

Special
Holiday Issue

Woodworker's Journal

Vol. 18, No. 6 November/December 1994

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"Through" Dovetails

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A Versatile Table*

Power Carvers

We Review The Field

Toys & Gifts:

Jewelry Armoire

Scrollsawn

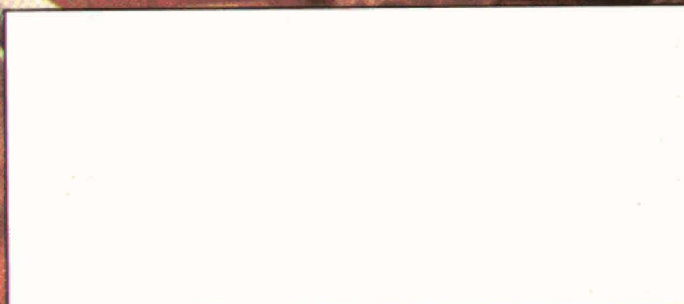
Winter Wonderland

Toy Ferryboat

Colonial Blanket Chest



'37 Pontiac
Coupe



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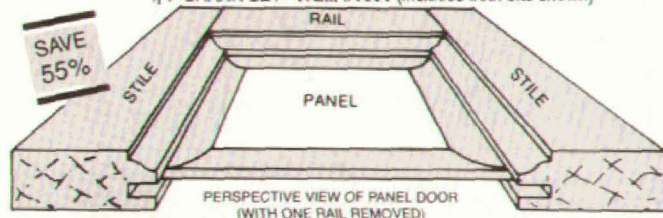
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#1308	CLASSICAL - 3/16" Radius — 5/8" Cutting Length	1/2"	\$22.50		#1339	FLUSH TRIM - 1/2" Diameter — 1-3/16" Cut. Length	1/2"	\$ 8.00
#1309	45° CHAMFER - 3/8" Cutting Length	1/4"	\$13.00		#1340	PATTERN / FLUSH TRIM - 1/2" Diameter	1/4"	\$15.00
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#1313	THUMBNAIL - 2-1/2" Large Diameter	1/2"	\$35.00		#1344	KEYHOLE CUTTER - 1/2" shown	1/4"	\$ 9.00
#1314	ROUND OVER - 1/8" Radius	1/4"	\$11.00		#1345	DOVETAIL (HSS) - 1/4" Diameter — 7-1/2"	1/4"	\$ 6.50
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#1316	ROUND OVER - 5/16" Radius	1/4"	\$14.00		#1347	DOVETAIL - 1/2" Diameter — 14°	1/2"	\$ 6.50
#1317	ROUND OVER - 1/4" Radius NEW !	1/2"	\$12.00		#1348	BEADING - 1/4" Radius	1/4"	\$13.00
#1318	ROUND OVER - 3/8" Radius	1/2"	\$15.50		#1349	BEADING - 3/8" Radius	1/4"	\$15.50
#1319	ROUND OVER - 1/2" Radius	1/2"	\$17.00		#1350	BEADING - 1/2" Radius	1/4"	\$17.00
#1320	ROUND OVER - 3/4" Radius	1/2"	\$21.00		#1351	LOCKMITRE - 7/8" Cutting Length NEW !	1/4"	\$32.00
#1321	MULTIFORM MOULDING - 15/16" Carbide Height	1/4"	\$40.00		#1352	LOCKMITRE - 1-1/8" Cutting Length	1/2"	\$45.00
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#1325	RABBETING - 3/8" Deep	1/4"	\$13.00		#1356	EDGE BEADING - 5/16" Diameter of Circle	1/4"	\$15.50
#1326	RABBETING - 3/8" Deep	1/2"	\$13.00		#1357	SPIRAL UPCUT - 1/8" Diameter (solid carbide)	1/4"	\$ 9.00
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#1328	CORE BOX - 1/2" Large Diameter	1/4"	\$13.00		#1359	SPIRAL UPCUT - 1/4" Diameter (solid carbide)	1/2"	\$12.00
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#1330	BULL NOSE - 1/2" Diameter of Circle	1/4"	\$16.00		#1361	SPIRAL UPCUT - 1/2" Diameter (solid carbide)	1/2"	\$29.00
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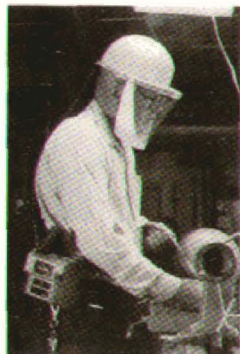
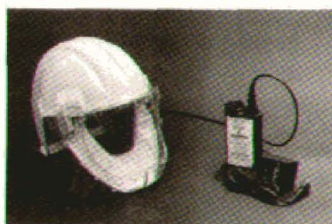


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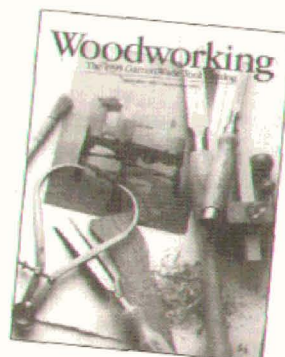
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Shoptalk



Whenever I board a commercial airliner, I make a point of taking a good look at the pilot. (Doesn't everybody?) I always like to see a fair amount of gray on this head. I equate gray hair with thousands of hours of flying time and seasoned, rock-steady judgment—which I translate into better odds on my safe arrival. Since I always check out the head on the left-hand side of the cockpit, I thought it only fair to give you a sense of who's in the pilot's seat here at *Woodworker's Journal*.

Magazine writing and editing have been my life for some 32 years now. I've been associated with six magazines and a dozen different books. Besides writing about woodworking, I've written hundreds of articles on agriculture,

science, computers, home remodeling, and gardening. I've filled positions at every level of the organizational chain from associate editor to editor. Since 1986, I've worked on two other national-circulation woodworking magazines, as managing editor, projects editor, and freelance contributor.

Although I occasionally disclose the story of my first serious woodworking venture—pounding my dad's entire supply of shingle nails into the barn door at the age of six—I got my first formal woodworking experience as a 10-year-old 4-H Club member. I started by learning the basics of hand tools, putting these to use on doorstops, stools, a tool carrier, and sundry other small but useful around-the-home projects. Growing up on a farm (near Appleton, Wisconsin) often put my carpentering skills to the test, such that I didn't really look upon woodworking as a hobby until years later.

At 26, I moved to Des Moines, where I joined the local woodworker's club and made my first major power tool purchase, a Craftsman radial-arm saw. Tool money being scarce in those days of small children and large appliance bills, I made this versatile machine perform just about every task it was capable of performing—and maybe a couple of others as well. Although I eventually acquired other tools, the radial saw continued to be my mainstay for quite some time.

Over the years, I've contributed at least my fair share of sawdust and shavings. A few pieces of stock, however, have escaped the Shop-Vac; I've made a set of cafe doors, several built-in wall cabinets, outdoor planters, welcome signs, a student desk, a couple of display cabinets, a garage, a grandfather clock, and a number of smaller clocks, among other projects.

I never grow weary of woodworking. I love doing it—learning it—teaching it—talking it. It challenges and rewards me every day. I hope it does the same for you, too.

Charles Sommers

The Woodworker's Journal

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So, before embarking on your next woodland adventure, make sure you're properly equipped. Blaze a trail to a store that carries the HD 3640 band saw and the other Skil Woodshop tools. You'll be glad you made the trip.

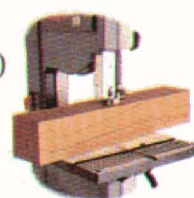
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Letters

We welcome opinions and comments (both pro and con) from our readers. Address correspondence to: Letters Dept., Woodworker's Journal, News Plaza, P.O. Box 1790, Peoria, IL 61656.

Updated Information On the New Sears Craftsman Variable-Speed Bandsaw



The new Craftsman variable-speed bandsaw reviewed in the bandsaw tool article in our May/June 1994 issue was completed before a new model number or price was assigned by the company. The Sears model tested by Jim Barrett and referred to as model 24450 in the Specifications Chart and text has since been designated model 24453. The saw appears on page 139 of Sears' current catalog and lists at \$189.99. We regret any inconvenience this inaccurate information may have caused you.

Two Readers Share Their Successes

I've enjoyed your magazine ever since I received my first copy in 1982. Through the years I've made a lot of projects based on your articles. I'm enclosing a photo of the Governor

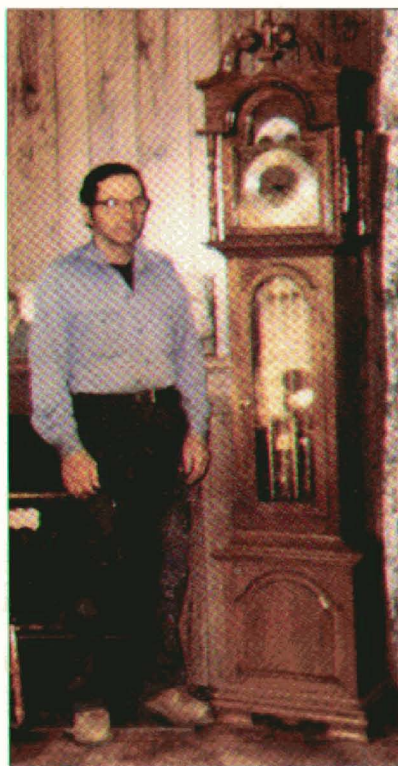
Winthrop slant-front desk that I recently built based on your article. At my wife's request, I took a few

liberties and made a few changes: used oak materials and added the top display case. Otherwise, I built it as described.

Brian Angwin, Clinton, Ia.

Beautiful job, Brian. And thank you for sharing the photo and your experiences with us. We, in turn, want to share both with Woodworker's Journal readers. You may be interested to know that the original desk in the Wallace Nutting Collection at Berea College actually has a matching display top very similar to the one you created. We hope to present it as a project within the coming year.

Gentlemen: I just wanted to show you the oak Grandfather clock I made from your project plans. We enjoy it a lot.



Dale Linton, Litchfield, Maine

Thank you, too, Dale, for sharing the photograph of your clock. You have every right to be proud of it. This also gives us an opportunity to encourage all readers to send us reproducible

photos of projects they've made from Woodworker's Journal articles. We'll publish as many as we have space for on this page.



Wants To Design Woodworking Projects With a Computer

I would like to use my computer for drafting woodworking projects. I build mostly furniture and household items. Is any particular software better for what I want to do than any others?

Jim Dziura, Chicago, Ill.

Jim, there are a number of graphic and computer-assisted drafting (CAD) programs that will enable you to design woodworking projects on your personal computer. Prices range from about \$50 on up to several thousand dollars, depending on how many bells and whistles you want.

Some of the drawings in this issue and those you'll be seeing in future issues of Woodworker's Journal will have been prepared using either MiniCad+ on a Macintosh or DesignCAD 2D on an IBM pc. Both are competent and considered middle-of-the-road programs price-wise.

However, Jim, we are reluctant to recommend any specific program. CAD programs vary a great deal, and everyone has very different computer knowledge and skills. DesignCAD 2D for



Windows, for example, lists at \$349. You can do full-sized and scaled mechanical drawings with it, but it won't calculate cutting diagrams. It has a limited symbols library, but additional symbols can be purchased. There are also inexpensive shareware programs available that will work, although not as nearly as elegantly.

Before you invest in any software, we suggest you talk with other CAD users and find out what they use and how they use it. Also, ask your dealer or the software companies for demonstration disks of the programs that interest you to see if they have enough features to create the kinds of drawings you want.

Revised Suggestion For Bad Puppy Intarsia Stock

In the instructions for making the Bad Puppy intarsia project (May/June 1994), the author suggested using birch

as an alternative to the basswood that contributing editor Bob Hlavacek usually uses. However, Bob tells us that birch would not be a good substitute because it is just too hard to cut with the $\frac{1}{16}$ " bandsaw he uses. Basswood continues to be his wood of choice. **W&J**

Your safety is important to us...We strive to present our plans and techniques as accurately and as safely as possible, and we try to point out specific areas and procedures that require extra caution. But because of the variability of local conditions, construction materials, and personal skills, we can't warn you against all potential hazards. Remember to exercise common sense and use safety measures when operating woodworking equipment. Don't attempt any procedures you're not comfortable with or properly equipped for. Sometimes, for the sake of clarity, it's necessary for a photo or illustration to show a power tool without the safety guard in place. In actual operation, though, you should always use guards and other safety devices on power tools that are equipped with them. Remember...an ounce of prevention really is worth a pound of cure.

The Editors

Look for the January-February issue of
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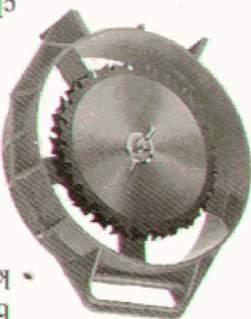


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To keep you up-to-date, this column features brief descriptions of new tools and supplies on the market. The product descriptions are provided by the manufacturers and presented here for your information. These products have not been tested or reviewed by Woodworker's Journal editors.

blades feature anti-kickback shoulders behind each cutting tooth. The four teeth instead of the usual two for making sharp, clean shoulders and flat-bottom cuts with no tear-out or chipping. The set also includes an extra-thin $\frac{3}{32}$ " ply-groove chipper to accommodate the in-between and undersized stock thicknesses frequently encountered. With the thin chipper, the four $\frac{1}{8}$ " chippers, one $\frac{1}{4}$ " chipper, and shims, the Chip-Master can produce cuts from $\frac{1}{4}$ " to $\frac{3}{4}$ " wide. Price: \$179. For more information, contact CMT Tools, telephone 800/531-5559.



Router Template Bushings Available in Non-Rusting Brass

For template routing, you need correctly sized bushings. This new kit, offered by The Tool Club, has seven bushings ranging in size from $\frac{1}{8}$ " (outside diameter) up to 1" to fit just about any template, jig, or pattern-routing need. The guides fit Black and Decker,



Porter-Cable, and other routers with $1\frac{1}{2}$ "-diameter holes in their base plates. Adapters are also available for mounting the bushing on other routers. The nine-piece kit (seven bushings, two retaining nuts) sells for \$34.95. For information, contact The Tool Club, 1026 Superior Avenue, Box 410, Baraga, MI 49908, telephone 800-486-6525. **W**

tool, and the vacuum automatically turns itself off 15 seconds later.

The new low-profile vac incorporates a 9-amp motor that develops 123 cubic feet of air flow suction per minute. There's also a dual filtration system for cleaner air, a foot-actuated wheel brake, and a 360° hose connector to minimize hose kinking. The corrosion-resistant polypropylene tank holds five gallons dry, nine gallons wet. For more information, contact Porter-Cable Corporation, 4825 Highway 45 North, P.O. Box 2468, Jackson, TN 38302-2468.

Spray-On Wood Stain Minimizes Messes

If you dislike the mess and cleanup usually associated with conventional wood stains, then consider the new spray-on wood stain and sealer products being introduced by Alpha-Omega. Available in eight colors and packaged in conventional aerosol spray cans, these finishes simply spray on and wipe off—there's no stirring, pouring, or brushing.

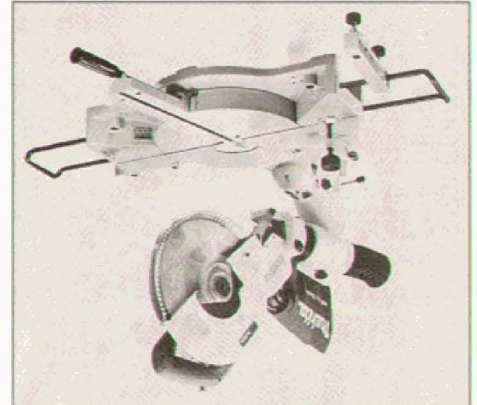


According to the manufacturer, Spray-On Stain contains its own sealer, so pre-sealing of the wood isn't necessary. It also has an absorption control agent to maintain uniform coverage on all types of woods. For the name of the dealer nearest you, call 800/346-1490, or contact Alpha-Omega at 11367 E. 61st Street, Broken Arrow, OK 74012.

New Dado Set Promises Cleaner Cut Dados

If you work melamine, plywood, wood sheet materials, or other difficult-to-cut compositions, consider CMT Tools' new 8" Joint Master dado set. The saw

New Compound Miter Saw Tilts 45 Degrees To Left and Right
Introduced at the National Hardware show in August, Makita's new 12" sliding compound miter saw (model LS1211) not only tilts 45° to the left, but with the touch of a single control, also tilts 45° to the right, for both bevel and miter cuts. This eliminates the need to flip the workpiece to make compound cuts on moldings. The saw can also make miter cuts of up to 60° both left and right.

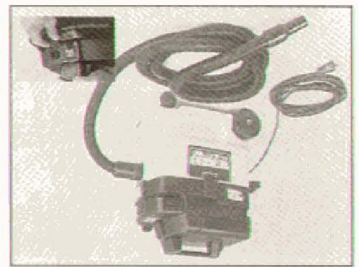


The new unit features a 15-amp double-insulated motor and incorporates an electric brake, a 96-tooth carbide saw blade, a materials vise, positive stops at 15 different angle positions, and a switch lock-off button to prevent unauthorized or accidental starting of the saw. For information, contact Makita U.S.A. Inc., 14930 Northam Street, La Mirada, CA 90638-5753, telephone 714/522-8088.

Power Tools Trigger

New Vac's On-Off Switch

Porter-Cable's new wet/dry vacuum (model 7810) incorporates the newest industry feature—power tool-triggered control. Plug a tool into the



special electrical outlet on the vac and turn on the vacuum turns on too. Turn off the power

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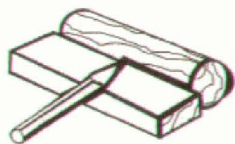
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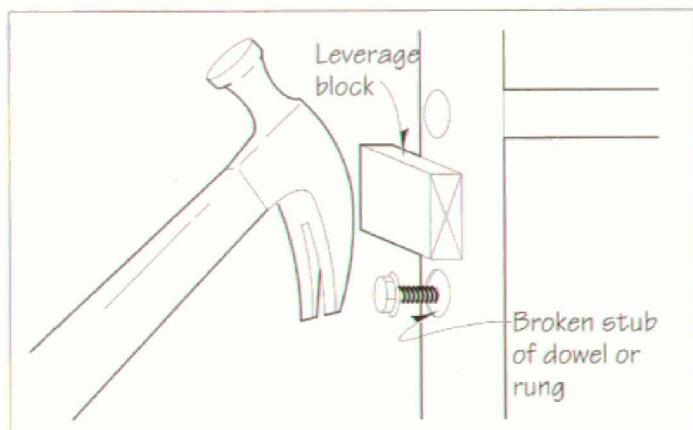


Shop Tips

Woodworker's Journal pays \$25—\$100 for reader-submitted shop tips that are published. Send your ideas (including sketch if necessary) to: Woodworker's Journal, News Plaza, P.O. Box 1790, Peoria, IL 61656, Attn: Shop Tips Editor. We redraw all sketches, so they need only be clear and complete. If you would like the material returned, please include a self-addressed stamped envelope.

Drive Broken Dowels First, Then Pull Them

In my furniture restoration work, I often get chairs with dowels broken below the surface. While I sometimes must resort to drilling them out, I first try the following:



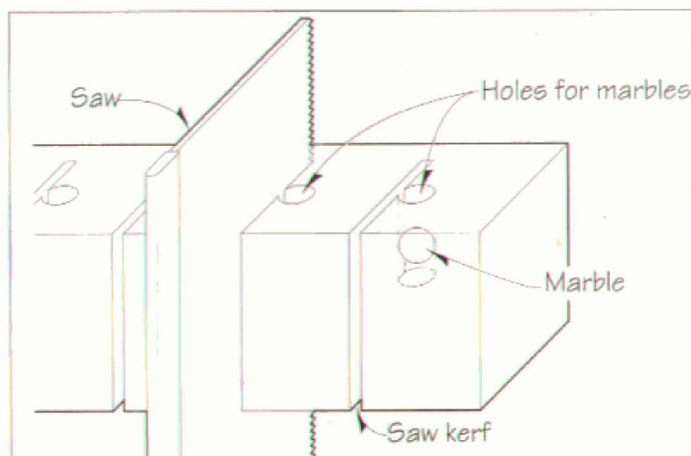
Using a large-diameter punch, drive the broken stub a fraction of an inch further into the hole to break any glue bond and to smooth and compress the dowel's face. A bolt that's slightly smaller than the dowel usually works best for this.

Next, I center and then drive a large, coarse-threaded screw deep into the stub, leaving the screw head exposed. Then, using a claw hammer and a scrap block under the hammer head for leverage, I pull on the screw's head to extract the dowel stub. Most stubs come out without a fuss.

Adam Coutts, Santa Monica, Calif.

Simple, Positive Wall Hanger For Handsaws

To hang my handsaws securely, I've developed this hanger. Starting with a 2x2 block of wood, I crosscut a slot into the block for each saw I wanted to store on it. Next, I bought a bag of glass marbles and bored holes (slightly larger than the marbles)



1" deep that tangentially intersect the slots. I then trimmed this block to length, attached it to a mounting board, and finally screwed the board to my shop wall so the holes faced up. After mounting, I placed a marble in each hole.

To use, I simply slide the blades of my saws into the slots. As I release the saw, the saw and gravity pull the marbles down to hold the saw in place.

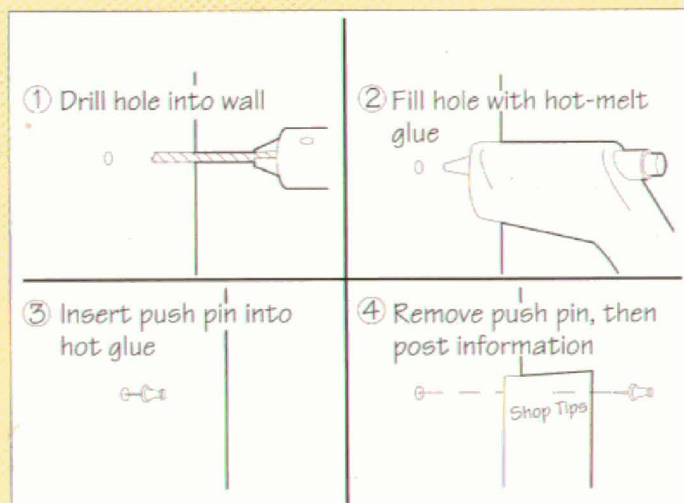
Robert Andrews, San Diego, Calif.

Pin Shop Notes Where You Want Them

In my shop, I am constantly referring to shop tips, screw size charts, jointer knife replacement instructions, and other information that I mount on the walls. I've found that push-pins, of the type with plastic handles often used on bulletin boards, are very useful for posting this information in strategic locations. The problem, however, is that the pins usually loosen in the holes and fall out.

I solved this problem by first drilling a $\frac{1}{16}$ " hole at the point where I want the information displayed. The surface may be a wood, plaster board, or concrete wall—it really doesn't make a difference. Next, using a hot-melt glue gun, I inject glue into the drilled hole, and then insert the push pin. The glue forms a tight fitting seal around the pin, yet the pin can be easily removed and reinserted into the hole over and over again.

Robert C. Noelle, Middletown, N.Y.



Continued on page 71

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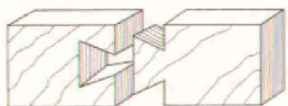
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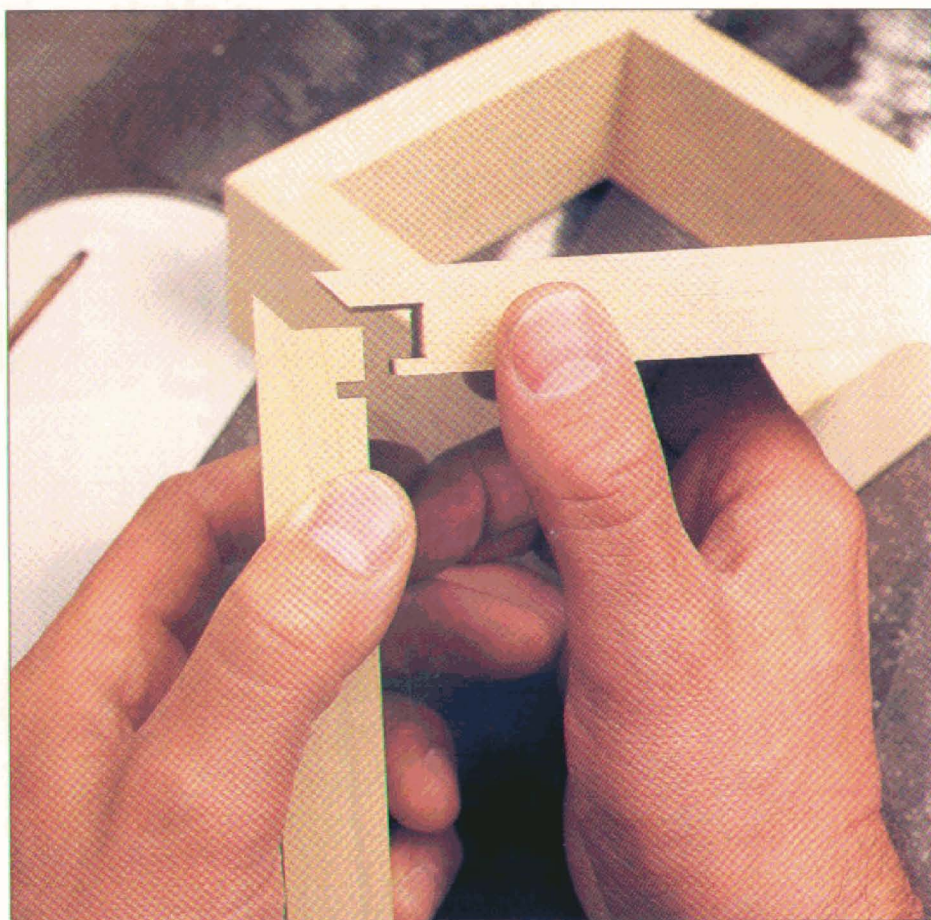
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Special Techniques

LOCKING MITER JOINT

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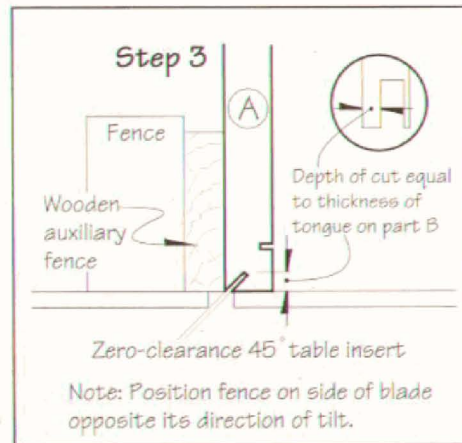
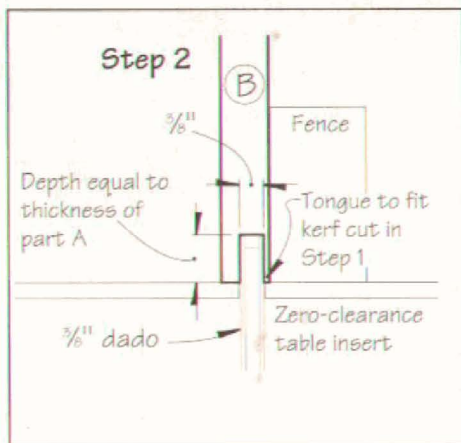
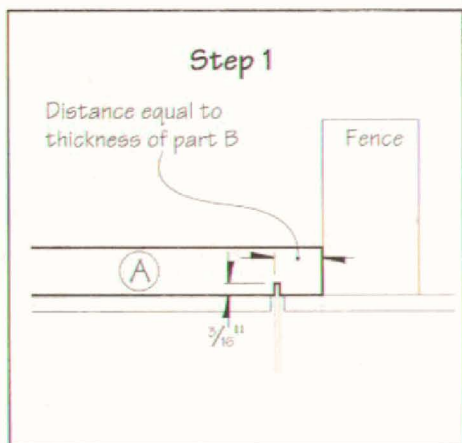
Step 1: Measure the actual thickness of your stock. Using this dimension, set your fence an equal distance from the blade. Now, cut a kerf near the end of each part A where shown.

Step 2: Fit your tablesaw with a $\frac{3}{8}$ " dado head and a zero-clearance insert. Elevate the dado head to a height that equals the thickness of part A. Next, set your rip fence $\frac{1}{8}$ " from the dado blade

(or a distance equal to the thickness of the blade you used in step 1). Then, cut a dado in the end of each part B where shown to create a tongue.

Step 3: Before setting up for this step, move your rip fence to the side of the blade opposite its direction of tilt. Next, change back to the blade used in step 1, and change to a 45° zero-clearance insert. Tilt the blade to 45°

from perpendicular, then elevate it to a height equal to the thickness of the tongue you cut on parts B (measuring vertically). Attach a wooden auxiliary fence to the rip fence, and set it for zero clearance with respect to the tilted blade. Now, cut an angular kerf (to establish the miter) in the end of each part A on the corner opposite to the kerf you cut in step 1.



Continued on page 62

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by Jim Barrett

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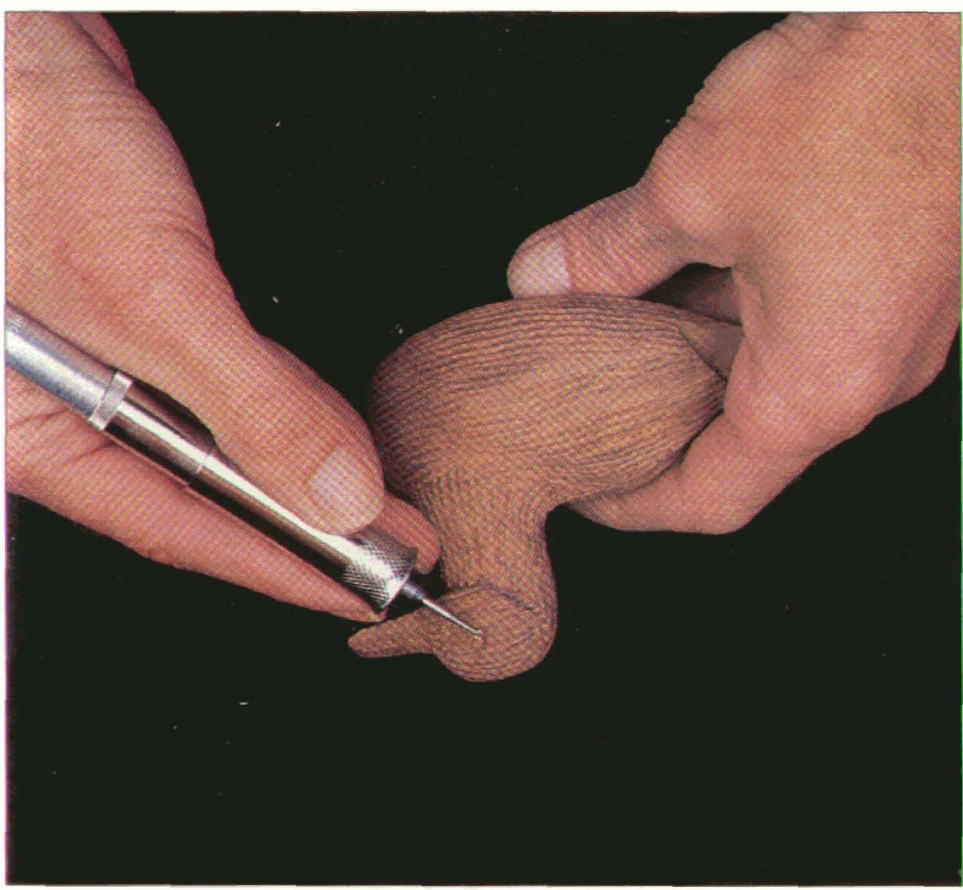
Sure, you can still find a few dyed-in-the-wool traditional woodcarvers practicing their craft with hand carving tools only. But gone are the days when you'll see carvers laboriously chipping away at large blocks of wood with mallet, chisel, and gouge. Nowadays, most carvers—pros and amateurs alike—rely on various power tools to speed work along. Over the decades, resourceful carvers have used everything from chainsaws for roughing out large sculptures such as carousel horses to dentist drills for adding intricate feather details to realistic bird and waterfowl carvings.

companies plus a variety of other tools designed specifically for woodcarving. In my search of the market, I soon discovered that these tools fall into four distinct categories, which I've dubbed motorized rotary tools (as exemplified by the Dremel Moto-Tool), flex-shaft rotary tools, reciprocating carvers, and micro-motor (detailing) tools. With the exception of the reciprocating carvers, all rely on rotary motion to remove stock. Some purists will argue that these tools grind wood rather than carve it, but the end result will be the same. You can fit these tools with hundreds of different burs, cutters, bits, and abrasive grinders to achieve practically any effect you want. Some bits have an extremely aggressive cutting action that will remove a lot of wood in a hurry. Others have been designed to provide fine texture and detail. (See *page 20* for a sampling of the most popular types.) I confess that I'm no master woodcarver—far from it, in fact. So, for this article, I enlisted the aid of a local

Motorized Rotary Tools

professional carver, William J. (Bill) Schulte, to help me shop-test the various tools. (For Bill's profile and comments, see page 23.)

Pioneered as the Dremel Moto-Tool some 50 years ago, these rotary tools are miniaturized versions of electric die grinders used for various manufacturing processes. Because Dremel dominates the motorized rotary-tool market, you'll hear people calling them "Moto-Tools" or "Dremel tools," no matter who makes them. Over the years, other tool companies have come up with their own versions. However, most have fallen by the wayside, simply because they couldn't compete with the original. Surprisingly, I couldn't find any "imitators" for this review, whereas several were still available back in the late 80s when I researched a similar article. I'm not saying that other motorized tools don't exist—but if they do, they aren't easy to find.



At present, Dremel offers three corded Moto-Tools (models 395, 285, and 275, *photo 1*) and two battery-operated tools, the Freewheeler and the Minimate. (You can also buy the 395 and 275 under the Sears Craftsman label.) The corded Moto-Tools come in kit form as well (designated as 3950, 2850, and 2750, respectively), each of which includes 40 bits and accessories and a sturdy plastic carrying case. The case is worth the extra few bucks you pay for it, both to protect the tool and to provide organized storage for all the tiny bits and accessories you'll eventually acquire.

Dremel has made some significant improvements in their tools since I first started using them in the early 70s: quieter but more powerful motors, ball-bearing construction, more comfortable tool bodies, variable speed control, quick-change collets, and keyless chucks, to name a few. Still, I consider them to be light-duty "hobby tools." Their small, self-contained motors simply don't develop enough torque for heavy stock removal, restricting the tools' use to detail work or the occasional small carving project. Of course, for their size and relatively low cost, you can't expect them to perform like the more powerful flex-shaft units.

Although I mentioned the two battery-powered Dremel tools, I don't consider them suitable for carving. They have neither the speed nor the torque to remove wood efficiently, even for most detail work. Also, they offer only 10 to 15 minutes of run time per

charge, and with their three-hour recharge time, they will spend most of their time on the charger.

If I were to use a Moto-Tool for carving, I'd pick the variable-speed model 395. It has plenty of speed (up to 30,000 rpm) for light carving and detail work, provided you use a light touch and don't try to remove too much wood at a time. Because you do most carving at the highest speed, you really don't need the variable-speed feature. However, if you use Moto-Tools for other household chores as I do, it's a nice option to have.

I've heard some carvers complain that the self-contained motors on the Moto-Tools make the handpiece somewhat bulky for doing fine work. Also, excessive vibration and heat buildup make the tool uncomfortable to use for extended periods of time. In my experience, you have to stop work every 15 minutes or so to let the tool cool off; otherwise, it becomes literally too hot to handle.

In spite of these drawbacks, many professional power carvers have cut their teeth on Dremel Moto-Tools. They offer a good, relatively inexpensive way



Photo 1: Dremel Moto-Tools (left to right): model 285 (2-speed, \$60-\$70 for kit); model 395 (variable-speed, \$80-90 for kit); model 275 (single-speed, \$50-60 for kit). Photo courtesy Dremel Co.

to learn the basics of power carving. And, when you decide to move up to a more powerful flex-shaft tool, you'll find plenty of other uses for a Dremel tool around the shop and house—cutting, polishing, grinding, sharpening, engraving, detail-sanding, and more. Dremel offers hundreds of bits and attachments as well as a drill-press stand, a router base, a shaper/router table, a chainsaw sharpening attachment, and a flex-shaft. Equipped with four collets ($\frac{1}{32}$ " to $\frac{1}{8}$ ") and a keyless $\frac{1}{8}$ " three-jaw chuck, the tools also accept bits and accessories from other manufacturers of up to $\frac{1}{8}$ " shank size.

Flex-Shaft Rotary Tools

When you're ready to take power-carving seriously, you'll probably want to invest in one of the flex-shaft carving tools (*photo 2*). No matter what type of carving you do—short of chainsaw sculpture—you'll most likely be able to find a model that suits your purposes. Rated at $\frac{1}{16}$ to $\frac{1}{4}$ hp, the flex-shaft motors have a lot more power than any of the motorized rotary tools just discussed. Also, because the motor connects to an independent handpiece via a flexible shaft, the handpiece vibrates less and stays cooler than a motorized rotary tool.

The flex-shaft models also accept a wider variety of bits, cutters, and accessories. Foredom leads this category,



Photo 2: Flex-shaft tools, (left to right): Foredom Model SR ($\frac{1}{4}$ -hp, reversible, about \$260 for kit); AMT model 5110 ($\frac{1}{4}$ -hp, reversible, includes variable-speed foot switch, \$158); Dremel model 732 ($\frac{1}{4}$ hp, about \$200 for kit); Woodtek model 876-768 ($\frac{1}{4}$ -hp, includes variable-speed foot switch, \$130).

Popular Carving Bits

Once you've bought your power carver, you'll be faced with a selection of hundreds, even thousands, of burs, bits, blades, cutters, abrasive wheels, and other accessories



Photo A: "Structured" tungsten carbide burs remove a lot of stock quickly and cut in both directions. They come in silver (coarse, aggressive cut) and gold (medium, semismooth cut).

that you can use to alter wood. However, most professional carvers stick with four basic types of bits.

Carbide burs come in standard

and double-cut styles and in a wide variety of sizes, point configurations, and shank diameters, making them the most versatile of all cutters. Carvers like burs because they remove stock quickly and leave a smooth finish (*photo A*). Use the larger burs for fast stock removal, the finer ones for detailing. Most of these burs and cutters also come in vanadium steel, although steel burs don't last nearly as long as carbide. The single-cut burs (*photo B*) cut in one direction only.

Tungsten carbide (structured) burs, also called SSG or "kutzall" burs, have a fast, free-cutting action and work equally well operated in forward or reverse modes, with or against the grain. They're used primarily for fast stock removal when roughing out large shapes. Typically, they

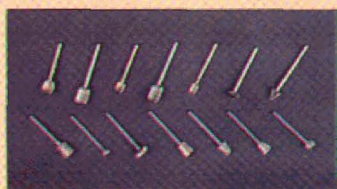


Photo B: Carbide cutters represent the mainstay of the power carver's arsenal. They cut quickly (in one direction only, however) and leave a smooth surface.

leave a rougher surface than directional carbide burs, but can be "dressed" on a diamond stone to produce a smoother finish or to custom-shape the cutting head. The coarse-grit silver burs shown provide the fastest cutting action; the medium-grit gold burs cut more slowly but leave a finer finish. These burs are virtually indestructible and can be used on hardwoods, porcelain, fiberglass, nonferrous metals, marble, and other hard materials. When they get clogged with wood, you simply burn out the material with a torch without harming the cutter.

Bird carvers favor ruby bits (*photo C*) for intricate detailing and contouring. These long-lasting bits leave an extremely smooth finish requiring little or no sanding. They work equally well in both directions. While some carvers use diamond

bits for this purpose, ruby bits have less tendency to clog; they also absorb and dissipate heat more readily, which helps prevent burning the workpiece. Aluminum oxide bits (*photo D*) produce the same velvet-smooth finish as ruby bits, but they cost a fraction as much and come in many more shapes and sizes. The smaller types make a much finer line than do ruby bits, and you can easily grind them into custom shapes. On

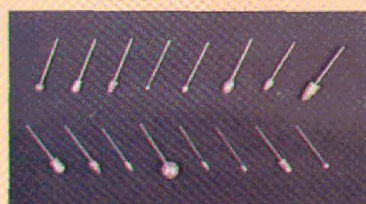


Photo C: Long-lasting ruby carving bits leave an exceptionally smooth finish, resist clogging, and cut in both directions. Use these for fine shaping and detail work.

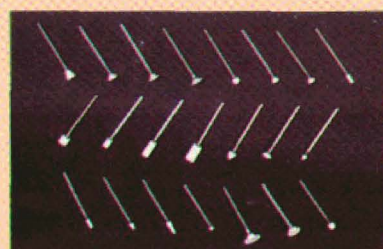


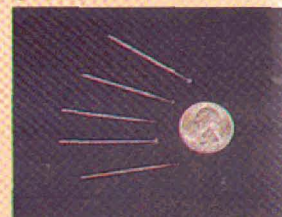
Photo D: Aluminum oxide bits come in a wide variety of shapes and sizes and can be ground into custom shapes. They're much cheaper than ruby bits but relatively short-lived.

the down side, aluminum oxide bits won't last nearly as long as ruby bits, so you'll need to replace them more frequently.

Engraving burs (*photo E*) come in vanadium steel or carbide. Use these for extremely fine texturing and detail work, such as adding the nostril holes in a bird's bill or applying minute feather textures. When buying any bur, bit, or cutter, pay attention to the manufacturer's maximum speed rating, and don't exceed it. Also, buy the highest quality bits you can afford, since they

will more likely be milled true and to exact shank sizes. Cheap bits often run slightly off-center, causing vibration, or the shafts aren't milled to precise diameters, allowing them to slip in the collet.

Photo E: Use engraving bits to carve minute details, such as separation lines between a bird's claw and foot or nostril holes in the bill. They come in vanadium steel and longer-lasting carbide.



offering seven different motors ($\frac{1}{8}$ to $\frac{1}{2}$ hp) and 22 different handpieces.

Motor options include bench-mounted or hanging models, some with reversible switches. On most, you can adjust the speed with an optional foot pedal or benchtop speed control. Several benchtop models have a speed-control dial built into the base. Reversible motors are especially handy for left-handed users (they direct dust away from the carver) or for achieving a symmetrical look in woods with difficult grain patterns. Some carvers prefer

the foot control because it enables them to change speeds while carving; others prefer the bench control so they can move freely around the carving table to attack large workpieces from different angles.

According to Mark Coleman at Foremost, most carvers prefer the $\frac{1}{2}$ -hp series S motor because it offers ample power for most carving tasks and accepts a variety of handpieces. Operating at speeds of up to 18,000 rpm, the series S comes in a hang-up model and two bench models, one of

which features a dial control in the base. A reversible version, designated SR, is also available. I prefer the hanging motor because it keeps the flexible shaft suspended above the work surface, which makes it less likely that you'll knock tools and other stuff off the table while carving. Coleman adds that the three most popular handpieces for carving are the no. 30, no. 44, and no. 8 (*photo 3*). The no. 30 has a Jacobs-style chuck that accepts up to $\frac{1}{2}$ " shanks. The no. 44 has a collet-style chuck that accepts seven collets ranging from $\frac{1}{16}$ "

to 1/4" in diameter. Bird carvers prefer the slim, pencil-style No. 8 handpiece for fine detail work. It features a retractable chuck guard, which slides down close to the bit for greater control, and accepts 1/8" to 1/4" collets plus a 3mm collet.

Foredom has put together a flex-shaft carving kit (no. 5240) that includes a hang-up model SR (reversible) motor, a no. 44 handpiece, a foot-operated speed-control switch, and 10 popular carving bits. I tried this kit in my review; at about \$260, it's an excellent choice for beginners. Add the no. 8 handpiece and a good selection of bits, and you've got a highly versatile carving system.

I also tried four other flex-shaft units: the Dremel model 332 Moto-Flex tool, the Dremel model 7360 heavy-duty flex-shaft kit, the AMT model 5111, and the Woodtek model 876-768. The Dremel Moto-Flex features a slightly larger version of the Moto-Tool connected to a pencil-style handpiece via a flexible shaft. The ball-bearing, variable-speed motor operates at 7,500 to 25,000 rpm and can be mounted on a swivel base or a wall hanger, both of which are included. A three-position switch enables you to operate the tool at full speed or in variable-speed mode by means of a dial on the back end of the

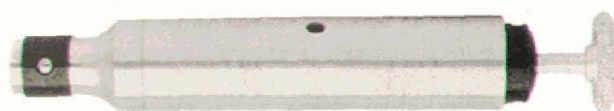


Photo 3: Foredom offers 22 different handpieces for their flex-shaft tools. Shown here are the most popular for carving: the no. 30 (top), the no. 44 (center); and the no. 8 (bottom). Photo courtesy Foredom Electric Co.

tool. With its 0.95-amp motor, it wasn't as gutsy as the other flex-shaft tools I tried (1.7 to 2 amps) but had plenty of power for small carving projects and detail work. In my tests, the Moto-Flex (about \$90) had a bit more torque than the Moto-Tools and was more comfortable to use, thanks to its thinner handpiece and lower vibration level. You can also buy a single-speed version (model 232, photo 4).

The Dremel heavy-duty flex-shaft tool (model 7360) sports a 1/2-hp, 2-amp motor and comes with a heavy-duty, collet-type handpiece that includes 1/4 and 1/2" collets. The kit form (about \$200) includes a variable-speed foot control, a bench-mounted hanger, extra cable and brushes, and a 27-piece, general-purpose accessory set.

The AMT and Woodtek machines feature nearly identical 1/4-hp, 2-amp motors, each offering a 15,000-rpm maximum speed. I suspect that both motors come from the same Taiwanese manufacturer. The AMT, however, features a hanging motor with a reversible

switch, while the Woodtek comes in a bench-mount style with forward speed only. The flexible shafts and variable-speed foot switches also appear to be identical. AMT provides a collet-style handpiece with three collets (1/8, 1/32, and 1/4"), whereas the Woodtek handpiece has a Jacobs-style chuck that accepts shafts up to 5/32".

While the Jacobs-style chuck makes bit-changing much easier and accepts an infinite range of shank diameters, it doesn't offer as much support for the bit. This causes more

vibration than collet systems produce. In addition, Jacobs chucks tend to loosen when the motor runs in reverse.

If you have read many tool articles, you've probably heard the old truisms about horse-power ratings versus amperage versus actual power. In the case of these tools, the AMT and Woodtek machines list the maximum developed horse-power of the motor at 1/4-hp (no-load speed), while Foredom assigns a more conservative 1/8-hp rating, taken under an arbitrary load condition. In my "bog-down" motor tests, the 1/8-hp, 2-amp Dremel heavy-duty flex-shaft tool provided a bit less torque than the 1/4-hp, 1.7-amp Foredom, although the Dremel operated at 22,000 rpm, as opposed to 18,000 rpm for the Foredom. Typically, as speed increases, torque decreases, given the same amperage draw. The Dremel theoretically has a more powerful motor than the Foredom, but the Dremel sacrifices torque in favor of a higher no-load speed. For the carver, this means that the Dremel performs better for light stock removal (the higher the speed, the cleaner the cut) while the Foredom will be less likely to bog down when making deep, heavy cuts with larger bits. At 16,000 rpm, the AMT and Woodtek 1/4-hp motors seemed to have only slightly more torque than the Foredom, despite their lower speeds and higher horsepower ratings.

While the AMT and Woodtek motors were a bit quieter than the Foredom and Dremel, I noticed more handpiece vibration on both of these two Taiwanese imports. Also, their foot



Photo 4: Dremel model 232 Moto-Flex tool comes with swivel base and hanger (single-speed version shown here, about \$90); the author tested the variable-speed model 332 (about \$100). Photo courtesy Dremel Co.

switch operation lacked the smoothness and precision of the latter two. Overall, the Foreman appeared to be a better-quality tool than the other three, but expect to pay a bit more for it.

Several companies offer flex-shaft attachments that fit an electric drill or drill press. While they're relatively inexpensive (between \$15 and \$30), these attachments aren't nearly as efficient or durable as the dedicated units discussed above. For one thing, few drills or drill presses develop enough speed to remove stock efficiently in this manner; the attached flex-shaft operates at between 800 and 6,000 rpm, generally considered too

slow for carving applications. For another, the drill must be secured to the benchtop, which can be cumbersome. Also, most portable drills typically aren't engineered to operate continuously in the ON position. If you do buy one of these flex-shaft units, make sure it has sealed ball bearings at each end of the shaft like the one shown (photo 5). This unit sells for \$29.95 through Woodcraft.

Reciprocating Carvers: A Different Approach

The purist will contend that power-carving with rotary tools isn't really carving wood but grinding it. For those of you who are used to using chisels and gouges in your work, you may find a reciprocating carver more to your liking. These tools produce the "hand carved" look of hand tools, but with a lot less effort. First introduced as the Automach by Sugino, a Japanese firm, these tools convert rotary motion into a reciprocating action. Automach makes three versions of this tool: two "motorized" units and one flex-shaft unit. The Handcraft Tool (model HCT-30, photo 6) has a miniature brush motor built into the handpiece, much like a Moto-Tool, and plugs directly into a



Photo 6: Automach HCT-030A reciprocating carver (at right) comes with five different cutters, wrench, and tool hanger (about \$290). Jacobs-style chuck attachment converts tool to a rotary carver. Automach flex-shaft attachment (at left) fits electric drills and drill presses with $\frac{1}{4}$ " or larger chuck capacity; it accepts rotary handpiece (bottom left). Photo courtesy Sugino Corp.

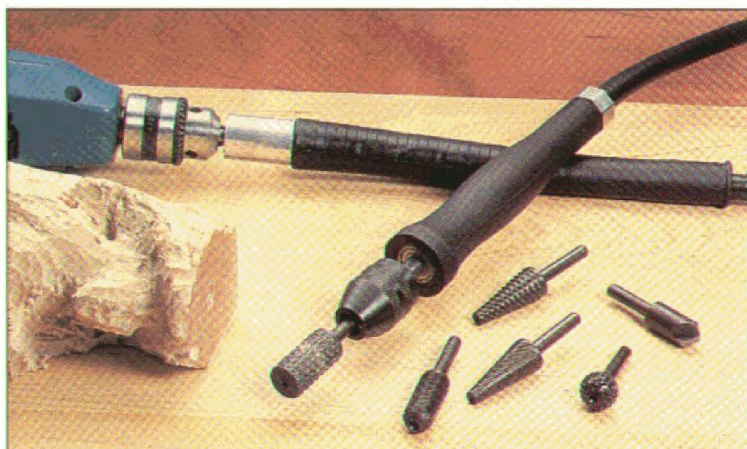


Photo 5: Flex-shaft attachment from Woodcraft fits drills and drill presses with $\frac{1}{4}$ " or larger chucks. It sells for about \$30. Photo courtesy Woodcraft.

110-volt outlet. A unique "floating ball" located ahead of the motor's reciprocal cam activates the cutter only by applying pressure to it. Otherwise, the cutter remains idle even with the tool switched on, which makes it exceptionally safe to

use. Even if you apply pressure to the blade with your fingertip, the blade won't cut you—unless you've honed the blade to a razor edge. But when you apply the blade to wood, it cuts like a hot knife through butter at 10,000 spm. I had no reservations about letting my 11-year-old daughter work with the tool (under parental supervision, of course).

During my tests, I found it difficult to bog down the blade, even when taking deep cuts. The Automach comes in a kit form (HCT-030A, about \$290), which includes the tool, five different cutters, wrench, and tool hanger. Optional features include over 20 different blades and a rotary-head attachment. The second version, a lighter-weight hobbyist's model (HHD-10), sells for about \$180.

Automach also makes a flex-shaft version, the WCS-100. The carver head operates in the same manner as the



Photo 7: Automach WCS-100 woodcarver kit consists of a reciprocating handpiece connected by a flexible shaft to a quiet induction motor, which is housed in a metal carrying case. The case provides storage for the handpiece, shaft, and various accessories (about \$435).

motorized unit described above, but is connected by a flexible shaft to a quiet induction motor housed in a metal carrying case (*photo 7*). The case also provides storage space for the tool and various accessories. In addition, you can buy an optional rotary-style handpiece for this unit. The WCS-100 provides slightly more torque than the motorized version but operates at a lower speed (6,000 spm). It also costs considerably more than the motorized version—about \$435 for the kit, which comes with five blades. Automach offers a wide selection of blades for this tool, along with an

optional rotary-style handpiece. You can also buy a flex-shaft/handpiece version that chucks into an electric drill.

Aside from the safety afforded by the reciprocating action, I liked the fact that these carvers produce chips or shavings, rather than raising clouds of sawdust as rotary carvers do. They remove stock fairly quickly but also can handle fine detailing. I found them quite easy to control, with only light pressure required to remove stock. To operate, you guide the blade and it pretty much cuts by itself. Although the reciprocating motion causes these tools to vibrate

a bit more than their rotary counterparts, they're still much kinder to your hands than a mallet and chisel.

AMT offers a reciprocating handpiece for its flex-shaft rotary tool at \$59.00, which includes a five-piece blade set. As with the Automach carvers, the tip on the AMT handpiece remains motionless until you apply it to the work. In our tests, the handpiece removed stock a bit less aggressively than the Automach tools, although it produced considerably more noise and slightly more vibration. Still, it proved effective for stock removal and also fit



Photo F: Like many other professional carvers, Bill Schnute relies on powerful air tools to speed work along. Bill specializes in high-relief wildlife carving.

While electric power carvers can handle a wide variety of carving tasks, many professional carvers have switched to air-powered tools. Why? I found out the answer when I visited a local carver, William J. (Bill) Schnute, owner of Oak Leaves Studio in Carmel, California (*photo F*). Although Bill was eager to help me evaluate the various electric tools featured in this article, I noticed a conspicuous lack of them in his studio. Instead, I spotted air hoses suspended from the ceiling above his worktables, a

Carving with Air: The Pro's Choice

half-dozen pneumatic die-grinder handpieces, and an array of neatly organized burs and cutters of various shapes and sizes. The hoses were attached to a system of rigid pipes fed by a 5-hp compressor, which was housed in a shed attached to the outside of the workshop.

Bill specializes in large wildlife subjects using a technique called high-relief carving, for which he's gained national acclaim. Over the years, he's written numerous articles on the subject and is currently updating his book, *High Relief Woodcarving*, for its third printing. Bill explains that his work requires the removal of large amounts of stock before the finish carving gets underway. Early in his career, he

used hand tools primarily along with Dremel Moto-Tools and occasionally a chainsaw. Now he, along with many other professional carvers, favors air-powered tools. "Projects that used to take several weeks with hand tools now take only a few days," he says.

Bill prefers air tools for several reasons. For one, most pneumatic grinders operate at nearly twice the speed and torque of their electric counterparts. Most of the larger handpieces operate at 25,000 to 30,000 rpm; the smaller ones

for detailing he usually operates at 60,000 rpm.

"At these speeds," Bill observes, "you don't have to be concerned with the grain—the wood just evaporates under the cutter, leaving a smooth finish." As he put the final touches to the fish carving shown in the photo, Bill added, "You get to where you want to be much faster, so your tools can keep up with your mind." With most bits, Bill finds that if he runs at less than 14,000 rpm, the tool tends to chatter, resulting in a rougher cut and possible damage to carbide bits.

Another reason Bill favors industrial-quality air tools is that they last longer and require less maintenance than electric tools, and because they're generally more durable and have fewer moving parts. The handpieces are smaller, they vibrate less, and they generally have better balance than those on most electric carvers, which enables Bill to keep the bit in the cut with a minimal amount of chattering.

Bill also likes the convenience of the paddle-type switches on air tools, which allow him to adjust the speed easily from the handpiece while carving. In addition, he can control the torque by adjusting the air pressure feeding the tool. (Bill buys his tools and carbide cutters from several industrial supply houses; see the source list for more information.)

CONTROLLING DUST

When carvers relied largely on hand tools for their work, waste wood fell to the floor in large chips and shavings, presenting no dust problems. Rotary tools, on the other hand, produce clouds of fine, airborne sawdust, which not only obscures the workpiece but also poses health risks. Standard safety procedures for power carving include the use of a respirator and either goggles or safety glasses.

Unfortunately, none of the tools I tested comes with a dust evacuation system. However, Woodcraft offers a portable dust-collection system that keeps your carving bench and workpiece virtually dust-free (*photo G*). This simple device consists of three fans, each driven by its own .35-amp induction motor, and all housed in a 6 x 10½ x 20½" plywood case. Folding



Photo G: Efficient dust control is a "must" for rotary power-carving. The Safe Air Dust Collection System keeps projects and bench dust-free while carving (\$179; replacement filters, \$6.50).

Plexiglas shields direct air from the work area through a replaceable filter, which, according to the manufacturer, traps over 90 percent of even the finest sawdust. When the filter gets clogged with dust, you simply remove it and tap out the dust over a garbage can. I found that it works well for smaller carving and sanding projects.

the Dremel, Foredom, and Woodtek flex-shaft tools. In our tests, the handpiece worked more efficiently on the higher-speed Dremel (22,000 rpm) than on the other machines (16,000 to 18,000 rpm).

Micro-Motor Tools

When it comes to fine detailing, you can't ask for much more precision and control than micro-motor tools offer. Unlike the heavier flex-shaft carvers, micro-motor tools have tiny, air-cooled DC motors housed in the handpiece, which is connected to a controller box via a thin, highly flexible electric cord.

The Gesswein Power Carver (about \$715) and the Foredom Micro Motor (\$845 from Foredom, less through woodworking catalogs) represent the high end (*photo 8*). Both units offer variable speed control and reversible motors. Speed control can be activated either from the controller or through a foot switch (standard on the Foredom, optional on the Gesswein). Each unit has electronic feedback circuitry that enables the tool to maintain constant speed under varying loads. Both also have thermal and motor-overload protection wired into the circuitry to prevent burning up the motor. The Gesswein control box has outlets for two handpieces, which enables you to switch

easily from one handpiece to another.

These micro-motors operate at extremely high speeds. The Gesswein runs at 5,000 to 55,000 rpm; Foredom offers two handpieces, one that operates at up to 45,000 rpm and a higher-torque version that winds up to 35,000 rpm.

Of all the carvers we tested for this article, these two impressed us the most.

The slim, comfortable handpieces produced virtually no vibration throughout their entire speed range—when we cranked up the motors to their maximum rpm and placed the handpieces on the bench, they lay there virtually motionless. Both units also have a remarkable amount of torque for their size, much more than the Moto-Tools we tested. The thin, six-foot telephone-style cords make the handpieces exceptionally maneuverable, although the cords do tend to knock things off a cluttered benchtop. The handpieces come with a quick-change collet system that enables you to change bits instantly by twisting the handpiece a quarter-turn (no wrenches needed). Each tool comes with ⅛ and ⅜" collets and an extra set of motor brushes. Gesswein offers a variety of other handpiece styles, which also fit the Foredom. In fact, the handpieces that come with these tools look virtually identical.

Considering the hefty prices of these precision continuous-duty tools, they're not for everybody. You're most likely to see these units in the studios of professional bird carvers, because nothing else compares to them for fine detail work. If your budget won't tolerate the Gesswein or Foredom models, but you still want the advantages of a detailing

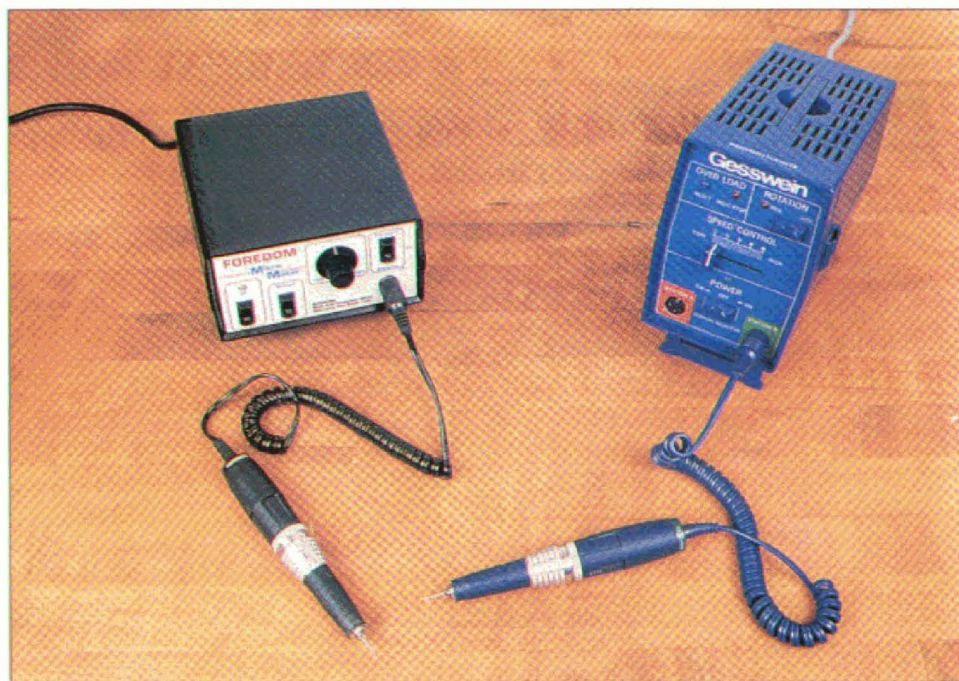


Photo 8: Foredom Micro-Motor model MH-145 (left) operates at speeds of up to 45,000 rpm (about \$825 from manufacturer, less through some woodworking catalogs). Gesswein Power Carver (right) comes equipped with Z-55X handpiece, which tops out at 55,000 rpm. Handpieces can be interchanged between these two machines; both manufacturers offer optional handpieces.



Photo 9: Ultima carver/woodburner combo (left) switches easily from "grind" to "burn" mode in seconds (\$329); Optima 2 Power Carver (right) offers variable speed of 2,000 to 24,000 rpm (\$275). Both are available through Woodcraft.

tool, consider the Optima 2 Power Carver (\$275) or the Ultima Power Carver/Woodburner (\$329), both available from Woodcraft (photo 9). (See the source list that accompanies this article.) The Optima might be called a simplified version of the Gesswein and Foredom units, with electronic variable speed (2,000 to 24,000 rpm) and a reversible motor operated from the control box. The motorized handpiece comes with $\frac{1}{8}$ and $\frac{3}{32}$ " collets. The Ultima unit offers both a forward/reverse micro-motor rotary carver (2,000 to 24,000 rpm) and a wood-burner handpiece with variable heat control. Both handpieces can be plugged into the controller at one time and may be operated by flicking a toggle switch from "burn" mode to "grind" mode. The delicate detailing tip on the pencil-thin burner heats up in about 2 seconds, ready to provide pyrographic detail to your carvings. Woodcraft offers six optional wood-burning points for the tool.

Compared to the Gesswein and Foredom tools, these units had very little torque, making them somewhat underpowered for all but fine detail work and small carving chores. They pack about the same punch as the Dremel Moto-Tools discussed earlier. However, we do like the feel and maneuverability of the handpieces, in spite of some minor vibration in them. **WVJ**

SOURCES

AMT

Fourth Ave & Spring St.
P.O. box 70
Royersford, PA 19468
(215) 948-3800

Automach

Sugino USA Inc.
1700 N. Penny Lane
Schaumburg, IL 60173
(708) 397-9401

Dremel

4915 21st St
Racine, WI 53406-9989
(414) 554-1390

*Widely available through woodworking catalogs and retail outlets

Foredom Electric Company

16 Stony Hill Road
Bethel, CT 06801
(203) 792-8622

Gesswein

255 Hancock Ave.
Bridgeport, CT 06605
(800) 243-4466 (east of Rockies)
(800) 232-2311 (west of Rockies)

Optima 2 Power Carver

Woodcraft
210 Wood County Industrial Park
P.O. Box 1686
Parkersburg, WV 26102-1686
(800) 535-4482

Ultima Power Carver/Woodburner

See Woodcraft, above

Safe Air Dust Collection System

See Woodcraft above.

Woodtek Woodworker's Supply

1108 North Glenn Road
Casper, WY 82601
(800) 645-9292

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(except where noted)

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November/December 1994

'37 Pontiac "Deuce" Coupe



Searching high and low for the ultimate Christmas gift for that special grandchild? Our classic '37 Pontiac will be one present you won't need to wrap. Just nestle it in under the branches with a big red bow attached, and you'll make somebody's holiday unforgettable.

This classic '37 was built for us by Stephen Sutton. Stephen lists the car as a reproduction of a 1937 Pontiac, but we felt it had enough *chutzpah* to merit the "deuce coupe" appellation. Although it may not be obvious from the photo, you'll find it no matchbox-sized toy. Measuring almost 15" from bumper to bumper, this boulevard cruiser looks almost big enough to ride on. But don't let that worry you. Its sturdy construction will stand up to a lot of punishment.

This represents our second classic car offering from Stephen and his successful company, Knothole Toys. Our first, the Woody Wagon (May/June 1994), proved such a hit with readers that many have told us they wouldn't mind seeing a Sutton project in every issue. We don't want to squeeze Stephen quite that hard, but we do promise to keep the classic cars coming on a regular basis.

Parts From Your Scrap Box

Too many woodworking projects require us to dig into our wallets to buy the stock. But with toys like this, comprised mainly of small pieces, we don't need to look any farther than our scrap box.

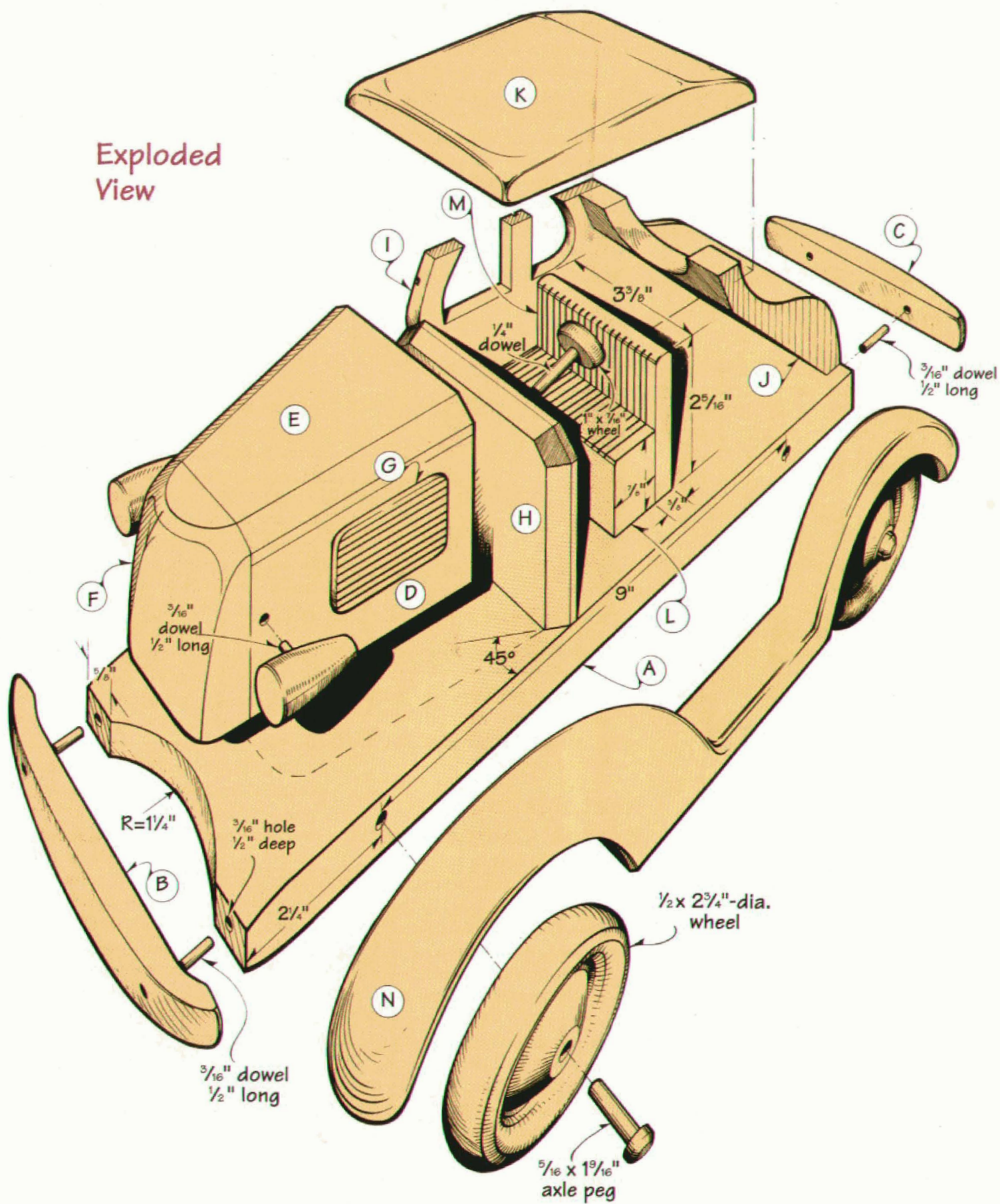
A few small pieces of walnut, and a mixture of red and white oak for contrast, will suffice. Of course, other combinations would work just fine too.

We know that toy making can be frustrating, especially if you have to search about for the right wheels and accessories. For every Knothole toy we present, Knothole offers a kit that includes all of the unusual parts you'll need to build the piece exactly as shown in the photo. (To order, see the Kit Source at the end of the article.)

A System That Works

A toy like the Deuce Coupe, although complex at first glance, can actually be easy to make, once you divide the con-

Exploded View



Bill Of Materials

PART	T	W	L	MAT.	No.
CHASSIS					
A	$\frac{7}{8}$ "	$3\frac{3}{8}$ "	16"	RO	1
B	$\frac{1}{2}$ "	$\frac{3}{4}$ "	5"	WO	1
C	$\frac{3}{8}$ "	$\frac{3}{4}$ "	$4\frac{7}{8}$ "	WO	1
ENGINE COMPARTMENT					
D	$\frac{3}{4}$ "	2"	4"	W	2
E	$\frac{1}{2}$ "	$3\frac{3}{8}$ "	4"	RO	1
F	$\frac{7}{8}$ "	$3\frac{3}{8}$ "	$2\frac{1}{2}$ "	RO	1
G	$\frac{1}{8}$ "	$1\frac{1}{4}$ "	$2\frac{1}{2}$ "	WO	2
BODY					
H	$\frac{1}{2}$ "	$2\frac{3}{4}$ "	$3\frac{3}{4}$ "	WO	1
I	$\frac{1}{4}$ "	$3\frac{1}{2}$ "	10"	W	2
J	$1\frac{1}{4}$ "	$3\frac{3}{8}$ "	6"	RO	1
K	$\frac{3}{4}$ "	$3\frac{3}{8}$ "	$5\frac{1}{2}$ "	WO	1
SEAT AND FENDERS					
L	$\frac{7}{8}$ "	1"	$3\frac{3}{8}$ "	WO	1
M	$\frac{3}{8}$ "	$2\frac{15}{16}$ "	$3\frac{3}{8}$ "	WO	1
N	$\frac{3}{4}$ "	3"	14"	WO	2

*Parts cut to final size during construction.

Materials list: RO—red oak; WO—white oak; W—walnut

Supplies: 2— $2\frac{3}{4}$ x $\frac{1}{2}$ "-thick wheels with $\frac{1}{8}$ " hole, 1—1" x $\frac{1}{8}$ "-thick wheel with $\frac{1}{4}$ " hole, 4— $\frac{1}{8}$ x $1\frac{1}{8}$ " axle pegs, $\frac{1}{8}$ " dowel, $\frac{1}{16}$ " dowel

struction into subassemblies. For this project, we'll make the chassis first, then the engine compartment, the body, and finally, the fenders.

Start With the Chassis

Step 1: For the chassis (A), cut a piece of $\frac{7}{8}$ "-thick red oak to $3\frac{3}{8}$ x 16". (You'll cut the chassis to final length later, when you shape the back end.) Next, lay out a $1\frac{1}{4}$ " radius on the front end of the chassis, as shown on the Exploded View drawing. (Note: We found that a $3\frac{1}{2}$ "-diameter tin can made a handy template for marking this radius.) Simply place marks $\frac{5}{8}$ " in from both edges, position the can so the edges strike these marks, trace the can's outline, and bandsaw the arc. Then, sand a gentle taper on the top and bottom edges of the cut, as shown in the Side View drawing.

Step 2: To make the bumpers, rip and crosscut a $\frac{1}{2}$ x $\frac{3}{4}$ x 12" white oak strip. Transfer the full-sized front and rear bumper patterns (B, C) found on page 78 onto the piece. Then,

bandsaw and sand the two bumpers to shape. Locate and drill the $\frac{3}{16}$ " holes through the bumpers, but don't mount them just yet.

Next, Make the Engine Compartment

Step 1: Cut the two walnut sides (D), the red oak hood (E), and the white oak grill (F) to the sizes listed in the Bill of Materials. (Note: The sizes listed are the starting sizes of these pieces, not their final dimensions after shaping.) Glue the four pieces together to form the block shown in the Step 1 drawing on page 30.

Step 2: Draw a $1\frac{1}{4}$ " radius on the hood top. (See the Step 2 drawing on page 30 for dimensions.) Next, measure in $\frac{5}{8}$ " from each side to establish the hood width. Draw lines from these two points back to the respective corners to mark the side tapers on the engine compartment. Between these points, mark guideline $\frac{1}{8}$ " apart for the vertical grill cuts.

Step 3: Place the engine compartment on the bandsaw table, and as shown

on the Step 2 drawing, make the vertical saw cuts into the grill, centering these cuts on the $\frac{1}{8}$ " lines you just drew. Make the cuts square to the front of the piece, and continue them up to the arc line on the top as shown. Then, lay out and drill a $\frac{3}{16}$ " hole 1" deep into both sides where dimensioned on the same drawing. Now, using your bandsaw, cut the engine compartment to shape, sawing on the outside of the taper lines. Finish by sanding to the lines.

Step 4: Cut a $\frac{1}{2}$ " chamfer along the top edges of the tapered engine compartment you just cut. (See the Step 3 drawing.) Then, sand the grill to blend it with the hood chamfers. The photos and illustrations will give you a good idea of how the grill should look, but don't be too concerned if yours doesn't match ours exactly. You can make fairly substantial changes from the plans and still end up with a great-looking finished piece. Finish-sand all surfaces.

Step 5: Make two white oak louvers (G) and two headlights, and attach them to the engine compartment where shown. Don't attempt to handhold the louver pieces while you cut the kerfs. After cutting the blanks to rough size, we recommend that you adhere them temporarily to a scrap block before sawing the $\frac{1}{16}$ "-deep kerfs $\frac{1}{8}$ " apart. (We used double-faced carpet tape.) Glue the louvers to the sides where dimensioned on the Side View drawing.

Step 6: To make the headlights, crosscut a $2\frac{3}{4}$ " length of $\frac{5}{8}$ " dowel. Locate and drill a $\frac{3}{16}$ " hole $\frac{1}{4}$ " deep 1" in from each end. Next, using the full-sized Headlight pattern on page 78 as a guide, sand both ends to shape, and then crosscut the dowel in half to yield two headlights.

Step 7: Crosscut six $\frac{1}{2}$ " lengths from a $\frac{3}{16}$ " dowel, and use two of them to attach the headlights to the engine compartment as shown on the Exploded View drawing. Set the remaining short dowels aside for use in attaching the bumpers later.

The Body Comes Next

The car's body consists of five parts: the firewall (H), the two side panels (I), the back (J), and the roof (K). Here you'll cut these parts, attach them to the chassis, and then cut the coupe's back profile. (Note: As with the chassis, we initially oversized the side panels, back, and roof pieces.)

Step 1: Start by cutting the firewall (H) to size from $\frac{1}{2}$ "-thick white oak. Using dimensions on the Firewall drawing, cut the two top corners at 45° . Center the front face of the firewall against the back of the hood, and mark the hood profile on the firewall. Next, bevel the edges of the firewall from these lines as dimensioned on the same drawing. Locate and drill the 40° -down-angled $\frac{3}{16}$ " hole for the steering column. Then, cut a $1\frac{1}{2}$ " length of $\frac{3}{16}$ " dowel for the steering column, and glue the steering wheel (a 1"-diameter, $\frac{1}{2}$ "-thick

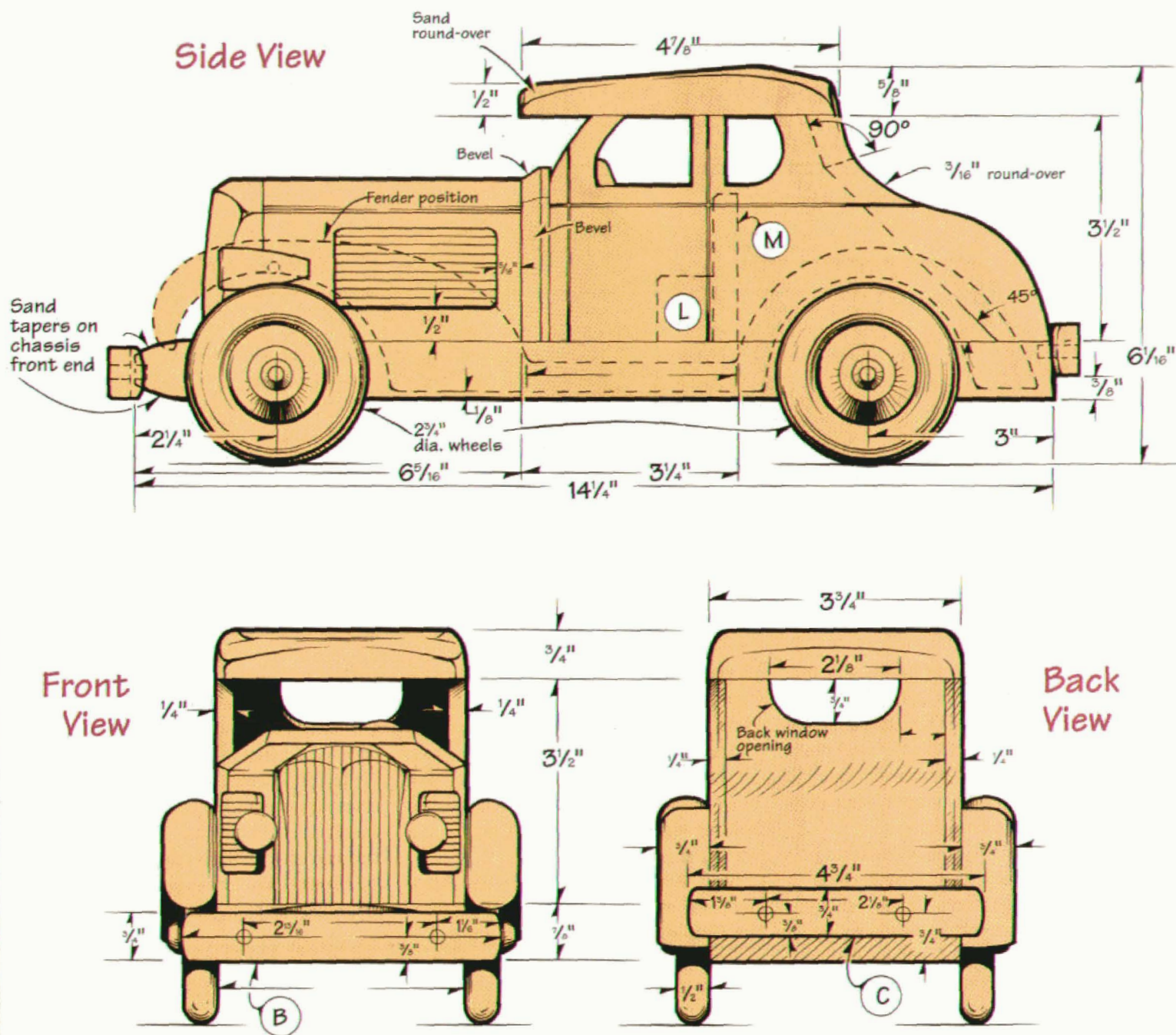
wheel) to the column. Finally, glue the steering column into the firewall hole.

Step 2: To make the side panels (I), rip and crosscut two $\frac{1}{4}$ "-thick pieces of walnut to $3\frac{1}{2} \times 10$ ". Stack the two pieces together using double-faced tape. Using the full-sized Side pattern, transfer the window outlines onto the top piece. Cut out the window openings. Now, separate the side panels, then mark and cut the $\frac{1}{16}$ "-deep bandsaw kerfs into the outside faces of both.

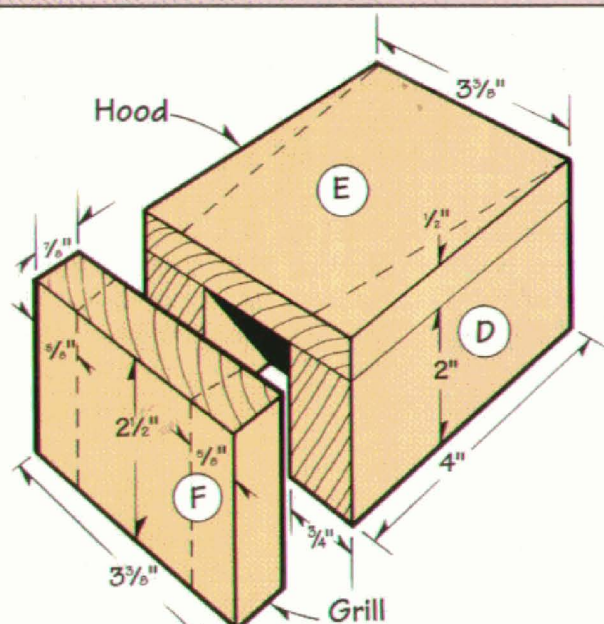
Step 3: To shape the back (J), first rip a piece of $1\frac{1}{4}$ "-thick red oak to $3\frac{3}{8} \times 6$ ".

Next, cut a 45° miter along the bottom end of the piece. Hold the back in place against one of the side panels to mark it for the top cut that establishes the back's length.

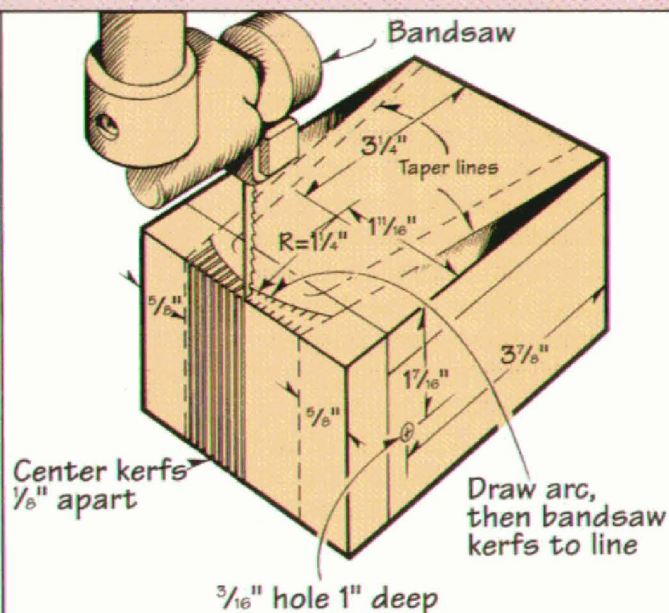
Step 4: Trim off the inside of the back piece where suggested by the dashed line on the Side View drawing to create a flat surface. Next, lay out the back window using the dimensions on the Back View drawing. With the back resting on its flat surface, cut out the back window as shown in figure 1. If you don't feel comfortable handholding this piece for band-



Assembling and shaping the engine compartment

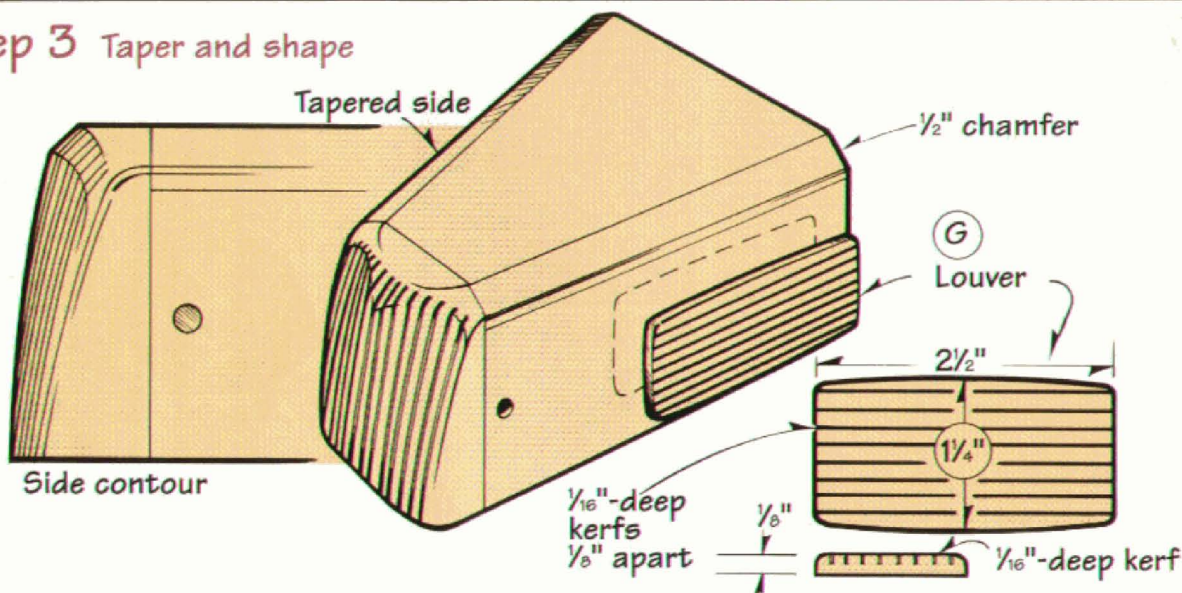


Step 1 Glue up and lay out



Step 2 Bandsaw the grill

Step 3 Taper and shape



sawing, clamp it in your bench vise and use a coping saw to cut out the window.

Step 5: For the roof (K), cut a piece of 3/4"-thick white oak to 3 1/4" x 5 1/2", but don't shape it just yet. You'll actually shape it and the car body's back later, after joining the body and chassis.

Step 6: Make the seat, consisting of a white oak bench (L) and back (M). To "texture" the surfaces, make shallow bandsaw kerfs across the bench and back as shown in the Exploded View drawing. Glue the seat parts together and set them aside to dry.

Step 7: Using dimensions shown on the Side View drawing, position, glue, and clamp the assembled seat to the

chassis. Next, glue the firewall, side panels, back, and roof to the chassis. Note: Position the outside or front face of the firewall 6 1/4" back from the chassis front. (We've found masking tape more convenient to use than clamps for holding together a number of small parts while the glue dries.)

Step 8: Once the glue has dried, trace the roof and back profiles from the full-sized Side pattern onto the assembly. Next, bandsaw the roof and back to shape. (See figure 2.) Note: A single cut establishes the "S" profile on the back, sides, and chassis. Sand the cut surfaces smooth (we used a 2"-diameter drum sander), then using a 3/16"-

radius round-over bit in your table-mounted router, round the edges of the top and back. Now, finish-sand all exposed surfaces.

Step 9: To complete the chassis/body assembly, glue the engine compartment to the chassis and firewall. If the end of the steering column dowel protrudes through the front, trim the excess flush before mounting the engine compartment.

You're Ready to Form the Fenders

Step 1: For the fenders (N), first rip and crosscut two 3x14" pieces from 3/4"-thick white oak. Make photocopies of our full-sized Fender patterns shown on page 78.

Figure 1: Cutting out the back window

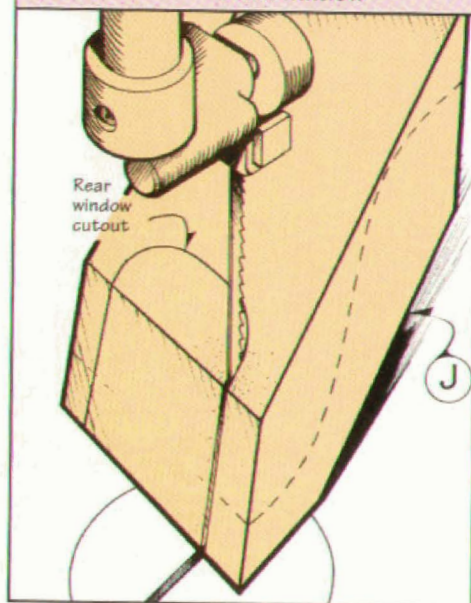
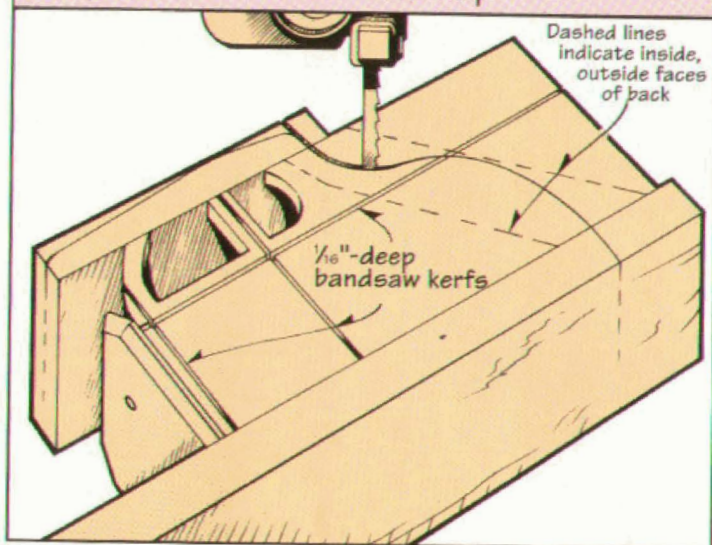
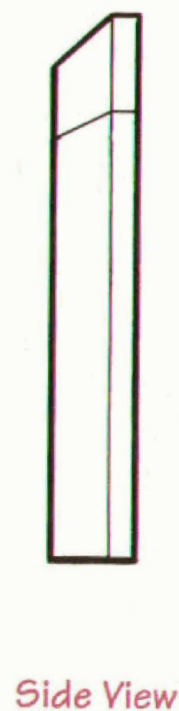
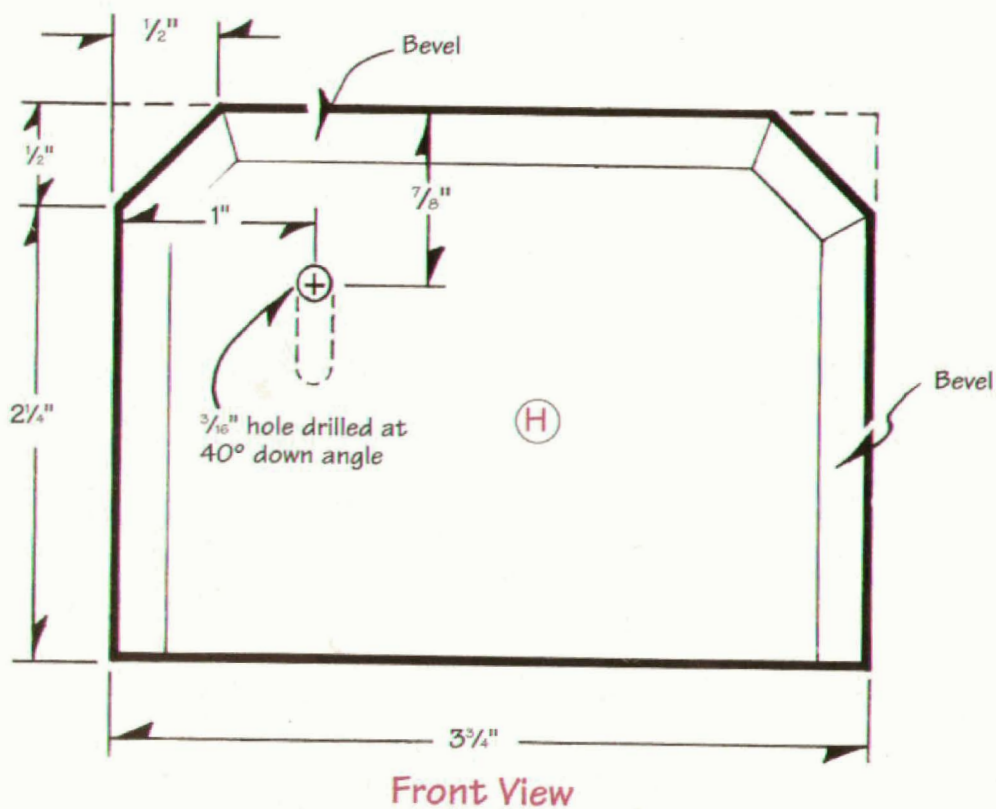
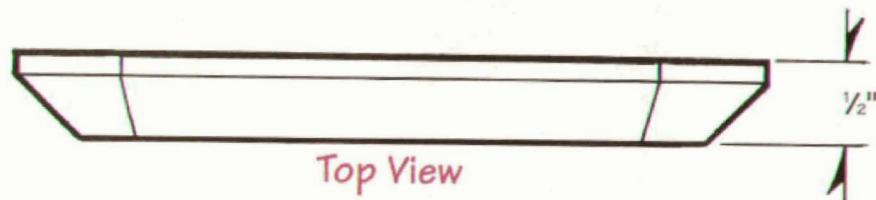
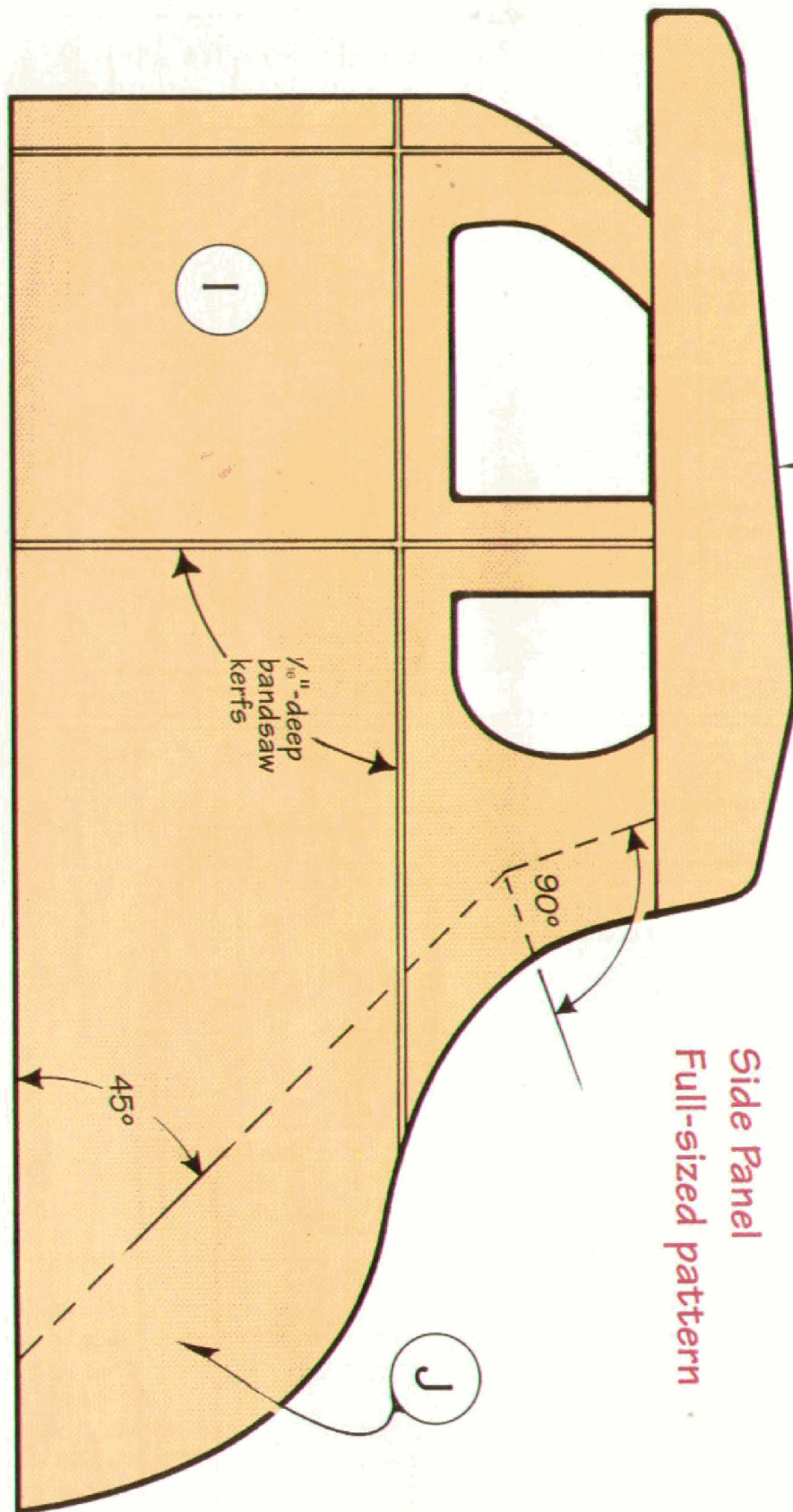


Figure 2: Bandsawing the roof and back to shape



Firewall





Side Panel
Full-sized pattern

then cut them out and tape them together to make a complete pattern. Note: The length of the running board between the fenders measures $3\frac{1}{4}$ ".

Step 2: Using double-faced tape, stack the two fender blanks face to face, and trace the fender pattern outline onto the top piece. Then, bandsaw both pieces to shape. Separate the fenders, remove

the tape, and using a file or sandpaper, shape them to approximate the look of the fenders on the coupe in the photo.

Now, Add the Final Details

Step 1: Using the dimensions on the Side View drawing, lay out the center-

points for the axle holes in the chassis edges. However, before you drill these $\frac{5}{16}$ " holes, temporarily hold the fenders and wheels in position, and make certain the wheels center in the wheel wells. Adjust the hole locations if necessary, and then drill them.

Step 2: Mount the wheels, then glue and clamp the fenders and the bumpers to the chassis. When gluing the fenders in place, note that we positioned the bottom edge $\frac{1}{8}$ " above the bottom edge of the chassis.

Step 3: To attach the bumpers, hold them in position and drill through the existing bumper holes and into the chassis. Now, attach the bumpers using the short lengths of $\frac{3}{16}$ " dowel you cut earlier.

Finishing— Your Last Step

Stephen recommends using a natural nut oil, such as Preserve, for wooden toys. If you can't find Preserve locally, you can order it from Woodcraft (800/225-1153) or Meisel Hardware Specialties (800/441-9870).

Patterns continued on page 78

KIT SOURCE

A kit consisting of four wheels, a steering wheel, a steering column, four axle pegs, a pair of headlights, and a length of $\frac{3}{16}$ " dowel stock sufficient to yield six pins may be ordered from:

Knothole Toys
RD4, Box 550
Eggleston Hill Rd.
Cooperstown, NY 13326

Specify '37 Pontiac Parts Kit. Price: \$9.95 per kit ppd. Check or money order only. Please note that the kit contains only the parts listed, not the wood for the other parts.

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Cutting “Through” Dovetails

A distinctive joint
for a simple but versatile table

by Roger Holmes



Of all the joints used by woodworkers, dovetails enjoy a special status. A marvel of low-tech engineering, the joint is unsurpassed in its combination of simple elegance, durability, and strength (*figure 1*). And, in a through dovetail at least, all of these qualities are on full display—what you see is what you get. Because they offer few places to hide sloppy work, dovetails have come to stand for fine craftsmanship as well as quality construction.

Woodworkers interested in hand-tool techniques consider cutting dovetails something of a rite of passage. I remember my first attempt vividly. The assembled dovetails presented a sorry sight—like an unkempt hedge, they were prickly with slivers of wood I had wedged into the numerous gaps to cover my imprecise sawing. The experience was sobering but not defeating. With practice, my dovetailing improved.

Some of my initial difficulties resulted from attempting to run before I could walk—my first projects were too complicated. The simple table design presented here will provide you the opportunity for a smoother start (*figure 2*). Each leg attaches with just two through

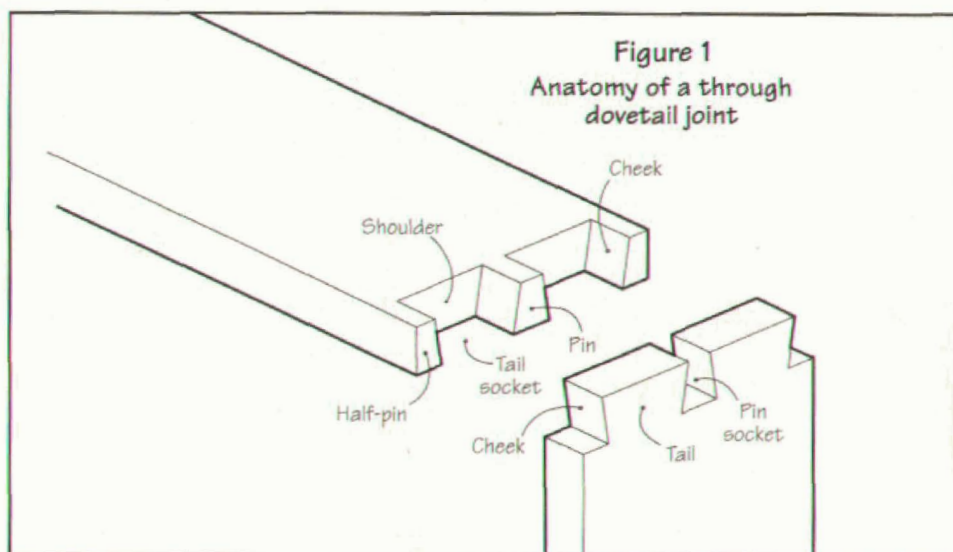
dovetails. The four joints stand independent of one another, and there are no carcasses or drawers to square, no rails, dividers, or other constructions to distract you. You can concentrate on the basics of the technique—laying out, cutting, and fitting the dovetails.

While not likely to win prizes for innovation, this design has proved versatile. By varying the size and proportions of the legs and top, and adding a stretcher or two when necessary, you can make end tables, nesting tables, low coffee tables, tall hall tables, serving tables, even dining tables. The broad surfaces will show off handsomely grained wood or lend themselves equally well to paint. Also, you can easily modify the design by gently curving the edges or ends of the table, tapering the legs, or embellishing the surfaces with carving or stencils.

The table shown in this article serves as a desk for my eight-year-old daughter. She's outgrown a smaller version (22 x 48 x 24" high, made from 1 1/8" stock), which was handed down from an older brother and now goes to our third child. Made of pine, with no stretchers to reinforce the joints, that table has withstood four years of daily use. While the dovetails prove surprisingly strong, I think it prudent to reinforce them with stretchers for taller tables (there's more leverage at work on the legs) and for larger tables, such as dining tables, that are likely to receive hard use. If you're just starting out and are looking for a project of manageable size, I've included a simple coffee-table design (figure 3) along with the drawing of the larger child's desk.

Preparing the Wood

I used poplar for this table, a relatively inexpensive wood that I found durable and easy to work. While it isn't particularly handsome, it takes paint well. Children's furniture in our house, though it may not start out that way, often acquires a coat of paint after awhile. I suggest you start with a similar type of wood—durable, dense without being too hard, and inexpensive. Pine, poplar, and soft maple all fit the bill. You may be tempted to try your luck with some lovely walnut, cherry, or oak. But if you've never made dovetails, chances are you'll see room for



improvement in the finished project. There's something to be said for gaining skill and confidence with easily workable materials that don't cost an arm and a leg.

For strength and appearance I use thick stock, from 1 to 1 1/2", depending

on the size of the table (and what I can get out of the material I have). Thicker parts provide more gluing surface and therefore more strength in the dovetails. Thicker stock also adds heft to the front view, where all you see are the edges of the top and legs. In large tables such as

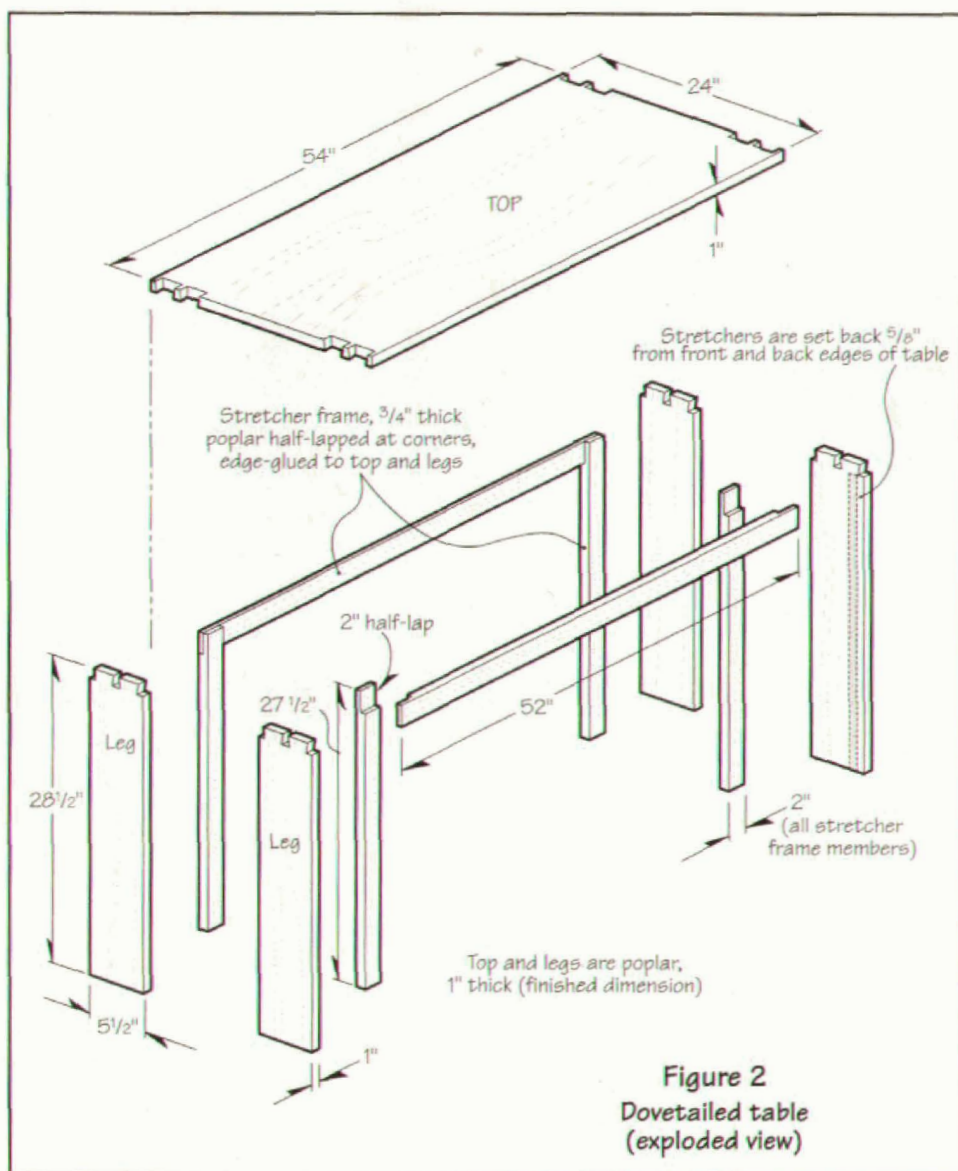
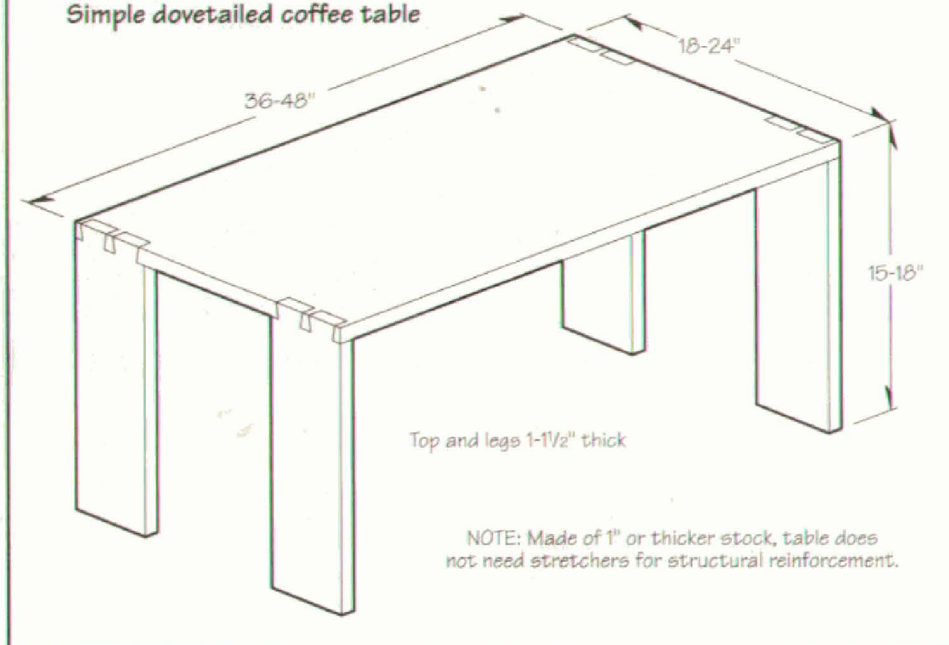


Figure 3
Simple dovetailed coffee table



this, stretchers provide additional strength as well as visual bulk. Although the two stretchers that connect the legs beneath the top would suffice for strength, I've extended them down the legs as well for visual balance.

Stock preparation is important for all woodworking projects, but particularly

so for those involving dovetails. You'll have a much harder time laying out, cutting, and assembling the joints with parts twisted or out of square. Fortunately, this table doesn't have many parts, so it doesn't take much time to ensure that faces are flat and edges and ends are straight and square



Photo A: Scribe the shoulder line for the tails around the end of each leg.

Figure 4
Sharpening a
chisel-point
marking gauge

File two faces on the hardened steel pin to form a chisel-like edge. Angling the edge in the direction of the tool's movement makes it easier to use.



Scribe in
this direction

This edge needs to be
pointed like a knife

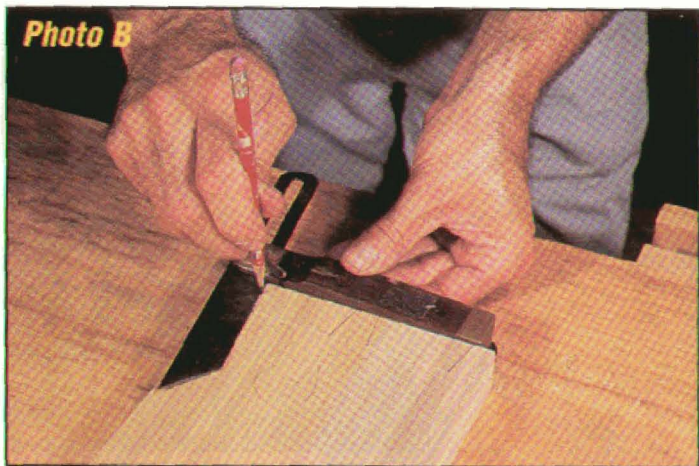
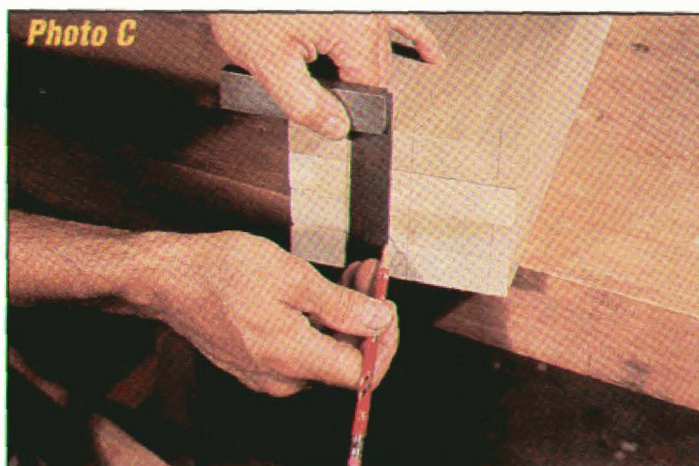
to the faces. Successful dovetails depend particularly upon the squareness of the member ends. I use a framing square to check the squareness of end to edge—the long blade compensates for any slight concavity along the length of the edge. An accurate engineer's square serves for checking the end against the face; a sharp hand plane makes adjustments as necessary.

Laying Out the Tails

The strength and beauty of a dovetail joint reside in the fit of its two parts—the wedge-shaped tails and pins must fit snugly together. To achieve a close fit, I lay out one member using the other as a template. For this table, I laid out and cut the tails on the legs first. Then, after cutting the tails, I used them to scribe the pins onto the ends of the tabletop using a sharp knife.

To lay out the tails, first scribe a shoulder line around the end of each leg. I use a marking gauge, set to slightly more than the thickness of the top (*photo A*). (I find it more convenient to plane off protruding tails than to plane the tabletop flush to recessed ones.) For me, a chisel-point gauge, sharpened as shown (*figure 4*), makes a cleaner line than one sharpened to a pinpoint. A fine, sharp knife, such as an X-acto, would also work. Scribe all around the leg—both faces and edges—making a light but clearly visible line. The deeper the marks, the more shavings you'll have to take after assembly to remove them, although some woodworkers opt to keep the scribe marks as a decorative feature.

Next come the tails themselves. You can figure out the number, pitch (the angle of the wedge), and spacing full-size on a sheet of paper, or do it directly on the first leg. (*Figure 5* shows the layout I used for the legs.) For tables like this, I prefer tails with a pitch of about 1 in 6, which is a bit steeper and more noticeable than the 1 in 8 pitch commonly used for drawer dovetails (*figure 6*). I also like tails that are considerably wider than the pins. I set a sliding bevel to the pitch using the method shown in *figure 6*, which I usually just pencil right onto the front edge of my bench. The drawing also shows the spacing of the tails and pins. Note that I make the half-pins at each edge of the leg slightly wider than half the

Photo B**Photo C**

Photos B and C: Mark the tails with a pencil and sliding bevel, then extend the lines across the end grain with a square. Stacking the legs and marking them all at once saves time.

width of a full pin; half-pins on the edge of the table may split if you make them too thin.

Once I've marked the centerline for the full pin, I measure from it to establish the pin's maximum width—it's handy when you're cleaning up the pin socket later to have this width slightly greater than that of a bevel-edge chisel in your set. From these marks, draw the tails with a pencil against the sliding bevel as shown (*photos B and C*). Next, square the lines across the end of the leg, and extend them down the other face with the bevel. (Experienced dovetailers often omit transferring the lines to the second face; some really proficient craftsmen cut tails with no layout lines at all!)

Rather than laying out each leg as described above, you'll probably find it easier to use the first as a template for

the rest. Mate two or more legs together, aligning the ends and edges, and extend the lines across the end grain. Then, draw the tails on the faces of each leg using the sliding bevel. You might want to darken the waste portions (the pin sockets) with a pencil to help you remember on which side of the layout lines to saw.

Cutting the Tails

You'll need a sharp backsaw to cut the tails, a coping saw to remove the waste from the pin sockets, and a chisel to clean up the shoulders of the pin sockets. Most backsaws come sharpened with pointed, crosscut teeth, but since dovetail cuts all run more or less with the grain, I have the teeth reground straight across, as for a rip saw. A saw with 12 teeth per inch (13 points per inch) works well for dovetails of this size. I find that saws with uniformly cut and set teeth are easier to control and also make the smoothest cuts. It's worth the effort to shop around for a reliable saw sharpener if, like me, you

don't have the skill, patience, or eyesight to do the job yourself.

The key to good dovetailing is developing your skill with the backsaw. Master the deceptively simple task of

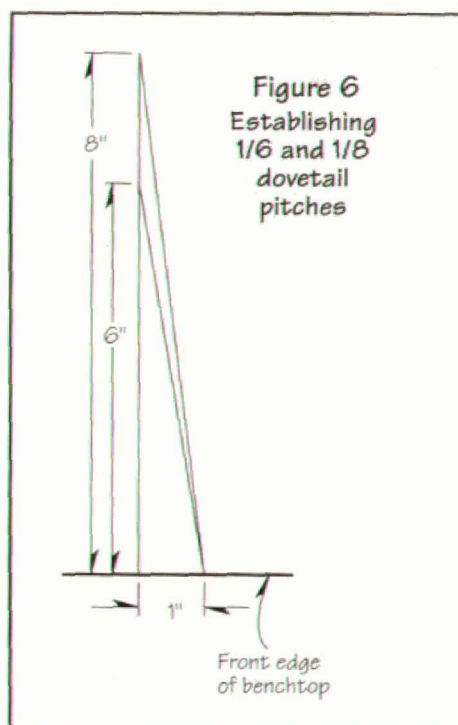
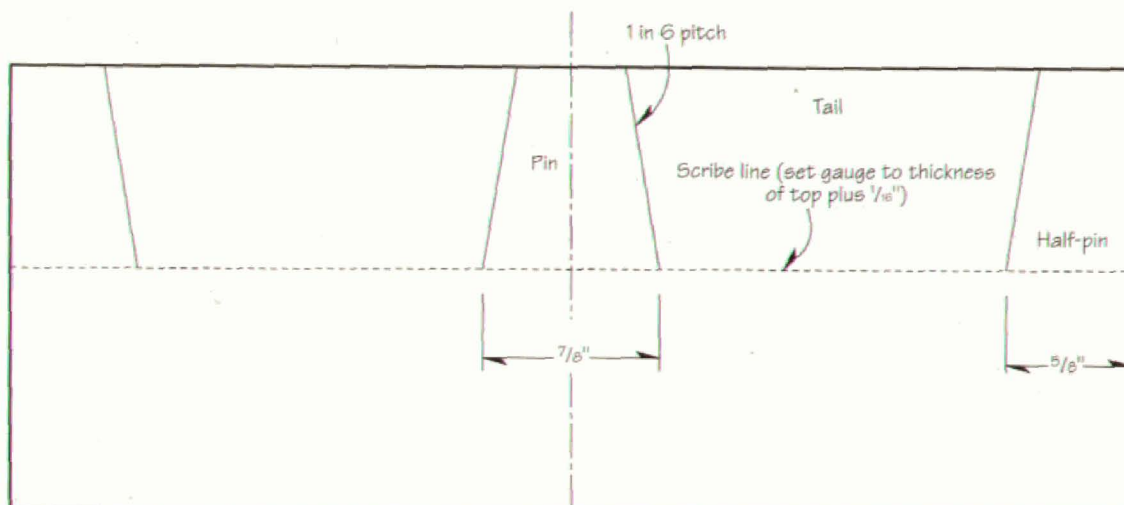
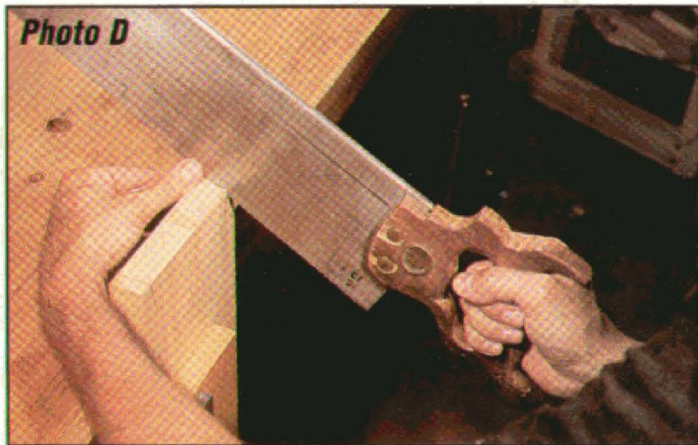


Figure 6
Establishing
1/6 and 1/8
dovetail
itches

Figure 5
Full-sized dovetail
layout for leg





Photos D and E: To cut a tail, start the saw at an angle, then lower it gradually to horizontal, making adjustments to keep it on line. Saw down to the gauged scribe line.



cutting unerringly along a straight line, and you're home free. The task of cutting the tails is complicated by having to keep the saw perpendicular to the face of the board while you follow the angled outline of the tail. That's why you pencil the lines across the end grain. Some workers tilt the board in the vise to enable them to saw straight up and down. I prefer to tilt the saw and make all the cuts at one angle, then tilt it the other way for the cuts at the second angle.

Whether you tilt the saw or the board, start the cut at an angle to the arris (the intersection of the end and face), then drop the blade gradually until it is horizontal (*photos D and E*). This allows you to make incremental adjustments as the cut proceeds along the end-grain layout line. (I cut right up to the line but don't remove it.) Once you've turned the blade to horizontal, the groove serves as a guide to keep the saw on line, although tiny adjustments may still be required until you reach the gauged scribe line. Once you get the hang of it, it will take less time to make the cut than to read my description of it.

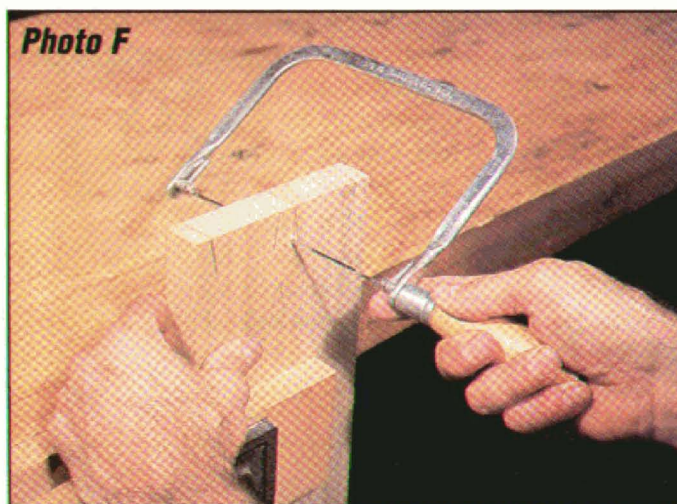
With all the angle cuts made, clear the waste from the full-pin sockets with a coping saw (*photos F and G*). I cut quickly and well away from the gauged scribe line—a sharp chisel makes a far neater job of the shoulders than a coping saw. Reposition the leg horizontally in the vise to cut the shoulders of the half pins on each edge. Here, I try to cut the scribed line in half—the fibers will break free where the chisel-point gauge has severed them. These cuts require even

finer tolerances than those provided by a pencil line, but the technique is the same.

Practice, alas, is the only way to acquire sawing skill, so I suggest you pencil some lines on pieces of scrap and spend a little time working out on these before embarking on the real thing. Even with scrap practice, it may be two or three real dovetail projects (or more) before you "find the groove," but you've got to start somewhere.

To trim the full-pin socket, slip a chisel's cutting edge into the gauge line and

slice down with even pressure about half-way through the wood's thickness (*photos H and I*). (A piece of scrap hardboard protects your benchtop from slips of the chisel.) Flip the piece over and do the same thing to clear the waste, then clean out the socket's corners as needed; the chisel's beveled edges make it possible to do so. I also slice a thin shaving or two from the center of the shoulder, so the surface will be slightly concave and won't hold the joint apart (*photo J*) later.



Photos F and G: Clear the bulk of the waste from the pin sockets with a coping saw, then cut away the waste at the half-pins. Cut right to the knife line on the half-pins, and you'll have little cleanup later.

Photo G



Laying Out the Pins

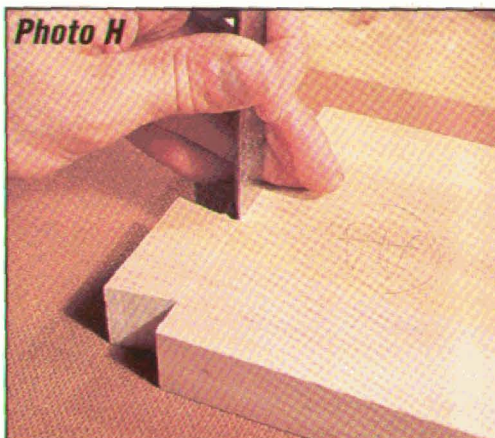
Tracing the outline of the actual tails directly onto the end grain of the tabletop helps ensure snug-fitting joints. A sharp, thin-bladed knife (a chip-carving knife, for instance) makes a much finer and therefore more accurate line. A knifed line will be harder to see, but an auxiliary light set at a low angle to create shadows in the scribed lines will make the cut lines more visible.

For the legs, scribe lines on the top and bottom surfaces of the tabletop to establish the bottom, or shoulders, of the sockets that accept the tails (and form the pins). Set the chisel-point marking gauge slightly wider than the thickness of the legs. You needn't scribe across the entire width of the tabletop; do just the sections where the legs attach.

Next, secure the tabletop end-up in a bench vise and lay a leg in place on the corner, supporting its lower end on a box or a stack of wood (*photo K*). Longer tops protrude higher above the benchtop and require more blocking to support the leg. The support should be solid, so you can apply pressure to hold the leg immobile while scribing.

Positioning the leg can be a bit of a fiddle. I hold a square against the tabletop and an edge of the leg to make sure that the leg fits perpendicular to the top. The shoulders of the pin sockets

Photo H: Trim the center full-pin socket to the scribe line with a sharp bevel-edge chisel. Position the cutting edge in the scribe mark. **Photo I:** The mallet provides force while the bottom hand keeps the blade perpendicular to the face of the leg.



and the bottom of the tabletop should be flush; look down on the leg and move it until you see just the tiniest slivers of light visible in the sockets. If there's a discrepancy between the leg position as determined by the square and that determined by the slivers of light, I usually align it according to the light, so that no gaps will show in the assembled joint.

Press the leg firmly in place with one hand, then scribe along the tails with your knife, making sure that the blade is flush with the tail (*photo L*). It may take several passes to deepen a line enough

to see it clearly. Then, with a pencil and square, extend the knifed lines down both faces of the tabletop to the gauge line. You may want to scribble on the waste, too, to remind you to cut on the right side of the lines. Lay out the pins in the same way at all four corners of the tabletop. Since the tails on each leg will be slightly different, make sure to indicate which leg goes where.

Cutting the Pins and Sockets

While this involves much the same approach as cutting the tails, the back-sawing should be, if anything, more precise. The pins and sockets must conform exactly to the knifed scribe lines (the actual shape of the tails) or the joint won't fit snugly. This requires that you cut to the center of the thin knifed line as you did to make the shoulders of the half-pin sockets on the legs. The



Photo J: Slice a shaving or two from the center of the shoulder so the surface will be slightly concave and won't hold the joint apart.



Photo K: Support the leg to the height of the tabletop. (A plastic waste basket and a wooden offcut do the job here.) To position the leg for scribing, give it a square and judicious eyeballing—only tiny slivers of light should be visible at the bottom of the pin sockets.

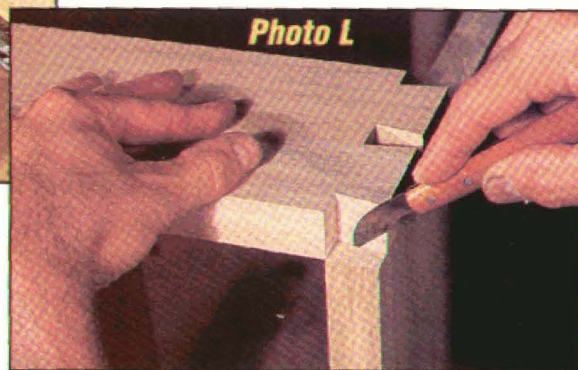


Photo L: Keeping the knife blade flush with the tail, scribe the tails onto the end grain, then extend the lines down both faces of the tabletop using a pencil and square.

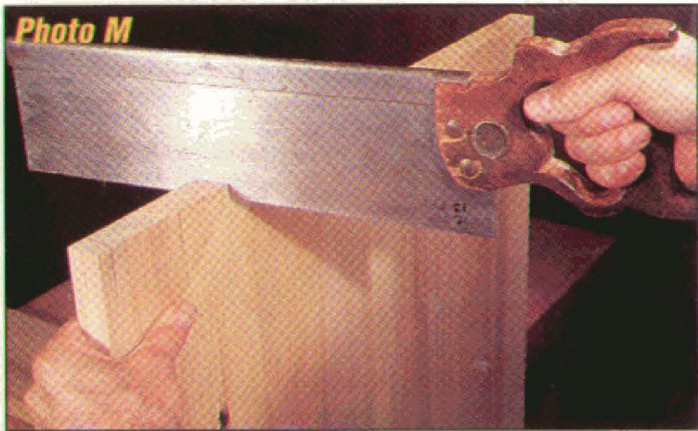
Photo M

Photo M: Cut to the center of the thin knifed line that outlines the pins, starting the blade at an angle. Then, lower it gradually to horizontal to complete the cut, using the vertical lines on the faces as guides.

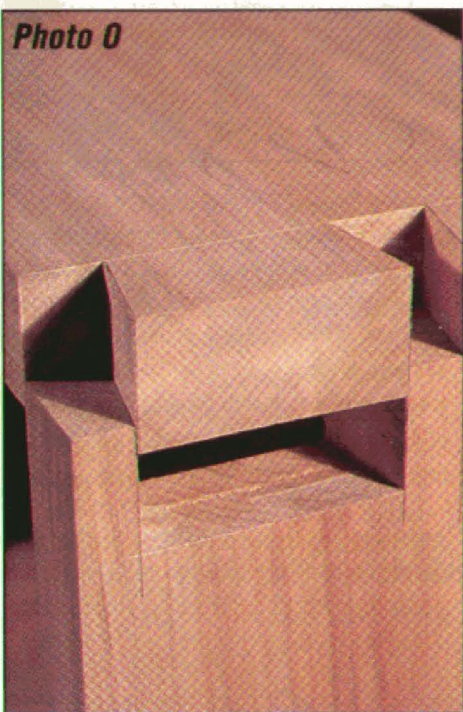
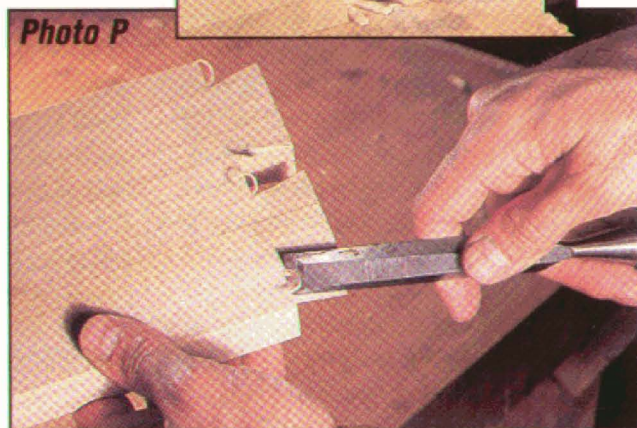
Photo O

Photo O: Push the joint only a quarter or third of the way home to test the fit.

Photo P: Chamfer the edges on the inside faces of the tails to ease assembly—remember to stop the chamfer short of the ends.

Photo N: Clean up the socket bottoms using a wide chisel.

Photo N**Photo P**

technique, however, is the same—start at an angle, gradually lowering to horizontal with minute adjustments along the knifed line (*photo M*). The thicker pencil lines running down the faces will help you maintain the cut at right angles to the end of the tabletop. After you get the hang of cutting accurately, the biggest problem you'll have (if you're a bit long in the tooth like me) will be keeping those tiny knife lines in focus. Again, raking side light helps a lot.

As before, clear the waste with your coping saw and chisel. First, I deepen the scribe lines slightly on both faces with a gentle mallet tap on the widest chisel that will fit between the pins. If the waste extends more than $\frac{1}{16}$ " or so beyond the scribe line, I take it out in several thinner segments with a mallet-driven chisel (*photo N*). Trying to

remove all the waste at once with some forceful mallet blows can push the cutting edge beyond the confines of the scribe line. After cleaning out the socket corners, take a few thin shavings off the socket shoulder to ensure that it is flat or even slightly concave so that it will seat properly.

Fitting and Assembling

Old-timers say that a dovetail goes together perfectly only once. A joint driven home to check the fit—then disassembled—won't be as tight the second time around, even less so the third. Pushing the joint no more than a quarter or third of the way home will alert you to most significant problems (*photo O*). Much as I'd like to say my joints fit straight from the saw, I invariably have to fiddle with things a bit.

Usually they're too tight, and I need to shave a bit off the side of this or that pin. If a sawcut has left more than half of a knife line, it's a simple matter to shave away the excess. If the knifelines are all bisected nicely, I'll slice off just a shaving from the center of each side

of the pin to ease assembly—without touching the periphery where gaps could show. Or, you may want to chamfer the inside edges of the tails (*photo P*), which makes it easier to drive the tails and pins together. Remember to stop the chamfers short of the end, or they'll show as gaps when you assemble the joint.

With loose joints, there's not much you can do but resort to stuffing the gaps with little slivers of wood. With only a few gaps, this can salvage the project. But if you have many gaps, the process gets to be tedious, and the results won't always be satisfactory. With simple projects like this, you can discard a leg with poorly cut tails, or try to saw an inch off the table's length to eliminate sorry pins, and then attempt the joint again.

When you're satisfied that the joints will fit (or willing to take the gamble), then it's time to organize for gluing. Well-cut dovetails can be pushed part way home by hand and driven the final distance with a hammer and block of wood. I like to pull the tails tight to the

Continued on page 45



Winter Sleigh Scene

Want to catch a bit of the scroll-saw magic that's captivating so many woodworkers? Here's a handsome plaque that will not only introduce you to the fast-growing world of "3-D" scrollsaw patterns but will also leave you with a work of art you'll be proud to display.

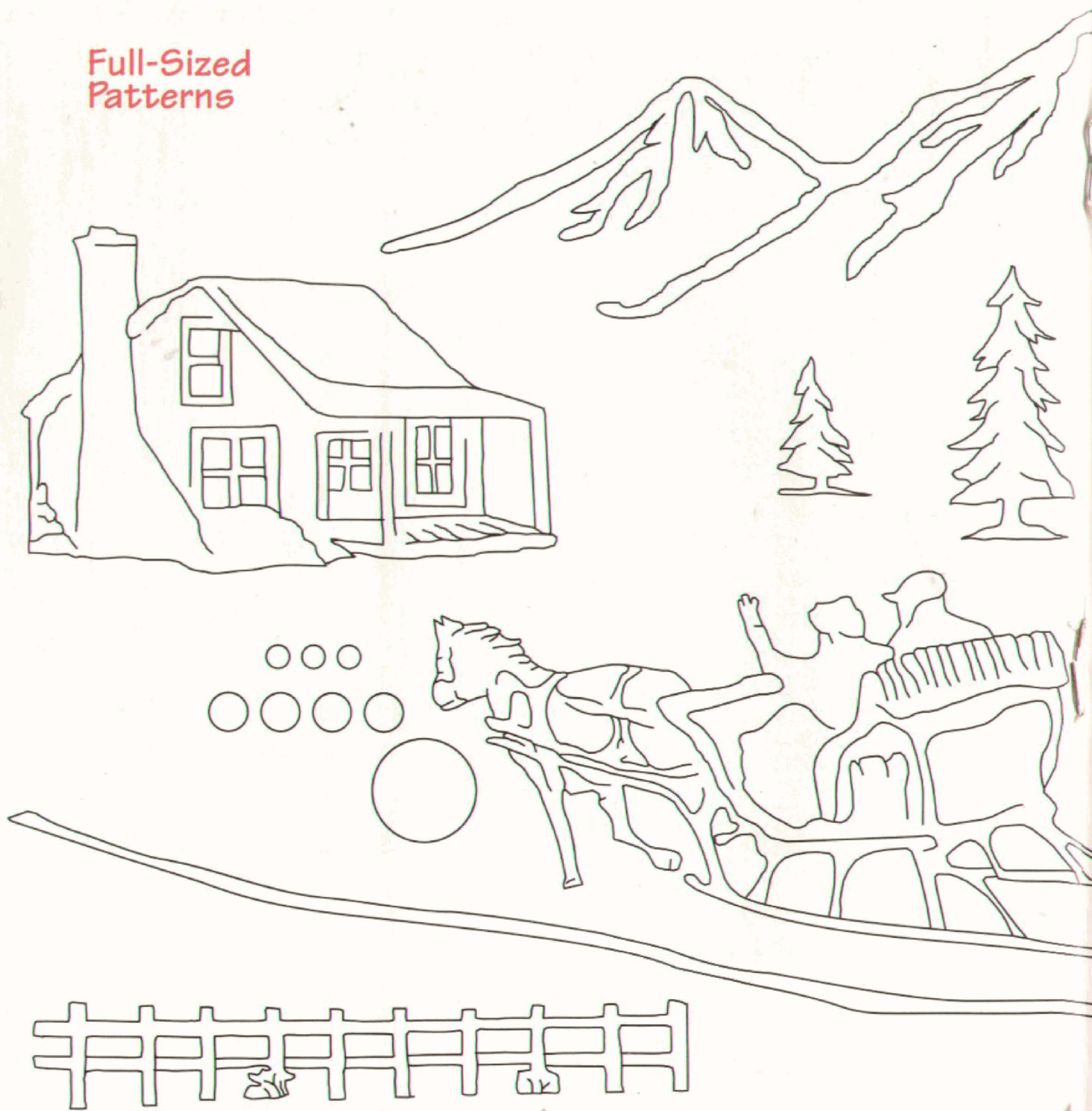
The term "3-D," as used by designers Roy King and Scott Kochendorfer, describes the simple technique they've perfected. You cut all the parts from a single piece of thin plywood, then assemble them in layers on a hardwood plaque to create an eye-catching, multilayered pictorial scene. This layering produces a play of shadow

and depth that, together with the scrollsawn detail, keeps scrollsawyers coming back for more of King and Kochendorfer's 340-plus designs.

Guaranteed Results the First Time

Most scrollsaw work involves the time-consuming and painstaking process of first boring a start hole for each interior cut, then threading the blade through one of the holes, remounting it, and finally making the cutout. After a few dozen holes, this gets to be very tedious work and can take much of the fun out of scrollsawing larger or more intricate projects.

Full-Sized Patterns

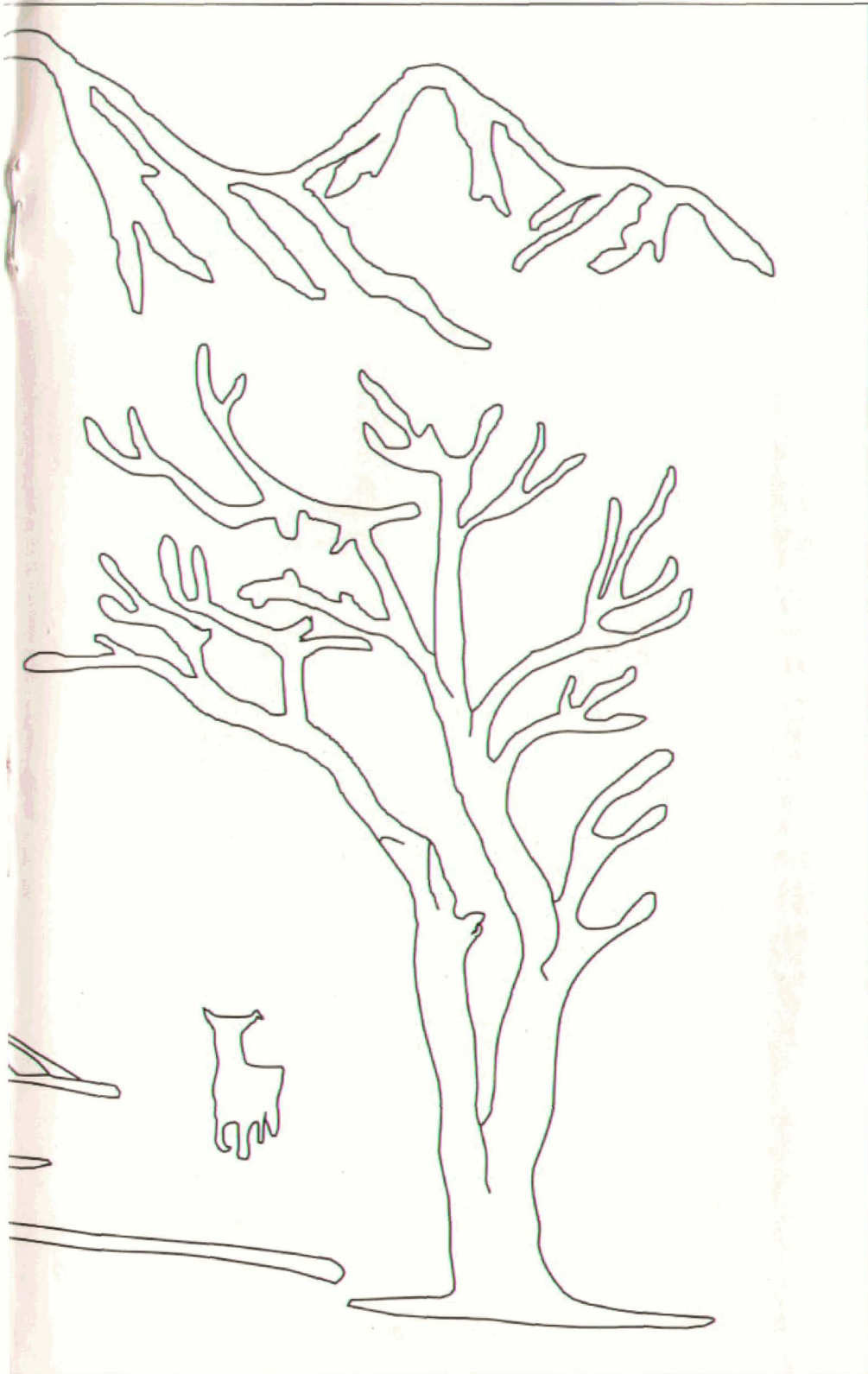


The “3-D” technique perfected by King and Kochendorfer (better known as Scroller) eliminates unconnected interior cuts. They’ve designed the individual pattern elements so that you can start every cut from the exterior of the piece. For example, if you look closely at the house silhouette, you’ll note that the windows and other interior cuts connect to the outside profile.

Designs like this that require no drilling of start holes can be worked fairly quickly. However, the resulting cuts often leave very delicate connections between sections. So, you need to take care when cutting and handling the silhouettes not to break off any of the sections. However, if you miss a cut or break off a section, don’t panic. You’ll find the Winter Sleigh Scene truly for-

giving; if you don’t follow the pattern precisely, no one will know. Should you accidentally cut through a connecting section, or if a piece breaks away, simply glue it back in place.

Designers Roy and Scott have developed a fairly foolproof method to ensure professional-looking results—even if you’ve never tackled a scroll saw project before. Read on to find out how they do it.



What You'll Need

You can cut all of the Winter Sleigh Scene parts from a single 8x10" sheet of Baltic birch plywood. We cut the plaque or backing board from a 12x16" piece of 3/4"-thick walnut, but you can use any contrasting stock. If you can't find 3/4"-thick Baltic birch plywood locally, see the list of sources on page 45 for a mail-order

kit that includes both the plywood and the walnut.

Transfer the Pattern

Make a photocopy of the full-sized pattern. Using an aerosol spray adhesive, such as Weldwood Spray 'N' Glue or 3M Spray Mount, spray a very light mist onto the backside of your photocopied pattern. Once the glue dries to a tacky

consistency, adhere the pattern directly to your piece of Baltic birch. If you use the adhesive sparingly, you should be able to remove the pattern fairly easily from the delicate cut-out pieces. Note that the sections do not overlap on the pattern as they do on the finished plaque.

At the Scrollsaw

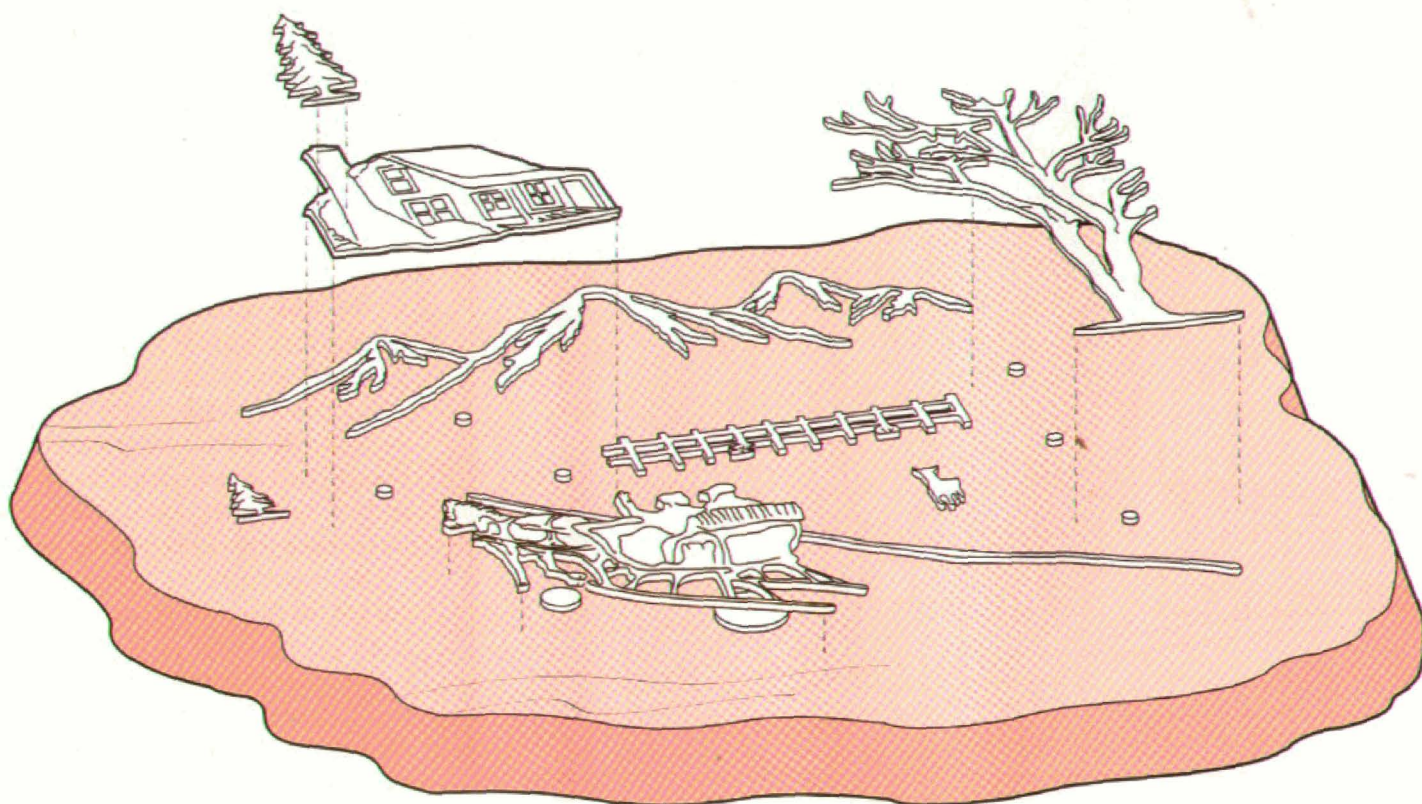
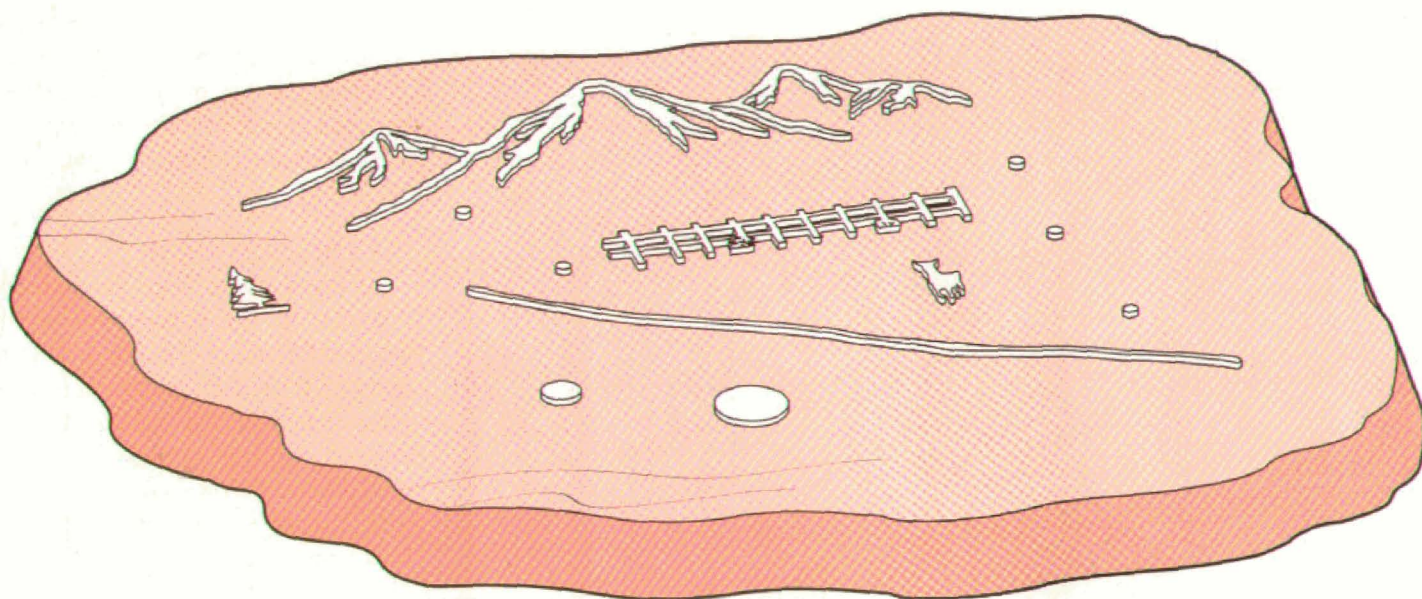
As noted earlier, every interior saw cut connects to the outside. For example, look at the upper window in the house and you'll see that cuts for both window panes are connected, and that they in turn connect with the roofline cut, which in turn connects to the edge of the silhouette. Thanks to this connectedness, you won't need to drill any interior start holes or stop the scrollsaw to thread the blade through.

However, to achieve the right look, you'll need to use thin blades. Scroller recommends using 2/0 scrollsaw blades and making a zero-clearance auxiliary tabletop. The tabletop provides support directly beneath the cut to minimize chipping and tear-out. To make one, trace the outline of your scrollsaw's table onto a piece of hardboard or thin plywood, and saw it to shape. Position the auxiliary top on the saw table, and mark the location of the saw blade. Then, drill a 1/8" hole for the blade. Clamp or double-face tape the auxiliary surface to your scrollsaw's table, and then reattach the blade.

To create the scene, first section the plywood into the various components. (We left enough stock around each of the sections to provide handholds.) Also, cut the eight shims and a few extras from the waste.

There's no "right" or "wrong" way to cut out the sections. However, Scroller suggests leaving waste pieces in place until you've made all of the cuts. In the branched tree, for example, leaving the waste around the branches helps stabilize these delicate parts while you make the cuts.

Relax, and guide the wood slowly into the blade, letting the blade do the work. Don't force a cut. With some of the interior cuts, such as those that establish the window openings, you can simply cut around and then exit the blade through the entrance kerf. With other cuts, such as the one that establishes the outside of the window frame and stop, you'll need to back the blade carefully out of the kerf.



As mentioned earlier, many parts will have only small sections of stock holding areas together. For example, if the cut that forms the upper window frame was continued a bit farther, it would intersect with the roofline cut, causing the window to fall away. On cuts such as this, make sure you avoid getting too close to previous cuts. It isn't necessary to follow the pattern lines exactly, but if

you do stray from the lines, remember to adjust subsequent cuts to compensate. After making all of the cuts, carefully peel the paper pattern from the cut-out parts.

Make the Plaque

If you like the scalloped profile of the plaque shown in the photo, tilt your bandsaw table to about 30° from perpen-

dicular, then cut the scalloped shape. Use your imagination here—you needn't duplicate our plaque exactly. Any shape or edge treatment—from a free-form profile to a rectangle with a routed edge—will look fine.

Assemble the Scene

As the Exploded View shows, the scene consists of three layers. The mountains,

the fence, the small conifer tree, the long path strip, and the sheep mount directly on the plaque, forming the base layer. For now, position these elements on the plaque without glue.

Create the second layer by gluing shims to the back of the house, the horse/sleigh, and the branched tree. The shims raise these elements $\frac{1}{8}$ " above the surface. For clarity's sake, we show these shims separated from the parts they raise. In practice, however, you'll glue them directly to the backs of these parts, then position the parts on the plaque. Also, note that several of these second-layer elements overlay sections of the first layer, such as the tree branch tips. If any of the silhouettes seem unstable, simply place additional shims under them as required to lend stability. Just keep the shims away from the edges; they should remain hidden.

When you're satisfied with the arrangement of the various elements, glue them in place. Use glue sparingly to avoid ruining

the effect with squeeze-out. After positioning the first and second layers, glue the third layer piece—the large conifer—over the left corner of the house.

Finishing

Roy and Scott generally omit the finish, preferring to let the natural beauty of the wood and the fine detail of the pattern work their magic. If you'd rather finish your plaque, we suggest using a clear aerosol spray lacquer, such as Deft. Don't attempt to brush-finish a piece like this. Brush strokes can break the more delicate sections, and a brush-applied finish will tend to fill the thin scrollsaw kerfs, destroying the delicate look of the piece. 

Project design: Scroller (Roy King and Scott Kochendorfer)

Photograph: Lynxwiler Photography

Illustrations: NOVA Graphics

Woodworking Basics

Continued from page 40



Photo Q

Photos Q and R: Drive the tails home with a hammer and wooden block, then snug them up with a pipe clamp.



Photo R

socket bottoms with a pipe clamp to eliminate tiny gaps the hammer can't close. So before spreading any glue, I make sure I've got a clamp of the right size, a hammer, and a block of hardwood at least $\frac{1}{8}$ " narrower than the narrow waist of the tails. In addition, I have a small brush or thin piece of wood handy for spreading the glue.

When ready, I start assembling one leg at a time. Spread a thin glue film on all mating surfaces of the joint—both faces of each tail and pin and the socket shoulders. Push the tails as far as you can, then drive them with the hammer

and block until glue squeezes out at the socket shoulders. Next, move to the legs at the opposite end of the table and do the same. When you have all four legs in place, pull the tails snug using the pipe clamp. If you tape blocks on each clamp jaw, you can pull a tail home at both ends at once. Sometimes this may be too much trouble, so I'll concentrate on one tail at a time, working quickly first at one end, then the other. If the joints fit snugly, you won't need to leave the clamp in place.

Sources

Pattern catalog. Roy King and Scott Kochendorfer's company, Scroller, offers a wide range of full-sized scrollsaw patterns, each rated for degree of difficulty and estimated time for completion. Like this project, most of Scroller's patterns require no inside cuts. For their 66-page catalog, send \$2.00 to:

Scroller

9033 S. Nashville (Box WJ)
Oak Lawn, IL 60453

Winter Sleigh Scene stock kit.

Includes 8x10" piece of Baltic birch plywood and 12x16" piece of $\frac{3}{4}$ "-thick walnut. Project-PAK no. WJ6941. \$14.95 ppd. Order from:

Heritage Building Specialties

205 N. Cascade
Fergus Falls, MN 56537
Phone: 800/524-4184

Finally, check that the legs are square to the tabletop, and adjust them as necessary. (Adjustments, however, may open slight gaps in the joints; you might prefer slightly out-of-square legs to gaps in your joints.)

Finishing Up

After the glue has dried, plane off the protruding tails and pins, then sand and finish the table as you wish. Although the joints on this table are very sturdy, the legs tended to whip a little because of their length, so I decided to add stretchers to stiffen them. Ordinarily, I would stub-tenon a horizontal stretcher into the legs. For this table, however, I also decided to beef up the legs with vertical extensions of the stretcher for extra visual weight. I found that the best approach was to assemble each U-shaped stretcher unit with simple half-lap joints at the corners and then attach these assemblies after gluing up the legs and tabletop. The stretchers run parallel to the grain of the legs and top, so I simply glued them in place using a half-dozen or so quick-action clamps. 

Photographs: Michael Farrell
Illustrations: Cad Art

MINIATURE JEWELRY ARMOIRE

Boxes have long been a favorite project of woodworkers, and over the years it's become a tradition at *Woodworker's Journal* to feature a jewelry box in our holiday issue. After all, who wouldn't appreciate a handsome box in which to store those special valuables?

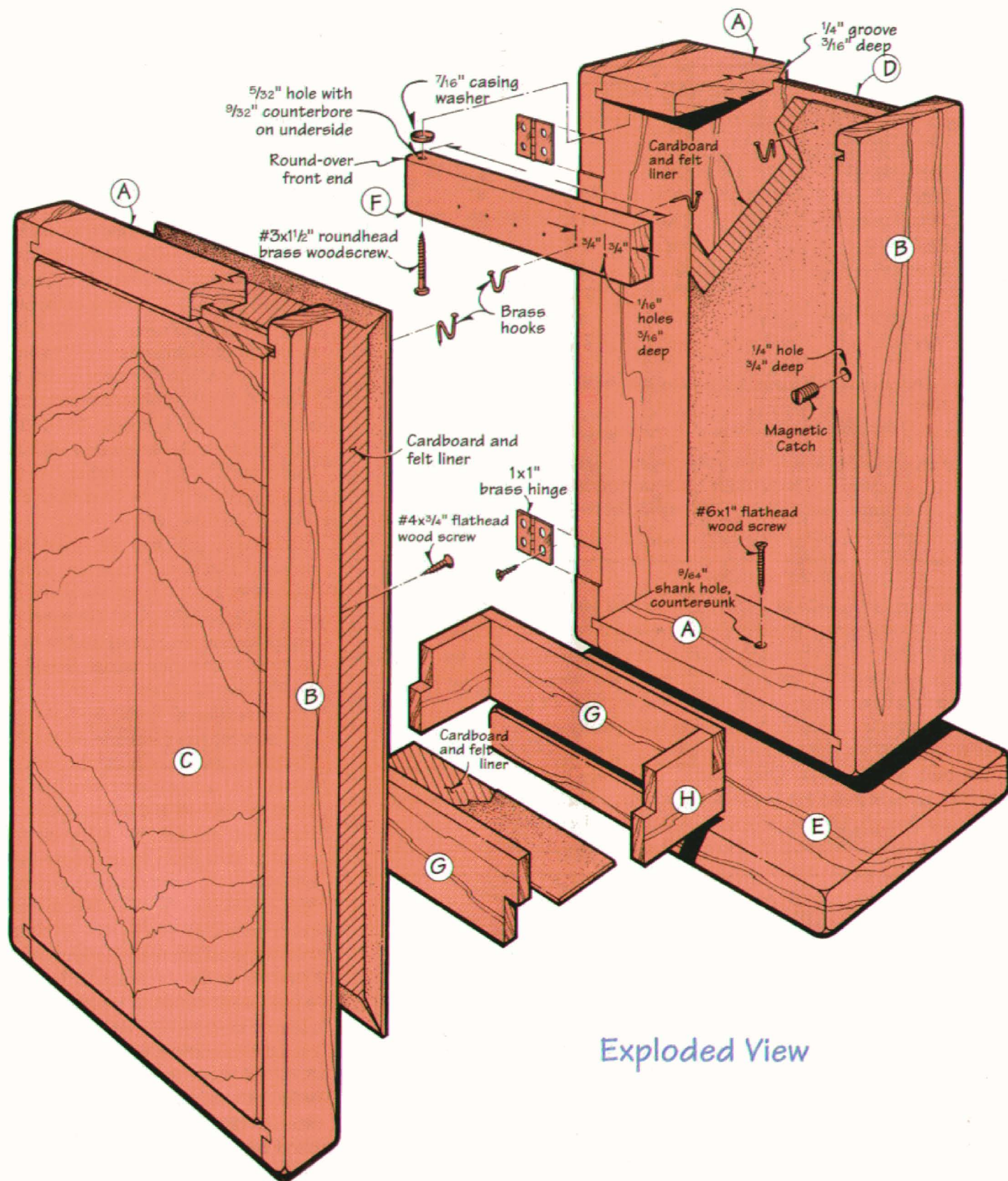
This year, we offer a traditional box with a different twist. Bill Bolstad of Bolstad Woodworks in Salem, Oregon, has taken a classic lidded box and reordered the interior to accommodate items that hang from hooks. Bill has turned his box on end and mounted it on a base, so that all the bracelets, chains, and earrings that usually lie tangled in



the bottom of a conventional box now hang there ready at hand. Bill tells us that these simple modifications have made this box his signature piece and one of his bestselling designs ever. Given the popularity of necklaces and dangling earrings, it's not hard to see why.

We made our armoire from bird's-eye maple and dressed up the front with bookmatched panels of redwood burl. However, you can use just about any combination of woods, so long as you select something spectacular for the front panel.

You'll find this armoire easy to make. First, build one simple box, then resaw it into two parts to yield the door and the case. The advantages of handling the construction this way will become obvious. Gluing up a single assembly saves time, requires only a few clamps, and guarantees a perfect match between door and case. Also, this approach ensures continuity of the grain patterns along the sides.



Exploded View

Follow Our Step-By-Step Instructions

Step 1: Cut the box top and bottom (A) and sides (B) to size. (We planed a single 48"-long board to 5/8" thick, ripped it to 4 1/8" wide, and then crosscut the lengths specified in the Bill Of Materials. (Note that the 4 1/8" width

includes a 1/8" allowance for the kerf that you'll lose when you saw the box into two parts later.)

Step 2: Cut 3/16" dados 1/16" deep near both ends of the inside face of the side pieces. (See the Box Joint and Side View drawings on pages 49 and 50.) To ensure uniformity in your dados, clamp a stopblock to the rip fence, and position it 1/16"

from the dado blade (figure 1). Note: For safety's sake, position the stopblock so that the stock clears the stop before touching the dado head.

Step 3: Cut grooves in the top, bottom, and sides for the front and back panels. To do this, fit your table-mounted router with a 1/4" straight bit, and elevate it 1/16" above the table. (Most routers

Bill Of Materials

Mini Jewelry Armoire

PART	T	W	L	MAT.	No.
A Top/Bottom	$\frac{3}{8}$ "	4 $\frac{1}{8}$ "*	6 $\frac{3}{8}$ "	M	2
B Sides	$\frac{3}{8}$ "	4 $\frac{1}{8}$ "*	12 $\frac{1}{4}$ "	M	2
C Front Panel	$\frac{3}{8}$ "	6 $\frac{3}{8}$ "	11 $\frac{3}{8}$ "	RB	1
D Back Panel	$\frac{1}{4}$ "	6 $\frac{3}{8}$ "	11 $\frac{3}{8}$ "	MP	1
E Base	$\frac{3}{4}$ "	5"	9"	M	1
F Arm	$\frac{3}{8}$ "	1 $\frac{1}{8}$ "	5 $\frac{1}{8}$ "	M	1
G Tray front/back	$\frac{1}{4}$ "	1 $\frac{1}{4}$ "	6"	M	2
H Tray ends	$\frac{1}{4}$ "	1 $\frac{1}{4}$ "	2 $\frac{1}{8}$ "	M	2

*Initial size, before cutting box apart to create door and case sections (includes $\frac{1}{8}$ " allowance for saw kerf).

Materials list: M—maple; RB—redwood burl; MP—maple plywood

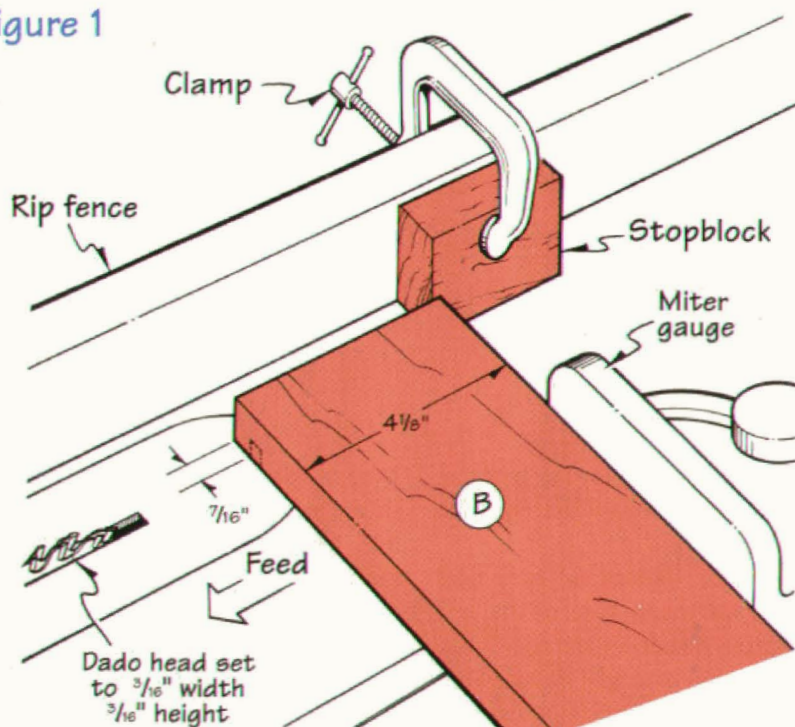
Supplies: 2—1x1" brass hinges; 1— $\frac{1}{4}$ " magnetic catch; 1—#6 x $\frac{3}{8}$ " flathead wood screw; 12—brass hooks (for arm); 28—brass hooks (for liners); 1—#8 x $1\frac{1}{2}$ " brass roundhead wood screw; 1—#10 casing washer; 1—#6 x 1" flathead wood screw, felt or velvet, cardboard.

should be able to handle this cutting depth in a single pass. If you have a light-duty router, you may need to make two passes.) To cut the grooves for the front panel, position the router-table fence $\frac{1}{4}$ " from the bit. Next, reset the fence $\frac{1}{8}$ " from the bit, and cut the groove for the back panel in these same parts. Note: The grooves in the top and bottom run entirely through, whereas those in the sides stop at both ends where they inter-

sect the dados that you cut in Step 2. We clamped stopblocks on the router-table fence to accomplish this, but you can also mark start- and stoplines on the fence. Do not continue the grooves for the front and back panels out the ends of the sides, or you'll end up with holes to fill!

Step 4: Cut a $\frac{1}{16}$ "-wide rabbet $\frac{1}{16}$ " deep on the ends of the top and bottom. (See the Joint Detail drawing.) Use the same basic dado setup shown in figure 1, but

Figure 1



elevate the dado head to $\frac{1}{16}$ ", and set the rip fence/stop $\frac{3}{16}$ " from the blade. Accuracy here is critical, so before actually cutting your stock, make test cuts on scrap to check the settings. You may need to fine-tune the dado height or fence/stop location to ensure that the resulting tongues fit correctly in the dados you cut in Step 2.

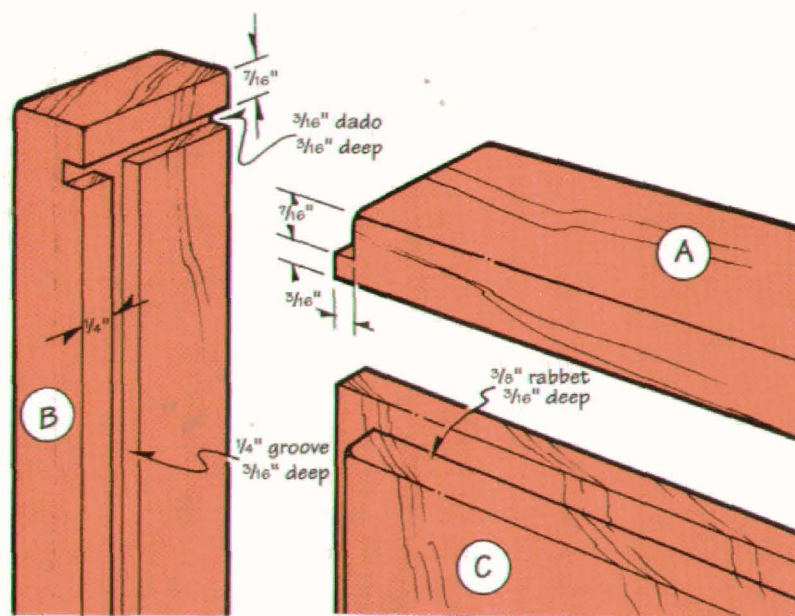
Step 5: Next, prepare the front and back panels (C and D). Our front panel, made up of bookmatched redwood burl, lends a certain symmetry to the look of the piece, although bookmatching your front is by no means a necessity. Once you've settled on the wood, size the front panel, then rabbet all edges as dimensioned to create a $\frac{1}{4}$ "-wide $\frac{3}{16}$ "-long tongue to fit in the top, bottom, and side grooves. Also, cut and fit the $\frac{1}{4}$ "-thick back panel. (We used maple plywood for the back to give our armoire a finished look.)

Once you've fitted the front panel properly so it doesn't interfere with the box assembly, gently sand a round-over on the front edges. Note: The panel protrudes beyond the front of the box by $\frac{1}{8}$ ", and the round-over radius should not exceed this dimension.

Step 6: Glue, assemble, and clamp the top, bottom, and sides around the front and back panels. Check the box for square, and adjust if necessary. Use glue along the rabbets and dados and in the back-panel grooves, but allow the front panel to float freely in its groove (without glue) to permit seasonal expansion and contraction. If you glue the front panel in place, you'll risk splitting it (should it contract) or blowing out the joints (if it should expand). This may occur when you build a piece in a dry climate or season, then move it to a humid environment, or vice versa. If you build the piece in a very dry environment, size the panel a bit smaller ($\frac{1}{16}$ ") than the groove-to-groove dimensions to allow for expansion.

Step 7: After the glue has dried, remove the clamps, then resaw the box to separate the door from the case. To make these cuts, elevate your tablesaw blade to $\frac{1}{16}$ " (or just a hair less than the $\frac{1}{8}$ " thickness of the box sides). Place the rip fence $2\frac{3}{4}$ " from the blade. Then, saw along the bottom, top, and each side (figure 2). This depth of cut should leave just enough stock to hold the two parts together. Next, using a sharp panel saw,

Joint Detail



case. Adjust the pieces if necessary, then glue, assemble, and clamp the tray. Now, set it aside to dry.

Step 10: Cut the cardboard-and-felt liners to fit the three lined areas. (Note: Don't adhere the liners yet; wait until after you've applied the finish.) Bill uses a laminated, ready-to-cut, felt-over-cardboard product, but you can buy felt or velvet material and wrap it over stiff cardboard. Make the liners for the door and case the same size, and cut a smaller section to fit the tray bottom. (You'll glue this smaller piece directly to the case bottom after gluing the tray in place.)

The Necessary Hardware and Finishing

You'll find mounting the hardware fairly straightforward, although you'll need to follow a certain sequence. Start by scribing and mortising the case edge for the hinges. Pre-drill pilot holes for the hinge screws, but don't attach the hinges just yet. Next, drill the 1/4" hole for the magnetic catch where shown, then drill the shank hole in the door for the screw that opposes the catch. Insert the catch until flush with the edge. Countersink the screw hole, then drive the catch screw until it's flush with the door edge.

Apply finish to the door, case, tray, base, and arm. (We used several coats of Minwax Antique Oil, then applied a coat of Minwax Paste Wax, which we rubbed out with a soft cotton cloth.)

While the finish dries, make 28 liner hooks and 12 arm hooks, using the profiles shown on the Exploded View. If you purchased the hardware kit, use the hooks supplied. As you'll note on the drawing, the liner hooks have an additional bend in them. Use 1" or longer brass brads, and use a pair of needle-nosed pliers to bend them.

To secure the hooks to the liners, drill a small hole through the liner for each hook. Insert the hooks, then apply a drop of epoxy to the back of each to anchor it to the back of the cardboard liner. (We attached three rows of hooks to the door, positioning them 3/4", 4", and 7" down from the top, respectively. In each row, we started 1/2" in from the edge and spaced the hooks at 3/4" intervals. We mounted a single row of seven hooks on the back.)

To mount the arm hooks, drill 1/16" holes 3/16" deep into both sides of the arm where shown. Insert the hooks, then apply a drop of clear epoxy to anchor each hook in place.

Using a sparing amount of epoxy, mount the cardboard liners to the back

and the inside of the door. Locate and drill a 1/64" shank hole in the case bottom for the mounting screw to anchor the base to the case. Apply epoxy to the case bottom, then position the base and temporarily clamp it in place. Drill a 1/32" pilot hole into the base, and then drive the #6x1" wood screw. Next, glue the tray in place. Now, fit the cardboard liner in the tray bottom, and glue it in place.

Attach the arm to the case with a brass screw and washer as shown on the Exploded View drawing. Leave the screw loose enough to allow the arm to swing freely. Next, loosely attach the hinges to the door and then to the case. Adjust the position of the door, then tighten the hinge screws. Adjust the catch-screw depth to control the magnetic pull on the door. Finally, add felt dots (available at any hardware or crafts store) to the base bottom before you gift-wrap your armoire. 

Kit Source

In case you should have trouble finding the hardware for this project, we've asked Bolstad Woodworks to supply a kit that includes all necessary parts. Order the kit from:

**BOLSTAD
WOODWORKS, INC.**
P.O. Box 971
Salem, OR 97308
Telephone 800/628-8945

Includes hinges, magnetic catch, brass hooks, washer, and all screws. \$20.00 ppd. You may also order a kit including all of the wood and laminated velvet-on-cardboard liners as well as the necessary hardware. Call for price and available wood combinations.

Project Design: Bill Bolstad
Photograph: Gerard Roy
Illustrations: Dan Thornton

Victorian Santa

by Rick and Ellen Bütz

Five years ago, when we offered Rick and Ellen Bütz's German Saint Nicklaus figure as our holiday carving project (Nov./Dec. 1989), we hadn't really planned on launching a tradition. Readers clamored for more, however, so we called on Rick and Ellen again. Their 18th-century Father Christmas figure (Nov./Dec. 1991) won the Bützes an even larger following. A third project, the traditional American Santa Claus (Nov./Dec. 1993), made it a series. Does a fourth Bütz Christmas figure establish a Woodworker's Journal tradition? We hope so.



Santa Claus's Image: A Thumbnail History

In Europe, where St. Nicholas has flourished for centuries as a legendary figure, he has usually been depicted as a somber bishop in flowing robes. In this country, however, by mid-19th century, the old European images of St. Nick began to merge with new traditions, which created a Santa Claus with a uniquely American personality.

In pre-colonial times, Puritans and other religious sects discouraged the celebration of St. Nicholas's Day. But the tradition persisted until, in 1809, the legend of St. Nicholas as a friend of children and bringer of gifts was given new life by Washington Irving in his *Diedrich Knickerbocker's History of New York*, a humorous and highly fictionalized history of the Dutch colonists.

In a series of *Harper's Weekly* cartoons (1863-1886), artist Thomas Nast gave us the first truly American depictions of St. Nicholas, or Santa Claus, as he became better known. Nast's renderings were inspired both by Irving's Dutch legends and Clement Moore's popular 1822 poem, "The Night Before Christmas."

Instead of bishop's robes, Nast's Santa wore a red coat with a broad belt and

heavy boots. A long-stemmed clay pipe reflected Santa's Dutch heritage, and his small cap was often trimmed with a sprig of English holly. But most pervasive was Nast's portrayal of Santa as jolly, roly-poly, and elfin, rather than solemn and saintly.

Carving Your Santa Figure

This Santa Claus is fun to carve and should bring a smile to everyone who sees him. Start with a piece of air-dried white pine or basswood cut to 2 x 3 x 5-1/2" long. Make sure that the grain runs lengthwise, so the carving will be structurally sound.



Photo 1

Transfer the full-sized side view pattern shown on *page 79* onto the 2"-wide edge of your blank, then cut it to shape using a 1/8" blade on your bandsaw. Next, transfer the front view pattern onto the 3"-wide face (*photo 1*), and bandsaw it to shape. Sketch in some guidelines to show the position of the arms (*photo 2*).

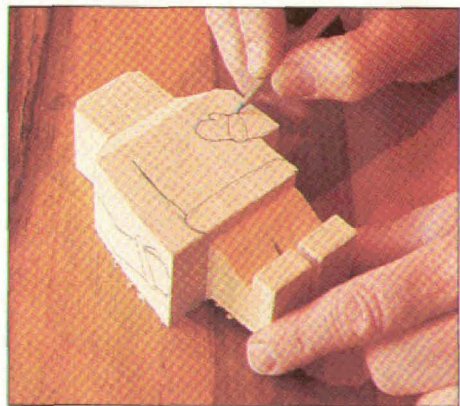


Photo 2

To rough out the shape of the arms, use a 12mm macaroni tool (*photo 3*). Don't try to remove all the wood with one cut. Instead, take the arm down to the desired depth using several shallow cuts to avoid splitting the wood. (If you don't have a macaroni tool, you can shape the wood with a knife and V-gouge or even just a knife. Remember, any tools mentioned are just suggestions. You can improvise using the tools you have and get the same results.

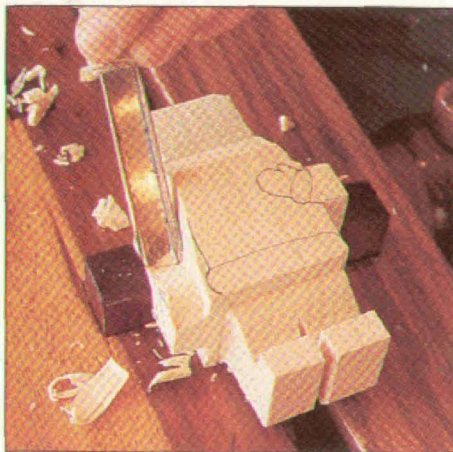


Photo 3

Our Santa is small and easy to hold in the hand, so most of the carving can be done with a small, sharp whittling knife. With a carving like this, I usually begin rounding off the corners at the feet and work my way up (*photo 4*). Work carefully, and take small chips when you shape the boot toes. If you apply too much pressure to these cross-grain parts, they can chip off.

Don't panic if this does happen. It's easy enough to glue a boot toe back on, using either an aliphatic resin glue (Titebond, for example) or a quick-set epoxy. I prefer the epoxy, because it doesn't require clamping. The pieces can simply be held in place by hand for a few minutes. Whichever you prefer, remember to give the glued joint time to develop strength before you put pressure on the mended area. Quick-set epoxy, for instance, may "set" in five minutes, but it doesn't reach full bonding strength for several hours.

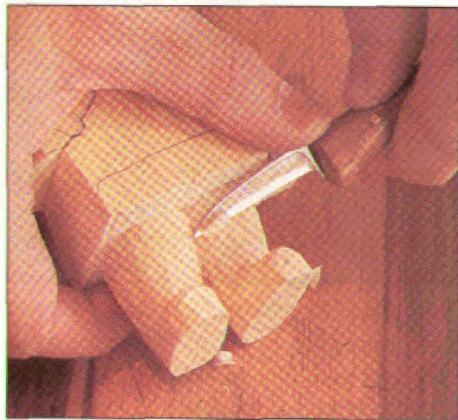


Photo 4

Once you've rounded the boots and legs, you can begin detailing them. First, pencil in some guidelines to mark out the cuffs on Santa's boots. Then, notch around the cuffs with a knife, or outline them with an 8mm no. 12 V-gouge (*photo 5*). Pare away the wood above and

below the cuffs slightly to make them stand out (*photo 6*). Now, texture the cuffs using a small V-gouge such as a 3mm no. 12 to make them look fluffy (*photo 7*).



Photo 5

After detailing the boots, use your whittling knife to round off all the sharp angles on Santa's arms and body (*photo 8*). Remove enough wood so that Santa doesn't have a square, blocky look. Much of this Santa's charm, after all, resides in his plump, jolly roundness.

To shape the cuffs on the coat sleeves, use the same techniques you used to carve the boot cuffs. Outline them with the 8mm V-gouge, then pare away the excess wood with a knife, leaving the cuffs raised (*photo 9*).

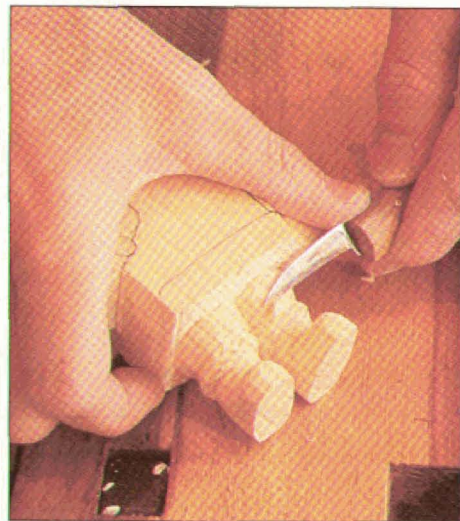


Photo 6

Next, shape the mittens using your carving knife. The hand holding the bag of toys curls into a fist (*photo 10*). If you have any doubts about the shape, put on a mitten and look at your own hand. The mitten shapes will be fun to carve because you don't have to worry about much detail.

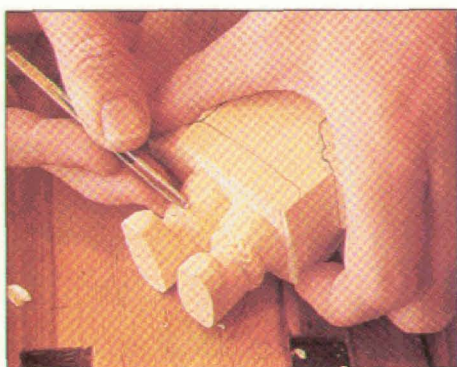


Photo 7

To outline the mitten holding the pipe, use your 8mm V-gouge (*photo 11*). Notice in the photo that I've braced the thumb of my right hand (the hand holding the tool) against the wood. This way, if the tool slips out of the wood, it can travel only a very short distance, because my hand is in firm contact with the wood. For safety's sake, position the fingers of your other hand (the hand holding the carving) out of the tool's path. For that matter, never use the full power of your arm to make a cut with one hand while holding a carving in the other.

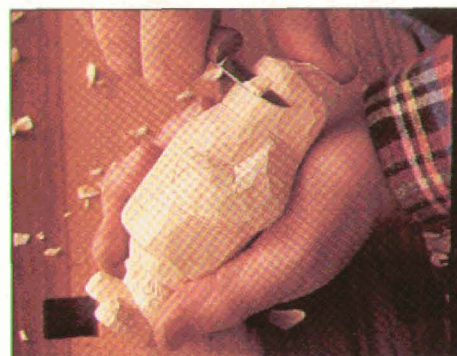


Photo 8

Using gouges on a small handheld figure like this requires special care. Remember always to use small motions, using only the muscles of your hand, to shave off small chips. Save the full arm movements for those larger works that you've clamped securely to your bench. If you don't feel comfortable using gouges for these minute cuts, remember that a knife works fine too.



Photo 9

Pare away the excess wood around the mittens using a carving knife (*photo 12*), and then move on to Santa's cap. (This Santa wears a small toque-style cap with a pom-pom instead of the more common "nightcap" variety.) First, round off the corners of the head. Next, pencil in the lines for the fur trim. Outline the trim using your 8mm V-gouge, then carve away the excess with a knife. Sketch in the pom-pom, and outline around the bottom using the V-gouge. Now, pare away the excess, and round the pom-pom (*photo 13*).



Photo 10

Sketch in the lines for Santa's beard and fur collar. Then, carefully carve a notch using your knife to separate the hair and beard from the collar (*photo 14*). Use the 8mm V-gouge to outline the collar, then carve away the coat using your knife. Leave the collar raised about $\frac{1}{16}$ " (*photo 15*).

To create the fur trim around the hem of Santa's coat, use the same techniques. First, outline the trim with the V-gouge, and pare away the excess using your knife (*photo 16*). Now, round the sharp edges on the trim to enhance the illusion of softness.

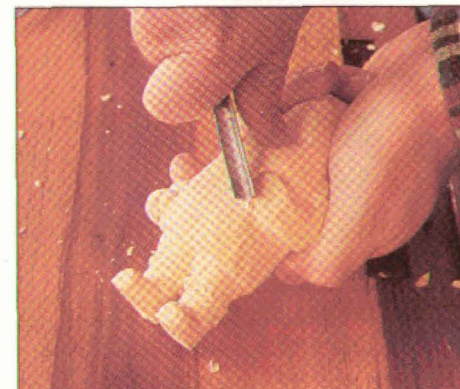


Photo 11

Next, pencil in the belt and buckle. Once again, outline the belt with the V-gouge, and remove the wood above and below it. Remember to keep your cuts shallow; the belt need be raised only a tiny fraction of an inch above the coat to

create the right effect. You'll want to leave as much wood as possible in this area for Santa's celebrated bowl-of-jelly belly.

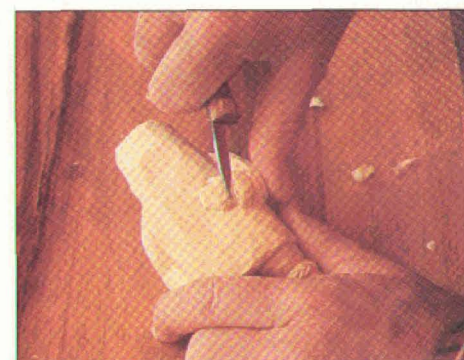


Photo 12

Before you start carving the belt buckle and other details, test your tools for sharpness. Well-honed tools will make the detailing much easier. Also, crisp, clean cuts will give your work a polished, professional look.

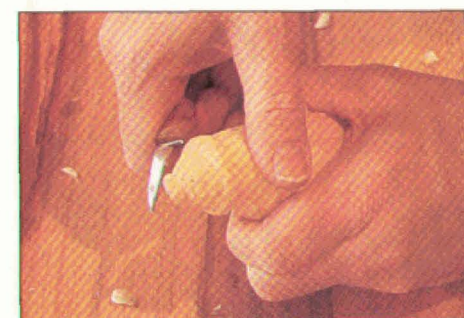


Photo 13

Detail the belt buckle using your 3mm no. 12 V-gouge (*photo 17*). Don't forget to brace your carving hand against the stock and keep your holding hand out of the line of fire, just in case. You can make the buckle holes in the belt using a scratch awl.

Now, let's move on to the face. Begin by drawing guidelines showing the outline of the beard, the position of the eyes, and a centerline (*photo 18*). About $\frac{1}{4}$ " below the guideline for the eyes, draw a second horizontal line to make the bottom of the nose.

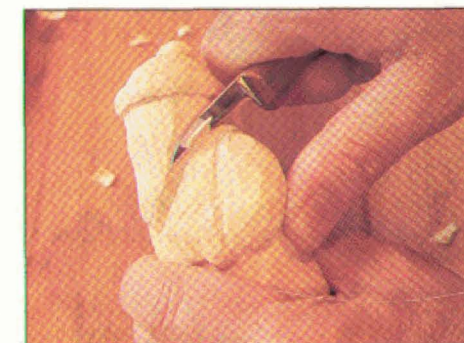


Photo 14

For the facial features, I find that an extra-fine-pointed detailing knife makes

it easier to control the fine cuts. The knife I use for the following steps is one that I designed myself for doing just this kind of work.

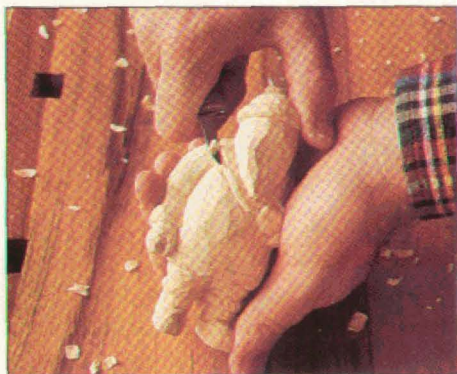


Photo 15

Using a detailing knife, carefully cut two horizontal notches $\frac{1}{8}$ " deep along the lines you've drawn (*photo 19*). Remember, the lines indicate the deepest part of the cuts. A front view of the carving does not at this point suggest a face, but look at the profile (*photo 20*). Santa's forehead and nose show plainly.



Photo 16

These two notches determine the proportions of the face, and you can vary them as you like. Putting more distance between the notches, for example, will give your Santa a long nose, whereas moving the notches closer together creates more of a pug nose.

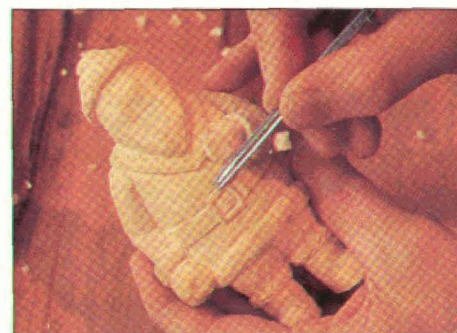


Photo 17

To shape the face, first use the 8mm V-gouge for the outlining. Next, pare away the sides of the face (*photo 21*). Note that the bottom of this cut forms the top of the mustache.



Photo 18

Our Santa has a slightly more prominent nose than some. To create it, first incise two vertical cuts, forming the sides of the nose. Hold the knife using a pencil grip, and make the cuts (very carefully) no more than $\frac{1}{8}$ " deep (*photo 22*). Then, gently pare away the cheeks, leaving the nose raised (*photo 23*).



Photo 19

To finish shaping the cheeks, remove a tiny triangular chip from the bottom of the cheek at either side of the nose. Next, cut down vertically to form the sides of the cut, then remove the chip using a small horizontal cut (*photo 24*). To give the cheeks a slightly more rounded look, remove some paper-thin shavings to soften the sharp angles.



Photo 20

Now, fashion the eyes. First, hold the knife using a pencil grip, and incise a very shallow cut—approximately $\frac{1}{32}$ "—around the outline of each eye (*photo 25*). Next, remove a paper-thin shaving above and below the eyelids, leaving them slightly raised (*photo 26*). To form the pupils, use the very point of your detailing knife to remove a tiny three-sided chip from the lower eyelid (*photo 27*).

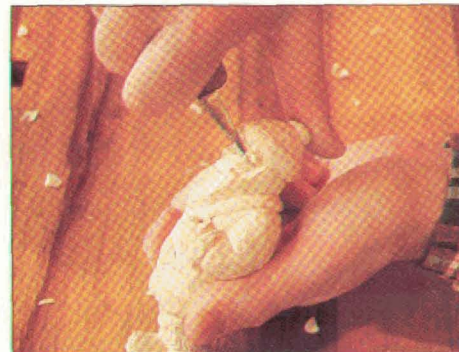


Photo 21

I particularly enjoy this moment in the carving. It always seems like magic when a workpiece suddenly changes from a block of wood to a little person looking back at you. If you want to add a touch of age and character, use the same technique as in the previous step to create extra wrinkles under Santa's eyes.

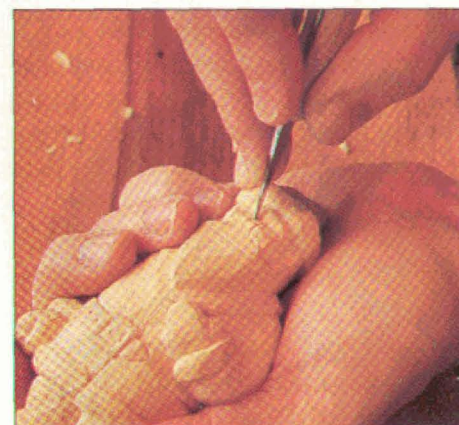


Photo 22

To give Santa his traditional mustache, hold the knife using a pencil grip, and incise a line $\frac{1}{32}$ " deep along the bottom edge of the mustache. Then, carve away a thin shaving below this line to leave the mustache raised (*photo 28*). If you like, follow the same approach to provide Santa with a visible mouth (*photo 29*).

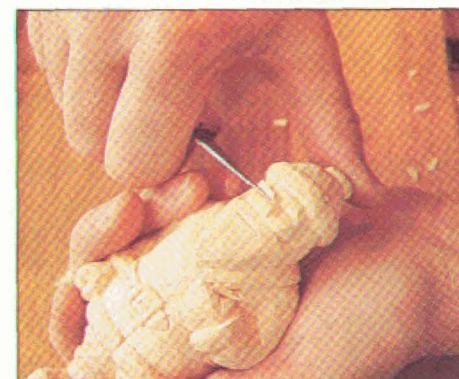


Photo 23

You can use this style of carving to create a variety of faces and expressions. I suggest carving some practice faces on small scraps of wood to get a feel for the possibilities.

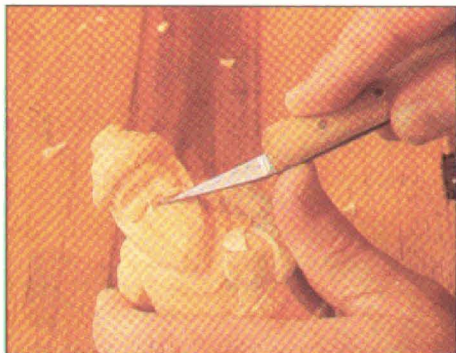


Photo 24

Details, Details

After the face comes the fun part—adding details. Now's the time to unleash your imagination and finish your Santa just the way you picture him. Here are some suggestions.

Thomas Nast, the famous Santa Claus illustrator, often festooned his Santas' caps with a swatch of holly. I used the small 3mm no. 12 V-gouge to outline the holly leaves on the fur trim of the cap. You can use this same tool to texture the beard and mustache (photo 30).

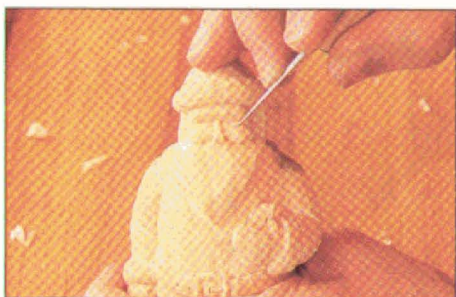


Photo 25

To texture the fur trim on Santa's cap, you can use a small V-gouge, but I prefer a U-shaped veiner, such as a 3mm no. 11. A veiner makes a round-bottom cut, which gives the fur a soft, fluffy look (photo 31).

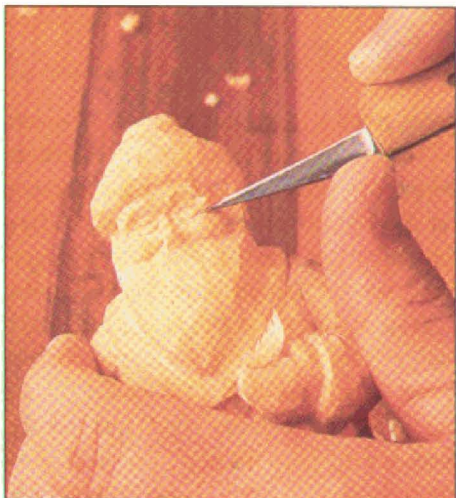


Photo 26

If you want to give Santa a bag of toys, start with a small piece of wood (again, air-dried pine or basswood) roughly $1\frac{1}{2} \times 2 \times 1$ " long. (Note: The 1" length dimension indicates grain direction, as shown on the pattern.) Whittle the bag into an irregular shape, leaving the hand-hold roughed out. Next, drill a $\frac{5}{32}$ " hole into the outside end of Santa's right hand. A sharp brad-point bit works best for this; apply light pressure, and let the bit do the cutting. Now, trim the hand-hold on the toy bag to fit snugly into the hole (photo 32).

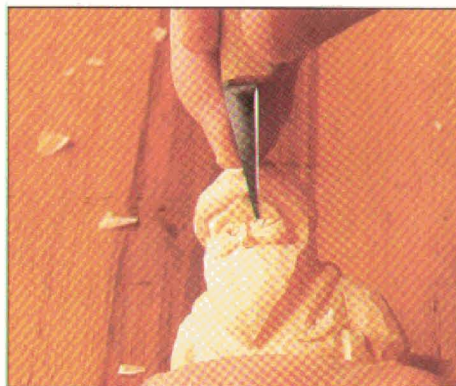


Photo 27

I carved a Dutch-style clay pipe from a scrap of birch, although any light-colored, fine-grained hardwood will do. Hardwood works better for this than pine, which makes for a rather flimsy stem. To secure the pipe to the left hand, drill a $\frac{1}{16}$ " hole through the hand, and slip the pipe stem through it after you've painted and waxed the figure. (I don't glue the fragile pipe in place, because if it should get broken, it would be much easier to replace if not glued.)

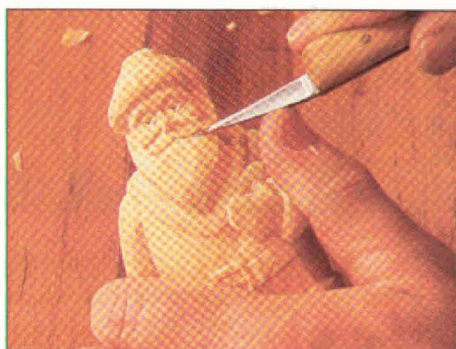


Photo 28

Now, For the Paint and Finish

For this Santa, I chose the traditional American Christmas colors of red, green, and white. I started by painting the beard, fur trim, and eyebrows with a

titanium white acrylic. (I prefer acrylic for this step because it's more opaque than oil paint and covers the wood better.)

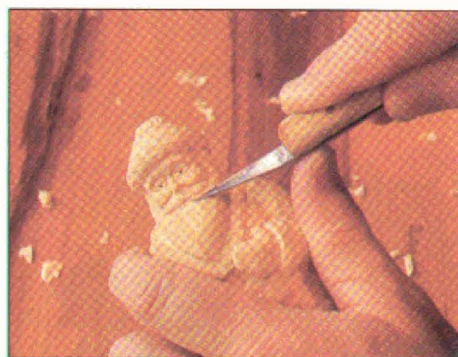


Photo 29

After the white acrylic has dried thoroughly, you can paint the rest of the carving using oil paint thinned to a transparent stain. I make the stains by daubing a bit of paint on a white saucer and

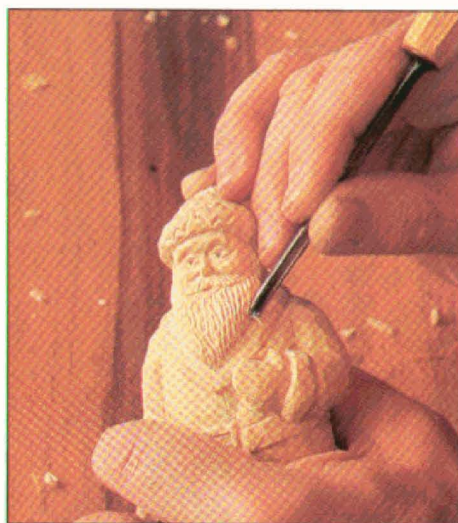


Photo 30

thinning it with a few drops of turpentine at a time. As you mix, test each stain on a scrap of the same wood you used for your carving. I thin the oil paint until it looks transparent, which allows the grain of the wood to show through. If you lay on a thick, opaque coat of paint, it will take forever to dry and will make your carving look like plastic.

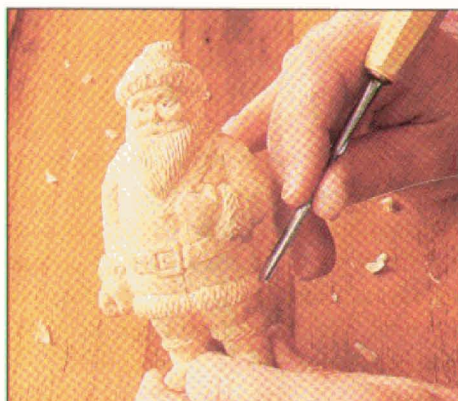


Photo 31

Continued on page 79



Sidewheeling Ferryboat

Designer Tom Landon creates toys with a view to function and durability, so that kids can get down and play hard with his products. This carpet-crossing ferry, modeled after a 1920s shallow-draft vessel, offers an exciting alternative to those everyday trucks and trains. In fact, of Tom's 25 or so designs, his ferryboat consistently draws the most attention at shows and fairs.

Step 1: From $\frac{3}{4}$ "-thick stock, cut the car deck (A), sides (B), sponsons (C), and upper deck (D) to the dimensions listed in the Bill of Materials on page 58. If you don't have wide enough stock to make one-piece decks, you can edge-join narrower widths. (We selected maple for the main parts and contrasting woods for the accents. We prefer using maple for toys like this because of its light, attractive color and dent resistance.)

Step 2: Elevate your tablesaw blade to $\frac{3}{8}$ ". Using your rip fence, cut spline

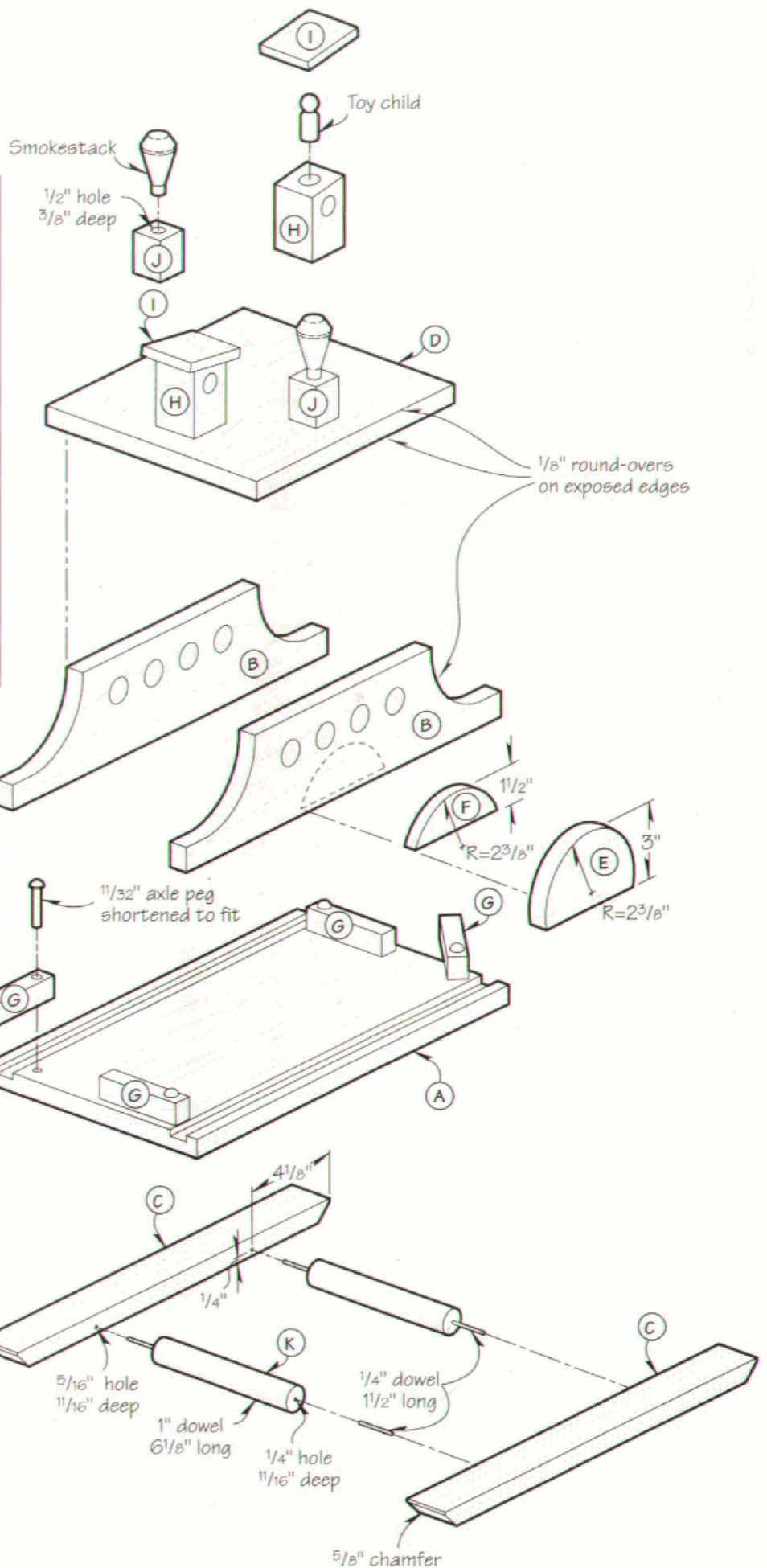
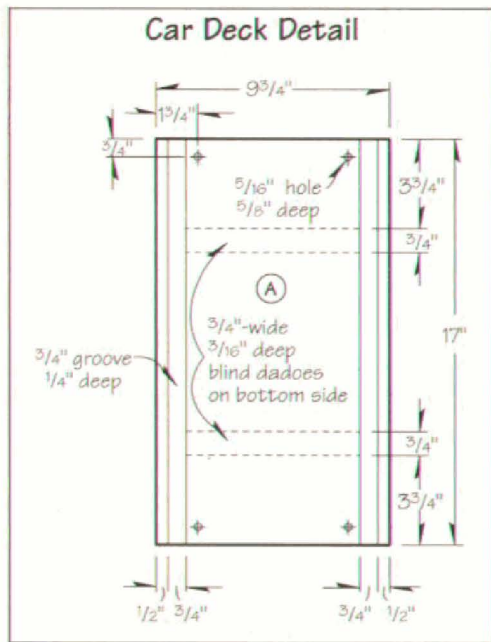
grooves along the bottom face of the car deck and top face of the sponsons where shown on the Car Deck detail *opposite*. To cut splines, simply rip two $\frac{1}{8}$ "-thick edge strips (at least 17" long) from one of the waste pieces left over after cutting the decks to width.

Step 3: Switch to a dado set, and cut the two $\frac{3}{4}$ "-wide, $\frac{1}{4}$ "-deep grooves in the car deck top face to accept the sides. (To ensure a snug fit, we sized the grooves using our side stock and cut a test groove in scrap material before grooving our

good stock.) Next, cut the two $\frac{3}{4}$ "-wide, $\frac{3}{8}$ "-deep blind dados across the bottom where dimensioned to provide clearance for the dowel rollers. Be careful to stop the dados at least $\frac{1}{8}$ " from both edges. Now, lay out and drill the four $\frac{3}{8}$ " holes.

Step 4: Copy the full-sized Side half-pattern shown on page 59. Using double-faced tape, stick the two side blanks together face to face. Next, transfer the pattern profile to the top piece and mark the hole centerpoints. Note: You'll need to flip the pattern over to finish laying

Exploded View



Bill Of Materials

PART	T	W	L	MAT.	No.
A	$\frac{3}{4}$ "	$9\frac{3}{4}$ "	17"	M	1
B	$\frac{3}{4}$ "	4"	17"	M	2
C	$\frac{3}{4}$ "	$1\frac{3}{4}$ "	17"	M	2
D	$\frac{3}{4}$ "	$9\frac{3}{4}$ "	$10\frac{3}{4}$ "	M	1
E	$\frac{3}{4}$ "	3"	$4\frac{3}{4}$ "	PH	2
F	$\frac{1}{2}$ "	$1\frac{1}{2}$ "	$4\frac{1}{4}$ "	M	2
G	$\frac{5}{8}$ "	$\frac{7}{8}$ "	$3\frac{1}{2}$ "	PH	4
H	$1\frac{3}{4}$ "	$1\frac{3}{4}$ "	$2\frac{3}{4}$ "	C	2
I	$\frac{3}{8}$ "	$2\frac{1}{7}$ "	$2\frac{3}{4}$ "	P	2
J	$1\frac{1}{4}$ "	$1\frac{1}{4}$ "	$1\frac{3}{16}$ "	P	2
K	$1\frac{3}{4}$ "	5"	$4\frac{1}{2}$ "	M	2
L	$1\frac{3}{4}$ "	2"	$4\frac{3}{8}$ "	M	6

Materials list: M—maple; PH—purpleheart; C—cherry; P—padauk.

Supplies: 4— $\frac{1}{32}$ x $1\frac{1}{2}$ " axle pegs; 2— $\frac{3}{8}$ "-diameter wooden small child; 2— $1\frac{1}{4}$ x $2\frac{3}{4}$ " wooden smokestacks; 24— $\frac{1}{8}$ x $1\frac{1}{4}$ " wooden wheels; 24— $\frac{1}{32}$ x $1\frac{1}{2}$ " axle pegs; $\frac{1}{4}$ " dowel; 1" dowel.

out the remaining side half. Now, bore the four holes, then bandsaw and sand the edges to shape.

Step 5: Locate and drill two $\frac{5}{16}$ " holes in the inside faces of both sponsons where dimensioned on the Exploded View. Next, crosscut 1" dowels as dimensioned to create the rollers. Then, center and drill a $\frac{1}{4}$ " hole $\frac{1}{16}$ " deep into both ends of the rollers. (See the Pro Tip *opposite* for our technique.)

You're Ready For The First Assembly

Step 1: Dry-assemble the splines, sponsons, 1" rollers, and $\frac{1}{4}$ " axles to check their fit on the car deck's underside. Next, separate the parts, and glue the splines into the sponsons and the axles into the holes in the ends of both 1" rollers. Apply wax to the exposed portions of the axles to act as a lubricant. Then, assemble the rollers and sponsons,

and glue and clamp them to the car deck bottom, aligning the ends. After the glue has dried, bevel-cut the $\frac{5}{8}$ " chamfer on the ends of both sponsons where shown on the Exploded View. Now, sand the splines flush with the ends of the deck.

Step 2: Dry-assemble the sides and car deck. To do this, first cut a $3 \times 7\frac{1}{4}$ " spacer from scrap, then glue and clamp the sides into the deck grooves. Insert the spacer you just cut between the sides to hold them square while the glue dries. Check the walls for square, and adjust

the parts and clamps if necessary. Wipe off any glue squeeze-out with a damp cloth before it dries.

Now, Cut The Remaining Parts

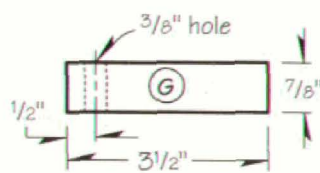
Step 1: To make the sidewheel housings (E), first cut a 3×10 " piece from $\frac{3}{4}$ "-thick stock of a contrasting color. (We used purpleheart, but walnut, cherry, mahogany, or any other dark-colored hardwood would work just as well.) Then, using the dimensions shown on the Sidewheel housing drawing *below*, lay out two $2\frac{3}{8}$ "-radius arcs on the piece. Now, bandsaw the parts to shape, cutting just outside the line.

Step 2: To make the inner housings (F), cut one $1\frac{1}{2} \times 10$ " piece of $\frac{1}{2}$ "-thick maple. Next, using one of the sidewheel housings you just cut as a pattern, trace the profile for two inner housings on the piece. Now, bandsaw both parts to shape.

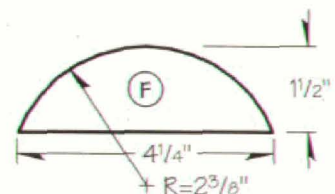
Step 3: Glue one part F to each part E where shown on the Exploded View. After the glue dries, sand the curved edges of both housings smooth. Then, glue the housing assemblies to the boat.

Step 4: Cut four gates (G), two pilot houses (H), two pilot house roofs (I), and two smokestack bases (J) using the dimensions listed on the Bill of Materials and shown on the drawings. (We made the gates out of purpleheart, the pilot houses out of cherry, and the roofs and smokestack bases out of padauk.)

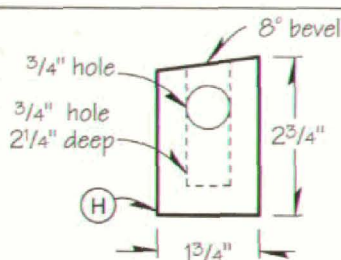
Step 5: Lay out and drill $\frac{5}{8}$ " holes through the gates where shown. Next,



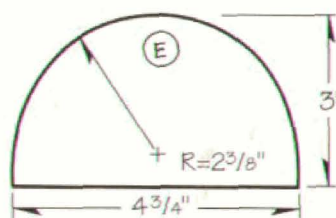
Gate



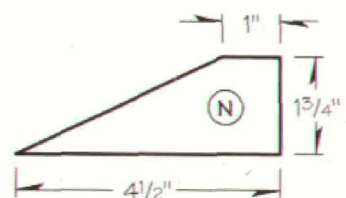
Inner housing



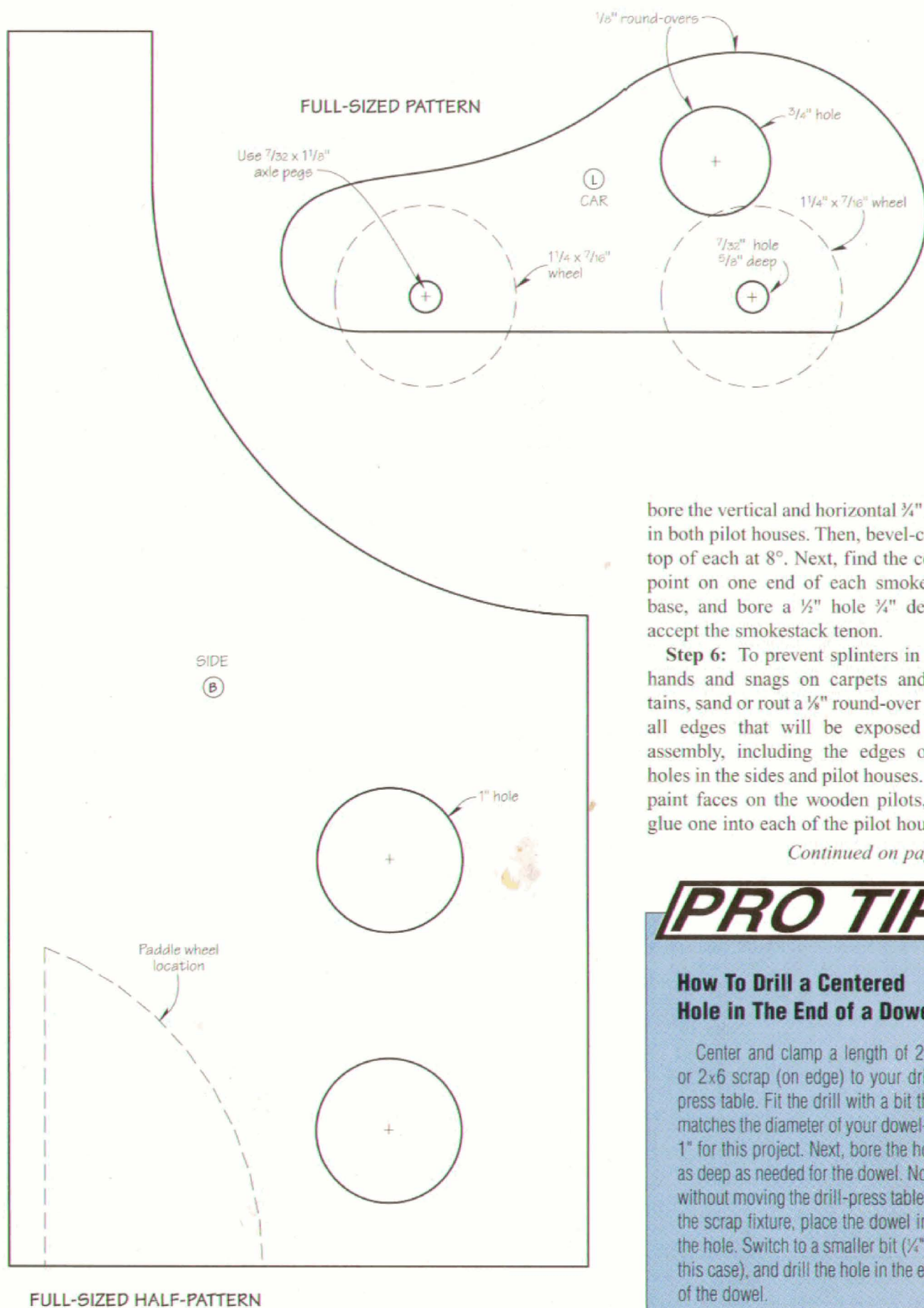
Pilot house



Sidewheel housing



Ramp



bore the vertical and horizontal 3/4" holes in both pilot houses. Then, bevel-cut the top of each at 8°. Next, find the center-point on one end of each smokestack base, and bore a 1/2" hole 3/4" deep to accept the smokestack tenon.

Step 6: To prevent splinters in small hands and snags on carpets and curtains, sand or rout a 1/8" round-over along all edges that will be exposed after assembly, including the edges of the holes in the sides and pilot houses. Now, paint faces on the wooden pilots, then glue one into each of the pilot houses.

Continued on page 61

PRO TIP

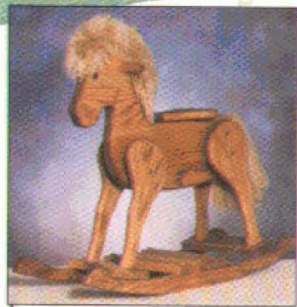
How To Drill a Centered Hole in The End of a Dowel

Center and clamp a length of 2x4 or 2x6 scrap (on edge) to your drill-press table. Fit the drill with a bit that matches the diameter of your dowel—1" for this project. Next, bore the hole as deep as needed for the dowel. Now, without moving the drill-press table or the scrap fixture, place the dowel into the hole. Switch to a smaller bit (1/4" in this case), and drill the hole in the end of the dowel.



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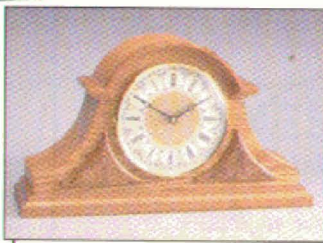


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Circle Reader Service #1010



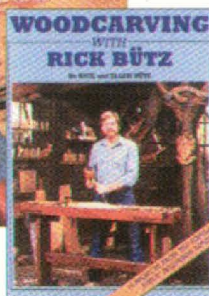
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Continued from page 59

Step 7: Dry-assemble the upper deck to the sides to check for level, and adjust the sides if necessary. Next, glue and clamp the pilot houses and smoke-stack bases to the upper deck. Now, glue and clamp the upper deck to the sides.

Step 8: While waiting for the glue to dry, rip and crosscut two 5"-wide ramps to the dimensions shown on the Ramp drawing. Now, finish rounding any remaining hard edges that will be exposed.

Step 9: Apply the finish of your choice to the boat, gates, and ramps. (We brushed on two liberal coats of Preserve nut oil, allowing each to penetrate for 30 minutes before wiping off the excess. Trim 1/8" from the shafts of the four 1/2"-diameter axle pegs, then attach the deck gates. Be sure to allow some clearance between the gates and the deck surface so the gates will swing freely.

Provide the Ferryboat With a Cargo of Cars

Step 1: To make the cars, you'll first need to prepare the 1 1/4"x2" blank. If you don't have stock this thick, consider laminating thinner pieces to achieve the necessary thickness. (To create interesting effects on the car bodies, try varying the widths and colors of the laminate strips.) You'll need a 4 1/2" length of stock for each car, so for six cars, prepare at least 27" of blank stock.

Step 2: Make a copy of the full-sized Car pattern shown on page 59 using card stock or pasteboard. Align the bottom of the pattern with the bottom edge of the blank, and trace the car profile. Mark the three hole centerpoints at the same time. Lay out the remaining cars the same way.

Step 3: Drill the 3/32" holes through the blank for the axles where marked for each car. Next, bore the 1/4" window hole for each car. Bandsaw each car to shape, sawing slightly wide of the pattern line. Then, using a drum sander, sand the cut edges to the line. Now, sand or rout a 1/8" round-over along all edges, including the window hole edges.

Step 4: Apply the finish of your choice to the cars and wheels. (We painted the wheels, and applied the same finish used on the boat to the car bodies.) After the finish and paint have dried, attach the wheels to the cars using 1/2" toy axle pegs. 

About the Designer

Tom Landon, owner and operator of TLC Toys in Stormville, New York, takes toys pretty seriously. His mission, as he modestly puts it, is "to design and build toys that can be passed on to future generations." If you've ever watched kids play rough with toys, you'll agree that this is no modest goal.

To this end, Tom takes considerable pains developing a design, a strategy that probably derives from his other career—as a digital systems engineer with IBM. There, his creativity and commitment to project development earned him an international patent and several invention disclosures.

Tom started TLC as a weekend venture way back in 1979. The business expanded to the point that it was crowding his daytime job, so in 1990, he took a retirement "bridge" and began scaling back his hours at IBM. Several months ago, he celebrated TLC's fifteenth year of business by fully retiring from the corporate jungle.

Tom's "retirement" finds him busier than ever, exhibiting his line of toys at 20 to 30 shows a year, some as far away as Miami and Chicago. He takes pride in the fact that many customers come back for seconds and thirds, which must say something about the quality of his products.

Kit Source

Hardwood parts kit. Includes 4—1/32x1 1/2" axle pegs, 2—1 1/4x2 5/8" smokestacks, 2—3/8"-diameter children, 24—1 1/4" wheels, 24—1/32x1 1/2" axle pegs. Kit no. 1244. \$7.95 plus \$3.50 shipping and handling. (Minnesota residents add 6.5% sales tax.) Order from:

MEISEL HARDWARE SPECIALTIES
P.O. Box 70
Mound, MN 55364-0070
Telephone 800/441-9870

Photograph: Lynxwiler Photography
Illustrations: CAD Art



Readers' Information Exchange

Looking for an owner's manual for an old bandsaw? Need a bearing for a hand-me-down tablesaw? Can't find a source of supply for an odd piece of hardware? Maybe our readers can help. Send along your request and we'll try to list it here—and perhaps one of our readers will have an answer for you. We'll include as many requests as space permits.

After reading this page for years, I find that I need help too! I would like some information on a 4" jointer-planer made by Shop Master, serial number 1608, 22 $\frac{1}{2}$ " total length. I would like an owner's and parts manual, and any other information available.

Wilson E. Ayers
8107 Kenwood Dr.
Norfolk, VA 23518-2715

I would like to make a full-sized old-fashioned wagon wheel. Can anyone tell me where I can get a set of plans?

John R. Vasant
2513 Lyon Dr.
Annapolis, MD 21403

I make miniature log cabins using $\frac{1}{8}$ " dowels. I have to cut them to various lengths, which gets to be very tedious. Other than cutting the dowels by hand as I do now, does anyone know if there's a machine that can cut the dowels without splintering them?

B. M. Amaker
2817 W. 43rd Place
Los Angeles, CA 90008

I have written to companies for information on brush seals for doors without any luck. I need approximately 50' of $\frac{1}{8}$ "-thick brush seal to fit in milled grooves around a patio door. The door was manufactured by a Florida

firm under the name "Patio Rama." I would appreciate it if anyone could provide me with a source or any additional information.

John E. Tucker
809 Lakewood Drive
Colonial Heights, VA 23834

I would like to find an owner's manual for a 16" wood planer manufactured by Hermance Machine Company, Williamsport, Pa. The serial number tag reads "W.T.R. Co. 825". It originally ran with a line shaft. Any information would be helpful and appreciated.

Gerald Kerr
352 W. Babler Rd.
Dakota, IL 61018

Special Techniques

Continued from page 16

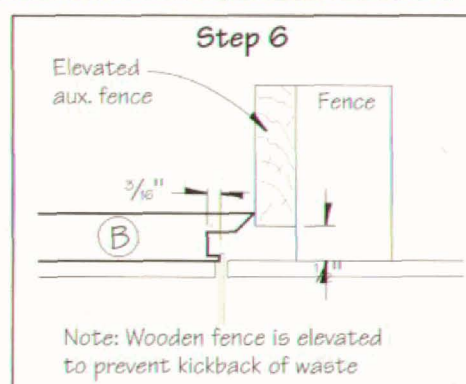
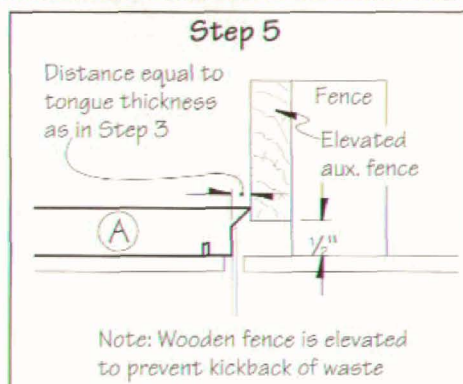
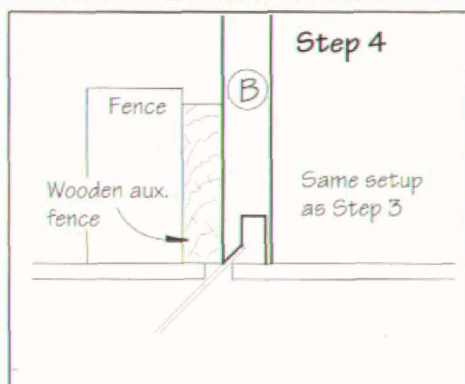
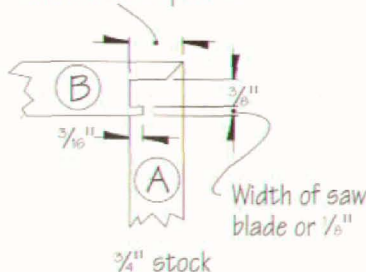
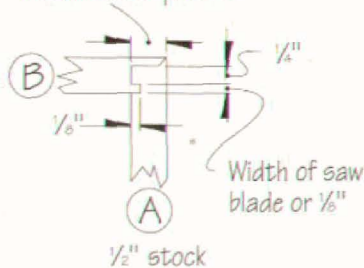


Figure 1: Adjust dimensions to fit your stock thickness

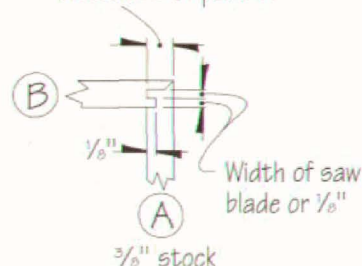
Depth of dado equal to thickness of part A



Depth of dado equal to thickness of part A



Depth of dado equal to thickness of part A



Step 4: Using the same setup as in step 3, miter-cut the end of each part B where shown.

Step 5: Remove your wooden auxiliary fence, and rip $\frac{1}{2}$ " from the bottom edge (or simply elevate it $\frac{1}{2}$ " before reattaching). Next, reattach it to the opposite side of your rip fence as

shown, leaving a gap to prevent kickback of the waste piece you'll remove in this step. Then, move the fence back to the other side of the blade. Now, reset the blade to perpendicular. Elevate it to a height equal to the tongue thickness on part B, and then cut away the waste on the end of each part A.

Step 6: Reset your rip fence, then trim the tongue on parts B to the appropriate length for the thickness of stock you're using. (See figure 1 to establish appropriate dimensions for $\frac{3}{4}$ "-, $\frac{1}{2}$ "-, and $\frac{3}{8}$ "-thick stocks.) 

Contributor: Bob Colpetzer
Photograph: Kevin May

COUNTRY COLONIAL BLANKET CHEST



The project suggestion file here at the *Woodworker's Journal* magazine office provides a fount of interesting reading. Requests of late have run the gamut from coffins to cupolas. (We've actually had several requests for coffin plans.) One project that perennially gets votes is a blanket chest. More than a few years have passed since our last blanket chest, but we think you'll agree that this handsome chest was worth the wait.

One look and you'll see that our chest has an authentic country colonial design, right down to the old-fashioned snipe hinges. We included a single drawer and detailed the front with traditional pinwheel and fan carvings, but you can build yours with any number of variations. For example, you can simplify construction by eliminating the drawer,

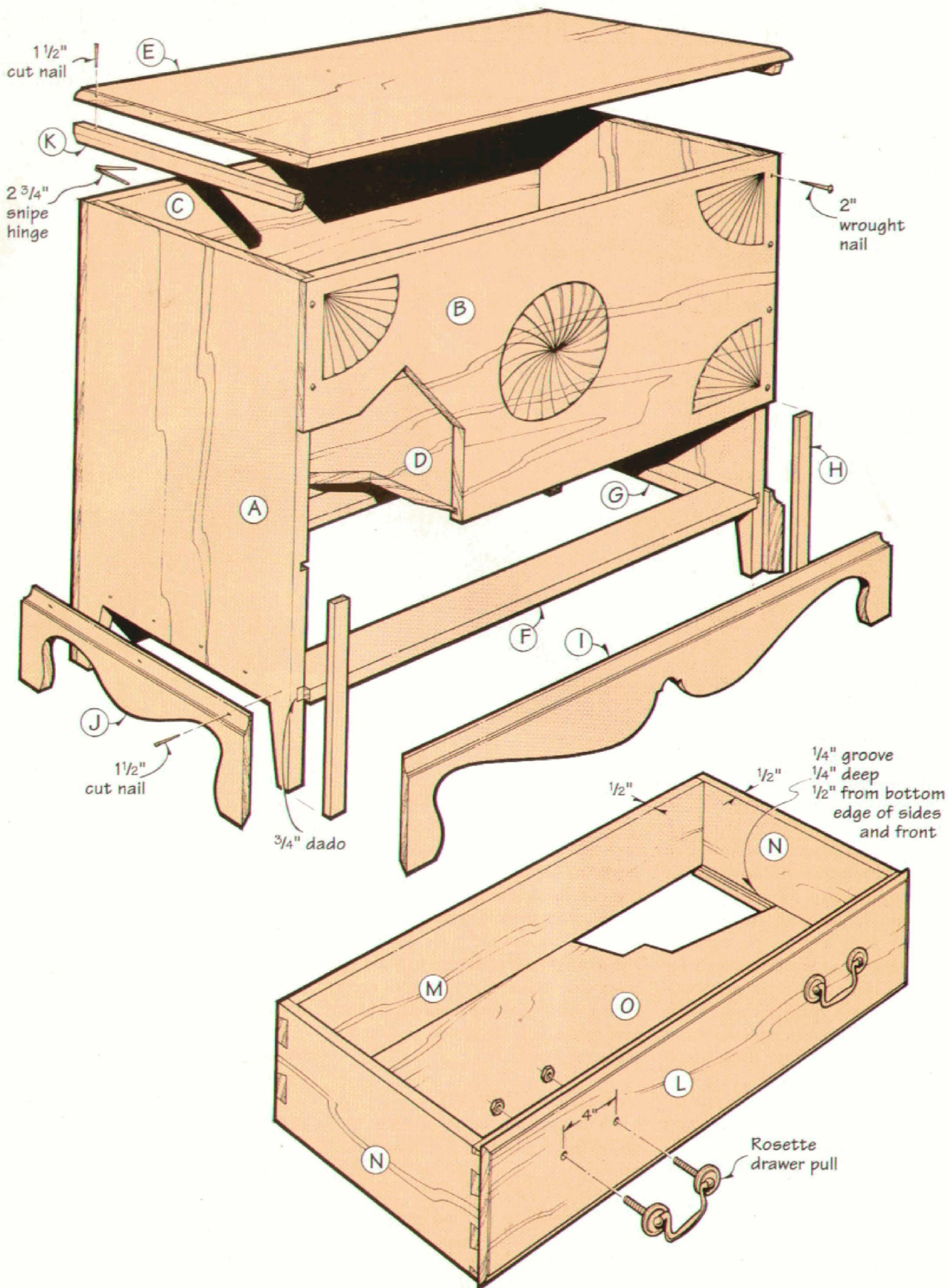
carvings, and paint. You can also add a small tray or a lidded compartment at one end inside the chest, as was commonly done to hold smaller items. In fact, you can use the basic dimensions and techniques shown here to build just about any version that suits your needs, from a basic six-board chest in honey pine to the fully decorated version you see in the photo.

What You'll Need

We crafted our chest of wide pine boards that had been milled from a stand of very old trees felled by Hurricane Andrew several years back. There's a certain temptation to build reproduction pieces using the same materials as would have been used in an original, and we were fortunate to find boards wide enough to require no edge-gluing. If you

don't have access to wide slabs of lumber, you can edge-glue your panels from 1x6 dimensional lumber, or switch to a different species of wood. (Note: If you do edge-glue, remember to check the annual rings in the end grain of your stock, and alternate faceup with face-down boards to minimize warping.)

We suggest you have the hardware on hand before you start. (See our Sources list on page 70.) You can substitute common nails and butt hinges for the reproduction nails and snipe hinges we show, but using authentic hardware really turns this chest into a conversation piece. In colonial days, the local blacksmith could easily have crafted snipe hinges and wrought head nails, which made them cheap and plentiful. The brass pulls, however, probably would have been imported from England at considerably higher prices.



Bill Of Materials

PART	T	W	L	MAT.	No.
CHEST					
A	3/4"	17 1/4"	29 1/4"	P	2
B	3/4"	17 5/8"	40"	P	1
C	3/4"	29 1/4"	40"	P	1
D	3/4"	17 1/4"	39 1/4"	P	1
E	3/4"	18 3/4"	41 1/2"	P	1
F	3/4"	3"	39 1/4"	P	2
G	3/4"	1 1/2"	12"	P	2
H	3/8"	3/4"	11 5/8"	P	2
I	3/4"	5 3/4"	41 1/2"	P	1
J	3/4"	5 3/4"	18 3/4"	P	2
K	3/4"	1 1/4"	18"	M	2
DRAWER					
L	3/4"	6 1/4"	39 1/4"	P	1
M	1/2"	5 5/8"	38 1/2"	P	1
N	1/2"	5 5/8"	17 1/4"	P	2
O	1/2"	17"	38"	P	1

*Figure the actual dimensions of your bottom panels to allow a little room for seasonal wood expansion/contraction

**Length includes tenons

Materials list: P—pine; M—maple

Supplies: 2—rosette pulls (4" centers); 2—snipe hinges, 2 3/4" long (each segment); 20—wrought head nails, 2" long; 25—cut nails, 1 1/2" long; paints and/or stain.

A Word About Chest Construction

Glance at the exploded view, and you'll note that after removing the base and drawer, the remaining chest is pretty much just a big box. However, experienced woodworkers will note some juxtapositions with respect to grain direction. For example, the grain in the sides (A) runs vertically, in contrast to the horizontally grained front and back boards (B and C). Joining parts this wide in cross-grain orientation almost certainly guarantees trouble, and the wide cracks that you often see on museum originals testify to the perils.

But if time could be reversed, we'd see that these cross-grain chests probably served admirably for most of their functional lives, which were spent in the drafty, uninsulated homes of colonial America. It was usually when such pieces found their way into airtight, centrally heated houses that the parts dried out enough to cause shrinkage and other wood movement problems.

In deference to central heating, we used very little glue in our assembly. Aside from the drawer frame and drawer, the base front and miter joints, and the filler strips, we assembled the chest entirely using old-fashioned nails. This approach allows considerable wood movement, which should forestall any cracking.

First, Prepare and Edge-Glue the Panels

Step 1: Start by preparing and edge-gluing stock for the sides (A), front (B), back (C), bottom (D), and lid (E). We suggest using 3/4 x 5 1/4" (1 x 6) stock; you'll need six widths of 1x6 to make the back and four widths to make the other parts. Crosscut the 22 required pieces to rough length (finished length plus 1"), then plane the edges of each on your jointer.

Step 2: Glue and clamp each panel, then allow the glue to dry overnight. Next, unclamp the panels, and scrape off any glue squeeze-out. To give the exposed

faces of the outside panels a little "character," use the planing technique outlined in "For That Antique Look" on page 70. Now, trim each panel except for the bottom (D) to finished length and width.

Add the Rabbits, Grooves, and Chamfers

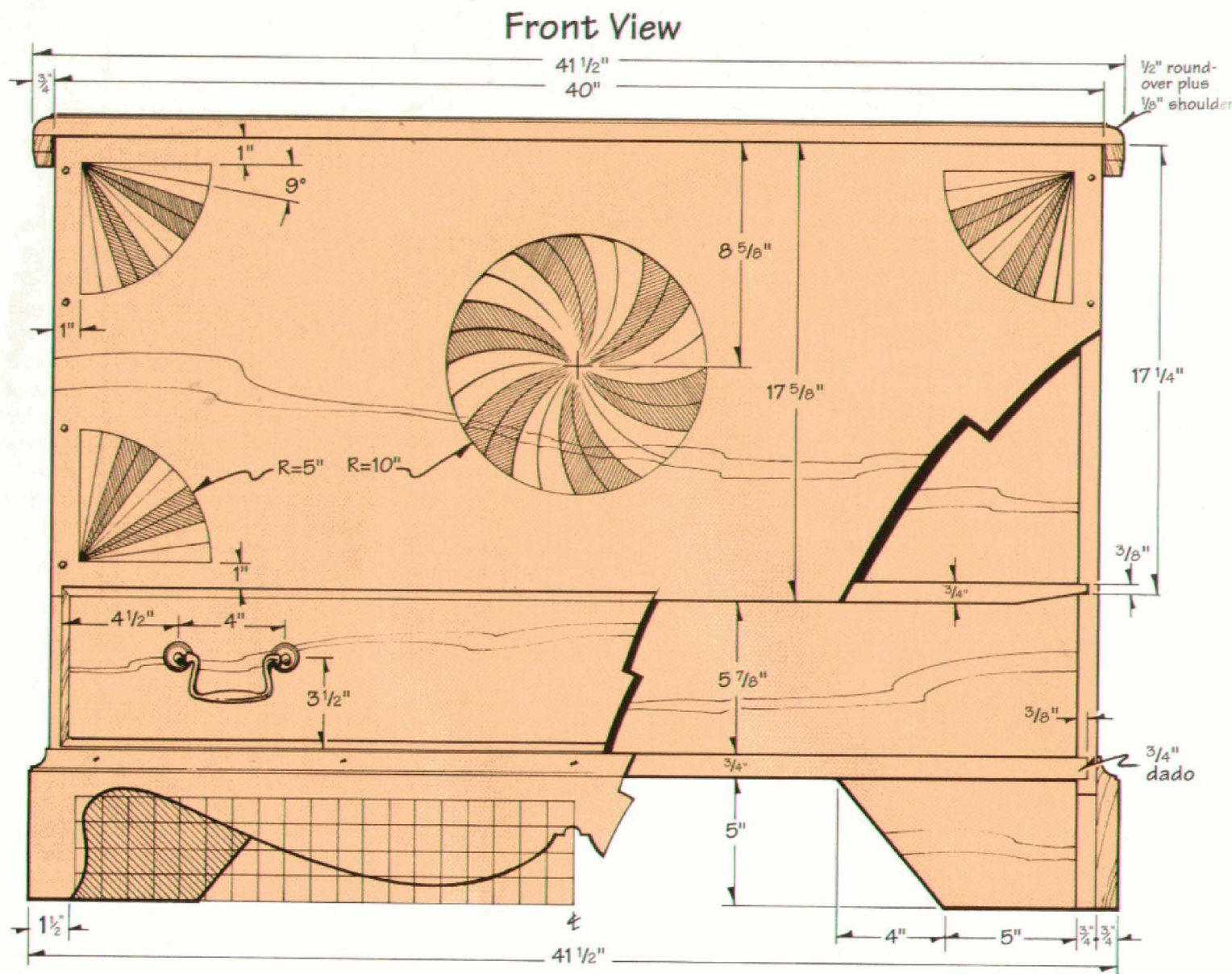
Step 1: Rabbet the ends of the front and back panels (B and C) to accept the sides (A). To do this, first attach a 3/4"-thick wooden auxiliary fence to your saw's rip fence. Next, fit your tablesaw with a 3/4" dado set. Run the dado up 1/2" into the auxiliary fence, and then reset the fence and dado head to cut a 3/4"-wide dado 3/8" deep. Cut the rabbets where shown (figure A). Now, cut a 3/4" dado 5" from the bottom end of each side (A) where shown on the Front View on page 66 to accept the bottom frame.

Step 2: Change to a 3/8" dado set, and cut a 3/8"-deep dado in the sides to accept the bottom panel (D). (Again, see the Front View.) Next, cut matching grooves into the front and back panels (B and C) where shown on the Side View on page 67. (Note: We use the term *dado* in reference to a crossgrain slot and *groove* to signify a slot cut with the grain.)

Step 3: Finally, make the cutouts at the bottom of the sides and back. (See the Front and Side Views.) A portable jigsaw works best here, since these parts are too unwieldy to maneuver on the bandsaw.

Step 4: Dry-assemble the back, front, and sides using masking tape or bar clamps to hold the parts together. Measure the interior, then rip and crosscut the bottom panel (D) to size. (Although we've dimensioned the bottom in our Bill of Materials for a no-gap fit, you should size the panel 1/16" smaller than the actual groove-to-groove distance to allow for a little wood movement.)

Step 5: Next, chamfer the bottom edges of the bottom panel as shown on the Front and Side Views to fit the 3/8"-wide groove. Although you can hand-plane this chamfer as you'd have done 200 years ago, it's much easier to use a tablesaw. However, you'll need a tall auxiliary rip fence to properly support a panel this large. (See our Jigs and Fixtures article on page 72 if you don't already have such a fence.) Elevate your saw blade to 2 3/4", then tilt it to 12° from vertical. Position your tall auxiliary rip fence 1/4" from the bottom of the blade on the side opposite its direction of tilt. (By the way, you'll probably need to



use a wide-slot insert on your tablesaw to permit this much blade tilt.) Place the panel on edge and chamfer the ends first, then the edges. Now, dry-assemble the components again to check the bottom for fit.

Next, Lay Out and Carve the Decorative Details

If you've decided to include the carved decorations on your chest, add them now. Refer to the section titled "Make the Pinwheel and Fan Carvings" on page 69 for the surprisingly easy how-to instructions.

Build the Bottom Frame, Then Assemble the Box

Step 1: To make the bottom frame stretchers (F), rip and crosscut two 3x39 1/4"

pieces of 3/4"-thick stock. Next, cut two 1 1/2 x 12" pieces of the same stock for the frame runners (G). Using your table-mounted router and a 1/4" slotting cutter set to cut 1/2" deep, cut full-length grooves along one edge of each stretcher (*figure B*). (Note: Don't notch the front corners of the frame just yet—we'll cut these after assembling the frame and chest.)

Step 2: Cut a 1/4"-thick tenon 1/2"-long on both ends of each runner (G). (See *figure B* for details.) To cut the tenons, fit your tablesaw with a 1/2" dado set and elevate it to 1/4". Next, glue, assemble, and clamp the frame parts. Check the frame for square and for flatness, then allow the glue to dry. (Note: The bottom frame is sized to allow a 1/4" space between it and the back of the chest. This allows the chest sides 1/4" of shrinkage without blowing out the back or front base.)

Step 3: Dry-assemble the chest by first fitting the sides (A) onto the bottom frame, allowing the front edge of the frame to protrude 1/8" forward of the sides. Next, fit the bottom (D) into its dadoes on the sides, then add the front and back (B and C). Adjust the fit wherever necessary. When everything fits, reassemble the parts in the same order. Although you can apply a little glue along the first several inches of the frame rails (G), don't glue the full length of the rail into the dadoes in the sides. Instead, drive several finishing nails through the sides to anchor the frame in the side dadoes.

Step 4: Lay out and drill shank holes in the front and back panels for the wrought head nails where shown on the Exploded View. Make these holes slightly oversized (*figure A*) to permit a little

[illegible]

Next, Add the Trim and Attach the Lid

lay the three parts facedown, and rout the cove (*figure C*). Elevate the bit another $\frac{1}{8}$ " for a $\frac{5}{8}$ " cut, and make another pass. Next, switch to a straight bit elevated to $\frac{1}{8}$ ", lay the stock flat, reset your fence, and rout the $\frac{1}{8}$ " shoulder where shown. (Note: A classical bit offers an interesting alternative to this profile.)

Step 2: Check the actual dimensions of your assembled box, then miter both ends of the front base piece to finished length. Next, miter one end of both side base pieces, making sure you cut the miter on the correct ends. Then, trim the plain ends to length. Enlarge the gridded patterns shown on the Front and Side Views, and transfer them to the front base and one of the sides. Stack the two side pieces using double-faced carpet tape, and bandsaw the profiles to shape. Use a drum sander to smooth the sawn edges.

Step 3: To attach the base, first drill shank holes in the side base pieces for the cut nails. Next, nail one side base in place without glue. Apply glue to the mating mitered surfaces and along the front edge of the bottom frame stretcher. Glue, assemble, and clamp the front base in position. Now, attach the remaining side base piece.

Step 4: Fit your table-mounted router with a fence and a $\frac{5}{8}$ "-radius round-over bit elevated to cut a $\frac{1}{8}$ " shoulder. Rout the top edge of the lid along the front and both ends. To make a pair of battens (K), rip and crosscut a $3\frac{1}{2} \times 18$ " piece of

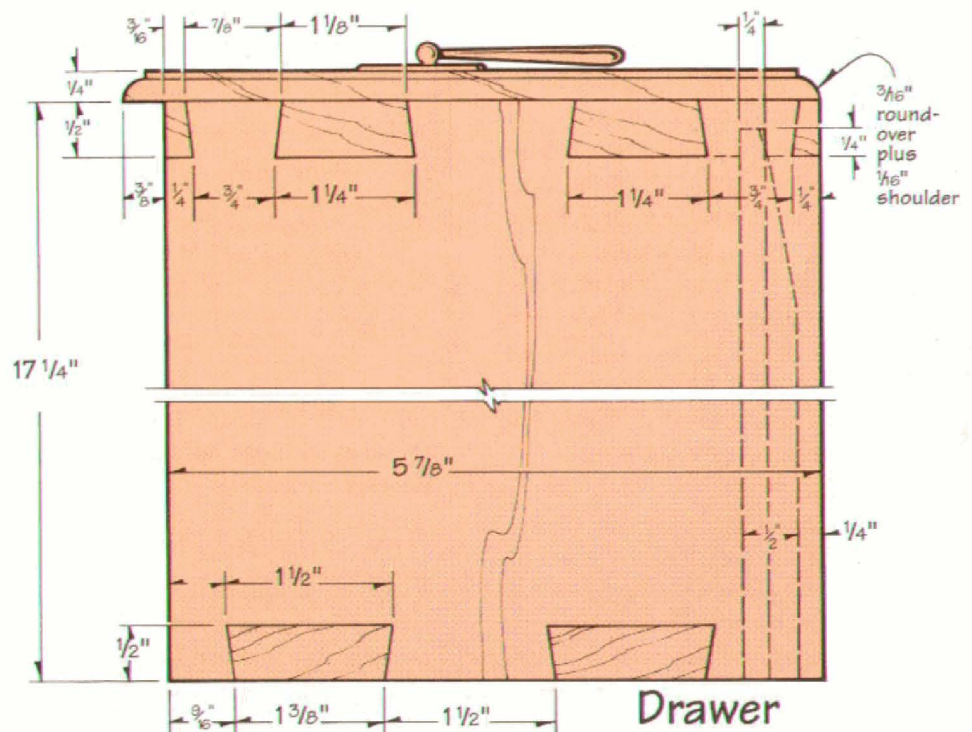


Figure B

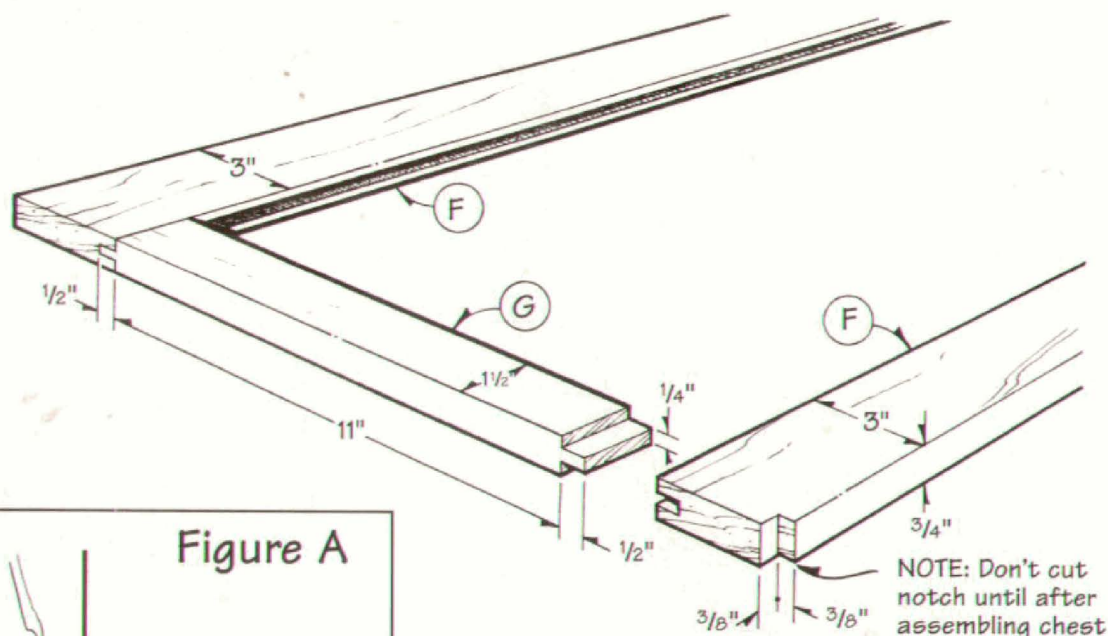


Figure A

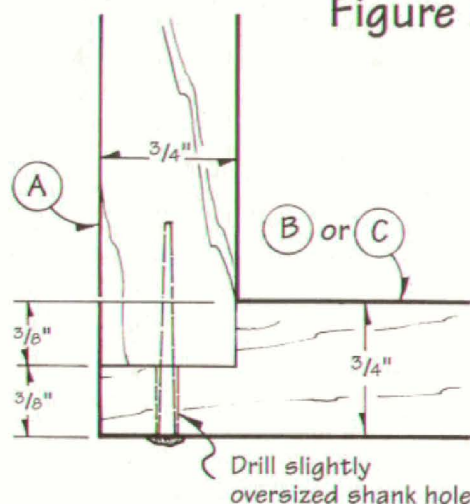


Figure C

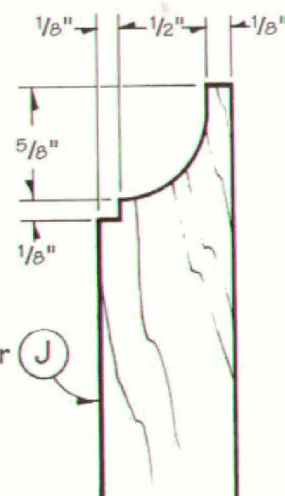
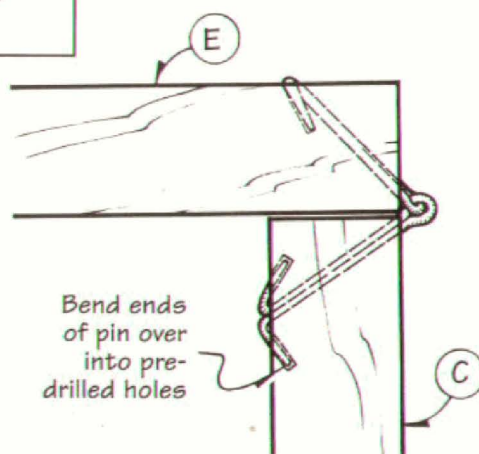


Figure D



3/4"-thick stock. (We made ours of maple to add rigidity to the lid.) Tilt your tablesaw blade to 15° from vertical, and set your rip fence 3/8" from the blade on the side opposite its direction of tilt. Stand your batten stock on edge, and bevel-rip it. Turn the stock edge for edge, and bevel-rip again. Now, rip a 1 1/2"-wide batten from each edge. Using the same saw setup and your miter gauge, bevel-cut both ends of each batten. (See the Side View). Drill shank holes for cut nails where shown on the Exploded View, then nail the battens to the lid ends.

Step 5: Attach the lid to the chest using authentic snipe hinges. To do this, you'll need to drill diagonal holes in the lid and back (figure D), being careful to align them properly. Once you've inserted the hinges, use a needle-nosed pliers to bend the ends of the hinge pins over and into small pre-drilled holes adjacent

to the main hinge hole. Finally, hammer the ends in flush.

Now, For the Drawer and the Finish

Step 1: From 3/4"-thick stock, rip and crosscut the drawer front (L) to size. Next, cut the back (M) and sides (N) to size from 1/2"-thick stock. Now, edge-

glue and clamp enough 1/2"-thick stock to make an 18x39" panel (rough dimensions) for the drawer bottom (O). Or, if you'd prefer, you can use 1/4"-thick plywood. (Note: Although our Bill Of Materials includes drawer dimensions, size your drawer parts to fit

the actual dimensions of the opening in your assembled chest.)

Step 2: Fit your tablesaw with a 1/4" dado set, and cut a 1/4"-deep groove on the inside face of the drawer sides and front to accept the bottom. (See the Drawer drawing on page 67.) Next, rout a bead along the edges of the drawer front where shown on the Drawer

Make the Pinwheel and Fan Carvings

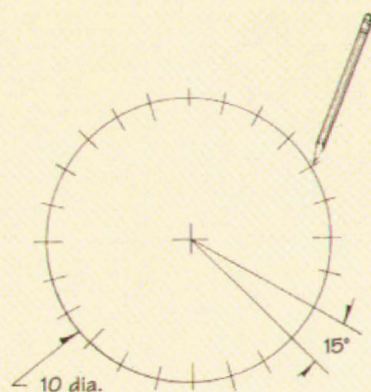
Want to try a simple decorative carving technique? The pinwheel and fans will enhance the appearance of your chest without severely taxing your skills or patience. Although we show fairly large-scale carvings, you can vary the size of the radii to dress up just about any piece, from a small jewelry box to a large kitchen cabinet.

The Pinwheel

Step 1: Using a compass with two sharp points (rather than a pencil lead), scratch a 5"-radius circle. Cut the surface enough that you can follow the line easily with a knife. (We used a pair of dividers with sharp points. This enabled us to scratch and cut in one operation. If you don't own such a compass, try fashioning a homemade trammel that will hold an X-Acto knife.) Using a protractor and pencil, divide the circle into 15° segments, and mark the perimeter at each point.

Step 2: Using the same 5"-radius compass setting, locate the compass centerpoint from one of the 15° marks, and scratch an arc. Move the centerpoint up one segment, and scratch a second arc. Repeat this process until you've scratched all of the arcs.

Step 3: Using a sharp knife, such as a chip-carving knife, make a tapered cut along each arc. This cut should taper smoothly from about 1/8" deep at the perimeter up to the surface at the centerpoint. Make a similarly tapered cut along the perimeter of each segment, cutting 1/8" deep where it meets the 1/8" arc cut, then angle it up to the surface where it meets the adjoining arc. Finally, make an angled paring cut along each of the arcs, creating the pinwheel effect.

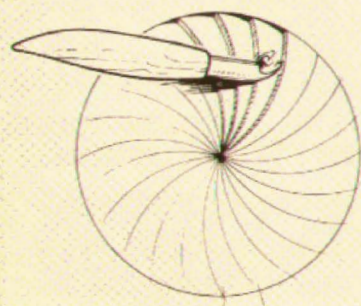
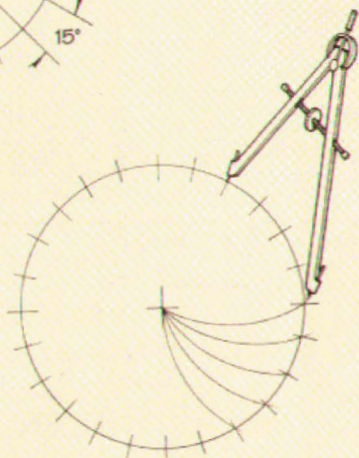


Step 1 PINWHEEL

Scribe 5" radius circle, mark every 15°

Step 2

Using the same dividers setting, scribe the arcs



Step 3

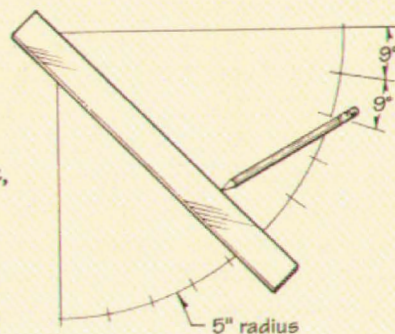
Make tapered cut along curve and pare to it

The Fan

Step 1: Scratch a 5"-radius quadrant (1/4 of a circle) at each of the four corners, then divide each of these 90° quadrants into 10 equal 9° arcs, marking each arc on the perimeter. Scratch a straight line from each mark to the centerpoint.

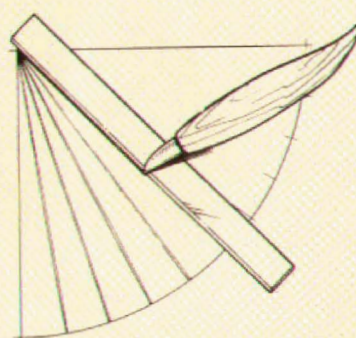
Step 2: Using a sharp knife, make a 1/8"-deep cut along each arc line. At the perimeter, make a cut that tapers in depth from about 1/8" at each arc line up to the surface in the area between the arc lines.

Step 3: Make a series of paring cuts along the sides of each arc to create an evenly rounded convex profile.



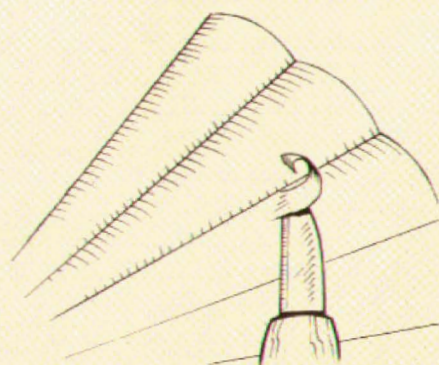
Step 1 FAN

Scribe the quadrant, mark the arcs



Step 2

Make depth cuts



Step 3

Pare to round each convex segment

drawing using a $\frac{3}{16}$ "-radius round-over bit elevated to cut a $\frac{1}{8}$ " shoulder. Next, cut or rout a $\frac{3}{8}$ "-wide rabbet $\frac{1}{2}$ " deep on the back of the drawer front excluding the bottom edge. (We used our tablesaw and a single blade, cutting the cheeks first and then the shoulder.)

Step 3: Make a set of full-sized dovetail patterns using dimensions on the Drawer drawing on page 67. Then, layout the ends of the drawer sides. In this situation, we suggest cutting the tails on the sides first and then tracing and chiseling out the pins on the front. Saw out the tails using a dovetail or Japanese thin-kerf saw and your coping saw. Then chisel the shoulders square. (Note: For some useful pointers on hand-cutting dovetails, see Roger Holmes's technique/project article on page 34. The half-blind dovetails that join the drawer front to the sides are similar to through dovetails but require a bit more chisel work.)

Step 4: To lay out the pins, scribe the tails onto the drawer back and front, making the shoulders $\frac{1}{2}$ " deep. Saw out the pins on the back as you did the tails, then chisel the shoulders square. Next,

start the cuts on the front tails using a saw, then finish them with a chisel.

Step 5: As Roger Holmes recommends, tap the tails about a third of the way onto the pins to check for fit. (Good dovetails, he observes, fit perfectly only once.) Use your chisel as a paring tool to adjust any parts that need it. Now, glue, assemble, and clamp the dovetails. Check the drawer for square and adjust clamps if necessary.

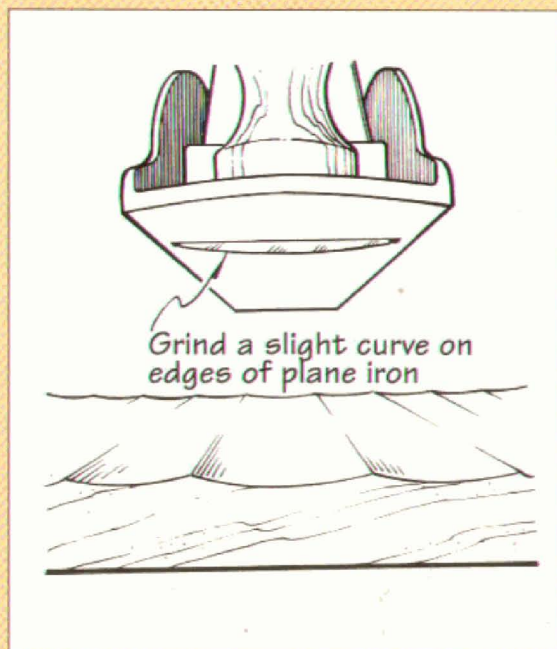
Step 6: While the glue dries, measure the inside dimensions of the drawer, including the groove depth. Then, rip and trim the bottom to fit, allowing about $\frac{1}{8}$ " on width and length for wood movement. Chamfer the bottom along the front and two sides as you did on the chest bottom (D), reducing the thickness to $\frac{3}{16}$ " at the edge. Slide the bottom into position, and secure it to the back using several cut nails. (Remember to drill slightly oversized shank holes first.)

Step 7: We mixed some leftover paints to achieve the color on our chest. If you'd prefer using a historically "authentic" color, Stulb's Old Village Paints are a good choice. (See our Sources list.)

For That Antique Hand-Planed Look

Since our chest is an authentic "country" piece, we wanted it to reflect that look right down to the hand-planed texture of the boards. To get this effect, you'll need to custom-grind a very slight convex edge on a standard plane iron as shown below. (For purposes of illustration, our drawing greatly exaggerates both the surface texture and the plane iron curve.)

Working with the grain, make a series of passes to texture the entire surface. Make single side-by-side passes rather than random passes to avoid changing the overall thickness of the stock. This is important, because you'll later rout the edges of the lid, base parts, and drawer front and carve the front of the chest. You want to achieve the subtle hand-planed look that appears on many authentic country colonial pieces. Plane only the visible surfaces—the lid, sides, front, back, base parts, and drawer front.



We've used alternating black and white paint to highlight our decorative carving, but don't hesitate to use your imagination here. You may want to consider painting only the carvings and finishing the rest of the chest with a natural honey pine or antiqued finish. You could also skip the paint altogether and go with one of these latter options, letting the carved detailing speak for itself. **WWJ**

SOURCES

You can order all of the hardware required to build the chest exactly as shown from:

HORTON BRASSES

Nooks Hill Rd.
Cromwell, CT 06416
Telephone 203/635-4400

Order part H-10 for the rosette pulls (2 required, specify 4" centers); part H-61 for the snipe hinges (2 required); part N-9 for the 2" wrought head nails (nails are sold by the pound); part N-5 for the $1\frac{1}{2}$ " cut nails.

Order historically "authentic" Stulb's Old Village Paints from:

SHAKER WORKSHOPS

P.O. Box 1028
Concord, MA 01742
Telephone 617/646-8985

For a look similar to our chest, ask for Soldier Blue.

Project Design: Mark Ziobro

Illustrations: Dan Thornton

Photograph: Michael Gellatly

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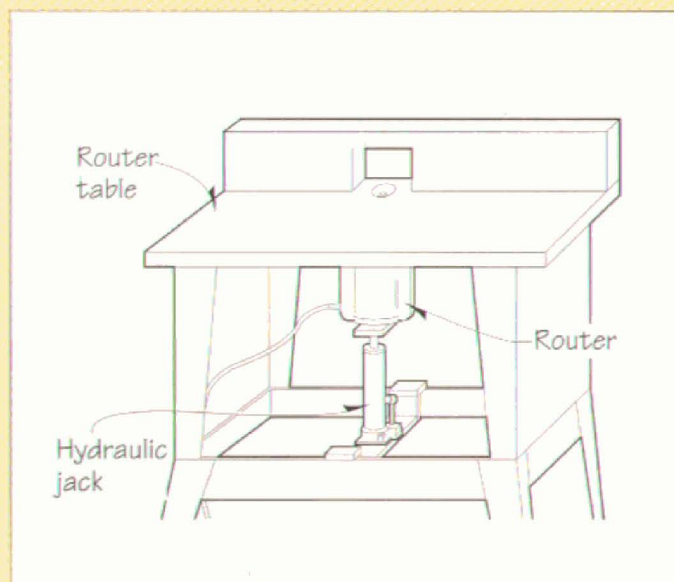
Hydraulic Jack Sets Router Depth

Several years ago my son lost the use of one hand. Since then, I've been making all of our shop equipment accessible to one-handed operation. The biggest obstacle was finding a way to adjust the cutting depth on our table-mounted router.

My solution was to mount a hydraulic jack under the router and use it to raise and lower the router. To do this, I made a small wooden bracket to fit under the router table to hold the jack. I also fashioned a small wooden cap to fit over the top of the jack and to bear against the router.

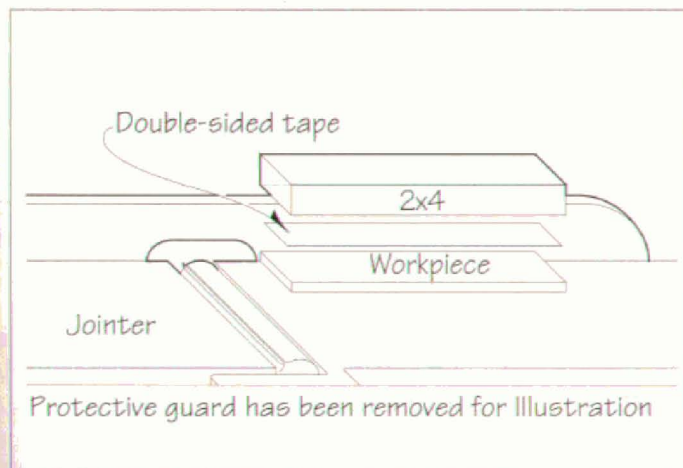
This will work with almost any router. We used a plunge router with a fairly heavy spring action and a depth-adjustment locking lever. To operate it, my son raises or lowers the router to the desired position with the jack and then locks the router with the lever.

John W. Brown, Milton, Pa.



Safer Way To Dress Thin Stock To Size

I often need to dress thin or small workpieces to size on my jointer, which can be difficult to do safely. Now, I simply apply



double-sided tape to the thin material or small pieces, tape them to a 2x4, and then machine them. This way it's safe, accurate, and there's no splintering at the ends.

Howard E. Moody, Upper Jay, N.Y.

More Sources for Scrollsaw Patterns

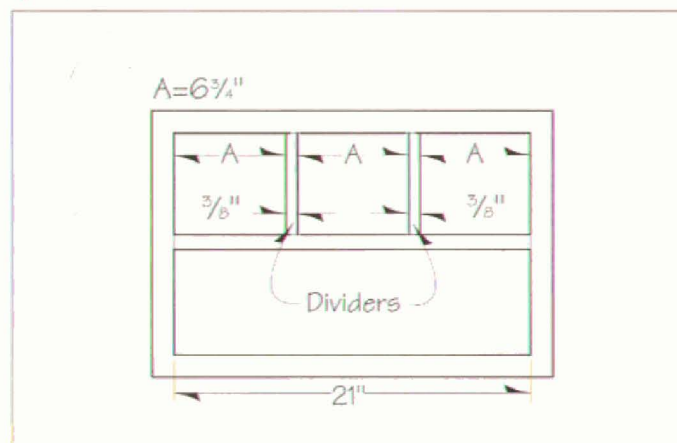
If you're searching for additional sources for scrollsaw patterns, check out the *Scherenschnitte* (scissor cut) and cut-glass designs in your local crafts stores.

L.K. Bolay, Oak Harbor, Ohio

Calculating Equal Spacing On Projects

There are times when we must determine equal spacing of parts on a project. Here's an easy method I use.

Problem: Suppose you want to space two $\frac{3}{8}$ "-thick dividers equally within a 21"-wide frame.



Solution: First, determine the amount of space the dividers will occupy ($2 \times \frac{3}{8}" = \frac{3}{4}"$). Next, subtract this value from the total width ($21 - \frac{3}{4} = 20 \frac{1}{4}"$). Then, divide that value by the number of spaces between the dividers ($20 \frac{1}{4}" \div 3 = 6 \frac{3}{4}"$).

If the answer ends in a decimal, round it to the closest $\frac{1}{32}"$ or whatever tolerance you choose to work with. If you cannot break the fraction equally, making the two outside spacings equal is generally the accepted practice.

John Plank Sr., Waupun, Wis.



Coming Next Issue....

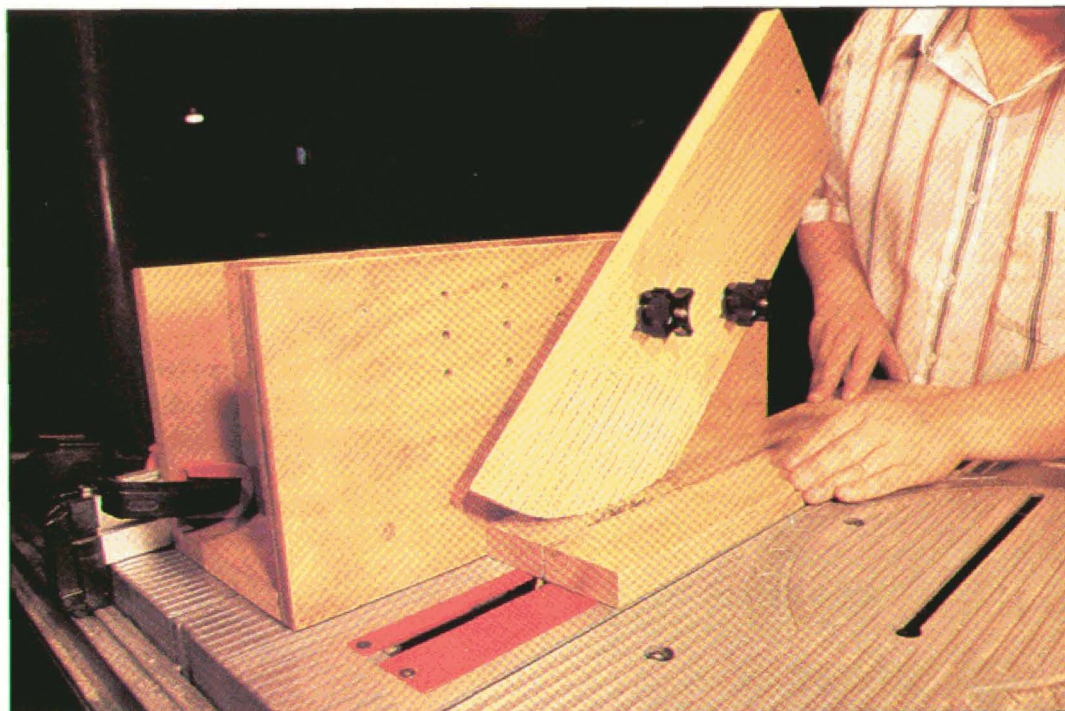
David Holmes' second installment on through dovetails, Mark Ziobro's new Colonial clock, Egyptian bookends from Bill Zaun. Add to this a pierced tin wall cabinet, and child's easel to round-out our great list of new fun-to-make projects.



DYNAMIC DUO: ***TWO SIMPLE JIGS THAT REALLY DELIVER***

If you're just getting started in woodworking and feel overwhelmed by all the equipment and gadgets available, then consider this pair of simple jigs. They'll enable you to perform a host of cutting tasks, from sawing tenons to making raised panels. Best of all, you can make them in your shop in a single afternoon, using stock you probably already have on hand.

by David F. Peters



As a discipline, woodworking isn't exactly rocket science. Spend a couple of weeks reading a book or two on the subject, and you'll gain a fair understanding. However, things can sometimes appear complicated. If you skim a few catalogs and magazines, you'll find a dedicated tool, gadget, or jig designed for any and every woodworking operation. It's commonly assumed that to do real work, you need a shopful of these highly specialized tools and accessories.

But the number of fancy tools and accessories in a shop doesn't necessarily reflect its activity level. Many a shoebox shop, with little more than a tablesaw, drill press, and several hand tools, has turned out work that would seem improbable for such limited means and space. As a measure of productivity, the size of the scrapbox next to the tablesaw, or the presence of a few well-chosen and versatile jigs (usually within arm's

reach of the tablesaw) probably provides a truer gauge.

A Simple Premise—Need

Jig-building has always been, to my way of thinking, one of the great attractions of woodworking. Figuring out a way to accomplish a difficult task with less effort and more accuracy—the cerebral aspect of our craft—is in some ways more rewarding than the task itself. Need I add that shop-built jigs save money? Page through any woodworking catalog, its pages packed with novel attachments and modifications for your favorite tools, and you'll understand what I mean. Whether it's a fancy miter fence or an elaborate tenon jig, there's a commercial jig available—provided your pockets are deep.

Most jigs are born of a simple premise—the desire to do more with less. My woodworking began with only three power tools: a circular saw, a hand

drill, and a portable jigsaw. And like many woodworkers, I fashioned my first projects out of immediate need, not whim or fancy. I look back on these projects, most of which my family and I still use today, and marvel at my (tongue-in-cheek) cleverness. Without benefit of book or instructor, I discovered that a straight board clamped to whatever I was cutting would ensure a straight cut for my circular saw. By temporarily screwing my jigsaw to a length of board, which I then fastened with a nail pivot to the stock I was cutting, I could cut perfect circles. Crude as these simple jigs were, they enabled me to produce flights of sturdy shelves, bookcases, tables, and even a writing desk.

Settled On A Productive Pair

Over the years, I've designed a number of jigs for *Woodworker's Journal*. Most have been fairly straightforward,

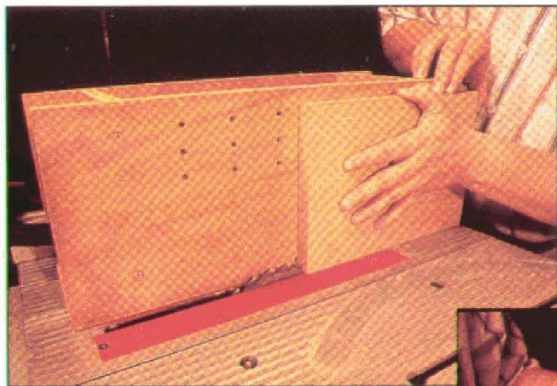


Photo 1

with phenolic knobs, T-nuts, and threaded inserts added where needed to impart ease of adjustment and a measure of permanence to the device. Several of these, such as the Box Joint Jig (Sept./Oct. 1993) and the Dovetail Jig (May/June 1994), I use regularly in my home shop. But these jigs perform a specific task, such as cutting box joints or dovetails.

The jigs that see the most action in my shop are deceptively simple: a right-angle jig and a device I call a box fence. I haven't filed for patents—woodworkers have used versions of these for years. But for nearly a decade, this dynamic duo has served me well enough that I haven't felt any need to buy the fancy aftermarket jigs and fixtures that serve the same functions.

You might scoff at the simplicity of these jigs, but much of what we do in

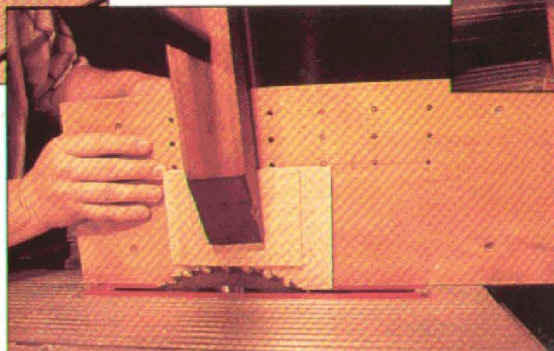


Photo 2

woodworking involves simply supporting the workpiece properly. This typically requires mass, not might or complexity. One could customize these jigs with threaded inserts, springs, rods, sliding stops, and a host of other fancies, but I've never really found these add-ons necessary. Indeed, the featherboard and the clamp bar/stop on my box fence are the only extras I use regularly.

Both jigs perform a variety of tasks, and you can make them out of $\frac{3}{4}$ " plywood or particleboard. When building these, keep in mind, as with all jigs, that any error you make in construction will be passed on to the project you use it on. So, build them dead-on square and accurate. Use a machinist's square, if you have one, to check all faces and edges, both as you cut the parts and as you assemble them.

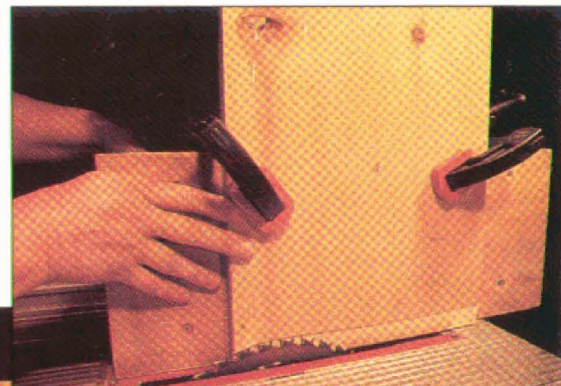


Photo 3

The Box Fence

Many woodworkers keep a wide board that they fasten to the table saw's rip fence for use as a high auxiliary fence; this expedites resawing, panel cutting, and a host of operations. But there's a catch built into such an arrangement: the stability of an auxiliary fence depends on the stability of your rip fence. If you're fortunate enough to have a costly aftermarket fence system (the Excalibur, for example), whatever auxiliary fence you secure to it will also be stable. However, the fence on my 40-year-old Sears table saw has been worn past the point of reliable stability. For that matter, many inexpensive table saws manufactured today come equipped with fence systems that are not substantial enough to support a high auxiliary fence.

My box fence sits flat on its wide base directly on the saw table. This makes it self-supporting; it uses the table saw's rip fence for positioning only. I can clamp it to the rip fence or use it as a sliding work support for tenoning, panel raising, and other common applications. It suffers none of the tippiness that narrow auxiliary rip fences are prone to.

As shown in the drawing on page 75, the box fence has a pair of sides, a bottom, and several crossbraces. The braces are set in from the ends to allow clamping the jig to the rip fence and clamping the stock to the jig. Use glue and screws to assemble it, and square all joints during assembly.

The spacing of the holes in the sides of the box fence and in the clamp bar and the spacing of the slots in the featherboard were designed to allow these parts to be used together in a variety of ways.

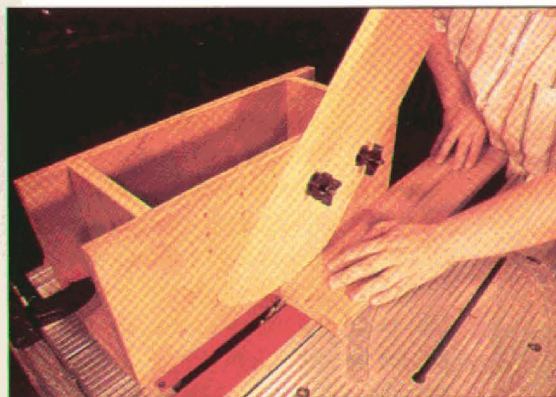


Photo 4

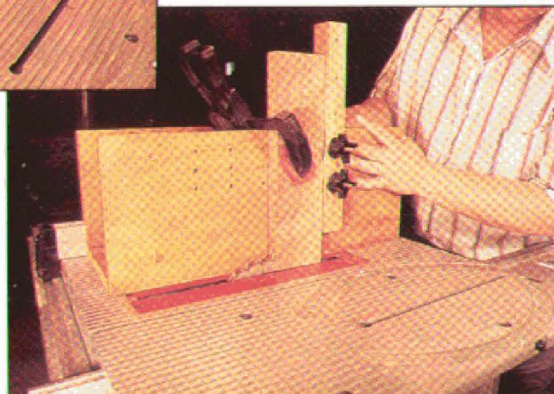


Photo 5

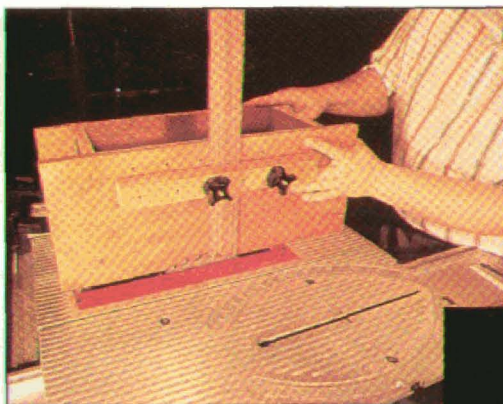


Photo 6

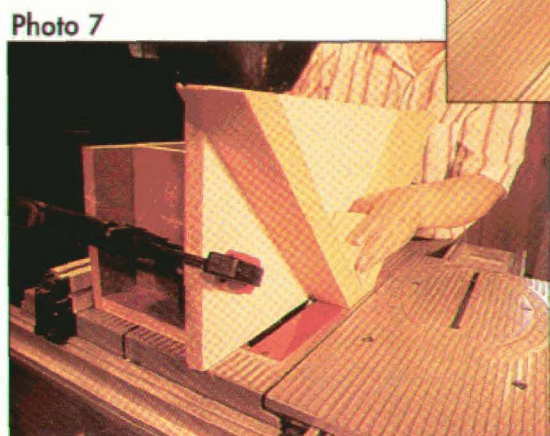


Photo 7

As an auxiliary rip fence: I use the box fence most frequently as a high rip fence. Clamped to the tablesaw rip fence, the box fence provides stable support for wide boards (*photo 1*). It's ideal for a broad range of operations, from cutting grooves for tongue-and-groove work to using the molding head for edging work. If necessary, add featherboards to keep the workpiece tight against the side of the box fence.

As a panel-raising support: Raised panels require a good sturdy surface to support the stock. The box fence works equally well for cutting small panels (*photo 2*) or anchoring larger pieces (*photo 3*). The box fence doesn't tip, a flaw that often plagues smaller supports, making it virtually impossible to make a clean cut. Again, I will use featherboards to keep the stock flush against the fence.

For panel-raising and other angle-cutting, the box fence also contributes to the safety of the operation. Besides helping you keep your hands clear of the blade, it enables you to stand a narrow



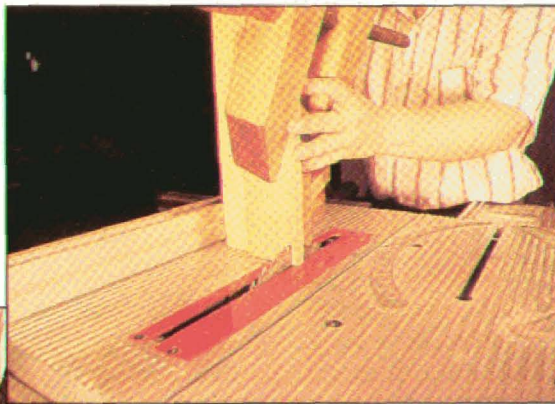
Photo 8

workpiece on end without the risk of dropping it into the throat. This is especially critical in panel-raising work, which requires you to elevate the saw blade well above the tabletop.

As mounting surface: The box fence serves as a rock-solid support for any number of add-ons to make operations safer and more accurate. Note that I've mounted a featherboard above the blade to ensure uniform cutting depth when grooving a long board (*photo 4*). How many times have you grooved such a board, only to discover that the groove depth varies because of warp or unevenness in the stock? Using the box fence as a foundation for mounting any number of guides and hold-downs, you can eliminate problems like these. I've found this jig especially useful for securing hold-downs while molding stock with the tablesaw molding head.

As ripping hold-down: When ripping long boards, it's often difficult to control both the workpiece and the cut-off strip. You can hold one of these, but the other will fall away, leaving you wondering whether it will safely clear the blade. Using a hold-down for ripping work makes the operation safer. The jig allows you to concentrate on handling the cutoff strip (*lead photo*); the hold-down keeps the inside strip in

Photo 9



place until you turn off the saw and remove it.

As a tenon jig: The box fence also makes an ideal tenon jig. Use it either with the clamp bar as a stop (*photo 5*) or with the clamp bar holding the workpiece (*photo 6*).

Be sure to square the workpiece or stop to the table. Assuming you carefully laid out and drilled the holes in the fence side and clamp bar/stop, the alignment should be almost automatic.

As a base for other jigs: The second most-used jig attachment in my shop is a 90° cradle. I use it to spline the corners of decorative boxes and picture frames. Although I've used this jig unsupported (usually when I'm in a hurry), this is a tipsy proposition that often results in sloppy spline grooves. Clamping the cradle to the box fence provides the necessary stability (*photo 7*). This allows me to concentrate on holding the work safely and securely in the cradle and advancing the jig. Any time you increase the steadiness of your work support, you are decreasing the likelihood of an accident, and that's smart woodworking.

The Right-Angle Jig

This jig consists of a reinforced right angle assembled with glue and screws. You can build it using the dimensions shown on the Right Angle drawing on *page 76*. (Although I show the jig being used in crosscutting operations, it isn't intended to replace a good crosscut table for your tablesaw.)

For short cutoff work: Many times, I'll be using the tablesaw for an operation requiring a fussy setup to get that just-right setting on the miter gauge. Naturally, I hate to lose that perfect setting just for some minor cutoff work.

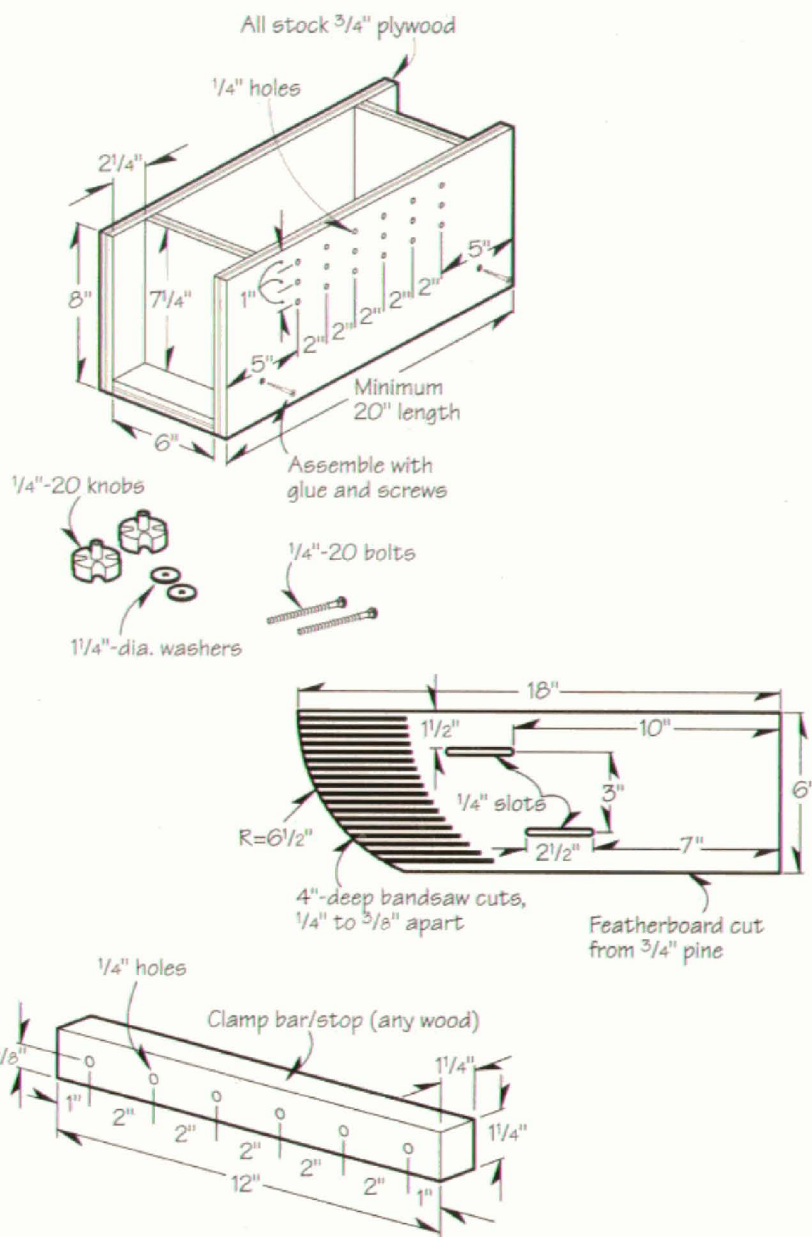
Box Fence

My box fence measures 20" long, 8" high, and 7 1/2" wide. These are the minimum dimensions I'd recommend, but of course you'll want to choose a length that best fits your tablesaw.

Cut the fence from a 30 x 48" piece of 3/4"-thick plywood. First, rip a pair of 8"-wide strips and a pair of 6"-wide strips. Use the 8"-wide strips for the jig sides and one of the 6"-wide pieces for the bottom. Crosscut the remaining 6"-wide piece for the pair of crossbraces.

Assemble the box using glue and screws, and check for square as you work. When assembling jigs like this that require perfect squareness, I'll do the assembly on the flattest available surface, usually my tablesaw. To construct the box fence shown, I placed a piece of 1/4"-thick plywood on the saw table, covered it with some waxed paper, then clamped the jig directly to the rip fence. This ensured that the fence would be perfectly square. Counterbore and countersink the screw holes.

Bore the holes in the jig side before assembly. Note that the hole spacing permits use of the clamp bar in either the horizontal or vertical position. Also, make the featherboard and the clamp bar, taking care to space the holes in the clamp bar as shown so they'll align with the holes in the side of the jig. If you can't buy phenolic knobs locally, use wing nuts instead.



Used on its back (*photo 8*) and with the rip fence, the right-angle jig provides the perfect quick solution for a short stock cutoff fixture (many woodworkers keep a square section of plywood handy as a pusher block to serve just this function). Simply hold the workpiece against the jig, position the rip fence where needed, and slide the jig and workpiece forward, keeping the piece tight against the fence. If necessary, you can use a scrap backup board to prevent tear-out when the blade exits the workpiece.

For end cuts: For any notching cut on the end of a board, or for cutting deep shoulders on the ends of a tenon, I'll flip the jig over on end, clamp the workpiece in place (use a square to get

Photo 10

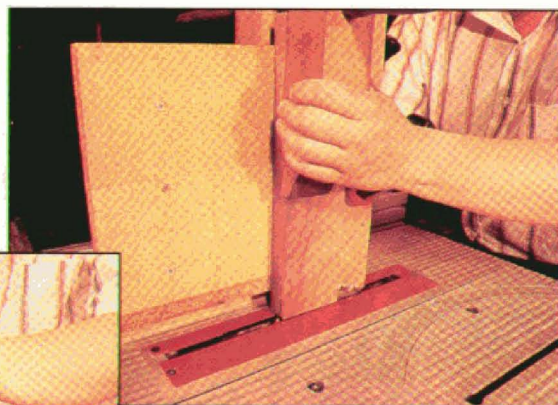
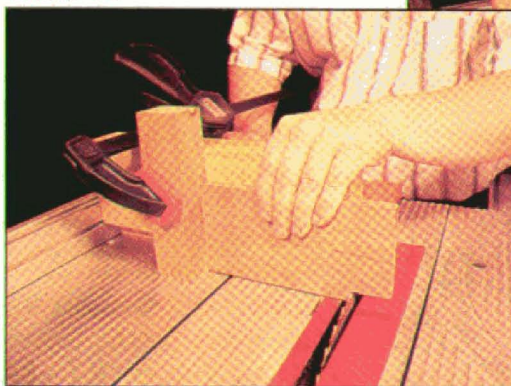
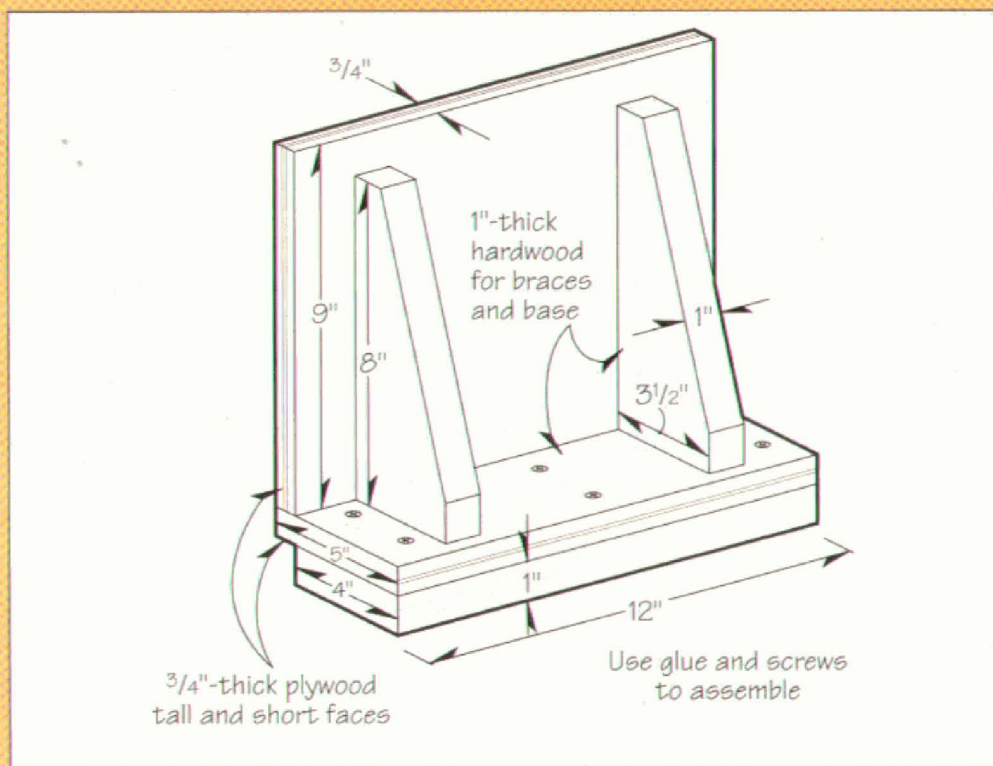


Photo 11

Right-Angle Jig

Build the right-angle jig from particleboard and hardwood. (Substitute plywood for the particleboard if that's what you have handy.) Rip enough 12"-wide stock to yield the particleboard parts, then cut the parts to final size. Cut the hardwood parts from 1"-thick stock. Be careful to cut all parts true and square, then assemble them using glue and screws. Note that the 4"-wide base creates a pocket at the bottom of the jig that helps to clear sawdust easily. Counterbore and countersink all screw holes before assembling.



the piece perfectly vertical), and position the rip fence as needed to properly locate the cut (*photo 9*). This will produce a cleaner cut in less time than using your miter gauge with the workpiece on edge, making multiple passes over a dado head. It also eliminates the need to switch to a dado head, which always seems to take longer than it should.

For edge cuts: In this position, the jig serves as a fixture for making cuts into the edge of a board. As shown in *photo 10*, I'm using the jig to complete and clear the waste for a deep notching cut. Use a stopblock as shown, and you'll eliminate the possibility of any blade creep that could otherwise affect the cut.

For tenoning: The right-angle jig also becomes a handy tenon jig. Assuming that you've built the jig with all edges true and square, simply align a

stopblock with the end of the jig, clamp it in place, and then clamp the workpiece against the stop (*photo 11*). Then, position your tablesaw rip fence as needed, raise the blade to the required height, and advance the jig and workpiece through the blade. Flip the workpiece to the opposite face to cut the other cheek. When using this procedure, always cut a test tenon on a scrap piece of identical thickness first to be sure the tenon ends up the exact thickness that you need. As another option, you can cut one cheek, and then reposition the rip fence for the remaining cheek cut.

The right-angle jig won't be quite as stable as the box fence for tenoning, but it should be more than adequate for most tenon work on shorter pieces. For tenoning work on large or long stock, use the box fence.

By the way, if you're lucky enough to have inherited some old-fashioned hand-screw clamps—as the photo shows—use them. The deep throat and good purchase these old clamps provide enable you to clamp the workpiece securely.

As resawing fence: So far, I've mentioned only tablesaw applications for the right-angle jig. But, you'll find it

equally at home with other shop equipment wherever a straight and true guide surface is useful.

For example, if you clamp the jig flat (on its tall face) to your bandsaw table, its short face becomes the perfect resawing fence. As shown, the jig provides maximum resawing support for my 14" bandsaw (*photo 12*). The step in the jig helps alleviate sawdust buildup that might otherwise prevent your stock from seating flush against the jig face.

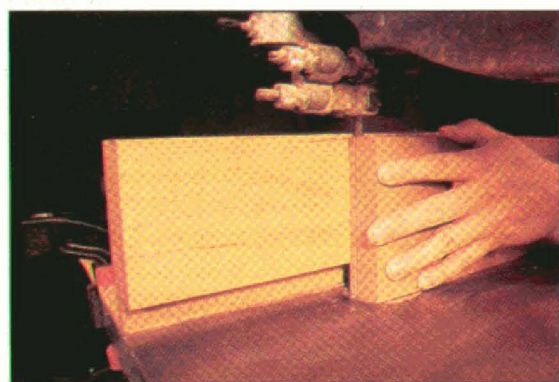
Still More Uses

Both of these jigs can be used in a variety of other ways. For example, the right-angle jig makes a serviceable fence or clamping fixture for your drill press or for any other tool application that requires a sturdy and true right angle. You'll find the box fence even more versatile. I've used it in countless ways—as an auxiliary assembly surface or as a portable router work table, for example.

By inverting the box fence and clamping one side in your bench vise (the 14" distance between the cross-braces should accommodate most bench vise jaws), you can create a handy work table for router inlay or mortise-and-tenon work. The inset crossbraces allow clamping of templates and work to

Continued on page 79

Photo 12





Shoptest

RING MASTER:

Cut rings out of a board to form hollow, cylindrical shapes in wood

by David F. Peters

For several years, I've eyed ads for a device called the Ring Master. Curious to try it out, I wondered at the same time whether this was another "gimmick" tool. Now that it's been on the market for six years and a growing number of proponents are touting its merits, I had the chance to investigate just what it is about this tool that compels some woodworkers to part with more than \$500 to own one.

What It Is

Ring Master operates as a milling machine that uses a pair of matched cutters. It cuts stackable rings from flat wood blanks, utilizing nearly all the wood with very little waste. Its flexible operation permits a user to make a wide variety of projects for minimal material cost.

Ring Master comes in several variations, including one that mounts on a Shopsmith multitool and a variety of others that adapt for use with popular lathes such as Sears and Delta. But whether you buy the self-contained model with its own motor and arbor, or buy a unit that uses your lathe as the power source, you get the same end-product with either setup.

I tested the stand-alone unit, which includes a motor, pulley assembly, arbor, base, and safety deflector (photo 1). The package also contains an instruction



Photo 1: The stand-alone Ring Master unit includes a motor, pulley assembly, arbor, base, and safety deflector.

manual, a handy jig for gluing and clamping projects, plus all the Allen wrenches and other tools you need to adjust the jig and change the cutters. A nice bonus was a project book with dozens of plans for projects such as candlesticks, canisters, and even a bird house.

What It Does

If you've ever tilted the base on your jigsaw and cut a series of concentric circles from a single piece of wood, you've probably discovered that by stacking the circles one upon the other, you can create a vase-shaped vessel. The Ring Master has taken this concept and perfected it. An indexing plate enables you to cut a series of concentric rings with identical wall thickness, and a built-in scale lets you set the cutting angle that works best with the stock thickness you're using. It would take several pages to explain the geometry in detail, but basically, if you take a section of board of a given thickness, and then cut a series of rings from this board at a specific angle, you can then stack these rings one upon the other to create a conical vessel with nearly smooth sides.

Although it's difficult for me to describe and probably for you to visualize, take my word for it—the system works extremely well. In addition to shaped vessels, you can cut straight-sided cylinders, bracelets, napkin rings, round picture and mirror frames, and many other items. By using contrasting woods, varying the way you stack the rings, and employing your imagination, you can multiply the possibilities. Unfortunately, the manufacturer's project book only hints at the ways this tool can be used. (The folks at Ring Master told me that a new project book may be in the works soon.)

How It Performed

Within a half-hour of opening the box, I had the Ring Master up and

running. To test the tool's mettle, I cut a number of blanks from some highly figured $\frac{3}{4}$ "-thick curly maple. After cutting the squares, I nipped the corners and bored a $\frac{1}{2}$ " hole through the center of each for mounting the squares on the arbor as per the instructions. Setting the cutting angle and indexing plate was simple and straightforward.

You initiate the cuts by gradually turning a handle, which advances the cutters into the wood (photo 2). This

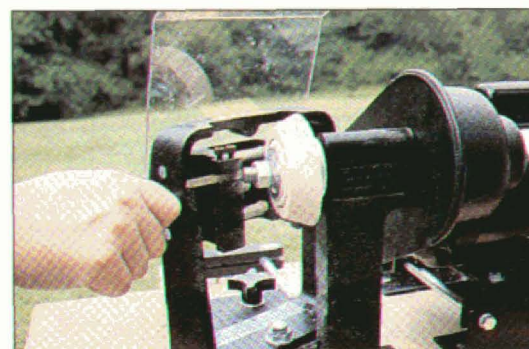


Photo 2: Turning the handle advances the cutters into the stock, making simultaneous cuts from front and back.

makes two cuts simultaneously, one from the back and one from the front. When the two cuts meet in the middle, the cut-off ring falls away.

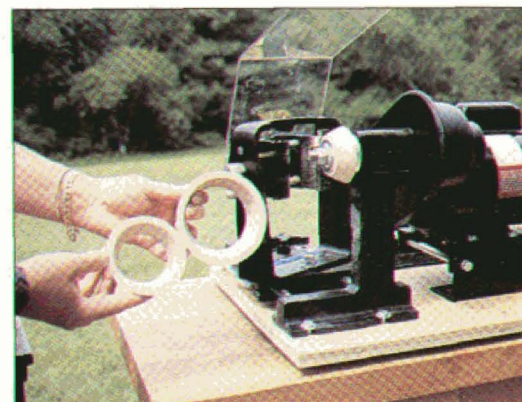


Photo 3: The author had the Ring Master up and running in half an hour and was "really humming" by his third cut.

Although I made my first cut slowly and tentatively, I was really humming by the third ring (photo 3). I did have some

Shoptest

concern as to what would happen when the cut-off ring fell free, but my worry was unfounded; the ring fell harmlessly to the side. You simply flip off the switch, remove the ring, and set the indexing pin for the next cut. Although the model I tested came with all the "bells and whistles" including variable-speed capability, the tool cut so efficiently that I never found it necessary to change speeds.

The Bottom Line

If you need or want a tool for the operation I've described, this one won't disappoint you. The Ring Master is sturdy and well made, and everything works smoothly and efficiently. But the Ring Master package includes much more than just a cutting device. The gluing and clamping jig simplifies assembly of your projects. After glue-up, the tool quickly converts to become an outboard lathe (tool rest included). In this mode, you can reattach the piece to the arbor for additional turning, sanding, finishing, and polishing, to achieve some amazing results (*photo 4*).

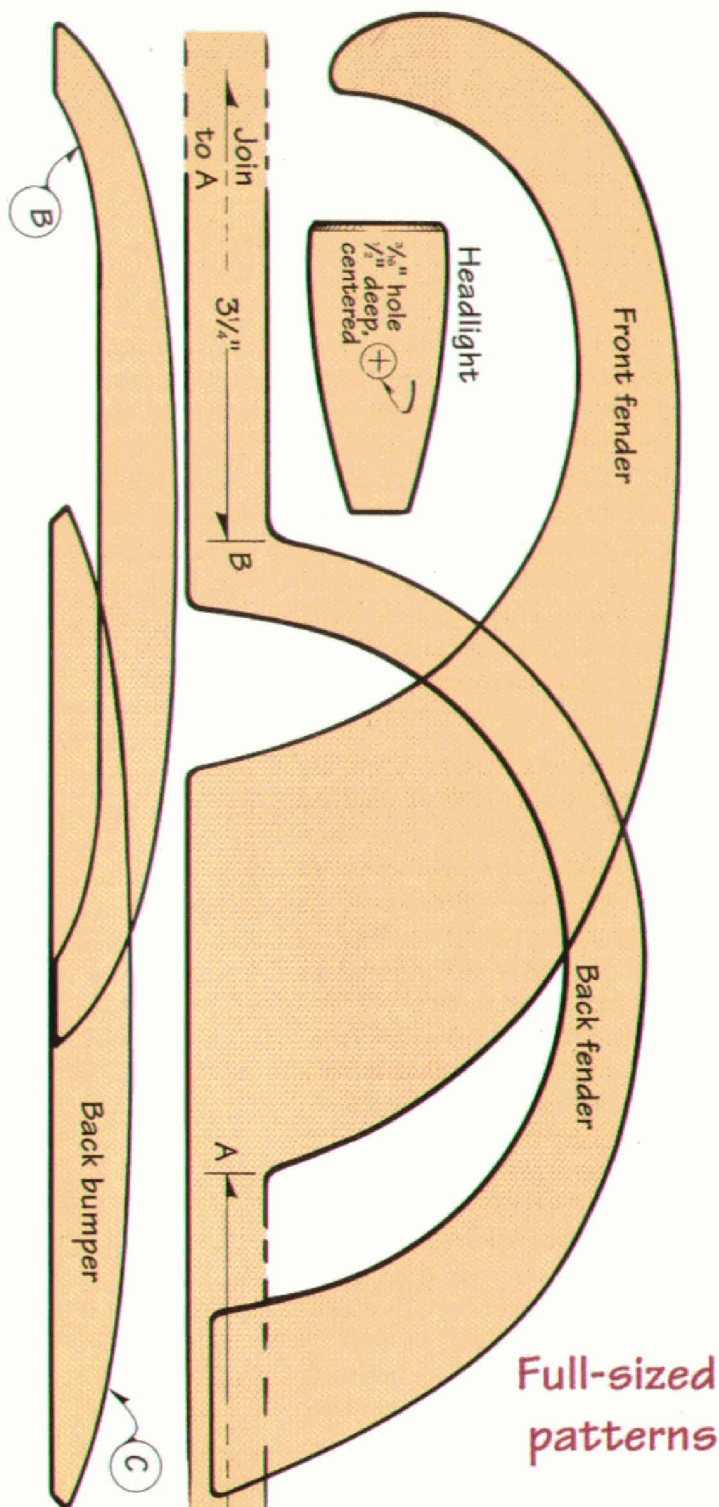


Photo 4: To achieve fancy finishing results like these, you can convert the Ring Master to an outboard lathe. Photo courtesy Ring Master.

Ring Master provides a complete package, including everything you need except the wood. You can start using the tool the first day you own it, and you're pretty much guaranteed to end up with a stack of attractive projects by day's end.

Ring Master may be purchased from Porta-Nails, Inc., P.O. Box 1257, Wilmington, NC 28402. Phone 800/634-9281. Price of unit as tested, \$565; single-speed model, \$469. *Photos by author except where noted.* 

*Classic Coupe
continued from
page 32*



In The Shop

Continued from page 76

both the horizontal and vertical surfaces. The clamp bar can also be utilized for some of these applications. Although I initially thought I'd need a dedicated jig for my mortise-and-tenon router work, the box fence works so well that I've never bothered to make one.

You can spend some serious money on specialized aftermarket jigs for your

tools, or even more time building a stable of dedicated jigs from scratch. But bottom line, I've found that a bit of imagination and a few simple but versatile jigs can serve a multitude of purposes. And that frees up more money to spend on wood and more time for actual woodworking. After all, isn't that what we want? 

Continued from page 55

On this Santa Claus, I used phthalo green for the hat, mittens, and trousers. Cadmium red medium made a nice, bright color for the jacket. Burnt umber provided a warm brown for the belt and boots (*photo 33*).



Photo 32

For the tiny details like the holly and belt buckle, I used Testor's gloss enamels, which are sold in ¼-ounce bottles at any hobby shop. Enamels consist of an opaque pigment mixture suspended in a thick, varnish-like solution. They have excellent covering power and add a bit of gloss. I used green for the holly, red for the berries, and metallic gold for the buckle. Allow the enamels to dry overnight before finishing the carving.

If you'd prefer a slightly weathered or antique appearance, sand the carving very lightly with 280-grit sandpaper. Take just one or two gentle swipes over the surface. This will lighten the paint on the ridges left by the tool marks and give the carving a slightly aged look. Be careful not to overdo this step. You don't want to remove too much paint or blur the tool marks, which would spoil the hand-carved appearance.

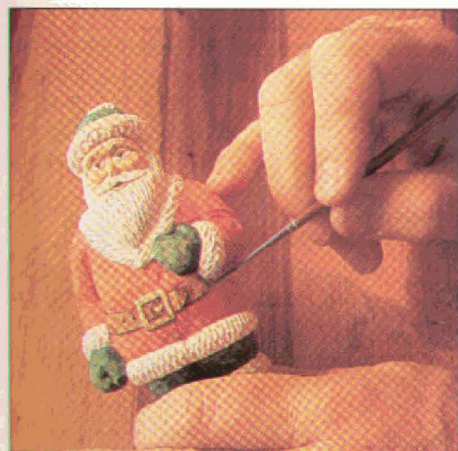


Photo 33

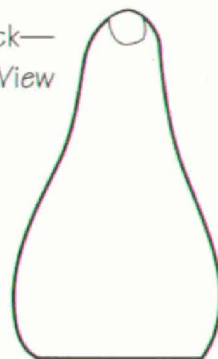
After painting the carving, I finished it with a light coat of a quality paste wax. This protects the wood and adds a subtle patina. Use a soft rag or small bristle brush, working the wax well into the crevices. A thin coat applied lightly works best; the solvent in the wax will dissolve oil-based paints if applied heavily. Let the wax dry for 10 or 15 minutes, then buff it with a soft, clean horsehair shoe brush. As the years go by, the color will darken slightly, adding warmth and character to your carving. 

Photographs: Rick and Ellen Bütz

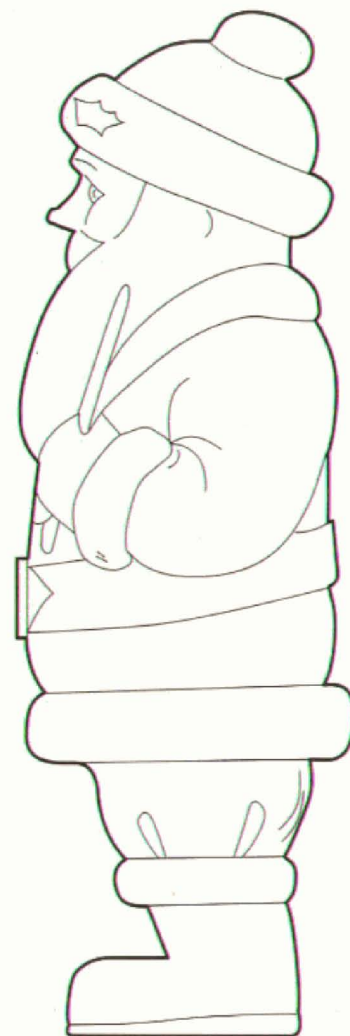
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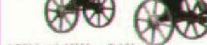


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Econ-Abrasives

WE MAKE ABRASIVE BELTS ANY SIZE, ANY GRIT!

Standard Abrasive Sheets

CABINET PAPER

	50/pk	100/pk
60D	\$15.00	\$27.00C
80D	14.00	25.00C
100 thru 150C	13.00	23.00C

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80A	\$10.00	\$17.00C
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NO LOAD PAPER(white)

100 thru 400A	\$11.00	\$19.00C
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"C" = 100 SHEETS

Velcro® Vacuum Discs

8 Hole pattern for Bosch sanders

Dia.	Grit	Price
5"	60	\$.48ea
5"	80	.46
5"	100 thru 320	.45

* Now in 5 hole pattern *

*Wide Belts*Rolls*Flap Wheels

*Pump Sleeves*PSA Discs

*Router & Wood Bits*Wood Glue

ABRASIVE BELTS

Please Specify Grits

1X30	\$.73 ea	3X24	\$.84 ea
1X42	.73 ea	3X27	.87 ea
1X44	.73 ea	4X21 3/4	.96 ea
2 1/2X16	.77 ea	4X24	.99 ea
3X18	.78 ea	4X36	1.20 ea
3X21	.81 ea	6X48	3.14 ea
3X23 3/4	.84 ea	2 1/4X80	2.94 ea

OTHER SIZES ON REQUEST

HEAVY DUTY SPRING CLAMPS

Clamps come w/PVC tips and grips.

Size	Price
4"	\$1.75 ea
6"	2.25
8"	3.50

JUMBO ROUTER PAD(24" x 36")

It will not allow small blocks of wood to slip out under router or sanding applications. **ROUTER PAD**

ONLY \$8.95ea.

JUMBO BELT CLEANING STICK
ONLY \$8.80

Econ-Abrasives

P. O. Box J865021

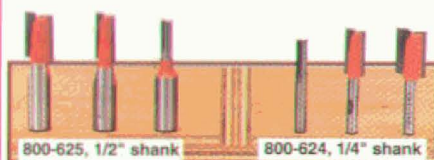
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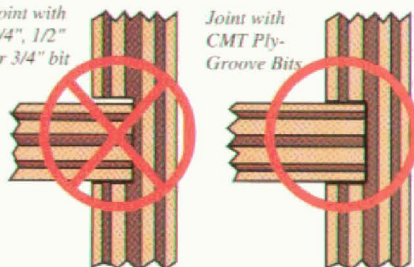
Exclusive Perfect Joints with CMT's
Ply-Groove Sets



Tired of sloppy fits when you route grooves or dados for plywood? Everybody knows that plywood is thinner than advertised, but CMT did something about it! Our Ply-Groove sets include 23/32" bits for 3/4" plywood, 31/64" for 1/2" and 15/64" for 1/4".

Joint with
1/4", 1/2"
or 3/4" bit

Joint with
CMT Ply-
Groove Bits



800-624 3-Piece, 1/4" Shank Set
List: \$57.30 **SALE: \$48.90**

800-625 3-Piece, 1/2" Shank Set
List: \$58.20 **SALE: \$49.90**

CMT Bits feature:

- Non-stick coating
- Anti-kickback design
- Micrograin carbide
- Fatigue-Proof® steel

Special offer: Free Blade Stabilizers
with every blade order!
That's our **\$19.90** gift to you!

Carbide Saw Blades
from CMT TOOLS



Premium performance guaranteed!

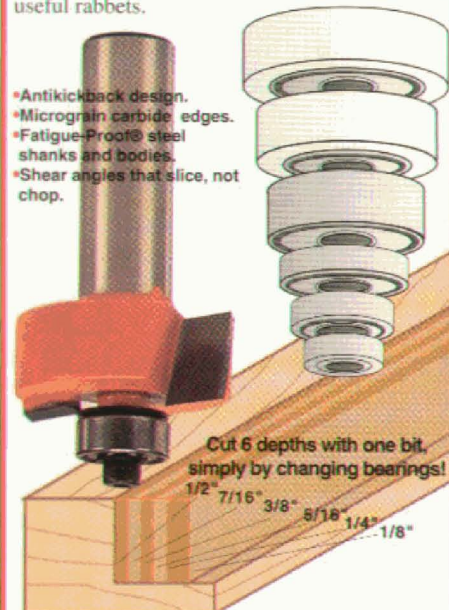
That's right, CMT promises you top-flight performance with every blade, or we'll cheerfully refund every penny of your purchase price. We don't think that'll happen, but if it does, you keep your free 5" blade stabilizers as our gift! Check our catalog, these precision machined stabilizers usually sell for **\$19.90**! More important, they improve the quality of your cuts by reducing vibration produced by the saw's motor, belts and bearings. Every CMT blade features micrograin carbide teeth, anti-kickback design and precisely-calculated angles & bevels. And all our blades now feature a new pattern of sound suppression slots for smoother, quieter cutting.

All blades 10" diameter with 5/8" arbor

Item	Primary Function	Teeth	List	SALE
110-240X	Rip wood or plywood	24	\$60.00	\$51.00
110-500X	General purpose	50	\$74.00	\$62.90
110-800X	Chip-free laminate cuts	80	\$79.00	\$67.20
110-801X	Splinter-free miter cuts	80	\$79.00	\$67.20
110-600X	All-purpose radial saw	60	\$74.00	\$62.90

Exclusive You'll be the master of
6 handy rabbets with CMT's
Rabbit-Master Kit

Here's a super price on the most versatile Rabbeting Kit on the market. You'll get an 1-3/8"-diameter Rabbeting Bit, 6 top-quality bearings and an allen key to cut 6 of the most useful rabbets.



800-622 1/4" Shank Set,
List: \$53.90 **SALE: \$32.90**

800-623 1/2" Shank Set,
List: \$57.90 **SALE: \$35.90**

Did you think you'd left
polygons in geometry class?
They're back, with

**CMT's New
Chamfer Set**

Yes, polygons are for woodworkers too, when they're in the shape of planters, jewelry boxes, wastebaskets or a host of other clever pieces.

Our 1/2" shank anti-kick-back Chamfer Set includes bits with five angles: 11-1/4°, 15°, 22-1/2°, 30° and 45°.

Cutting those angles accurately on a table saw can be tedious work. CMT's precise carbide edges relieve you of the tedium, cutting perfect angles every time!

Save
\$34.00



Chamfer stock
that's a full
3/4" thick!

Rectangle
45°, 4 sides

Hexagon
30°, 6 sides

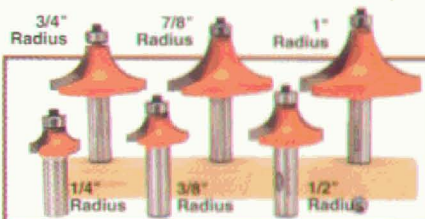
Octagon
22.5°, 8 sides

Dodecagon
15°, 12 sides

(we're stumped)
11.25°, 16 sides

800-627 5-Pc. Chamfer Set
List: \$166.10 **SALE: \$132.10**

Twice the work, twice
the cuts at one low price!
**CMT's Roundover
and Beading Sets**



Get twice the work and twice your money's worth from these sets. You'll get top-quality Roundover Bits, plus an extra bearing to convert each tool into a handy beading bit. CMT bits feature micrograin carbide, non-stick coatings & anti-kickback design.



800-614 3-Bit, 1/4" Shank Set
1/4", 3/8" & 1/2" radius
List: \$93.10 **SALE: \$74.50**

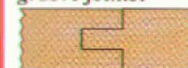
800-615 3-Bit, 1/2" Shank Set
1/4", 3/8" & 1/2" radius
List: \$104.30 **SALE: \$83.50**

800-616 6-Bit, 1/2" Shank Set
1/4", 3/8" & 1/2", 3/4", 7/8" & 1" radius
List: \$309.00 **SALE: \$247.90**

It's like a dado set
for your router!

**CMT's Slot
Cutter Set**

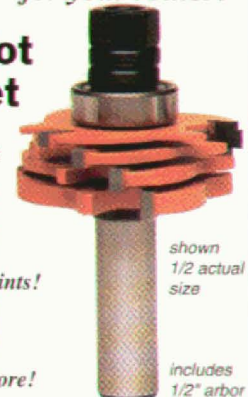
You'll cut tongue & groove joints!



You'll cut biscuit joints!



And much, much more!



Vary the spacing and combinations of the cutters to cut dados, rabbets, tongue-and-groove joints, even slots for biscuits. This set will cut any groove from 1/8" to 11/16". The set includes 1/8", 5/32", 3/16" and 1/4" carbide-tipped cutters, 1/2" arbor, bearing for 1/2" depth-of-cut (bearings for other depths sold below) & .1mm- to 4mm-thick shims.

800-506
Slot Cutter Set
\$72.80

791-014 Bearing for
3/8" cut depth \$8.20
791-016 Bearing for
1/4" cut depth \$8.20

CMT TOOLS



Ask for our free catalog
Shipping and Handling \$5.00
Orders over \$100.00 ship free!

Call toll-free 24-hours a day: **1-800-531-5559**

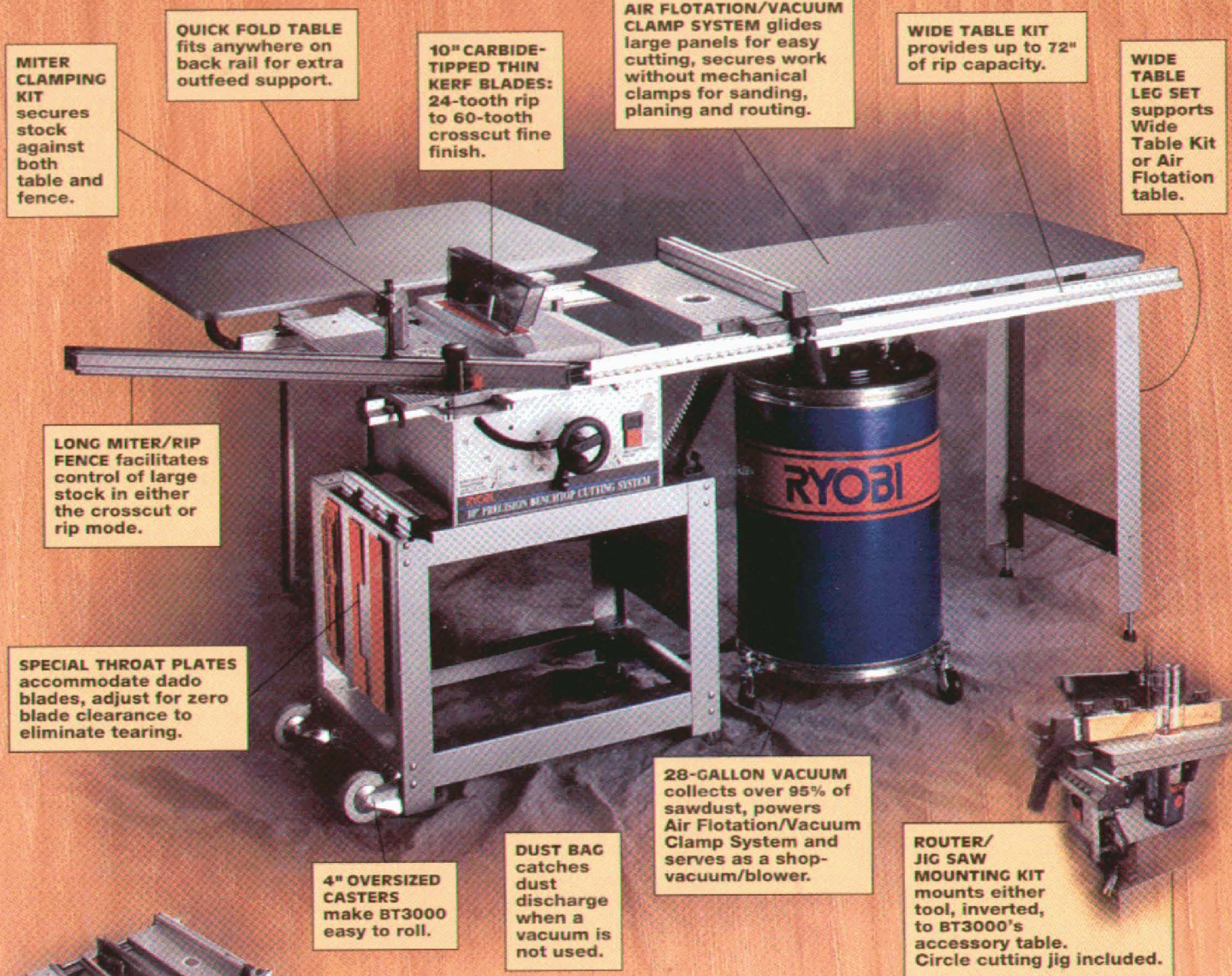
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THE RYOBI BT3000. NO OTHER WOODWORKING TOOL BRINGS AS MUCH TO THE TABLE.

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Presenting the most versatile, accurate and expandable woodcutting system on the market. The BT3000 from Ryobi. With its revolutionary design and unique features, the BT3000 opens a whole new realm of woodworking possibilities. Setup and adjustments are fast with its one-lever height and bevel control. Cuts are made with ease and precision on the sliding miter table with its

extra long miter fence and oversized scale. Ripping is a breeze with the patented auto-parallel rip fence lock and 30" stock support on either side of the blade. A 15-amp, heavy duty motor and 36-tooth, carbide-tipped 10" blade allow you to glide through hardwood 4x4s. And it mounts to a sturdy metal stand that keeps the system secure, yet portable. Best of all, the BT3000 easily expands into a full-blown woodworking system with the optional accessories shown here. All of which make the BT3000 one table you won't want to walk away from.

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