4}$ " flathead wood screws through the bed into the X-support cross members. To avoid splitting the wood, be sure to drill pilot holes for your screws first.

From the bottom side of the bed, drill a  $\frac{1}{2}$ " hole up through the wagon bed. Hold a block above the hole to prevent split-out of the wood.

**3** Center and position the rear undercarriage in the same way. Attach this assembly through the top with six  $\#10 \times 1\frac{1}{2}$ " flathead wood screws.

**4** To secure the wheels to the axles, fit a flat washer, the wheels, and a fender washer onto the  $\frac{1}{2}$ " bolts you prepared earlier. Drive the  $\frac{1}{4}$ " screws into the tapped holes, then epoxy the wheel assembly in place.

### Applying the Finish

**1** Finish-sand all surfaces. Then, apply two coats of penetrating oil finish (we used Watco natural Danish oil finish).

**2** After letting the oil dry for a few days, we applied three coats of polyurethane varnish. We also buffed between each coat with steel wool. To further brighten and protect the finish, we applied two coats of paste wax.

### Final Assembly

**1** To secure the handle, thread a  $\frac{1}{4} \times 2$ " machine bolt through the strapping, nylon washers, and tongue.

**2** Secure the sideboard assembly to the bed by driving  $\#10 \times 1\frac{1}{4}$ " wood screws through the edges of the bed into the stakes. Allow a  $\frac{1}{4}$ " space between the bottom of the sideboards and the bed.

**3** Fasten the front axle to the bed, using a  $\frac{1}{2} \times 7$ " carriage bolt. Secure the bolt with a self-locking nut.

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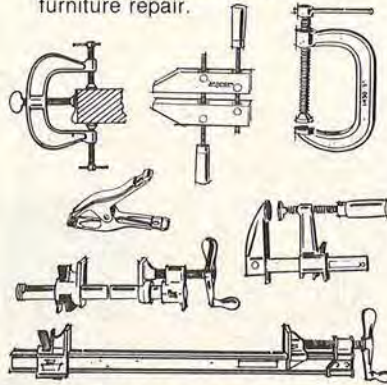
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## OLD HAND WAYS

Continued from page 69

knots; otherwise they would peg the chunk firmly to the log.) You continue on down the log until all of the chunks are split off.

As it stands, this surface is quite rough. You can further level it by chopping in a more closely spaced array of scorings and then again splitting along the grain. The finishing touch is to slice down across the grain of the timber. This can be done with the felling axe, but the specialized broad axe makes the job much easier. The broad axe has a face that is virtually flat on the side towards the log. The handle is generally offset to the opposite side so that your fingers will remain attached to your hands



as you work. When one side is done, you do the opposite side and continue to bring it four square.

Preparing the material is the most time-consuming part of building, and hewing is only one of the means to this end. Much of the material, such as shingles, clapboards, and even studs, can be produced entirely by splitting. This is the riven stock, and it will be the next issue's challenge of The Old Hand Ways.

## BOOKS WORTH READING

### *The Woodworker's Reference Guide and Sourcebook*

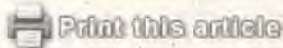
by John L. Feirer.  
Charles Scribner's Sons,  
New York. 1983.

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Far from being simply a series of factual lists, the *Woodworker's Reference Guide and Sourcebook* is educational in its own right. Feirer spends considerable space, for example, talking about wood—its makeup, the various types available, and how to identify it. And the seven glossaries, which account for almost half of the book's pages, will certainly broaden most peoples' knowledge of the subject areas covered, and serve as a handy reference. There's little doubt that the amount and quality of information this book puts at your fingertips make the hefty \$35 cover price seem more reasonable.

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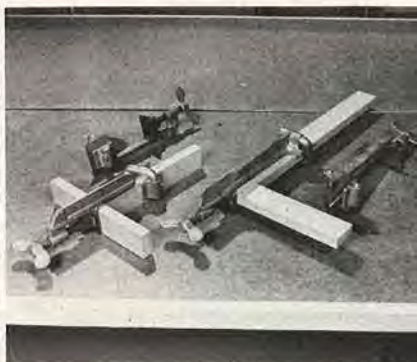
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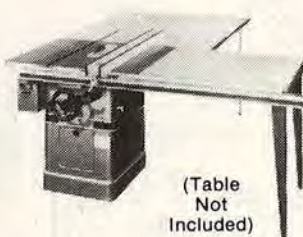


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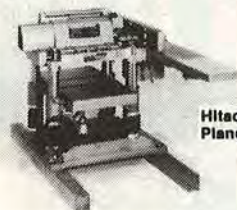


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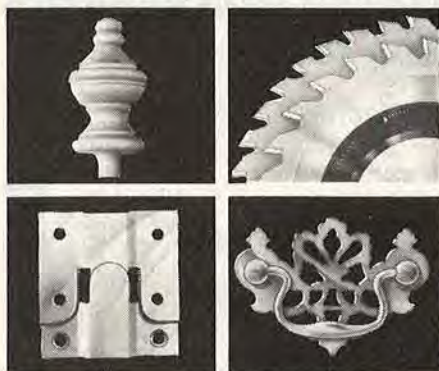
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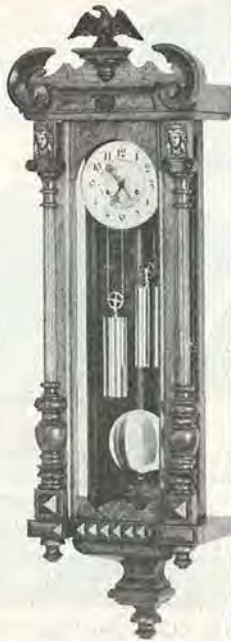
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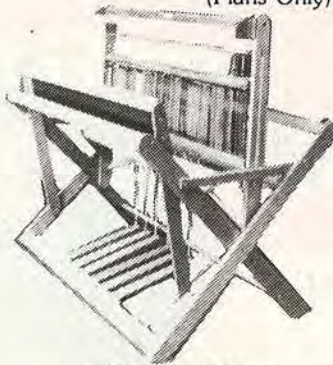
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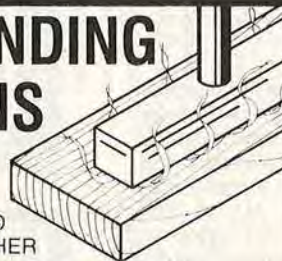
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### Mortise-and-Tenon Router Jig



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### Wedge Sanding Block



Designed to reach into tight corners without marring adjoining surfaces, the BeltPlane uses standard 3x21-inch sanding belts. A removable wedge allows for removing and securing the belt. Made of high-impact molded plastic, BeltPlane has a unique handgrip system that helps guard fingers. With appropriate belts, it works on wood, aluminum, plastic, drywall, laminates, glass, and tile. *BeltPlane*, about \$12.95 retail. Portalign Tool Corp., Dept. W, P.O. Box 80547, San Diego, CA 92138.

### Swift-cutting German Saw



Blade teeth electric-hardened beyond the setting point eliminate need for resharpening the Softcut 2002. The 22" spring-steel blade has five bevel-sharpened, double-edge teeth to the inch for swift, smooth, no-bounce sawing. Handle is of tough, temperature-resistant ABS plastic and features 90 and 45-degree marking guides in line with the blade. A lifetime guarantee is included. *Augusta Softcut 2002 Hand Saw*. \$18.95 retail. Imported by Raki International, 190 Blydenburgh Rd., Central Islip, NY 11722.

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Cut flat wood into angle or straight-edged rings, stack the rings and create ANY HOLLOW CYLINDRICAL SHAPE... just glue, sand and finish... create matched sets of items.



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## SOUND ADVICE

Continued from page 14

# POWER TOOLS

ally, consumer tools have sleeve bearings. For pro tools, manufacturers use better-quality ball bearings to a greater extent to reduce the amount of lateral movement and vibration.

**Gears.** Often, a heavy-duty tool has wrought-steel gears, which are heat-treated to harden the metal. With some consumer tools, powdered-metal gears are used because they're less expensive.

**Housings.** Unless you know plastics, it's difficult to tell the difference between the materials used on pro tools and their consumer counterparts. Super-tough nylon often sheathes the former, and consumer tools have a less durable plastic covering.

Metal housings differ, too. The professional has mating surfaces that have been machined to fit against the motor housing. The consumer model is diecast with minimal machining.

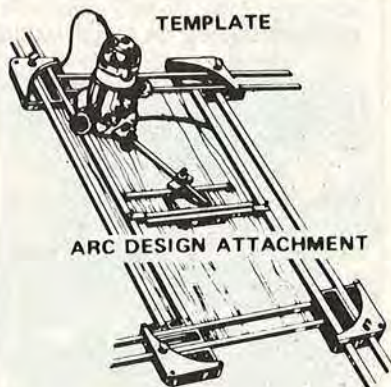
**Assembly.** The major components of pro tools interlock with one another. With consumer tools, the components often are held together with one set of screws.

**Safety.** No matter which type of equipment you buy there are certain maintenance procedures you'll want to follow for safety as well as extended tool life.

All electrical power cables should be in good repair, without frays, breaks or loose plugs. If your home workshop outlets aren't the three-prong type, always use a grounding plug adaptor.

If tools aren't self-lubricating, follow the instructions in the manual to lubricate them at regular intervals.

And keep blades sharp. Dull blades can be dangerous as well as ruinous to work.



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# news and events



This space is reserved for information about regional and national woodworking events that are open to the public, and for news items of interest to readers. The November/December issue will cover events occurring between November 1 and December 31; the January/February issue, events between January 1 and February 28; and so on. We need your information a minimum of three months before the publication date.

 Print this article

September 22–October 28  
(except Tuesdays)

## Fall National Crafts Festival

*Location:* Silver Dollar City, near Branson, Missouri.

*Admission:* Adults, \$12.95/single day; children, \$10.95. For a second consecutive day, \$3.00.

Set against the backdrop of the 1880's aura of Silver Dollar City, this festival is a must for anyone interested in the old, original tools, methods, and materials used by craftsmen during the late 19th century.

Of the 80 or so crafts being demonstrated, about a quarter of them relate to woodworking. You can watch craftsmen and women make barrels, fiddles, dulcimers, carved gunstocks, treenware, shakes and shingles, decoys, toys, chairs, baskets, music boxes, and cedar trunks, among other things.

This year's event will pay tribute to wood carving, especially the carving of wooden Indians. You'll be able to see 40 wooden Indians, and watch as carvers take them through the various stages of completion.

A couple of our staff have been to this festival in past years, so it's one we can heartily recommend as being worth your time. In addition, Silver Dollar City is situated in the rolling, forested hill country of the Ozarks. There are plenty of lakes nearby offering hiking along the shores, boating, and some of the best bass and crappie fishing.

To obtain more information, write National Festival, Silver Dollar City, Marvel Cave Park, MO 65616. Phone 417/338-8210.

September 21–23

## The Woodworker

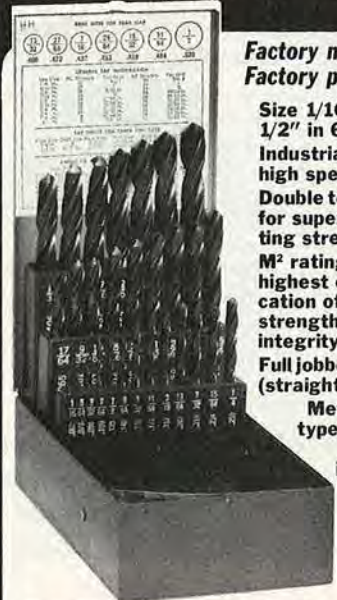
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—Continued on page 96—

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**Factory new!  
Factory perfect!**

**Size 1/16" thru 1/2" in 64ths.  
Industrial grade high speed steel.  
Double tempered for superior cutting strength.  
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Full jobberlength (straight shank).  
Metal index type storage case is included.**

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These are NOT ordinary, run-of-the-mill drill bits! These are made of industrial grade high speed steel . . . especially hardened at high furnace temperatures for super strength and dependable cutting power. You can rely on all 29 drill bits (sizes 1/16" thru 1/2") in this set to bore clean through tough metals, time after time, without the need of frequent sharpening.

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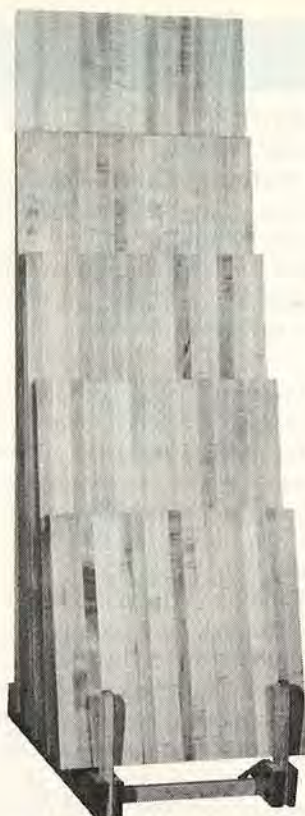
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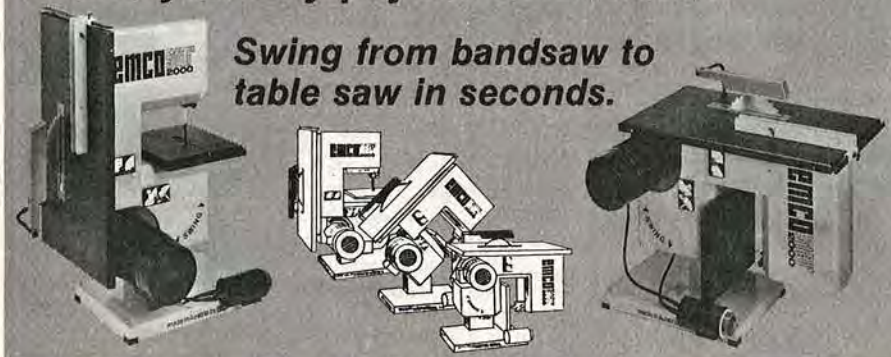


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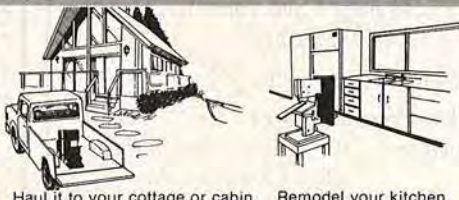
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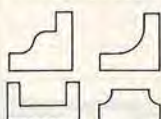


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## NEWS AND EVENTS

*Continued from page 95*

**September 22**

**Decoy and Wildlife Show**

*Location:* Music Pier  
Ocean City, NJ

For more information, write Ocean City Recreation Center, P.O. Box 570, Ocean City, NJ 08226.

**October 5-7**

**Wildfowl Carving and Art Exhibition**

*Location:* Civic Center  
Civic Ave.  
Salisbury, MD 21801

*Admission:* \$3.50/person.

To obtain more information, write or phone The Ward Foundation, Inc., 655 S. Salisbury Blvd., Salisbury, MD 21801. Phone 301/742-4988.

**October 6**

**The Ward Foundation Fall Seminar on the Decoy**

*Location:* Will be an on-location site. Contact the Ward Foundation for further details. (Address and phone number listed in the entry above.)

**October 11-14**

**Early American Industries Association Fall Meeting**

*Location:* Capitol Plaza Holiday Inn  
Sacramento, CA

*Admission:* Full membership is \$15/person or \$22.50 for 2. You may join at the door.

To obtain more information, write Roger Phillips, President, EAIA West, 133 E. Santa Anita Ave., Burbank, CA 91502.

**October 18-20**

**Midwest Tool Collectors Association Fall Meeting**

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*Location:* Wilson Lodge  
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Wheeling, WV

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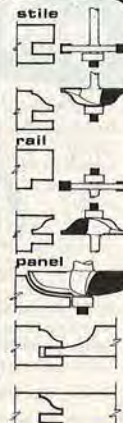
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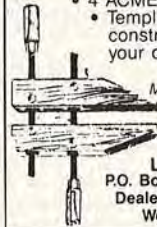
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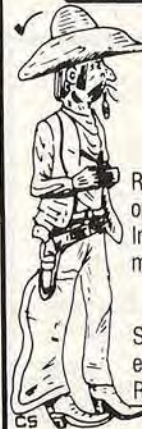
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## FINISHING AND REFINISHING

# paste stain and varnish — a tough finish that goes on easily



Print this article

**Polyurethane varnish as thick as petroleum jelly—you wipe it on with a rag for a fool-proof finish**

No question about it — if you want the toughest possible clear finish on a project, polyurethane varnish is the way to go. It's hard, lustrous, and impervious to alcohol and water. But it is some trouble to apply. You have to mess up a brush, worry about runs and sags — and then there's the dust problem.

Paste varnishes and their companion products, paste stains, avoid all these problems while still giving you all the advantages of a polyurethane finish. We've been seeing them in the woodworking catalogs, and decided to order some to give them a try.

The three brands we tested are Velvit Poly-Gel Varnish, Heritage Paste Varnish and Stain, and Bartley Paste Varnish and Stain. We made up some wood samples—hunks of oak, maple, and pine—and applied the stains and varnishes according to the directions. For comparison, we also finished a sample in satin polyurethane—brushed on.

All three paste varnishes are simple to apply. You just wipe them on with cheesecloth, applying a light, smooth coat. The two stains we tested are just as easy. They go on smoothly and cover evenly. Between coats of varnish, we buffed off the samples with steel wool, then wiped on a second coat.

In our dusty shop, the paste varnishes came out as smooth as a carefully applied brushed-on and hand-rubbed finish. The brushed-on polyurethane, on the other hand, was full of dust.

There was some variation in the degree of yellowing or warm tone the varnish gave to the wood. The brushed-on finish and the Poly-Gel were the closest in color to the natural wood. Heritage was the warmest, with the Bartley varnish falling somewhere in between.

After the samples were thoroughly dry, we gave each a coat of paste wax. Then, to test them for durability, we dribbled both water and alcohol on all the samples, letting them stand until dry.

This torture test did show up some differences between paste varnish samples and the brushed-on polyurethane. There was some

Continued on page 101

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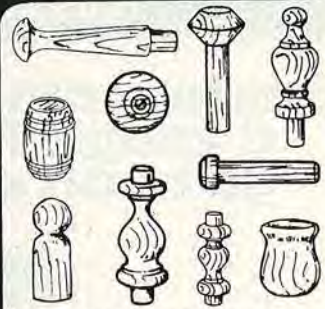
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## FINISHING AND REFINISHING

Continued from page 99

### paste stain and varnish

slight discoloration and grain rising on the paste varnish samples, while the brushed-on polyurethane wasn't affected at all.

However, the paste finishes were easy to repair. To patch them, we buffed all three with steel wool and applied another coat of wax. We could still see very faint traces of raised grain in all three samples after rewaxing, but nothing that couldn't be lived with. All in all, we'd have to rate the paste finishes as being tough and easy to care for.

A distinct advantage of the paste varnishes in our book is that the finish itself is very thin, without much buildup. This gives that hand-rubbed look without all the elbow grease. The cost of the paste varnishes and stains is in the same ballpark with brushed-on varnish, and a little seems to go a long way. Another plus is that paste varnishes and stains are virtually odorless.

We've used these products on several projects with excellent results. Give 'em a try! We think you'll agree that paste varnish and stain solve a lot of finishing problems.

The paste varnish and stain products we tested are available from the following sources:

#### Heritage paste stain and varnish

Varnish \$3.25 per 1/2 pint,  
\$4.90 per pint

Stain \$3.50 per 1/2 pint,  
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#### Crafts Products Company

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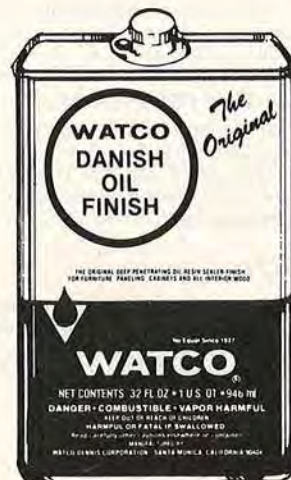
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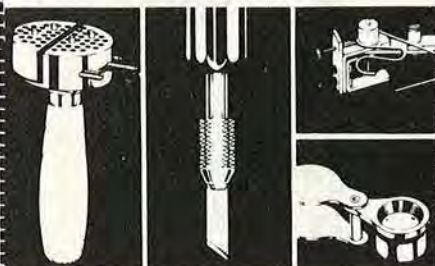
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# QUESTIONNAIRE

## Tell us about yourself

**W**e need to know more about you! We've put together this first issue of *WOOD* based on a lot of research, our own experience as home woodworkers, and a good deal of experience as magazine editors. But, to make the kind of magazine that will really be of the most use to you, we need your feedback. In all of the issues after this, we're going to have an extensive letters section, to which we hope you'll contribute. We want you to tell us what you think of the articles we publish, what kinds of projects you're doing, what you'd like to see more of in our

magazine, and what you've discovered in woodworking that can help all of us involved in this wonderful craft.

But, for now, if you'll take a few minutes to fill out this basic questionnaire about who you are and what kind of woodworking you do, you'll really be giving us a hand.

Here's your chance to help shape this magazine the way you want it to be. Simply fill out the questionnaire and drop it in the mail. And, please don't hesitate to add a personal note if you have time. We really want to hear from you now, as well as in the future.

**1.** How many years have you been involved in woodworking?

- 11-1  Less than 1 year      4  6-9 years  
 2  1-2 years      5  10 years or more  
 3  3-5 years

**2.** Are any other members of your family involved in woodworking?

- 12-1  Yes    2  No    Please specify \_\_\_\_\_

**3.** How many hours per week do you spend at woodworking?

- 13-1  None      4  11-15  
 2  1-5      5  16-20  
 3  6-10      6  More than 20

**4.** Do you have a workshop?

- 14-1  Yes    2  No

**5.** If so, where is it?

- 15  Garage      18  Spare room  
 16  Basement      19  Separate building  
 17  Attic      20  Other

**6.** How big is it?

- 21-1  50-99 sq. ft.      3  150-199 sq. ft.  
 2  100-149 sq. ft.      4  Over 200 sq. ft.

**7.** What's your level of woodworking ability?

- 22  Beginner      26  Teacher  
 23  Intermediate      Whom do you teach?  
 24  Advanced  
 25  Professional.  
 What kind?  
 \_\_\_\_\_

**8.** What kinds of woodworking do you do and/or would you like to learn more about?

(Check all that apply and underline your chief interest.)

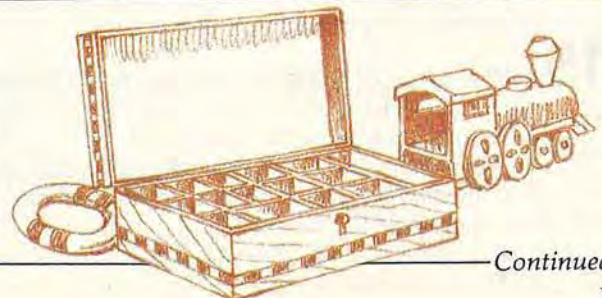
	Do Now	Would Like to Learn More About
Cabinet building	27 <input type="checkbox"/>	<input type="checkbox"/>
Furniture making	28 <input type="checkbox"/>	<input type="checkbox"/>
Woodcarving	29 <input type="checkbox"/>	<input type="checkbox"/>
Marquetry and veneering	30 <input type="checkbox"/>	<input type="checkbox"/>
Turning	31 <input type="checkbox"/>	<input type="checkbox"/>
Outdoor projects	32 <input type="checkbox"/>	<input type="checkbox"/>
Small-scale projects	33 <input type="checkbox"/>	<input type="checkbox"/>
Model building	34 <input type="checkbox"/>	<input type="checkbox"/>
Kit construction	35 <input type="checkbox"/>	<input type="checkbox"/>
Refinishing and restoration	36 <input type="checkbox"/>	<input type="checkbox"/>
Other _____	37 <input type="checkbox"/>	<input type="checkbox"/>

**9.** For whom or what do you build your projects? (Check all that apply and underline the most applicable)

- 38  Yourself      41  For gifts  
 39  Your family      42  For sale  
 40  For kids      43  Other \_\_\_\_\_

**10.** On an average, how much do you spend on materials for a project?

- 44-1  \$0-9      4  \$50-99  
 2  \$10-24      5  More than \$100  
 3  \$25-49



Continued

# QUESTIONNAIRE

**11.** Do you belong to any woodworking clubs or organizations?  
 45-1  Yes    2  No    Please specify \_\_\_\_\_

**12.** What tools do you own or intend to buy within the next year?

Stationary tools	Own	Intend to Buy
Table saw	46-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Radial arm saw	47-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Band saw	48-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Jigsaw	49-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Drill press	50-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Jointer	51-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Shaper	52-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Wood lathe	53-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Belt-disk sander	54-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Bench grinder	55-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Carving duplicator	56-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Multipurpose tool	57-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Planer	58-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Others (please specify) _____		

Portable electric tools

Pad sander	59-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Belt sander	60-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Drill	61-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Router	62-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Circular saw	63-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Saber saw	64-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Chain saw	65-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Miter box	66-1 <input type="checkbox"/>	2 <input type="checkbox"/>
Others (please specify) _____		

**13.** In which of these outlets do you buy your tools? (Check as many as apply.)

67 <input type="checkbox"/> Hardware stores	71 <input type="checkbox"/> Home improvement centers
68 <input type="checkbox"/> Discount stores	
69 <input type="checkbox"/> Department stores	72 <input type="checkbox"/> Mail order
70 <input type="checkbox"/> Lumberyards	

**14.** Where do you buy the materials for your projects? (Check as many as apply.)

73 <input type="checkbox"/> Lumberyards	76 <input type="checkbox"/> Specialty woodworking stores
74 <input type="checkbox"/> Home improvement centers	
75 <input type="checkbox"/> Mail order	77 <input type="checkbox"/> Discount stores

**15.** What types of wood do you use most often for your projects?

11  Softwoods (pine, fir, etc.)  
 12  Domestic hardwoods (walnut, maple, oak, etc.)  
 13  Exotic hardwoods (teak, rosewood, ebony, zebra, etc.)

**16.** Where do you get the ideas for your projects?

14  Design my own    16  Plans I buy  
 15  Plans or ideas    17  Plans or ideas in books found in magazines  Other \_\_\_\_\_

**Tell us about yourself**

**17.** Sex  
 19-1  Male    2  Female

**18.** Age

20-1 <input type="checkbox"/> Under 18	4 <input type="checkbox"/> 35-44	7 <input type="checkbox"/> 65 or over
2 <input type="checkbox"/> 18-24	5 <input type="checkbox"/> 45-54	
3 <input type="checkbox"/> 25-34	6 <input type="checkbox"/> 55-64	

**19.** Education

21-1 <input type="checkbox"/> Grade school	4 <input type="checkbox"/> Graduated college
2 <input type="checkbox"/> High school	5 <input type="checkbox"/> Postgraduate work
3 <input type="checkbox"/> Some college	

**20.** Do you:

22-1 <input type="checkbox"/> Own your home	3 <input type="checkbox"/> Rent an apartment
2 <input type="checkbox"/> Rent a house	4 <input type="checkbox"/> Other _____

**21.** What is your occupation?

23-1 <input type="checkbox"/> Professional/executive	7 <input type="checkbox"/> Self-employed/proprietor
2 <input type="checkbox"/> Homemaker	
3 <input type="checkbox"/> Secretarial/clerical	8 <input type="checkbox"/> Retired
4 <input type="checkbox"/> Student	9 <input type="checkbox"/> Armed services
5 <input type="checkbox"/> Semiskilled worker	24-1 <input type="checkbox"/> Farmer/rancher
6 <input type="checkbox"/> Skilled worker	2 <input type="checkbox"/> Unemployed

**22.** What's your family income per year?

25-1 <input type="checkbox"/> Under \$15,000	4 <input type="checkbox"/> \$25,000-34,999
2 <input type="checkbox"/> \$15,000-19,999	5 <input type="checkbox"/> \$35,000-49,999
3 <input type="checkbox"/> \$20,000-24,999	6 <input type="checkbox"/> \$50,000 or more

**23.** (OPTIONAL)  
 Name \_\_\_\_\_

Street Address \_\_\_\_\_

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26-27

28-29-30-31-32

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## SOUND ADVICE

# Wood-working clubs

Print this article

Woodworkers work alone, losing their thoughts in the smell of wood, saw noises, and the familiar confines of the shop. Or do they? Indications are that an evergrowing number are discovering benefits in belonging to a woodworking club. Benefits such as —

- Exchanging knowledge, information, and skills
- Mutual assistance and cooperation on projects
- Cost-sharing of tools, materials, and workspace
- Discounts through group purchases
- Social comraderie in their craft

There's a lot more, too. An organization like a woodworking club can arrange for special speakers, demonstrations, and field trips to facilities and manufacturers unavailable to individuals.

As a group, woodworkers can make a significant contribution to community service — special projects for charity fundraisers, assistance to vocational education, repairs and construction of facilities for Little League, and other worthwhile endeavors.

There may be a woodworking club in your area to join — a check with a lumberyard, hardware store or power tool dealer should tell you — but if not, you may want to start one. Before you begin, though, there are some things to consider.

**What do you want your club to accomplish?** Most clubs operate for two general purposes: 1. To support mutual benefit between members, and 2. To encourage the woodworking craft. These goals can be modified or expanded to suit members.

**How large will your club be and who will be members?** What you want the club to accomplish may



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decide its size. And the criteria for membership, as well as dues, may limit the number who can join. A very large club, for example, may be able to support a fully equipped shop and even pay for a manager. A club limited to members of a prescribed skill level will be small.

No matter the eventual size of the woodworking club, you'll have to start with some highly interested individuals able to keep it going and take on responsibility as it grows.

**Where do you find potential club members?** Anywhere woodworkers tend to frequent is a likely place to start. Posters or announcements in lumberyards, home centers, and schools with adult vocational courses will help. Organizations to which you already belong may also be a source of members. Once the club begins, others will become interested.

Shopsmith has a full-time program for developing woodworking clubs and can help you find members as well as provide you with a kit to get started.

According to Vince Pax, Club Development Manager, the company presently works with about 75 clubs across the nation and has recently developed a national organization of woodworking clubs. Write him at Shopsmith, Inc., 750 Center Drive, Vandalia, OH 45377, or call toll-free 1-800-543-9396 (in Ohio, 1-513-898-6070) for your kit.

When it comes, you'll find pages of information on forming a club — tips on structure, member enlistment, rules, programs, and publicity. Also included are sample forms for an organizational checklist, minutes, expenditures and receipts, group buying, and a press release.

When your club is established, Shopsmith will publish your news in *Shavings*, their bi-monthly woodworking club newsletter if you'd like.

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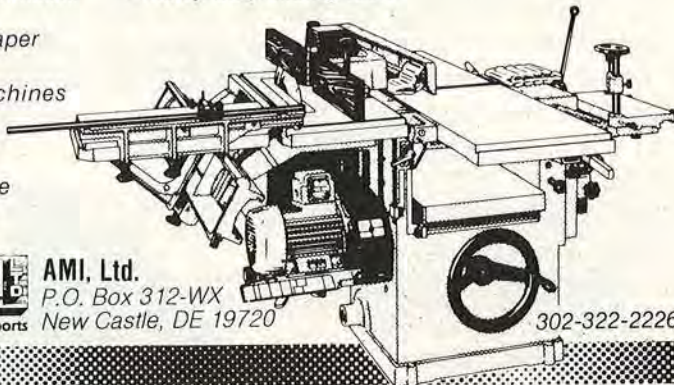
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## TOOL BUYMANSHIP



**These handy-to-have-around tools take the guesswork out of joining wood with dowels.**

Most woodworkers acknowledge the dowel joint as a good option for use with furniture, cabinets, and assorted other projects. The trick has always been drilling straight holes that line up with each other. Enter the doweling jig. Once you learn how to use any one of the five jigs shown, you should be able to make perfect dowel holes every time.

If all of them perform well, what difference does it make which one you buy? The answer lies partly in the type of work you want the tool to do; partly in how much money you're willing to spend.

Some of the five jigs we tested work only with lumber less than 2½" wide, for example. And some are more limited in the doweling situations they will handle. There are other subtle differences as well.

Each jig featured has something to commend it, and hopefully our report will help you understand each tool's relative merits.

### Record 148 Doweling Jig, \$56.53

Capacity: ¼", ⅜", ½" drills

This jig is a study in contrasts. Although the most versatile and accurate of the tools we tested, it's also the most difficult to learn how to use and set up. The product comes with a 10-page instruction manual, which is required reading.

As for the #148's versatility, it has two independently adjustable drill guide blocks, which have adjustable side stops that you can remove for wide work pieces. The manufacturer also furnishes a C-clamp to hold the jig in place when the clamp jaw has been removed. The above-mentioned features allow you to drill holes anywhere you want.

Set up with this jig does take time, mainly because the drill guide blocks and their stops don't have index marks.

### General 840 Doweling Jig, \$24.96

Capacity: ⅜", ¼", ⅝", ⅜", ⅞", ½" drills

Quick to set up and use, this jig

*Continued on page 111*

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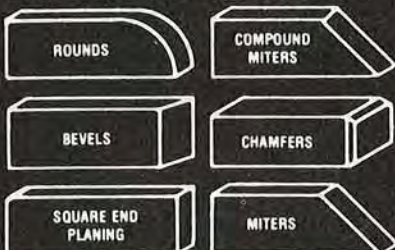
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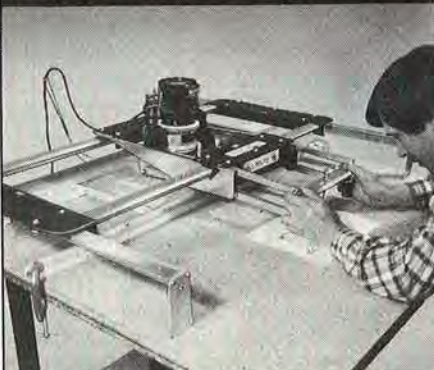
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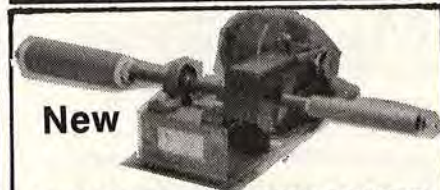


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## TOOL BUYMANSHIP

Continued from page 109

### doweling jigs

accepts lumber up to 4½" wide, which makes it more versatile than some of the others. A spring-loaded turret drill guide mounted on a carriage that rides on indexed steel rails makes positioning the holes a breeze. We did notice that our unit had about ¼" of play in the turret and carriage when they were locked in position. That won't cause fitting problems in most situations, but the 840 would be a better jig without the play.

With the General, you drill holes directly through the holes in the turret rather than through guide bushings. So you'll want to be careful not to angle the drill as you insert it.

#### Dowl-it 4000 Doweling Jig, \$102.14

Capacity: ¼", ⅜", ½", ⅝", ¾", 1" drills

Designed primarily for wide projects, this jig has guide rods that hold lumber up to 12" wide. It won't work well with boards under 2½".

One interesting feature built into this jig is its ability to drill matched pairs of holes in the ¼", ⅜", and ½" sizes at ⅜" center to center without moving the jig.

The hex set screws used as the only locking device on this jig are troublesome. They are inconvenient to use and complicate things unnecessarily.

#### General 888 Dowel Centers, \$2.36

Capacity: ¼", ⅜", ½", ⅝", ¾", 1" drills



#### General 888 Dowel Centers

Difficult to classify, dowel centers really aren't a jig in the sense of

guiding a bit or a blade. But they are an extremely easy way of marking opposing dowel holes in odd shapes that other jigs can't tackle. Some woodworkers swear by these handy little markers and they're worth having around.

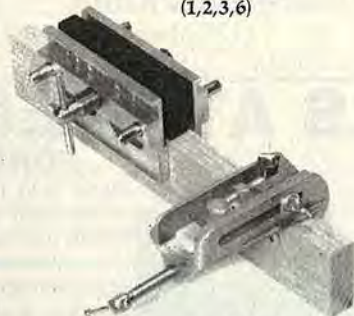
#### Dowl-it 1000 Doweling Jig, \$39.15

Capacity: ¼", ⅜", ½", ⅝", ¾", 1" drills

The only self-centering jig we tested, the 1000 will handle lumber up to 2¾" wide and as narrow as ⅜". We found this jig to be quite easy to use. Turning the threaded rod in the center of the jig clamps the jaws to the board. Since the drill block is always in the center of the piece, you can't do offset doweling with it.

The 1000 does have index marks, but on the black guide block, they are hard to see.

Dowl-it 1000  
Doweling Jig  
(1,2,3,6)



Stanley 059  
Doweling Jig  
(1,2,3,6)

#### Stanley 059 Doweling Jig, \$39.95

Capacity: ¼", ⅜", ½", ⅝", ¾", 1" drills

A good compact jig, the Stanley features an easily manipulated control block and clamp mechanism. With a clamp capacity of 2¾" wide, the jig won't help you with wide stock, but for edge-joining and for attaching rails, legs, or facers it is very accurate. Clearly scribed index marks make setup an easy chore.

The removable hardened steel guide bushings are a mixed blessing. Though inexpensive and easy to replace, they tend to get lost easily.

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# Glue squeeze-out

when  
should you  
remove it?

Practical Art

If ever there was a topic guaranteed to generate discussion among woodworkers, glue squeeze-out is it. We've talked to experts, then arrived at our own solution.

Ask three or more woodworkers the above question and you'll probably get three different answers: "right away," "after a few minutes," and "after the glue has dried." Chances are equally good that the person who gives you any of the three answers will have a rationale that seems plausible. In short, the subject of glue squeeze-out is one that's sure to generate some good discussion among anyone who has worked with wood.

Whenever you clamp two pieces of wood together with glue in between, you're dealing with variables in clamping pressure, consistency and amount of glue, and species of wood. All of these factors can affect the amount of adhesive that may ooze out of the joint, as well as the technique you use to remove it.

### Some Squeeze-out Is Good

A little glue squeeze-out — a few tiny droplets or dribbles along the joint — is a sign of a good glue-application job. No squeeze-out

means you might have applied too little glue, creating a "starved," potentially weak joint. All the experts agree on this point.

Glue squeeze-out becomes a problem only if you can't completely remove all the excess glue from the wood surface. Any glue that remains on or in the wood fibers can hamper application of finishing material. You know you must remove all the glue that gets squeezed out from the joint, but when and how?

We decided to do a little research on the subject.

We restricted our investigation to two of the more frequently used glue types: the aliphatic resins (the yellow mixtures such as Borden's Elmer's Professional Carpenters Wood Glue and Franklin Titebond) and the polyvinyl acetates (the white glues such as Elmer's Glue-All and Franklin Evertite). These adhesives are similar in consistency and application, although they differ slightly in strength and setting time. All dry within minutes of one another, ooze out from joints

Continued on page 114

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## SHOP TECHNIQUES

Continued from page 113

### glue squeeze-out

one another, ooze out from joints similarly, and can be removed with the same tools. So the following comments apply to all of them.

#### What the Experts Say

Some woodworkers we know wait until the oozed-out glue has dried hard. Then they pick it off with a sharp-bladed tool or sand it away with sandpaper. The secret to the success of this technique is to limit squeeze-out to the tiniest possible beads of glue.

Dr. Robert Snider of Franklin Chemical Industries favors one of two other techniques — depending on the gluing project. Snider, whose doctorate is in chemical engineering, has been at Franklin for over 45 years. More than just the company's glue expert, he's a home craftsman.

"In my own projects," he says, "I usually try to remove excess glue with a metal spatula when the glue becomes the consistency of cottage cheese — that is, after about 5 to 10 minutes." However, Snider says he sometimes removes the glue with a damp sponge immediately as it oozes out.

So does Tom Duncan, section head of the Borden Adhesives Group Development Laboratory. Duncan has bachelor's and master's degrees in forest utilization from the College of Environmental Science and Forestry, State University of New York at Syracuse. He says, "I'd probably wipe off the glue while it was still wet and then sand whatever was left after it had hardened."

Snider's favorite glue-wiping tool is a sponge dampened with water. Duncan uses rags and hot water, rags with hot water and detergent, or rags and ethyl alcohol.

#### Moisture Affects Wood

Whichever applicator and liquid are used, both men agree, the moisture may raise the wood fibers. But, says Snider, "You always sand afterwards anyway, so

that's no problem. Just be sure not to overload the wood with water."

After using a damp rag, Duncan advises, "Wait maybe a couple of days for the wood to reach an equilibrium state with the humidity of the air, then sand. Either alcohol or water could cause the fibers to swell, but alcohol will evaporate sooner."

Won't the water or alcohol carry glue down into the wood, much as the solvent in pigmented liquid stain carries the pigment? Says Duncan: "Maybe, but once you've sanded the wood you'll have sanded off the glue."

Snider notes that too little moisture rather than too much is more likely to be a problem. Using a rag or sponge that's not moist enough, he says, might prompt you to apply too much pressure in removing the glue. And this, he says, can indeed push glue into the wood.

Will removing semi-dry glue with a spatula or other scraper pull glue out of the joint? No way, says Snider. "You simply can't pull the glue out of the joint, and you don't have to worry about making gaps in the glue when you scrape it away. The glue line should be only about two thousandths of an inch thick."

Duncan agrees: "Many people who sell adhesives like to say that the glue is stronger than the wood itself. It really shouldn't pull out of the joint if it's doing its job."

#### What We've Experienced in Our Shop

Generally, we don't advise waiting until the glue has dried hard. Note the "generally." Sometimes, you might be able to estimate your glue needs exactly and get just a few tiny beads of glue squeeze-out. If you have no more than this, you can wait till the glue has dried and flick off the beads with any sharp tool.

But, as was mentioned earlier, you could be making a serious mistake in trying to limit glue squeeze-out to so small an

amount. Remember the starved joint.

The other extreme is no better. If so much glue oozes out that you'd need a chisel or lots of sandpaper to remove it after it hardened, you're in trouble. Since the completely dry glue is quite likely harder than the grain of the surrounding wood, the adhesive you cut away might take some wood along with it. And if you use a sander, you risk sanding away too much of the wood.

### No Water Is Better

We agree to disagree somewhat with both Snider and Duncan regarding use of a damp sponge or rag. We're convinced that the combination of moisture and pressure can indeed push some glue into the pores of the wood. Sanding will remove the glue at the surface, but perhaps not all the glue that was forced down deep. Why take a chance and wait maybe a couple of days for the wood to reach an equilibrium state before you can sand off the residue?

### Let Glue Gel

Clean up excess glue after it has gelled a bit but before it has hardened. Follow Snider's advice and wait 5 to 10 minutes (or longer) after clamping. At this point you'll be able to slice away the "cottage cheese" with a dull chisel or other type of scraper.

As Duncan puts it, "Scraping the glue off after it has set for a few minutes makes sense. It's sort of a compromise between removing it right away and waiting until it's completely dry. Of course, once you remove the skin that's formed on the surface of the glue, the glue underneath is still wet. But removing it at this point keeps you from smearing the glue all over quite as much."

And by removing as much as you can in this way, you minimize the sanding you'll have to do once the remaining glue has hardened.

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### How To Avoid Excessive Squeeze-Out

- Check that joint parts fit well by clamping together before gluing. Open pores of wood by sanding.
- Use a brush about the same width as the wood to spread glue. Glue directly from a squeeze bottle should be applied in zig-zag lines to both surfaces, then the pieces rubbed together to distribute.
- It's best to apply glue to both surfaces thinly and allow to par-

tially set before joining pieces.

- Check drying or "set" time of glue you're using. Some set up faster than others. Work to the pace of the glue.
- Don't apply too much clamp pressure. The object is to create a thin film of glue between parts. Too much pressure will squeeze the glue out, resulting in a starved joint. Usually, finger tight will do.

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8 . . . . \$2.00	15 . . . . \$1.00	35 . . . . \$5.00	55 . . . . \$1.00	68 . . . . \$1.95	88 . . . . \$2.00	
9 . . . . \$2.00	20 . . . . \$1.00	40 . . . . \$3.00	63 . . . . \$1.00	70 . . . . 60¢	89 . . . . \$1.00	

Name (please print) \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip Code \_\_\_\_\_

**I AM ENCLOSING:**  
\$ \_\_\_\_\_ for priced items  
\$ 1.00 for handling  
\$ \_\_\_\_\_ total remittance

### OUR EDITORS INVITE YOU TO HELP THEM BY ANSWERING THESE QUESTIONS:

1. What is the age of the head of your household?
  - A.  18-24
  - B.  25-34
  - C.  35-49
  - D.  50-64
  - E.  65 or older
2. What is the highest level of education reached by the head of your household?
  1.  Graduated college
  2.  Attended college
  3.  Graduated high school
  4.  Attended high school
  5.  Did not attend high school
3. Do you live in:
  - F.  A large city
  - G.  A suburban area of a large city
  - H.  A small city or town (not a suburb)
  - I.  A rural area
4. Who purchased this copy of *Better Homes and Gardens Wood*?
  6.  A male
  7.  A female
  8.  Was a joint purchase by a man and a woman
  9.  Magazine was not purchased but was borrowed from someone else
5. How did you get this copy of *Wood*?
  - J.  Subscription
  - K.  Purchased on newsstand or woodworking store
  - L.  Borrowed from a friend
  - M.  Other
6. Approximately how long do you expect to keep this issue of *Better Homes and Gardens Wood*?
  0.  Less than a month
  1.  1 to 3 months
  2.  3 to 6 months
  3.  6 months to a year
  4.  More than a year
7. In which of the following categories is your annual household income before taxes?
  - N.  Under \$15,000
  - O.  \$15,000 to \$24,999
  - P.  \$25,000 to \$34,999
  - Q.  \$35,000 to \$49,999
  - R.  \$50,000 to \$74,999
  - S.  \$75,000 to \$99,999
  - T.  \$100,000 or more

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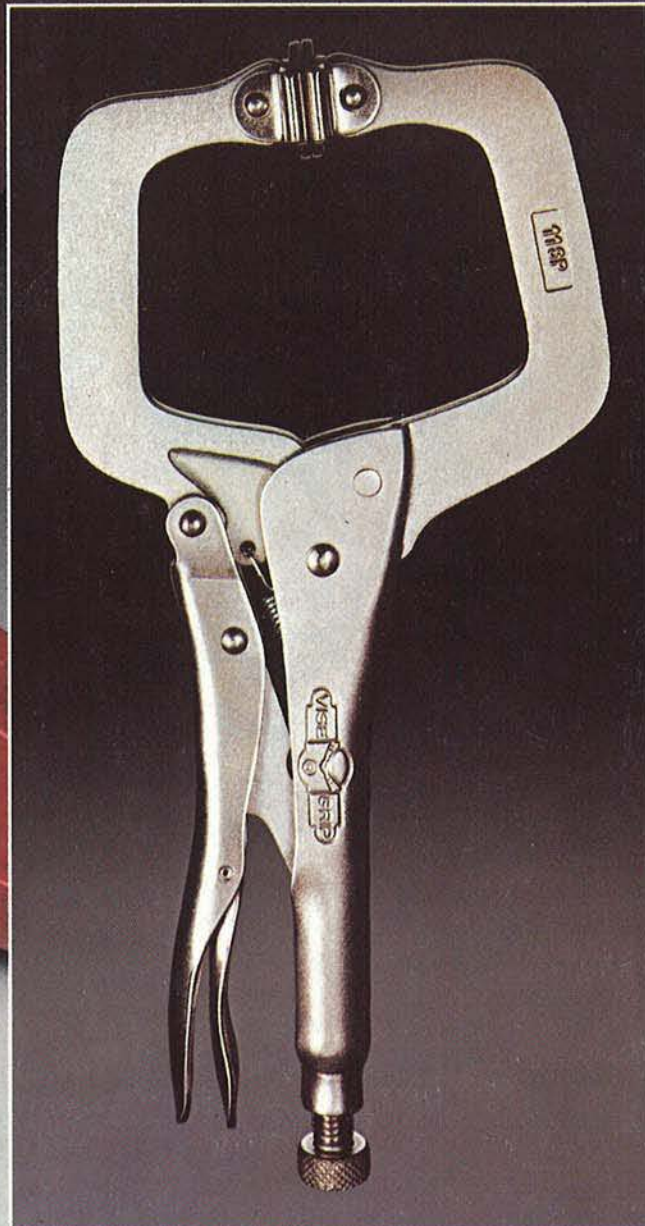
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