Better Homes and Gardens

W O O D

THE WORLD’S LEADING WOODWORKING MAGAZINE
JUNE 1998 ISSUE 106

Check out our Dust-Defying Tablesaw Add-Ons

Must-build projects
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- Snack table
- Garden birdbath
- Turned pens
- Country keepsake box
- 8 fancy picture frames

See page 60

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PROVEN QUALITY!
- 3 H.P. motor single phase, 220V w/ reversing switch
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Welcome to WOOD SHOW ONLINE
The World's First Virtual Woodworking Show

If you've ever been to a woodworking show, you know how stimulating attending one can be. All the informative woodworking seminars, the product vendors, the show specials on tools and products, the excitement of talking with other woodworkers about your favorite hobby—it's great! The only problem is that many woodworkers have to travel long distances to take part in the fun. No longer!

We've decided it's high time that someone bring a woodworking show into the homes of millions via the internet. The same group of WOOD magazine staffers who built our WOOD ONLINE® site on the internet (www.woodmagazine.com) have come up with a zinger of an idea that I hope many of you will take advantage of. We call our new baby WOOD SHOW ONLINE, and as far as we know it is the first virtual woodworking show ever created.

A few years ago, WOOD SHOW ONLINE would have been little more than a gleam in someone's eye. But now it's very real. Our inaugural show will start sometime in May, but you can register today. Just contact us at www.woodmagazine.com.

We're hosting WOOD SHOW ONLINE because we believe it will allow many more people to share in the excitement that woodworking shows offer. Remember, all of this is free! If you don't have a computer yet, or you haven't mastered the one you do have, perhaps this will be the motivation you need to get started. It'll be lots of fun—I guarantee it.

Larry Clayton

Here are just some of the exciting things we plan to build into our show

- Exhibitor booths you can visit by just clicking a button.
- Free woodworking seminars on these topics: Wood finishing & refinishing, Scrollsaw techniques, Joinery, Turning, and more
- An interactive discussion group for show attendees.
- Show-special prices and detailed information on exhibitor tools.
- Direct links to exhibitor sites.
- A 10-Great Shop Tricks live-action video from the editors of WOOD magazine.
- Online chat rooms with experts in woodworking fields.
You take care of the craftsmanship. We’ll deal with the blotching and lapping.

Olympic Interior Products are a group of professional quality stains and finishes that let you match what’s in your mind’s eye. We’ve engineered these stains with our exclusive Absorption Control™ formula, which allows you to achieve expected results without having to contend with blotching, streaking or lap marks.

Top off your work with Olympic Antique Oil Finish or your choice of Oil or Water Based Polyurethanes, engineered with our Smooth Flow™ formula, to provide maximum protection and durability. Call 1-800-441-9695 for a retailer near you.

**Talking Back**

**Crib safety warning**

Regarding the article “Tag Team Woodworking” in issue #101, please pass this word on to those particular gentlemen and all of your readers. Don’t ever extend the corner posts of a crib or playpen above the endrails. Cut the endrails flush and in a downward slope toward the outside. The problem with corner posts is that a baby, trying to climb out of a crib, could catch its shirt on the post and hang him or herself. It is our job as builders to make certain our products are safe.

—Daniel Blackmore, via internet

**A tip for a tip**

It would appear that Glenn Sperry left out one small detail in his letter published in issue #99, “Tips from your shop (and ours).” The tip was to edge-straighten boards with his “Clamp ’N Tool Guide.”

The finger grips on the adjustable jaw of this tool stick out about 3/8” past the edge that would ride against the tablesaw fence. Mr. Sperry must have removed this protrusion on one side of the “Clamp ’N Tool Guide” for his method to work.

—Harry McNeil, Toronto

Let us know what’s on your mind

We welcome your comments, criticisms, suggestions, and yes, even compliments. We’ll do our level best to respond to you, perhaps on this page!

Write to us at: Talking Back, WOOD Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. Send e-mail to: woodmail@woodmagazine.com

Continued on page 6
HOT BLADE.

COOL CUT.

What is it?
Our new line of Teflon® coated blades, TCS, short for a new industrial coating by DuPont® that makes our blades run super fast, super smooth and super cool.

How?
- The coating makes these blades more resistant to friction and heat buildup. The blade stays up to 50% cooler than non-coated blades. This helps the wood glide by the blade with a lot less effort compared to conventional blades. So, you get some major benefits.
- This puts less stress on the blade. Studies by DuPont tell us that TCS coated blades last up to 50% longer than conventional blades before sharpening.
- It also causes less pull on the saw, 38% to be exact. Which translates into over 1/3 more cutting power. And as a bonus, the smoother cutting action means less wear and tear on the motor.
- TCS blades won't bind like conventional blades. The self-lubricating, non-stick finish sheds sappy wood residue before it builds up. So you will get a smoother, more professional cut with TCS blades.
- Clean up with these blades is also easy. Pitch and resins just don't stick well to the industrial Teflon. So, even after extensive use, simply wipe clean with hot water.
- Don't be concerned about cleaning the blades with water. The Teflon coating makes the blade rust resistant, in fact, you don't need oils, greases or rust-preventatives.

The industrial Teflon coating gives you a lot of great benefits, but remember that under the Teflon coating is a Freud blade.

For Catalog Call 1-800-472-7307 or E-Mail freudinc@aol.com

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Information courtesy of DuPont Industrial Coatings®.

Precisely what you need.
Wanted: The designer of this project

In our IDEA SHOP 3s we show the swing down lumber rack left. Now, we’re looking for the faithful reader who first submitted this plan to us so that we can run it in an upcoming issue. Please contact us ASAP.

Thanks for a great jig

I keep finding new ways to use the Universal Tablesaw Jig in the December 1998 issue. I use it for all my cross-cutting and for cutting tapers, ripping smaller pieces, and making picture frames. The hold-down feature works superbly. I have now been using this jig almost daily for five months, and I have yet to find a fault or weakness. All my kudos to Jim Downing and the crew at WOODs magazine.

—Bill Allen, Brunswick, Ga.

We’re glad you find this jig as useful as we do, Bill. Readers can still get the kit through the company store on our internet home page, or by contacting:

Schlabaugh & Sons Woodworking
720 14th Street
Kalona, IA 52247
800/346-9663

Leave a little on the lid

I have a technique for cutting a lid from a box that’s useful for the Grand Humidor project in the August 1997 issue. Instead of using spacers to keep the space even while making all four cuts, I set the blade 1/2" shy of the material thickness. This leaves a thin layer that holds the spacing even while making the last cut. Then, I finish cutting the lid from the box with a sharp utility knife. The thin lip sands down easily, and this technique makes cutting the lid from the box a little easier.

—Charles Smith, Townsend, Mass.

Supress shop sounds

I loved the basement shop setup in the November 1997 issue. When I built my basement shop, I took some extra steps by soundproofing the walls and ceiling. To do this, I built 2x4 stud walls for all four sides. I then insulated the walls and ceiling and installed sound channels between the frame and the drywall. While the shop isn’t totally soundproof, our four-year-old can sleep on the sofa just outside the shop, even when I run the planer.

—Jim Bartolomeu, Logan, Ohio

Soundproofing the shop seems like a good way to promote harmony in the house, Jim. By the way, another name for sound channel is resilient channel. It comes in 12" lengths, and you can usually find it at an acoustical or drywall supplier. It works because a stud’s density makes it an excellent transmitter of sound. The channel allows the drywall to stand away from the stud as shown right, creating a sound barrier. Essentially, it becomes a secondary frame on which to screw the drywall.

If you can’t find resilient channel, you can build a staggered 2x4 wall, weaving a 1/8" thick sound bat between the inner and outer studs. However, this option costs more, and takes more space.
We had two choices: clash in Dillingham or head back to Anchorage and crash there.

As we descended from 12,000 feet the landing gear got stuck. The backup system failed. The fuel was getting low. And the Alaska Range loomed ahead.

So, while my copilot flew, I got out my Leatherman Tool. I was upside down as I tried to open the instrument panel with the screwdriver. Then, using the mouth nose pliers, I fished out a broken cable. I kept pulling and with a 'clunk, clunk, clunk' the landing gear descended and locked.

We landed safely in Dillingham. I gave my Leatherman Tool the next day off.

Mike Harris, Dillingham, Alaska.

Leatherman Tools are often thrust into tight spots.


LEATHERMAN® [ ONE TOOL. A COUPLE THOUSAND USES. ]
Painless ways to what you make

1. **Get business cards.** This is one of the cheapest and most effective marketing tools. Yet it's amazing how many woodworkers show their items at craft shows without displaying business cards.

2. **Use word of mouth.** The quality of your work is key, but you also can use marketing to help word of mouth work better. Make follow-up calls a few weeks after a sale to be sure your customers feel satisfied. Ask for referral letters from happy ones, and leads on others who might want to buy your work. This way, not only can you contact potential buyers by mail, you also put the idea about spreading your name into your existing customers' heads.

3. **Develop an image.** Particularly with items that have more artistic than functional appeal, the creator may be as important as the work to customers. Have a graphic designer develop a logo that tells your story. This gives all your other marketing efforts more impact. Use mounted photographs and short, descriptive paragraphs in your booth, on your shop wall, or on a handout to tell how you do your work, how you got into woodworking, and any unusual species of wood or other materials you use.

4. **Don't just tell, show.** They cost more to print, but business cards with photos of your work help sell. Develop brochures that show potential customers products they may not have known you make. And a photo album of work you've done for past customers stirs the imaginations of new ones. Often, you can trade a professional photographer's skills for items you've made.

5. **Put your name on your work.** If you sell through retailers, they probably won't want to display your address or phone number for fear customers will buy direct. But you can always put your name and hometown on your work, even on a small tag, to help people remember you.

6. **Pay to advertise.** This doesn't have to be expensive, as long as you use media that target only the types of people likely to buy from you. Depending on what you make, classified ads in your neighborhood paper or Yellow Pages listings may be perfect. Ads in city magazines or weekly entertainment papers can work, too. Even TV isn't out of the question. Check your local cable system for an inexpensive plan that lets you reach audiences to which your work might appeal.

7. **Hang your shingle.** If zoning laws permit, and you live on a busy road, a good sign in front of your house could generate all the business you'll ever need.
Give away your work. For only the cost of your labor and materials, you can donate a piece you built to a charity auction, such as a public television or radio fundraiser, and get some great advertising in the process.

Stay in touch with your customers. These kind folks are your best source of future business. Collect names and addresses whenever possible, and a few times a year mail a postcard or note about new products or craft shows you'll be in.

Get free publicity. The more unusual your product, the better your chance of getting a feature about yourself in the local newspaper or on TV. Let the media know if you win an award or reach any other milestones. Write and mail a press release about you and what you do, and if possible, include a photograph or two of you and your work.

Remember that no marketing approach is right for everyone, nor should you rely on only one. As in woodworking, experimentation will show you what works best.

Written by Jack Neff, a Batavia, Ohio, business writer and author of Make Your Woodworking Pay For Itself.
Illustrations: Jim Stevenson
INTRODUCING 18 VOLTS OF PURE ADRENALINE. HANG ON TIGHT.

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Basement Window Exhaust Fan

All the makings for effective shop ventilation

Looking for a fast, inexpensive way to improve the air quality in your basement shop? Then we think you'll like this idea. Our setup allows you easy access to the sliding window in front of the fan, and it doesn't block light like a fan with a plywood support would.

To build the support, we used hardware-store 5/8" aluminum U-channel screwed to our existing metal basement window frame. We pop-riveted the 12" guard-mounted exhaust fan (available from Miller Hardware, 515/283-1724, $129 ppd.) to two strips of 1/8" aluminum that in turn were riveted to the U-channel. The size of the fan will depend upon your window size. Our 12" fan with 1/20 horse-power delivers 700 cfm and has a totally enclosed motor suitable for dusty environments.

Smart Solutions For Your Basement Shop

IDEA SHOP 3

From The Editors Of WOOD Magazine

EXPLODED VIEW

Window frame

Cut 1/8" plywood corner braces and epoxy in place to secure corners.

#8 x 1" panhead sheet-metal screw

1/8" x 3/4" aluminum bar
Length is the width of window frame minus 1/4".

1/2" roundhead machine screw

12" guard-mounted exhaust fan

#8 x 1" panhead sheet-metal screw

Pop rivet

1/8" aluminum bar

Height of window frame

Width of window frame

Window frame

TOP VIEW
Practical as they are, most portable planers are notorious snipers. If you're looking to minimize sniping without sacrificing portability, check out Delta's new 12 1/2" Portable Planer (Model 22-560), with its exclusive snipe control lock. Call toll free for the name of your nearest Delta dealer: Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.

http://www.deltawoodworking.com/delta
RETURN OF THE Mortise Machine

Readers offer solutions to machine's mysteries

We first showed you the Miller mortise-joint machine in the December 1997 issue. Back then, we left you with a question: How does it work? A number of you took up the challenge to explain this thing.

What do those rods do? Are they in backward?
Most speculation about how the Miller machine works centered on those mysterious, toothed rods. Some correspondents wondered if the machine in the photograph had been dismantled, then reassembled incorrectly. “Reverse the rods!” they implored. This way, the rods’ teeth would face outward and could grip against the adjustable blocks, helping to advance the cutter into the work.

That this machine could have been improperly assembled by some previous owner seemed entirely plausible. But then we heard from Loring McKenize of Logansport, Indiana.
A tool collector, Loring sent photos of several mortise machines he owns, including a Miller. Close inspection of the photo of his Miller machine showed the rod teeth facing inward. We took this as evidence (though it’s hardly conclusive) that the rods were installed correctly on Dick Gowan’s machine that we showed.

Is drilling the key?
Loring figures that the Miller machine was intended to finish a mortise first roughed out by drilling. Several other readers focused on that idea of drilling first, too. Some held that the entire mortise would be drilled out, then cleaned up with the machine. Others leaned toward drilling two pilot holes, one at each end of the mortise. The more we thought about it, the more we came to accept the pilot-hole theory of operation. It was best expressed by Tom Oertling, a Galveston, Texas, woodworker trained in archaeology.

“I believe that the ends of the mortise were defined by two holes drilled straight down to the depth (and maybe plus a little) of the mortise,” he wrote. The rods would then extend into the pilot holes, and the adjustable blocks would be adjusted to press them against the sides of the holes.

“Note that the ratchets are cut so that the rod will move down in the hole, but will bite [into the end-grain wood] if it is pulled up,” he added.

Swinging the handle to the right extends the right rod farther into its hole. As the handle moves leftward, the right rod, its teeth pressed against the side of the hole, resists pulling up. At the same time, the left rod advances farther into its hole. This action would advance the handle/cutter assembly, by Tom’s reckoning.

“This machine would probably not have left a very clean mortise. No doubt some chisel work was necessary to clean it out,” he said.

Is the mystery solved?
We’ll let that explanation stand for now. But someday, someone will happen across a yellowed instruction booklet for Miller's Patented Mortising Machine. Only then will we know for sure just how this thing is supposed to work.

Machine courtesy of Dick Gowan, Aurora, Nebraska Photograph: Hetherington Photography

WOOD MAGAZINE JUNE 1998
Hold everything.

Here’s the third hand you always wanted: the revolutionary QUICK-GRIP® Bar Clamp.

Its unique pistol-grip handle lets you hold the clamp and adjust jaw pressure with just one hand — an easy solution to even the most demanding clamping problem. For wood, plastic or other materials, the QUICK-GRIP Bar Clamp makes any job easier and faster.

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QUICK-GRIP®
Safe Ways to Saw Small Pieces

Are you having a tough time cutting small chunks of wood? Safety man Mike Gililland offers some suggestions.

It seems that whenever a discussion about safety pops up, much of it involves anecdotes (some of them scary) about cutting small workpieces—a task similar to yet unlike thin-strip ripping. A while back, I visited WOOD magazine’s web site and clicked on the general discussion group. Sure enough, there were postings on that subject there, too. One seemed to sum up many: “Every close call I’ve ever had involved making a small piece smaller. Now, I’ve learned to just say no.”

Although there seems to be a general agreement among woodworkers that trying to saw small pieces of wood is dangerous, there’s no consensus on exactly how to do it safely. The best method is to shape the piece while it’s still part of a larger, more easily handled one.

But if you find that you must work with small pieces, I know that you can rip and miter them safely on a tablesaw. But, you have to give them firm support. I’ve found at least two sound ways which I’ll share with you to do that. With either, you should install a zero-clearance table insert to keep from getting tiny scraps down into the blade.

**Combine a miter gauge and a hand screw**
You’ll be surprised at what you can accomplish by attaching a scrap board to your miter gauge to serve—not as a fence—but as a backing board for your small workpiece. As you can see in the drawings below, by clamping the workpiece to the scrap with a hand screw, you’ll be able to make miters as well as straight cuts. Be sure, though, to always use a clamp, such as a wooden hand screw, that won’t harm your tablesaw blade should you venture too close.

**Clamp up to a universal jig**
A bit more complicated than the preceding technique, but sometimes far more accurate for straight cuts (ripping or crosscuts) only, is to pair up a universal jig and two clamps with your small workpiece. A universal jig (about $50 in die-cast aluminum at Sears and elsewhere) slides along the miter slot in your saw table. As shown in the drawing below, it brings a small workpiece clamped to it past the blade with control.

As with the first technique, you’ll want to use a wooden hand screw to hold the workpiece. But a C-clamp or other type works fine to secure the hand screw to the jig. Some universal jigs come with a pair of C-clamps attached, but stick with the hand screw for work close to the saw blade.

Now that I’ve shared two of my favorite ways to cut small workpieces, you don’t have to “just say no” anymore. Instead, go ahead and start sawing small, but in control and carefully.

Mike Gililland is a lifelong woodworker and an engineer with 25 years experience designing and working with woodworking power tools to make them safer. A resident of Missouri, he owns and runs a safety consulting firm.

Send your safety-related questions with a SASE to: The Safety Man, WOOD Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. Not all questions will be published, but all will receive a reply.
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Right-Hand-Man Sanding Table

A built-in dust chute links it directly to your shop vacuum or dust collector.

We designed this sanding table to fit a 10" Jet Contractor's Saw. You'll probably have to alter the table's size to fit your particular saw. Dust catchers such as ours aren't meant to replace dust-collection devices you're already using. This one is a site-specific accessory that helps you manage the fine dust that results from using a handheld pad sander. Note also the handy built-in tool tray for storing sanding blocks, pushsticks, and other workshop items.

Build the table as shown in the Exploded View at right to fit your particular saw. We used a piece of perforated hardboard to mark the numerous hole locations. Drill the holes and then countersink them slightly. Use a piece of duct out the back of the unit to fit your dust-collection system or shop vacuum.

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**Bill of Materials**

<table>
<thead>
<tr>
<th>Part</th>
<th>Finished Size</th>
<th>Matl</th>
<th>Qty.</th>
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<tr>
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<tr>
<td>A tabletop</td>
<td>24&quot;</td>
<td>MF</td>
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<td><strong>DUST CHUTE</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>G sides</td>
<td>25%&quot;</td>
<td>H</td>
<td>2</td>
</tr>
<tr>
<td>H end cap</td>
<td>5%&quot;</td>
<td>H</td>
<td>1</td>
</tr>
<tr>
<td>I bottom</td>
<td>6%&quot;</td>
<td>HB</td>
<td>1</td>
</tr>
</tbody>
</table>

**Materials Key:** MF-medium density fiberboard, H-hardwood (maple or birch), HB-hardboard.

**Supplies:** #6 x 1%" flathead wood screws, #6 x 1%" flathead wood screws, 1%" hardware cloth, plastic laminate, #6 x 1%" panhead sheet-metal screws, 4% round duct 5% long, #17 x 1" wire nails.

---

**Note:** Apply plastic laminate to the top of (A) before drilling any holes.

Project Design: James R. Downing
Illustration: Lorna Johnson
Photograph: Hetherington Studio
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Need help with the how-to? Look for the four template styles to make the profiles shown below and the video ‘Arched Raised Panels Made Easy’ by Marc Sommerfeld both available in the new CMT catalog.

CMT the only ORANGE one

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Biscuit, biscuit, where's the biscuit?

After marking and installing biscuit joints in several boards that I've glued up edge-to-edge, I then plane the glue-up to thickness and rip it to finished width. The problem is that in the process I also remove the marks that show where the biscuits are located. Later, when crosscutting the glue-up to length, I sometimes cut through one of the biscuits—and that leaves me with a very unattractive edge.

One day, while gluing up some long pieces of oak, I grabbed my electronic stud finder and ran it along the seam. To my surprise, it located every biscuit in the boards. Now, I never have to guess!

—Dick Diedrich, North Lake, Wis.

A low-tech way to help contain tablesaw dust

Making some removable covers that fit over the large openings at the front and rear of your tablesaw greatly increases the efficiency of your dust collector. I made mine with 1/8" tempered hardboard and sticky-back flexible magnets from a crafts supply store. When I need to tilt the blade, I just pull off the covers.

—Randy Lee, Fairfield, Ohio
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1Always use seat belts. Remember a backseat is the safest place for children. Rearward-facing child seats can be used in the front seat only with the passenger airbag turned off. J.D. Power and Associates 1995-1997 Automotive Performance, Execution, and Layout Studies. 1997 study based on 29,187 consumer responses.
Cut workpieces to uniform width with your planer

With an old handscrew clamp and some scraps of hardwood you can use a thickness planer to make uniform-width cabinet stiles, rails, and other pieces with jointer-smooth, square edges, as shown below.

Prepare your workpieces by jointing one edge and ripping the other edge so the workpieces are slightly too wide. Then, clamp down one of the workpiece guides to your planer's infeed table, and adjust its face 90° to the planer table. Adjust the face of the opposite guide so the stile fits snugly between the guides. Clamp the other guide down. Use the handscrew clamp to fine-tune the snugness of the guides and the workpiece.

—Bob Killian, Lubbock, Texas

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Squaring up a cabinet assembly

Here are two simple methods I've used to square up cabinets. If you build a lot of cabinets, you'll find plenty of use for plywood braces like the one below.

If you don't want to store or build such braces, just groove two blocks of wood to fit snugly over the blades of a framing square as shown below. These clamp blocks provide the clamp jaws with surfaces to bite against.

—Tom Moore, Clarksville, Va.

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The West’s favorite fodder Mountain Mahogany

There’s a small tree dotting the American West that stockmen like to call sweetbrush. That’s because domestic cattle, sheep, and goats (along with deer and other wild creatures) relish its foliage in the winter months. In winter, after the leaves have fallen, twigs become the main course.

This culinary cellulose delight is the mountain mahogany tree (*Cercocarpus* spp.), which appears in three varieties. Each, though, shares many of the same characteristics. The short, stout trunk can attain a 40’ height, although you’ll commonly find them at 15’ with many a twist. Contorted branches also mark this tree, giving it a totally unkempt look.

In spite of the mountain mahogany’s odd, disheveled image, the wood rates as quite attractive. In fact, the stocks’ deep brown color and hardness prompted the mahogany name for this species, which isn’t a mahogany at all. You’ll find the wood heavy, too. Freshly cut, it won’t float. And although brittle, the wood was frequently utilized by Native Americans for bows.

The Navajos made perhaps the best use of mountain mahogany. An extract of its roots was the primary ingredient for a dye to turn their wooden blankets red. They also employed the fruiting, white-plumed twigs as ceremonial prayer sticks. Short, straight branches, when peeled, were snagless implements for handling the women’s weaving threads. Navajo men, though, had the most fun with mountain mahogany. They crafted its wood into long-wearing dice for gaming.

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There’s more than one way to cut a log

I’ve read articles explaining the differences between flatsawn and quartersawn lumber. Over the years, I’ve also seen the term “riftsawn lumber,” but I’ve never seen a definition for it. Does riftsawn lumber have any special properties or uses?

—Dan Borczyk, Omaha Neb.

Dan, riftsawn is the word used for lumber that has been cut at no less than 35° and no more than 65° to the annual rings in a log. The word bastardsawn is also used for this type of lumber. Most riftsawing is done at about 45°. The best description we’ve heard comes from Lisa Flittner, of Paxton Lumber Co. in Kansas City. She explained that boards riftsawn from a log resemble the spokes on a bicycle wheel. The cut follows a path from the center, and travels at an angle across the tree to the outside. Quartersawn lumber, on the other hand, is cut straight from the core to the outside.

When you look at a riftsawn board, the end will have growth rings angled at about 45°, and the face will be so straight-grained that it’s often called comb-grained lumber. These boards also have long sweeping stripes resulting from the rays that run from the center of the tree to the bark. These same rays show up as specks in quartersawn lumber, and don’t appear at all in flatsawn lumber.

You may find riftsawn boards hard to come by, even though they prove to be as strong and as stable as quartersawn boards. That’s because sawyers have to spend more time and create more waste, when cutting riftsawn stock. You’ll mostly find riftsawn boards in oak, because of the desirability of the ray and grain figures. But other hardwoods can be ordered riftsawn. This type of wood is also the most expensive. In oak, it costs about a dime more per board foot than quartersawn lumber, and $1.60 more than flatsawn stock.

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Continued on page 30
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A question of compatibility

I built a curio shelf and want to use some white shellac as a sealer coat. I then plan to spray lacquer for the topcoats. Are these finishes compatible, or will the piece start to peel or do other strange things down the road?

—Laurie McDougall, Vancouver, B.C.

No problem, Laurie. In fact, shellac is often used as a sealer under lacquer because it sands easily and lacquer readily bonds to it. Your concern about peeling and “other strange things down the road” probably stems from the fact that ordinary shellac, straight out of the jar, contains wax. This wax can cause compatibility problems with some other finishes, most notably polyurethane.

Taming the splintering in oak

In spite of all my efforts, I have trouble with splintering whenever I try to rout an oak edge. I use new, quality bits and I remove the material in multiple passes. Would a speed reducer help, or should I make even shallower passes?

—Al Davidson, Hardwood, Ont.

Slowing down your router’s rpm will help, Al, especially if you’re also getting burn marks. So will routing in the opposite direction, a procedure known as “climb-cutting.” To climb-cut, securely clamp your stock to a worktop—and get a good grip on the router, because it will try to pull itself through the wood. Make a series of slow, shallow climb-cut passes for good (and safe) results.
How to get smoother-running jigs

I have trouble keeping the runners that fit into the miter-gauge slot of my tablesaw parallel to the blade when I make saw jigs. Do you have any suggestions that might help me?

—Mike Chambers, Winston-Salem, N.C.

Mike, first check that the saw blade runs parallel to the miter-gauge slots. Do this by placing a straightedge against the side of the saw blade (be sure the straightedge rests against the side of the blade and not against the projecting teeth). Then, measure the distance from the ends of the table slots to the straightedge (see drawing below). If needed, adjust the blade alignment according to the saw manufacturer’s manual. With the blade parallel to the slots, follow these steps for smoother-moving tablesaw jigs:

1. Cut 3/8 x 3/4" (or sized to snugly fit your tablesaw slots) oak or maple strips for the runners a few days ahead of building the jig. Cut extra pieces, and stack and sticker these to allow them to stabilize. Then, select the straightest two sticks to use for your jig runners.

2. Next, glue and screw one runner into position on the bottom of the jig. Allow the glue to set, and scrape off any glue residue.

3. Place the second runner in the other miter slot, apply glue to its top surface, and then set the jig in place on the tablesaw. Slide both the jig and second runner slightly over one edge of the table and fasten the runner to the jig base with a small wood screw. Repeat this procedure on the other end of the runner. Finally, drive a third screw down through the jig surface and into the center of the hardwood runner while the jig is on the saw.

4. When the glue on the runners dries, slide the jig back and forth in the miter-gauge slots to check the fit. Areas of the runners that bind against the sides of the miter slots will develop a metallic sheen from rubbing the metal. Abrade these areas with a sanding block to ease the motion of the jig. Then, lightly coat the runners with paraffin or other wax so the jig will move easily.
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4 Helpful Handsaws

When it comes to ripping and crosscutting, the power tablesaw reigns as the workshop workhorse. What's more, most shops boast various other motorized saws. Even so, you'll still run into woodworking situations that call for a handsaw. Here are four we rely on in our shop.

Some handsaws you can count on include the Japanese Ryoba (A) and Dozuki (B), a flush-cutting saw such as the Japanese Kugihiki (C), and a short, hard-tooth toolbox saw like the 14" and 20" ones here (D).

**Japanese saws**

Make a few cuts with the unusual-looking Japanese Ryoba and Dozuki (A and B in the photo above), and they could easily become your favorite handsaws. Functionally, these Far Eastern saws differ significantly from traditional Western models: They cut on the pull stroke. This allows another departure from the handsaws you knew in shop class—the Japanese saws have thinner blades. That's because they're in tension—being pulled taut—rather than compression while cutting. This minimizes the danger of the blade wobbling or buckling on the cutting stroke.

And the blades not only are thin, they carry sharp, aggressive teeth. The Dozuki may have as many as 26 teeth per inch, making it an excellent tool for precise joinery. The double-edged Ryoba carries 6-10 teeth per inch on one edge and may have as many as 22 per inch on the other. The coarser edge is generally considered a rip-saw; the finer one, a general-purpose crosscut saw.

Flush-cutting saw

When you need to trim one piece flush with another, reach for another Japanese-style saw—the Kugihiki, marked C in the photo.

Lay this saw's thin, flexible blade right against a surface and saw away, as shown left. You won't mar...
Handsawing tips and tricks

Here are a few tips and techniques that will help you get the most from a handsaw.

- Keep it sharp. You can learn to file the teeth yourself or have a pro sharpen your saw. Hardened teeth probably will require grinding, a job for a sharpening shop.
- Hold it straight. With a D-handle, extend your index finger along the side, as shown below. This helps keep your hand and wrist aligned on the handle. When you grasp the Japanese saw’s straight handle, place your thumb along the top. Keep the handle aligned with your arm.
- Cut with long, smooth strokes. Speed isn’t critical; you’ll do better to maintain an even cadence. Your elbow and the saw blade should move along a line in the same vertical plane.
- Watch the reflection in the saw. You can make sure you’re cutting squarely by keeping an eye on the reflection of the workpiece in the saw blade. When it appears to run straight through the saw as shown below, you’re square.

the surface because the blade’s teeth are not set to the sides, as is common with most other saws.

This saw comes in handy for fine trimming—sawing the ends of an onlaid molding flush with the ends of a drawer front, for instance. You’ll find it useful in making wedged joints and through mortises, as well as for trimming box-joint fingers after assembly. And once you’ve tried it, you’ll probably adopt this as your standard tool for trimming screw-hole plugs flush with a surface. The lack of set does make it impractical to use the saw for deep or long cuts.

Shorty toolbox saw

You’ll make short work of sawing when you wield an abbreviated traditional-style saw like the ones labeled D in the photo. Most manufacturers now offer one or two of these short saws, edged with aggressive, hardened teeth.

Generally about 14-20" long, the blade may have 8-14 teeth per inch. Though thick and coarse-toothed in comparison to the Japanese blades, these saws make surprisingly clean cuts. They cut fast (many cut on both push and pull strokes) and stay sharp through much use.

In the workshop, you’ll like this saw for quickly cutting stock to rough size and other general work. And if you tackle home-repair or remodeling jobs, you’ll appreciate this saw’s handy size, versatility, and cutting ease.

Photographs: Hetherington Photography

Keep your cut square by watching the workpiece and its reflection in the saw blade. When both line up straight, you’re sawing squarely.
To a Kubota TG owner, mowing the lawn is not a mere chore. It's a pastime, a passion, an obsession. Perhaps that's because the new Kubota TG is more than a mere lawn mower. Built like a sports car, this highly advanced tractor comes fully loaded with electronic rack-and-pinion steering, Cushion Ride Suspension and an 18-hp liquid-cooled gas or diesel engine. Which all adds up to the smooth, quiet, comfortable ride you've always dreamed of. For more details, and possibly a new fixation, call 1-888-4-Kubota, ext. 116.
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Every bat is going to break, and thank God for that. Otherwise I would not make a living,” quips Juan Faxas. He owns and operates Glomar Enterprises, a Fullerton, California, company that turns baseball bats for the pros. His customers include Jose Canseco (Oakland A’s), Andres Galarraga (Colorado Rockies), Tony Gwynn (San Diego Padres), Rickey Henderson (California Angels), Ryan Klesko (Atlanta Braves), Eddie Murray (Los Angeles Dodgers), Charlie O’Brien (Toronto Blue Jays), Tim Salmon (California Angels), and Omar Vizquel (Cleveland Indians).

Juan, 57, loves the game of baseball passionately and prides himself on the quality of the bats that carry his GLOMAR imprint. They’re made from the finest, slow-grown white ash from the Northeast—hand-selected, dense wood with straight grain, no visible defects, and kiln-dried to perfection. They’re custom-made to each major-league player’s specifications. Yet, even the best of bats can’t last forever.

White ash at the plate
“Wood is wood. Unless I x-ray every single piece, it is impossible to see exactly what Mother Nature has done to the wood—how the cells line up or if there’s an imperfection within,” Juan points out.

Although he uses the choicest ash for his bats, it’s the players who have the final say on how long a bat will last. “In the heat of a game, a player swings the bat wrong and it gets hit on the handle or the tip,” he notes. “Then the bat is going to go, no matter how good the wood is or how well I turn it.

“Yet, I have bats that have had 1,000 hits without cracking or splintering,” he adds, “and the integrity of the bat is still there. Some players break a lot of bats, though, because of the way they hit; others don’t. It can be the power of the swing, how strong the guy is, how rough he treats it. There are a lot of factors. A bat is a piece of wood. The player behind it makes it work.”

Continued
Juan inspects a 3⅛"-3⅛" white ash bat blank for grain straightness and imperfections, such as tiny knots. Only the best wood will hold up to the 90-mph-plus pitches of the major leagues.

Each of Glomar's 110-120 major-league customers orders 8-10 dozen bats per season, paid for by the team. But the reason they order so many is not due to breakage, according to Juan. "They have so many fans that they autograph their bats and give them away."

A bat supplier to the pros must be licensed by Major League Baseball, and adhere to the restrictions imposed. "The barrel of the bat can be no larger than 2⅛" diameter and its total length no longer than 42". And of course, you can't add any foreign substances, like lead or cork or anything else, without the possibility of losing your license," explains Juan.

Within those restrictions, every player has his preferences for length, thickness of handle and barrel, taper from barrel to handle, and weight (between 32-38 ounces). "Bats are extensions of the players, and one of the most important tools they have," says the woodturner. "And making one is more complicated than you would think, especially when it has to hold up to a ball thrown at over 90 mph."

Juan scans the master models of bats on the rack, then adds, "There's a tendency toward skinny bats now. Why, a player with good eyes and coordination can hit with a broomstick!"

But won't a skinny bat lack punch? "Skinny bats allow me to use denser stock for a harder bat than one with a full-sized barrel. But that's as much as I'll tell you," Juan hedges. "The wood I select for a particular bat is a secret of the business."

**A sandlot beginning**

Juan founded Glomar Enterprises in 1991 after player agent Mario Valdes spotted his bats at a Little League game. Back then, wood-turning was a hobby for Juan, something he did to make items for his home and toys for his children—the bats included. By day, he worked as an electrical engineer for a major company, a position Juan had striven for since immigrating from Cuba some 30 years earlier.
and thank God for that.”

Before final finishing, each Glomar bat gets a company brand decal and a silk-screen imprint of the player’s and team’s name. Each of Juan’s big-league customers orders 8–10 dozen bats per season, and gives many of them away to fans.

California’s air-quality laws demand that bats receive a coating of water-based finish. Each will get up to four coats.

“Even as a child in Cuba I loved baseball. I got up with a baseball glove, ready for the sandlot,” he fondly recalls. “My father taught me woodturning when I was 12. He was a hobby turner, making chairs, and bats for me. Out of all his shop tools, the lathe held the most fascination for me. Bats were the first things I turned.”

Juan found major-league bat-making tougher than providing sticks to the local kids. One batting practice at Dodger Stadium turned his finely crafted bats into kindling. “My supplier had sent me furniture-grade wood. I learned to be more specific.”

Juan’s friend Valdes lined up the help of major-league players to test bats. Those tips got the business going. One thing he learned was how fussy pros can be. “At first, I turned 4–5 bat blanks to get the specifications right,” Juan says. “Even now, it usually takes 2–3 bats to get a customer’s specs as they want them.”

Glomar goes for a homer

When he started making bats commercially, Juan turned them all by hand. To get the rounded barrel and handle just right, he made special skewers. Now, with nine employees, a pair of copy lathes, and an automatic one, the only hand turning Juan does is to create the master bat for each of his customers’ models, now hovering at nearly 200 different bats. The copy lathes rough out the bats for the rest of the order.

Today, Glomar’s production starts climbing during spring practice and continues to the World Series. That means a peak of between 200–300 bats per day, 5½ days a week. “It’s really crazy during baseball season,” exclaims the woodturner.

At Glomar, bat production begins with inspecting the specially ordered ash stock, milled to 3½" thickness. “We have to weed out the wood that we don’t think can take the punishment,” Juan explains. “Wood with defects we sell for table legs or something. Then, we rip the good wood to 3½" wide for a turning blank.”

After the bat blanks are rough-turned to predetermined shapes on copy lathes, they’re hand-turned to finish quality. Automatic sanders smooth them while they’re still mounted. Workers then apply a water-based sealer to the bats before another sanding with 400-grit. Then, some receive paint. Others are stained, followed by a coat of clear water-based finish, which readies the bats for decaling with the GLOMAR brand and silk-screening with the player’s name. More clear coats are added after that.

“We end up with three, sometimes four, coats of sprayed-on clear finish,” says Juan. “Ash is difficult to finish because it’s very porous wood. And in California, air-quality laws won’t allow us to use regular lacquer, which would fill the pores faster with buildup. But, the water-based finish does stand up to a beating.”

By the time you read this, Glomar bats will be taking a beating at pickup games on sandlots and anywhere else baseball is played. Juan has decided to run the retail bases against names such as Rawlings, Cooper, and Louisville Slugger. “We’re going to have different models based on pro players’ specifications, 22 in all,” he says. “And even at $35 to $49 each, there won’t be any drop-off in quality. Everyone has the right to swing a good bat.”

Where to go for Glomar

To find a sporting goods dealer near you who handles Glomar bats, send a SASE to Glomar Enterprises, 116 W. Walnut Ave., Fullerton, CA 92632.

Written by Peter J. Stephano  Photographs: Ken Naverson; Ball park, Larry Clayton

WOOD MAGAZINE JUNE 1998
Add pizzazz to your outdoor spaces with our matching table and planter.
Complete your apple-motif patio furniture set with this handsome side table and planter. Using the same straightforward construction as the matching glider and chair from previous issues and shown at left, you'll have this pair assembled in plenty of time to enjoy the outdoors this summer.

**PATIO PLANTER**

**Start with planter side and front frames**

1. Cut the feet (A, B), top rails (C, D), uprights (E, F), and slats (G, H) to the sizes listed in the Bill of Materials (we used cedar).
2. Using the dimensions on the Parts View drawing on the next page, mark the dado locations on the feet (A, B) and top rails (C, D). Using the same drawing for reference, mark the radiused outlines on both feet. Using your table saw fitted with a dado blade and stop, cut the 3/8"-deep dadoes on all eight pieces. Take your time when marking and cutting for correctly spaced dadoes.
3. Mark the locations, and cut mating half-lap joints across both ends of the uprights (E, F).
4. Transfer the full-sized apple pattern on page 49 to the center slats (H), 10 1/4" from the top end of each where shown on the Frames drawing. Drill a blade-start hole, and scroll saw the patterns to shape. Sand the edges of the cutouts.
5. Cut the bottom edges of the feet (A, B) to shape. Use a drum sander to sand the radii smooth.
6. Paint the apple cutouts in the center slats (H). To do this, brush the surfaces around and inside the apple cutouts with lacquer. The lacquer minimizes the wicking of the paint to the surrounding wood. Brush on red and green high-gloss exterior enamel paint. After the paint has dried, sand the lacquer off the surrounding surfaces.

**Assemble and connect the four frames**

1. Glue and screw each of the four frames together in the configuration shown on the Frames drawing. When assembling each frame, keep the bottom ends of the slats (G, H) flush with the top of the cutout on the bottom side of the feet (A, B). Wipe off the excess glue with a damp cloth.
2. Clamp the side frames between the front and back frames. Drill countersunk mounting holes through the front and back frames and into the side frames where shown on the Exploded View drawing. Use a framing square to check for square and to locate the holes so they're centered in the uprights (F). Drive the screws.

**Note:** The shelf allows you to raise or lower your potted plant for the best viewing height. In our planter, we positioned the shelf so the top of the pot was about level with the top of the planter.

3. Cut the shelf cleats (I) and shelf boards (J) to size.
4. To locate the shelf for the planter, measure down from the top edge of the planter the height of your flower pot plus 1/4", and
Patio Pair

make a mark on each side frame upright (F). Next, lay the planter on its side, position the top edge of one cleat (I) even with the marked lines on two of the uprights (F). Drill mounting holes and screw the cleat in place. Repeat for the second cleat on the opposite side of the planter. Then, screw the shelf boards (J) to the cleats, leaving 3/4" between each board.

The top trim completes the construction

1 Cut the top trim boards (K) to size. Fit your tablesaw with a dado blade, and cut mating half-lap joints in each. See the Trim Board detail accompanying the Exploded View drawing for reference.

2 Glue and screw the trim boards together, checking for square. Mark a 1 1/2" radius on each corner, and cut and drum-sand them to shape.

3 Rout a 1/8" round-over on all but the bottom inside edge of the trimboard frame where shown on the Exploded View drawing.

4 Center, then glue and screw the frame to the planter base.

5 Finish-sand the entire planter, and add a quality exterior finish. It's critical to get a good seal on the bottom of the feet (those parts that come in direct contact with the ground or patio). Recoat the chair annually.

Parts View

Dadoes 3/4" deep on inside face

Dadoes 3/4" deep on inside face

Continued
CUTTING DIAGRAM

1½ x 9½ x 96” Cedar (2x10)
1½ x 5½ x 72” Cedar (2x6)
3¼ x 9½ x 96” Cedar (1x10)
3¼ x 9½ x 96” Cedar (1x10)
3¼ x 7½ x 96” Cedar (1x8)

TABLE
Bill of Materials

<table>
<thead>
<tr>
<th>Part</th>
<th>Finished Size</th>
<th>Material</th>
<th>Qty</th>
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<tbody>
<tr>
<td>A feet</td>
<td>1⅛” x 4½”</td>
<td>C</td>
<td>2</td>
</tr>
<tr>
<td>B feet</td>
<td>1½” x 4½”</td>
<td>C</td>
<td>2</td>
</tr>
<tr>
<td>C top rails</td>
<td>1½” x 2”</td>
<td>C</td>
<td>2</td>
</tr>
<tr>
<td>D top rails</td>
<td>1½” x 2”</td>
<td>C</td>
<td>2</td>
</tr>
<tr>
<td>E uprights</td>
<td>1½” x 3”</td>
<td>C</td>
<td>4</td>
</tr>
<tr>
<td>F uprights</td>
<td>1½” x 1½”</td>
<td>C</td>
<td>4</td>
</tr>
<tr>
<td>G slats</td>
<td>¾” x 2”</td>
<td>C</td>
<td>16</td>
</tr>
<tr>
<td>H slats</td>
<td>¾” x 4”</td>
<td>C</td>
<td>4</td>
</tr>
<tr>
<td>I cleats</td>
<td>1½” x 1½”</td>
<td>C</td>
<td>2</td>
</tr>
<tr>
<td>J shelf boards</td>
<td>¾” x 6”</td>
<td>C</td>
<td>3</td>
</tr>
<tr>
<td>K top trim</td>
<td>¾” x 3½”</td>
<td>C</td>
<td>4</td>
</tr>
</tbody>
</table>

Material Key: C—cedar

Supplies: 1¼” deck screws, 2½” deck screws, #8 x ⅝” flathead wood screws, red and green enamel paint, clear exterior finish.
Patio Pair

CHAIR-SIDE TABLE

Using a construction procedure similar to that of the planter and chair, build the side table shown here. See the Parts View on the opposite page for parts A, B, and F. Also see the Bill of Materials below for part sizes. Finally, review the Cutting Diagram for laying out the pieces.

Clamp the top boards together using spacers for even gaps, then screw the base to the bottom of the top.

<table>
<thead>
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<th>TABLE</th>
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<tbody>
<tr>
<td>Bill of Materials</td>
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<table>
<thead>
<tr>
<th>Part</th>
<th>Finished Size</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T</td>
<td>W</td>
</tr>
<tr>
<td>A feet</td>
<td>11/2</td>
<td>3</td>
</tr>
<tr>
<td>B top rails</td>
<td>11/2</td>
<td>11/2</td>
</tr>
<tr>
<td>C slats</td>
<td>3/4</td>
<td>2</td>
</tr>
<tr>
<td>D slats</td>
<td>3/4</td>
<td>4</td>
</tr>
<tr>
<td>E lower crossmember</td>
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<td>21/2</td>
</tr>
<tr>
<td>F upper crossmember</td>
<td>11/2</td>
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</tr>
<tr>
<td>G top boards</td>
<td>3/4</td>
<td>51/4</td>
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<tr>
<td>H top center board</td>
<td>3/4</td>
<td>6</td>
</tr>
<tr>
<td>I cleats</td>
<td>3/4</td>
<td>11/5</td>
</tr>
</tbody>
</table>

Material Key: C-cedar

Supplies: 11/2 deck screws, 2" deck screws, 21/2" deck screws, red and green enamel paint, clear exterior finish.

Written by Marlen Kemmet
Project Designs: Gary Webster
Illustrations: Roxanne LeMoine; Lorna Johnston
Photographs: Bill Hopkins

WOOD MAGAZINE JUNE 1998
To order our other plans

Our glider and patio table with benches were such successes we’ve put together a WOOD PLAN® of each so you can build these projects to create an entire set. Order the Glider, OFS-1028 or the Apple Patio Table and Benches, OFS-1038 from WOOD Magazine Plans, P.O. Box 9255–Dept. 9806, Des Moines, IA 50306. Or call 800/572-9350 to order. We also can accept orders electronically through our internet site at www.woodmagazine.com
Bathing Beauty

A birdbath that will make a big splash in your yard

Our apple-accented outdoor furniture has been a hit with readers. Here's a matching piece that birds will love—an easy-to-build birdbath.

Let's start sawing
1. Cut all parts to the sizes shown in the Bill of Materials. You can saw all of them from two pieces of western red cedar—a 2x4 and a 2x6, each 8' long. Cedar lumber is often knotty, so select boards that will allow you to avoid the worst of the knots.

2. Saw 30° bevels on both sides of one end of each bowl support (A) and foot (B). The bevels should meet at the middle of the end, as shown by the Top Section Top View drawing and the Exploded View drawing. To cut the bevels uniformly, tilt your tablesaw's blade 30° from vertical, then set up your miter gauge with an auxiliary fence. Position a stopblock on the auxiliary fence to cut each set of parts.

3. Bevel-rip each wide upright (C) along both sides of one edge. The bevels should meet at the middle of the edge. After sawing the bevels, sand or hand-plane a slight flat at the point, shown in the Wide Upright End View drawing. This will create space for excess glue to squeeze into at assembly time.

4. Saw spline slots in the wide uprights where shown in the Wide Upright End View drawing. To accomplish this, leave the saw blade tilted to 30°, and attach an auxiliary fence to your saw's fence. Adjust the fence position and the blade elevation to cut the spline slots as dimensioned. Then, saw the slots, standing the workpiece on its beveled edge as shown opposite page, top photo.

5. Lay out the end profiles on the bowl supports (A) and feet (B), following the radii and dimensions shown on the Parts View drawings. Bandsaw the pieces to shape, remaining slightly outside the layout lines. Then, sand to the lines.

6. Saw three \( \frac{1}{4} \times \frac{3}{4} \times 18"\) splines for the center joint. For strength, cut them from plywood or hardboard.
To saw the spline slots in the wide uprights, saw blade is tilted 30° from vertical. Position the rip fence to locate the slot correctly.

Now, do some drilling
1 Lay out the hole centerlines on the edges of parts A and B, following the dimensions in the Parts View drawings. Draw the lines on the edges that will be counterbored.
2 At the center of the edge, bore a ¾" hole ¾" deep at each centerline. We used a drill press and Forstner bit, and positioned a fence to center the bit on the edge.
3 After drilling the counterbores, change to a ¾" bit, and drill through the center of the counterbores, as shown below. The fence you set for drilling the counterbores will help you drill the bolt holes accurately.

Next, add the apples
1 Make three copies of the Full-Size Patterns for the apple design. You’ll find the pattern on page 49.
2 Apply a copy of the pattern to each wide upright where shown. Rubber cement or spray adhesive will hold it. (If you use spray adhesive, follow the manufacturer’s instructions for temporary bonding.) Point the leaf away from the beveled edge of the upright.
3 Drill a blade start hole inside the apple, and scrollsaw along the pattern.

A fence on the drill-press table helps center the counterbores and bolt holes in the bowl supports and feet.
**Bathing Beauty**

line. A #7 blade, .045 x 0.18" with 12 teeth per inch, works well for scrollsawing the thick cedar. Sand as necessary.

4 Paint the sawn apple edge red and the leaf and stem green. Here's how we did that.

First, brush clear lacquer onto the sawn edges and the surfaces around the apples, extending about 1" out from the cutout. The lacquer helps keep the paint from wicking into the wood grain, and masks the faces around the cutout for a tidier paint job.

After the lacquer dries, paint the leaf and stem green. Let that dry, then paint the apple red. To paint the cutouts, we sprayed small amounts of aerosol enamel into a paper cup, and brushed it on.

5 After the paint dries, sand the faces of the wide uprights to remove the lacquer.

6 Rout or sand 1/8" round-overs on all parts. Do not round over the ends of the upright members, C and D. Finish-sand all parts.

**Put everything together**

1 Dry-assemble the three wide uprights (C) and splines. To fit the parts together, insert a spline into the right-hand bevel of each part C. Then, bring the parts together at the bottom, and working upward,

Work from the bottom upward when assembling the splined three-way joint.
push the three-way joint together, as shown opposite page. Pull the joint firmly together with two band clamps to check the fit.

2 When you're satisfied that the parts fit together properly, undo the clamps, separate the parts, and reassemble with water-resistant glue (we used Titebond II). Clamp until dry.

3 Stand the assembled wide uprights on end, the top end up. Place the bowl supports on top of the assembly, centering each from side-to-side with their junction over the center of the upright assembly.

4 Hold the bowl supports in position, and mark the centers for pilot holes into the uprights. Inserting a pencil or one of the lag bolts through the holes in part A will mark the centers.

5 Drill \( \frac{3}{4} \)" pilot holes 2" deep. Attach the bowl supports to the wide uprights with \( \frac{3}{8} \times \frac{1}{4} \)" lag bolts and washers. A socket wrench (\( \frac{1}{2} \" \)) makes driving the bolts into the counterbores easier.

6 Stand the assembly on its top, and drill pilot holes for the feet (B), following the same procedure. Attach the feet to the uprights with \( \frac{3}{8} \times \frac{1}{4} \)" lag bolts and washers.

7 Slide the narrow uprights (D) into position, mark pilot hole centers in both ends, and drill the pilot holes. Bolt the uprights into place. Handscrew clamps will hold the narrow uprights while you drive in the bolts.

8 Apply a clear exterior finish. After it dries, place the tray in the bowl supports. We designed the birdbath for a 19\( \frac{3}{4} \)"-diameter plastic flower pot saucer (Akro-Mils Plas Terra no. 12-124; saucer for a 24" pot.) You should be able to purchase one at a garden-supply shop, or you can mail-order one from our source in the Buying Guide. You can secure the bowl to the supports with a few dabs of silicone adhesive.
When we decided to check out HVLP spray systems priced under $300, we knew exactly who to turn to. Auto body specialist and WOOD® magazine tool tester Bob McFarlin has been slinging spray guns for 20 years. So you’re about to hear from someone who knows the difference between the must-have sprayers and the also-rans.

How HVLP sprayers differ from conventional sprayers

The key distinction between these systems lies in the amount of finish overspray each produces. Conventional guns blast out air at up to 40 pounds per square inch, compared to just 4 to 10 psi from an HVLP gun. This puts up to 85 percent of the finish from an HVLP gun on the project, compared to only 35 percent from conventional sprayers. You waste less finish, and you don’t end up coating everything in your shop with overspray.

Professional-level HVLP systems evolved for two reasons, Bob tells us: Environmental considerations and skyrocketing material costs, especially for automotive color, which have risen from $15 to upwards of $80 per quart. For a production facility, reducing overspray cuts down on airborne solvents, and uses a lot less expensive paint in the bargain.

The cost of finishes isn’t a big consideration for most amateur woodworkers, but low-cost HVLP systems—scaled-down versions of the professional equipment Bob uses every day—take much of the mess out of spraying in a home shop. They also lay on a smoother finish than you can create with a brush. The chart on the next page shows how HVLP systems stack up against other finishing options.
**Fast facts**

- Most HVLP sprayers offer one key advantage to home woodworkers: less overspray. They don’t pollute your shop’s environment, or leave a settling of finish on shop surfaces, to the extent that conventional sprayers do.
- Some conversion sprayers labeled as HVLP systems actually create as much overspray as conventional sprayers. We’ll tell you which ones do this and how to spot such imitators.
- The under-$300 HVLP systems we tested for this article do not atomize finishes well enough to meet the exacting needs of spraying high-gloss, super-smooth surfaces such as car exteriors. But, they do an excellent job of applying finishes to wood.
- It’s a real chore to clean the finish from these guns, just as it is with conventional guns. So, only consider a spray gun if the amount of finishing you do justifies the cleanup hassle.

### HOW HVLP SPRAYERS COMPARE TO OTHER FINISHING OPTIONS

<table>
<thead>
<tr>
<th>FINISHING OPTION</th>
<th>QUALITY OF FINISHED SURFACE USING A HIGH-VISCOSITY FINISH (1)</th>
<th>QUALITY OF FINISHED SURFACE USING A LOW-VISCOSITY FINISH (2)</th>
<th>EASE AND SPEED OF APPLICATION</th>
<th>AMOUNT OF OVERSPRAY</th>
<th>CLEANUP CONVENIENCE</th>
<th>INITIAL COST</th>
<th>LONG-TERM COST</th>
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</thead>
<tbody>
<tr>
<td>HVLP TURBINE SPRAYER</td>
<td><strong>G</strong></td>
<td><strong>E</strong></td>
<td><strong>E</strong></td>
<td><strong>G</strong></td>
<td><strong>P</strong></td>
<td>HIGH</td>
<td>LOW</td>
</tr>
<tr>
<td>HVLP CONVERSION SPRAYER</td>
<td><strong>G</strong></td>
<td><strong>E</strong></td>
<td><strong>E</strong></td>
<td><strong>G</strong></td>
<td><strong>P</strong></td>
<td>HIGH</td>
<td>HIGH</td>
</tr>
<tr>
<td>CONVENTIONAL SPRAY GUN</td>
<td><strong>F</strong></td>
<td><strong>E</strong></td>
<td><strong>F</strong></td>
<td><strong>P</strong></td>
<td><strong>P</strong></td>
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<td>LOW</td>
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<tr>
<td>AEROSOL SPRAY CAN</td>
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<td><strong>E</strong></td>
<td><strong>G</strong></td>
<td>LOW</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Thick finishes such as polyurethanes, water-based clears, enamel, and latex paints reduced no more than 10 percent with solvent.
2. Thinner finishes such as lacquer reduced up to 50 percent with solvent.

**Atomization: the secret to smooth finishes**

Although HVLP spray systems greatly reduce overspray, there’s no such thing as no overspray, Bob emphasizes. Why? The operative word with any sprayer is atomization, which uses air to break the finish into tiny droplets.

Conventional guns atomize the finish into a very fine, vapor-like mist that clouds the air. HVLP sprayers atomize the finish into bigger droplets ranging from the diameter of a pin’s body to the size of its head. The photo below shows the difference in the size of finish droplets from conventional and HVLP guns.

Though HVLP guns produce little airborne vapor, they still leave splatter around the project you’re spraying. And even with HVLP equipment, overspray varies with the finish you’re using and the size of the project. The thinner the finish and the larger the project, the more overspray you’ll generate.

### HVLP sprayers feature two ways to get air to the gun

HVLP sprayers differ in the way they deliver both air and finish to the nozzle. For this article we tested two types of units. Turbine-based machines pump their own air; conversion-air systems (CAS) tap air from a compressor. Here’s a look at each.

- **Turbine sprayers** pump high volumes of air (50 to 60 cubic feet per minute) at just 4 to 5 pounds per square inch. They have no air tank and run continually, with no pressure regulator or moisture traps to impede air flow.

  Turbines, like the one on page 53, include one or more direct-drive blowers that push air through a ¾-inch-diameter hose. We tested three turbine sprayers, two from Campbell Hausfeld and one from Wagner. The Campbell Hausfeld HV2000 and the Wagner CS2000 FineCoat have plastic housings with...
built-in paint gun receptacles. Both are lightweight with handles that make them easy to carry around. The Campbell Hausfeld HV2500 has a well-constructed metal case with internal baffling to lower the noise level, plus an exhaust filter that also lowers noise.

At 95 decibels, the HV2000 sounds like a shop vacuum. The HV2500 and the Wagner are much quieter at 85db. (Decibel levels double every 10db; you can talk over 85db, but not 95.)

Both of the Campbell Hausfeld units are equipped with fine foam filters. The Wagner's filter is also foam, but it's much coarser. This helps maintain CFM, but doesn't do a good job of trapping fine dust.

**Conversion sprayers** look like conventional spray guns. Both use a compressor and air tank as an air source. But, HVLP conversion guns have large orifices at the gun's business end as shown right. These holes, as well as other internal components, let more air through. The result: a high volume of air at low pressure exits the gun in order to reduce overspray.

Of the conversion guns we tested, the Central Pneumatic 7901 does the best job of bringing HVLP technology to the woodworker. Bob says it doesn't atomize paint well enough for automotive use, but works well for finishing wood.

One problem with conversion systems: Most quickly exhaust the air pressure from a 3 hp compressor. In our tests, the conversion guns quickly ran the air tank down after about two minutes of spraying. With the Campbell Hausfeld PH8110 Bob had to stop spraying and let the compressor recover. All the other guns—except the Central Pneumatic 7901—continued to function, but orange peel increased and the spray width decreased.

Bob believes the Central Pneumatic 7901 is the only conversion gun that operates well from a 3 hp compressor. The others work better with a more-expensive 5 hp compressor.

If you decide to go with a conversion system, be sure to use hose couplers designed for high air flow. As shown in the bottom photo, these couplers have larger inside diameters than standard couplers. So, with them a conversion gun gets the high volume of air it needs to operate efficiently. We especially liked the Dynabrade no. 95674 coupler and no. 95677 female plug. For the name of a Dynabrade dealer near you call 800/828-7333.

---

**Conversion guns require high-air-flow couplers like those left (from Dynabrade) and middle (DeVilbiss). On the right is a standard coupler. Note the larger inside diameter of the male component of the high-air-flow couplers.**
Turbines take some getting used to

If you're used to spraying with a conventional gun, you may find a turbine gun cumbersome at first. With a conventional sprayer, a small-diameter air hose attaches to the bottom of the gun and you control airflow with the trigger. Turbines run off larger hoses connected to the back of the gun body, and have constant airflow. The trigger controls the finish, but not the air.

Bob found the turbine guns and hoses bulkier than the ones he uses every day, but with a slightly different wrist pressure he quickly learned to control them.

And, unlike a compressed-air system, air rushes out of a turbine-powered gun even when you let go of the finish-application trigger (while the turbine is switched on). So, you have to be careful about turning the unit on around dust. The best procedure, Bob advises, is to hook up the gun and be ready to spray before hitting the on/off switch.

The big shoot-out: How the sprayers performed

To put the HVLP equipment through its paces, Bob sprayed seven different wood finishes including four oil-based products: polyurethane, lacquer, enamel paint, and stain. He also sprayed three water-based products: clear finish, stain, and latex paint. Each was first sprayed unthinned, then thinned, if necessary, until the finish atomized without sacrificing coverage or durability.

Bob first sprayed oak, pine, and maple test panels, but differences in the woods' grains and porosities made it difficult to gauge finish quality. For a more objective test, he then sprayed each finish onto Sherwin-Williams test cards—treated paper that's half black, half white. With this consistent base, Bob was able to accurately evaluate orange peel and atomization. He paid special attention to overspray—both in the air and bouncing off the surface.

Here are some general observations of what happened with each of the finishes. See the chart on page 55 for how well each of the tested guns did with each finish.

- **Polyurethane.** To get this finish to flow through the guns we had to reduce it 20 percent with solvent. (Thinning also helps the finish droplets "flow" into a consistent film after they strike the project surface.) Only four guns produced good results with this finish.

- **Lacquer.** Reduced 100 percent with thinner, lacquer atomized finer than any other finish. All of the tested guns sprayed lacquer glassy smooth.

- **Water-based stain.** Water-based finishes proved more difficult to atomize than solvent-thinned materials, mainly because water is harder to break into fine particles without high pressure. None of the turbines did an excellent job, but the Campbell Hausfeld 2500 did better than the other tested units. The higher-pressure Central Pneumatic 7901 gave excellent results with minimal overspray.

- **Oil-based stains.** These atomized much better than water-thinned materials and all the HVLP guns performed well. (However, Bob notes that unless he had an extremely large project or a production situation, he wouldn't bother spraying stain. It's not difficult to apply by hand, and he didn't think the results of spraying justified the hassle of cleaning the gun.)

- **Water-based clear finish.** Manufacturers don't recommend thinning water-based finishes, but out of the can, their thick viscosities made them all but impossible to spray. Thinning with one part water to six parts finish brought acceptable results. As with water-based stains, the CAS systems performed better than the turbines.

- **Enamel.** Here's an area where the HVLP sprayers performed quite well. They let the average woodworker spray enamel finishes with near-professional results.

- **Latex.** The turbines scored highest with latex. Thinned with one part water to five parts paint, they sprayed better than the conversion systems because they sprayed a higher volume of paint. Both the suction-and gravity-feed guns had trouble moving the material. With these, pressure needed to be turned up to 40 PSI, which greatly increased overspray.

Continued
From pot to nozzle: three ways to move the finish

HVLP sprayers move finish from the "pot" or cup to the nozzle in three different ways. Here's how they compare.

- **Suction-feed** guns, such as the Campbell Hausfeld PH8110 and DeVilbiss FLG622 we tested, create suction that pulls finish up a siphon tube. The suction is created by air moving past the nozzle at high speed. The PH8110 requires 30 to 40 pounds per square inch to operate and could more accurately be called a high-volume, high-pressure system. Not surprisingly, it was the worst oversprayer in our test, and it also had trouble pulling up heavier finishes such as enamel and latex.

  The DeVilbiss FLG622 uses newer HVLP technology that drops the pressure and increases the volume. It did a good job with even the heavier finishes, but overspray clouded the shop.

- **Pressure-feed** guns, from Campbell Hausfeld, Central Pneumatic, and Wagner, use air pressure to force finish up the siphon tube at 10 PSI or less. A small hose channels air from the gun body's air chamber into the pot.

  Overfilling a pressure-feed gun and tipping it horizontally can leak finish into the air hose, creating a major cleaning headache. To prevent this, Bob recommends filling pressurized cups only 3/4 full, or spraying all vertical surfaces first to lower the finish level before you tip the gun.

- **Gravity-feed** guns from Central Pneumatic and DeVilbiss have cups mounted on the top of the gun—gravity feeds the finish. Both gravity-feed and pressure-feed guns handle heavy finishes (properly reduced) with ease. The gravity-feed guns oversprayed less than the suction-feed sprayers, but more than the pressure-feed guns.

What you need to know about needles and nozzles

A small hole in the center of the fluid nozzle restricts the flow of thick finishes, and a large hole allows thick (high viscosity) finish through. This means you need to tailor the needle and nozzle assembly to the material you're spraying.

  Lacquer requires a fine needle and nozzle; thicker finishes spray best through a medium to large tip set.

  The Campbell Hausfeld turbines come with a fine and medium set, and you can buy a set for thick materials. The Wagner is equipped with a medium needle and nozzle, and four other sizes are available.

  DeVilbiss guns have just one needle that works with two sizes of nozzles, which are included with the guns. The other conversion guns need only one needle/nozzle set because you can vary the air pressure to properly atomize finishes with different viscosities.

Bob's picks

If you own a 3 hp-or-larger compressor, consider the Central Pneumatic 7901. It did the best job of limiting overspray while acceptably atomizing the finishes. Bob really likes the way this gun sprayed the materials he tested it with.

  If you want outstandingly fine atomization, can put up with more overspray, and have a 5 hp compressor, buy the DeVilbiss FLG631 gravity gun.

  For woodworkers without a compressor, we like the Campbell Hausfeld HV2500. It's well-constructed, quiet, and showed good results with most finishes. The Wagner FineCoat CS2000 came in a close second. The Campbell Hausfeld HV2000 also sprays well, if you can put up with the racket it makes.
### THE ABC'S OF HVLP

<table>
<thead>
<tr>
<th>BRAND</th>
<th>MODEL</th>
<th>AIR SOURCE (1)</th>
<th>GUN TYPE (2)</th>
<th>GUN MATERIAL (3)</th>
<th>COP MATERIAL (4)</th>
<th>FLUID CAP MATERIAL (5)</th>
<th>HOSE LENGTH (FEET)</th>
<th>QUALITY OF VARIOUS SPRAYED FINISHES (4)</th>
<th>COUNTRY OF ASSEMBLY (6)</th>
<th>WARRANTY MONTHS</th>
<th>OVERSPRAY (%)</th>
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</table>

**NOTES:**
1. (T) Turbine (A) Air compressor (P) Plastic (S) Stainless steel
2. (G) Gravity-feed (P) Pressure-feed (S) Suction-feed
3. (A) Aluminum (B) Brass (S) Steel
4. E Excellent (G) Good (F) Fair (P) Poor
5. Reduced 5 parts of polyurethane to 1 part of solvent.
6. Reduced 1 to 1.
7. Reduced 5 to 1.

**Conversion Guns**
- DevIlbiss FLG631
- Central Pneumatic 7901

**Turbines**
- Campbell Hausfeld HV2500
- Campbell Hausfeld HV2000

Where to call for more information:
- Campbell Hausfeld: 800/625-4401
- DevIlbiss Finish Line: 800/433-6997
- Central Pneumatic: 800/292-4637

Written by Jim Hufnagel | Technical consultant: Bob McFarlin | Photographs: Hopkins Associates | Illustrations: Kim Downing
Pens With Panache

Here's a project you'll write home about—and with

Whether you're just looking for a little fun at the lathe, want to make some gifts, or hope to start a sideline business, think pens and pencils. We asked professional woodturner and penmaker Rus Hurt for some tips on turning fine writing instruments. Here's what we learned.

Here are the tools and equipment you'll need
Basic equipment includes a lathe and a drill press. A tablesaw or bandsaw comes in handy if you want to saw your own blanks.

Almost any lathe will do. Many penmakers prefer a mini lathe, such as the Carba-Tec shown (from Penn State Industries, 800/377-7297), or a special pen-turning lathe for the job. But you can turn pens on full-size machines, too. The lathe should run up to 2,000-3,000 rpm, but you probably won't need to run it slower than 1,000 rpm, even for roughing out the small TURNINGS.

The key to turning the two wooden parts of a pen or pencil, as well as a variety of similarly made items, is a mandrel that runs between centers on your lathe. Some mandrels are designed to be gripped in a drill chuck installed on the lathe's headstock, but Rus likes the Morse taper type that fits right into the headstock spindle. A live tail center supports the other end.

In addition to the mandrel, you'll need bushings for the particular style of pen you're turning. These sizing bushings, sold in sets, slide onto the mandrel to help you establish the correct diameter for the TURNINGS. Many woodturning suppliers sell mandrels and bushings; the ones shown, along with other necessities, came from Craft Supplies USA. See the Buying Guide on page 59 for the address.

A barrel trimmer comes in handy for squaring the ends of the blanks prior to turning. And some pen styles require a cap adjuster tool. (Your pen-parts supplier can tell you whether the style you're buying requires this special tool.)

As for turning tools, Rus relies on a 3/8" spindle gouge, a 1/2" skew, a 1/4" parting tool, and sometimes a 3/16" parting tool for his pen work.

Wood is but one of the materials you can use
For each pen or pencil, you'll need a parts kit like the one shown on the opposite page. These come in a variety of styles, priced from around $5-$20 each. Pen kits are
Prepare a pair of blanks

1 Cut the pen blank into two parts, the correct lengths. (The straight-bodied pencil we turned for the photographs called for two 2”-long blanks.) Lengths may differ for other pen styles—check your kit instructions. Take care to cut the ends squarely.

2 Locate the center on one end of each piece, then, with a drill press, drill lengthwise through the center of each part. The kit you’re using will specify the correct bit size.

Though it sounds simple, drilling the blanks can be the most troublesome part of the job. Here are some tips to minimize the possibility of spoiling a blank:

- Drill with a sharp bullet-point bit. Rus says that these pilot-tip bits from Black and Decker give the best results—they’re less likely to wander or blow out the end of the blank. Pen instructions sometimes call for metric-size or letter-size holes. It’s best to use the specified bit, but you may be able to get by with the fractional-inch bits nearest those sizes: 7mm-9/32”, 8mm and Ø-5/16”; and 10mm-25/64”.
- Drill in a series of short bursts, withdrawing the bit frequently to clear chips. In exotic hardwoods and other dense materials, Rus drills about 3⁄8” deep in 1⁄8” strokes, then lets the bit cool before continuing. Overheating the material during drilling, he says, can lead to cracking later, especially in plastics and plastic-stabilized wood.
- Hold the blank securely. A jig like the one shown on the next page does a great job of keeping the blanks vertical and steady, or you can clamp them to the drill-press fence. (See the Buying Guide for our source for the drilling jig.)

3 Glue the brass tube into the drilled blank. Epoxy or instant glue

Continued
Pens With Panache

(cyanoacrylate adhesive) will do; Rus prefers a polyurethane adhesive, such as Excel.

Roughen the outside of the tube with 150-grit sandpaper. If you’re using polyurethane glue, moisten the hole in the blank with a damp rag or cotton swab. (Dampening the blank—especially a plastic one—helps the water-reactive glue cure quickly, Rus explains.)

Apply glue to the outside of the tube and the inside of the blank hole. Press the tube about halfway into the blank, rotating both parts to distribute the glue. Then, pull it out and reinsert it into the other end of the blank, making it flush on both ends. As the glue expands to fill voids, it may move the tube out of the blank; reposition the tube before the glue cures.

4 Trim the ends of the blanks with a barrel trimmer as shown above right. This will square the blank ends with the axis of the tube, ensuring that all parts fit well when you assemble the pen.

Now, grab your gouge

1 Slide the blanks and correct sizing bushings onto your mandrel assembly. Tighten the nut on the end to hold everything on the mandrel as shown opposite page, top. For some pen styles, the blanks and bushings go in a particular order; check the pen instructions.

2 Fit the tapered end of the mandrel into the lathe spindle.

3 Slide up the tailstock with a rotating center installed, and engage the center’s point in the depression in the end of the mandrel.

4 Turn the blank to a cylinder of the size established by the bushings, employing ordinary spindle-turning techniques.

You can use almost any spindle-turning tools—we roughed out the cylinders with a \( \frac{3}{4} \)” roughing gouge, as shown in the opening photo. Rus shapes pen barrels and caps with a \( \frac{3}{8} \)” gouge, and wields a \( \frac{1}{2} \)” skew for finishing cuts. He brings \( \frac{1}{8} \)” or \( \frac{3}{16} \)” parting tools into play for detailing on some pen designs. Run your lathe at a high speed (2,000-3,000 rpm) for finishing cuts, and always keep your tools sharp to ensure clean cuts on the small pieces.

5 Test the turned barrel and cap against the pen parts for size and fit, but don’t fully assemble the pen just yet.

The write finish will be important

1 Sand the turned tubes with 220, 400-, and 600-grit paper. For the best results, sand wooden turnings lengthwise (with the grain). You can leave them on the lathe as a convenient way to hold them while sanding, but don’t finish-sand them with the lathe running.

Wet-sand plastics and stabilized woods with the same grits. For these materials, where cross-grain scratches don’t pose such a problem, you can sand with the lathe running. After sanding, Rus buffs the turned parts. (For a buffing cloth, he wets a rag with Brasso metal polish and lets it dry.) He gives the parts a final polishing on a cotton buffing wheel with white jeweler’s rouge.

2 Apply a finish. Writing instruments take a lot of abuse, and dirt and oils on fingers can wear out finishes fast. That means you need a durable finish.

Rus suggests padding lacquer as the most successful finish for
With the blanks and sizing bushings in place and the knurled nut secured, the mandrel is ready to install on the lathe. The brass fitting at the left acts as a sliding stop.

Reaming a slight chamfer on the inside of the tube ends makes assembly easier. A parting tool does the job just fine.

Press the fittings into the turned tubes in the order specified by the kit instructions. A clamp or vise does the job without damage.

wooden pens. (For a home-brew version of this finish, mix equal parts of shellac, denatured alcohol, and boiled linseed oil. Apply it to the spinning turning with a soft cloth pad.) But even this finish will wear off eventually.

Synthetic materials generally stand up well to use, and require no further finishing after polishing.

Press the pen together
Pen styles differ slightly in assembly details. Refer to the instructions that came with your parts kit for pertinent information. Here are some general tips.
1 Lay out the pen parts in assembly order, following the drawing with the instructions. Check the fit of parts that slide into the brass tubes. For easier assembly, ream the tube ends slightly with a parting tool, as shown left.
2 Press the parts into the tubes, following the kit instructions. Don’t try to drive the parts in with a mallet; a wooden-jawed vise, shown below left, or a clamp with jaw protectors will accomplish the task with minimal risk of damage.

You can cement the pressed-in parts in place for more permanence. Rus uses 3M ScotchWeld epoxy (no. 2216/B/A) for this, mixing three parts gray with two parts white. He applies the adhesive sparingly, with a toothpick, and wipes off any squeeze-out immediately after assembly.
3 Finally, insert the pen ink refill, and adjust the cap, if necessary.

Buying Guide
Pen-turning tools, supplies. A full range of pen and pencil parts, turning accessories, drill bits, blanks, finishing materials, and other pen-turning necessities. Craft Supplies USA, 1287 E. 1120 S., Provo, UT 84606, or call 800/551-8876 for a catalog.

Drilling jig. Hinged jig as shown for drilling ½" and ¾" blanks, $19.45 ppd. in U.S. HUT Products for Wood, 15361 Hopper Rd., Sturgeon, MO 65284, or call 800/547-5461 to order.

Photographs: Hetherington Photography
Attention all tablesaw owners! Now's your chance to make some big improvements in your equipment for just a few dollars. By following the directions on the next few pages and investing as few as a couple of evenings, you can enclose the base, add an outfeed table, and reduce the noise level of your saw. Now how can you beat that?

Note: Our base and outfeed table were designed and built to fit a 10" Jet Contractor's Saw. The top of the base cabinet extends about 3/4" on each side of the metal saw surround. You may have to alter the base size to fit your saw. The mobile base beneath the base cabinet appeared in the November 1997 issue (#100). The sanding table is shown on page 18. Find the dust-collecting blade-guard retrofit in the next issue (#107).

Let's start with the base cabinet construction
1 Cut the base cabinet sides (A), back (B), and bottom (C) to the sizes listed in the Bill of Materials from 3/4" medium-density fiberboard (MDF) or birch plywood. As noted on the Cutting Diagram, MDF measures 1" wider and longer than regular 4x8' sheet goods.
2 From 3/4" solid stock (we recommend maple or birch), cut the 3/4)x3/4" cleats (D, E, F) to the lengths listed in the Bill of Materials. (We ripped 3/4"-wide strips from the edge of 3/4" stock, and then crosscut the strips to length.) Next, cut the filler strips (G) to size.
3 Using the Base Cabinet Exploded View drawing for reference, mark the locations of the cleats on the inside face of the side and back panels (A, B). Then, drill countersunk mounting holes in the cleats and filler strips (D-G) where dimensioned on the Base Cabinet.
Upgrade

Cleats drawing. Screw the cleats and filler strips in place.
4 Glue and screw the basic cabinet assembly (A, B, C) together in the configuration shown on the Base Cabinet Exploded View drawing. Be sure to check for square.
5 Working on the outside of the cabinet, sand the joints between the two side panels (A) and back panel (B) smooth. Then, rout a ½" round-over along the back corners of the cabinet.

Now, add the toe kick, door, and bag holder
1 Measure the width of the base cabinet, and cut the toe kick (H) to size. The toe kick should be as long as the cabinet is wide. Rout ½" round-overs along its ends, and screw it in place.
2 Cut the door (I) to size. The door should be as wide as the assembled cabinet and ½" less in height than the opening. This allows for ½" clearance above and below the installed door.
3 Rout ½" round-overs along the sides of the door. Then, cut a rabbet along one edge of the door for the continuous hinge. Locate and drill a pair of holes for the wire pull. Hinge the door in place to test the fit.
4 Working from the top of the cabinet, measure the opening and cut the saw-mount cleats (J) to size. Drill a pair of countersunk mounting holes at each end of each cleat, where shown on the Base Cabinet Cleats drawing. Screw the cleats in place. With the aid of a helper, position your tablesaw on the base cabinet. Now, mark the hole locations on the cleats (J) needed to secure the tablesaw to the cleats.
5 From ½" plywood, cut the bag holder (K) to size. Place a large garbage bag over the bag holder, and slide the holder into place. If the fit is too tight, trim the edges of the bag holder.

Next, add the outfeed table/motor enclosure
Note: Since tablesaw fences vary, review the Fence Configurations drawing to determine how to fit our outfeed table/motor enclosure with your fence. You'll need to adjust the mating pieces accordingly. When adding the assembly, keep the top surface of the outfeed table ½" below the top surface of the saw table.
1 Cut the top (L) to size, radiusing the back two corners where shown on the Outfeed Table/Motor Enclosure drawing.
2 Cut two pieces of plastic laminate to the same size as the top plus 1" in length and width. Apply contact cement to the mating surfaces, and secure one piece of laminate to the top of the outfeed table. Use a rubber roller to ensure a good bond between the laminate and MDF. Using a flush-trim bit, rout the edges of the plastic laminate flush with the edges of the top. Repeat the process to laminate the bottom side.
3 Cut the box back (M), sides (N), and support (O) to size from your sheet goods. Cut the cleats (P, Q)
Tablesaw Upgrade

to size from solid stock. Then, cut the bottom (R) from ¼" perforated hardboard.
4 Assemble the box in the configuration shown on the drawing. Rout round-overs along the back edge where shown on the drawing. Test the fit of the box against your tablesaw and trim if necessary.
5 Position the outfeed table on the motor enclosure, and carefully mark a pair of miter-gauge slots in the top to align perfectly with those in your saw top. Cut or rout the grooves to an 8" length. (After marking the groove locations, we used a straightedge and a router fitted with a straight bit to rout the grooves.) Then, mark and cut the slot for the splitter/guard support.

You're almost done—just sand, paint, and assemble
1 Fill any imperfections, and finish-sand the base cabinet, motor enclosure, door, and outfeed table.
2 Prime the assemblies. (We did this in several coats, using a sanding block with 220-grit sandpaper between coats to smooth the primer.) Paint the assemblies. See the article on page 14 in the November 1997 issue to obtain the textured paint look we achieved on this cabinet and the rest of the cabinetry in IDEA SHOP® 3. Add a clear finish to the exposed edges on the outfeed table.
3 Hinge the door to the cabinet. Attach the wire pull and magnetic catch to the door.

Written by Marlen Kemmet
Project Design: James R. Downing
Illustrations: Kim Downing
Photographs: Heatherington Photography

FENCE CONFIGURATIONS
(SIDE VIEW)

Rabbet edge
Miter-gauge slot

Chamfer edge of support.
Miter-gauge slot

Rabbet edge
Miter-gauge slot

Bill of Materials

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<th>Part</th>
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<td>18⅝&quot;</td>
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<td>C bottom</td>
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Outfeed Table/Motor Enclosure

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<tr>
<td>R bottom</td>
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Materials Key: MF—medium-density fiberboard, H—hardwood (maple or birch), PL—plywood, PH—perforated hardboard.

Supplies: #8×1⅛" flathead wood screws, #8×1½" roundhead wood screws, #10×2" flathead wood screws, plastic laminate, 3" wire pull, magnetic catch and strike plate, ⅛" continuous hinge 17½" long, primer, paint, clear finish.

CUTTING DIAGRAM

⅛ x 5½ x 72" Maple

⅛ x 49 x 97" Medium-density fiberboard ("MDF")

⅛ x 48 x 48" Plywood

⅛ x 48 x 48" Perforated hardboard

*Standard 4x8 sheet particleboard will work in place of MDF.
5 Ways to Make Precision Rabbet Cuts

Basic techniques every woodworker should master

Although simple in appearance, there's more to the rabbet cut than first meets the eye. To make the best use of rabbets, you need to know the various ways to cut them, when to use each method, and how to make the cuts effectively.

A rabbet is simply a rectangular recess along the edge or end of a workpiece. Although most often found as a joint in casework (see illustration above), a rabbet also can pop up as a design feature in a molding, as a recess for holding artwork in a picture frame, along the edges of a cabinet door to help recess it partway into its face frame, or as a half-lap or shiplap joint.

In the WOOD* magazine shop we cut rabbets with a tablesaw (set up with a dado set or combination blade), router (handheld or table-mounted), or jointer. The choice depends on the type and quantity of workpieces, and the desired quality of the rabbet cut. Here's what you need to know about each method.

1 Tablesaw with a dado set. We use this setup often because it yields clean rabbets in one pass typically—two passes for wide rabbets. For good results, you need a high-quality dado set. Since it takes a little time to install the dado blades, we use this method only if we have several workpieces to cut.

To do this successfully, first attach a ¼" wooden face to your tablesaw fence. By doing this you can cut into the wooden face and fine-tune the width of the rabbet with quick fence adjustments.

2 Tablesaw with standard blade. If we're rabbeting just a piece or two, we'll leave our combination blade in the tablesaw and make the cut in two passes. The key: You need to precisely set the fence, and the height of the blade, for both cuts so one doesn't cut beyond the other.

First, cut the rabbet to its correct depth with the workpiece facedown on the tabletop. Then, stand the piece on edge to cut the rabbet to width.

If you don't own a good dado set, or have a low-powered saw, this option may prove better than No. 1 for all of your work. But, it can be tricky if you need to rabbet the end of a narrow workpiece. In that case, you will need to clamp
the workpiece to a fixture like the one shown below that holds it steady and upright as you guide it along the fence.

4 **Router table with a straight bit.** Although you can't easily rabbet large pieces on a router table, this method has some distinct advantages over a handheld router. First, a router table has a fence that ensures a perfectly straight rabbet (a bearing-piloted bit will follow any irregularities in the workpiece edge). And, although a piloted rabbeting bit will help you cut a rabbet up to 1/2" wide and 1/2" deep, you can put a large straight bit in a router table and cut rabbets up to 1x1".

3 **Handheld router with rabbeting bit.** Unlike saw blades and dado sets, router bits do not leave tiny scoring marks. So, use a router bit if the surface or ends of the rabbets will be visible in your finished project.

Router bits are your only option if you need to rabbet an opening inside a surface rather than along an outside edge or end. Examples include a router-table opening for receiving a router plate, or the inside of an assembled doorframe for accepting a piece of glass.

With a handheld router you typically use a rabbeting bit with a pilot bearing as shown above. You can change the width of the cut simply by changing bearings. And, with this setup you can even cut rabbets along curved edges.

5 **Jointer.** We admit we rarely use a jointer to cut rabbets, but if you must cut a perfectly smooth rabbet over 1" wide, and along a straight, outside edge, look to a jointer. You can cut a rabbet as wide as the length of your jointer's cutterhead. The maximum cutting depth of your jointer will limit the depth of the rabbet, typically to 1/2".

To do this, you need to make an initial cut with your tablesaw. First, set the blade height to match the depth of the rabbet. Adjust the fence-to-outside-of-blade distance to match the rabbet width. As shown above, this cut will prevent the end of the jointer's knives from hammering the workpiece. Remove no more than 1/8" with each jointer pass.
Country All-Star Keepsake Box

Growing up in Pennsylvania, woodworker/designer Patrick Leonard visited many art festivals and exhibits. Quilts were a popular item, and the star pattern, with its infinite variations, was one that frequently caught his eye. Today, Patrick incorporates that time-honored design to top off his fashionable hardwood keepsake boxes. If you're looking for a project that's a surefire crowd-pleaser, we hope you'll agree, this is it.

Let's begin with the base and lid pieces
1 Rip and crosscut a piece of 1/2" walnut to 1" wide by 26" long for the lid pieces (A) and a second 1/2" piece to 2 1/4" wide by 26" long for the base pieces (B). Notice on the Cutting Diagram how we cut these two pieces side-by-side from the same stock so the grain would match between the lid and base later. Use your own stock or see the Buying Guide for our source.
2 Use Forming the Lid Profile drawing for reference to machine the 1"-wide lid strip. Repeat the process using Forming the Base Profile drawing to shape the base strip.
3 Miter-cut eight pieces at 22 1/2° to 2 7/8" long to form the lid pieces (A). Number the pieces in the order they were cut to align the grain when gluing them together later.
4 Repeat step 3 to cut and number the base sides (B).

It's time to miter-cut the diamonds
1 Build the jig shown on the Miter Jig drawing. Angle your miter gauge 45° from center. Position the jig against the miter gauge so the adjustable stop is 3/4" away from the blade where shown on the drawing. Drill pilot holes, and screw the jig to the miter gauge.
2 Cut a piece of walnut to 3/6" x 3/4" x 18", two pieces of maple to 3/6" x 3/4" x 18" and four pieces of oak to 3/6" x 3/4" x 20". Make a 45° miter-cut at one end of each strip. These strips will be used for the diamonds (C, D, E).
3 Raise the blade on your tablesaw 1/4" above the surface of the jig base.
4 As shown in photo A, place the mitered end of one of the strips against the stop, and miter-cut a test diamond. Position the wood diamond on the Full-Size Diamond Pattern. If necessary, adjust the stop and jig angle so the piece just cut is the same length and shape as the full-size pattern.
5 Miter-cut the diamonds from each strip. (We used the eraser end of a pencil to hold the diamond being cut in place.) After pushing the strip through the blade to make the cut, remove the diamond from the jig before moving the jig back across the blade for the next cut.

Continued
EXPLODED VIEW

LID

BASE

1/4" groove 1/4" deep 1/8" from top edge

Miter corners 22 1/2°

1/4" groove 1/4" deep 1/8" from bottom edge

BASE

1/4" x 3 1/2" x 26" Walnut

1/4" x 1 1/2" x 24" Walnut

1/4" x 1 1/2" x 24" Maple

1/4" x 1 1/2" x 24" Oak

Bill of Materials

<table>
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<tr>
<th>Part</th>
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<td>B</td>
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<tr>
<td>F</td>
<td>1/4&quot; x 6 1/2&quot; x 6 1/2&quot;</td>
<td>P</td>
<td>2</td>
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</table>

Materials Key:
W-walnut, M-maple, O-oak, P-walnut or oak plywood.

Supplies:
clear finish.

Buying Guide
Hardwood kit. All the individual pieces shown on the Cutting Diagram are cut oversized from the thickness and species listed in the Bill of Materials. Kit no. W1061, $11.95 ppd. for one, $48.95 ppd. Heritage Building Specialties, 205 North Cascade, Fergus Falls, MN 56537. Call 800/524-4184 to order.

MITER JIG

Using the miter jig, miter-cut the diamond pieces to size from the hardwood strips.
Keepsake Box

Now, let's glue the diamonds to the top panel

1. Cut two 6½" square pieces of ⅛" walnut or oak plywood for the top and bottom panels (F). Mark centerlines on the top panel where shown on the Lid Panel drawing on the opposite page.

2. Cut two 3¼" squares from ⅛" hardboard. Stick the two 3¼" squares caddy-corner from each other on the unveneered face of the ¼" plywood top panel (F) with double-faceted tape. Use a square to make sure the 3¼" hardboard squares are positioned at a right angle to each other.

3. Spread glue on one of the exposed square areas of the top panel. Position the diamonds (C, D, E) tightly into the corners and against each other on glue-covered areas as shown in photo B. (We used white glue for the extended working time.) Position waxed paper and a clamp block on top of each glued-up pattern, observing the pieces closely so they don't spread apart.

4. Remove the two taped-on 3¼" hardboard squares from the top panel, and repeat the process to cover those areas with the hardwood diamonds. Now, before the glue is fully dried, clamp the top panel to a flat surface to keep it from cupping. (Left unclamped, the top panel with the glued-on diamonds might cup as the glue dries.)

5. Fit your bandsaw with a fine-toothed blade, and trim the overhanging portions of the diamonds flush with the edges of the top panel (F). Sand the cut edges flat.

Use two square positioning blocks to align the diamonds when gluing them to the top panel.
6 Position the top panel upside down on your workbench. Mark cutlines on the plywood to form a perfect octagon. See the Lid Pattern drawing on page 80 for reference. Bandsaw along these lines to cut the top panel to final shape. Repeat for the bottom panel.

7 Sand the top surface of the top panel smooth and until it fits into the 3/8" groove in the lid pieces (A).

Here comes the fun part—assembling the pieces

1 Line up the base sides in the order they were cut and numbered, inside face down. This allows the grain to wrap around the base. Use masking tape to tape the pieces together at the miter joints, using a straightedge to keep the edges flush. See photo C for reference.

2 Wrap the taped-together pieces around the bottom panel to check the fit; adjust if necessary.

3 Use a small brush (we used an acid brush) to spread an even coat of glue on the miter joints.

4 Roll the taped-together base side pieces around the bottom panel (F) as shown in photo D. Use a band clamp or rubber bands to clamp the box sides to close the joints tight. Wipe off any excess glue with a damp cloth. Then, place the clamped-together assembly on a flat surface with a weight on top of it to hold it flat while it dries. Let the assembly dry overnight.

5 Repeat the process with the lid sides and lid panel. Wipe off any glue squeeze-out with a damp cloth, and place the lid on the base to test the fit of the two assemblies. Let the glued-together lid dry while fitted to the base.

6 Finish-sand the box and lid. (We wrapped sandpaper around a 3/8" dowel to sand the coves.) Apply a clear finish (we used satin polyurethane) to the base and lid.

Written by Marlen Kemmet
Project Design: Patrick Leonard
Washington, Pennsylvania
Illustrations: Kim Downing, Lorna Johnson
Photographs: Hetherington Studio
Despite its nickname, the largest aircraft ever built and flown wasn’t made of spruce. Find out what wood did go into this magnificent artifact of aviation history.
A Close-Up Look at the Spruce Goose

This never-before-published photograph, taken by someone whose name is lost to history, shows the Spruce Goose on the day of its one and only flight. The giant amphibian flew 70' above the harbor at Long Beach, California, for over a mile.

Continued
On Sunday morning, November 2, 1947, Howard Hughes sat behind the controls of his HK-1 flying boat as it floated on the harbor waters off Long Beach, California. As he efficiently turned switches on the panel, the aircraft's eight 3,000-hp engines roared to life.

With members of the press aboard and the shoreline filled with spectators, the huge wooden cargo plane began a series of taxi tests, lumbering to speeds up to 90 mph on the choppy water. When the HK-1 came to a stop, all reporters save one went ashore to file their stories. The remaining newsman, James McNamara of Los Angeles radio station KLAC, stayed aboard to interview the pilot.

He was in for a thrill, because without warning, Hughes once again revved the engines. Then, turning the mighty aircraft into the wind, he set the flaps to 15° for takeoff. The giant plane surged forward and upward as it smoothly, almost effortlessly, became airborne.

Hughes kept it 70° in the air for a little over a mile before easing it down for a landing. That epic flight was the first and last for the woodworking marvel called the Spruce Goose.

How the Spruce Goose came to be

Early in World War II, shipbuilder Henry Kaiser had the idea of building flying boats that could escape the danger of enemy submarines to deliver troops and supplies to battle theaters overseas. Teaming up with Howard Hughes and his design and construction team, Kaiser landed contracts in November 1942 worth $18 million to build three HK-1 (Hughes-Kaiser, 1st aircraft) flying boats. The contracts stipulated that the aircraft were to be constructed within two years, using material noncritical to the war effort.

Within months, Kaiser withdrew from the project. So Hughes unofficially called it the H-4. But the aircraft soon took on the then derisive misnomer Spruce Goose due to its all-wood construction.

Public funding was blocked by a U.S. Senate committee investigation in 1945. The HK-1 was only three-quarters complete. Hughes,
though, resolved to finish the project with his own millions.

He did, but three years behind schedule and need. Yet, the November 2, 1947, flight proved to his detractors that such a mammoth aircraft could indeed be successfully engineered.

**How the Hughes flying boat was built**

Metals, such as aluminum, were directed to the war effort and not available for prototype aircraft such as the HK-1. That left wood, a material not unknown to aviation. Because of its great strength-to-weight ratio, the Hughes design team chose yellow birch, laid up in laminations, for major components of the wing (see photo below) and fuselage framing as well as the skin. Small amounts of spruce, poplar, maple, and balsa also were used. All of the flying boat’s control surfaces (rudder, ailerons, etc.) except the flaps were fabric-covered.

The laminating process that produced the birch plywood for the aircraft was long used by Hughes’ friend, Sherman Fairchild, himself an aircraft builder. Called Duramold, it required epoxy resin glues and thin (¼”) birch veneer. The 1”-thick hull was composed of 32 layers laminated with epoxy. (Some structural components had as many as 50 laminations!) To exert the pressure necessary to temporarily keep the curved skin-laminations together while the epoxy cured, workers used thousands of small nails—about eight tons in all.

The exterior finish on the HK-1 consisted of one coat of sanded wood filler, a coat of sealer to act as a cement for the thin tissue placed over it, then two coats of spar varnish. A final coat of aluminized spar varnish gave the aircraft a metallic look, as shown in the photo below. And although aluminum later became available, Hughes preferred this smooth finish to one peppered by rivets that produced drag in flight.

The glass-smooth surface of the monstrous aircraft was created by sanded wood filler on the plywood panels, a sealer covered with thin tissue, two coats of clear spar varnish, and a topcoat of aluminized spar varnish.

**The Spruce Goose dwarfs a Piper Cub and overshadows the largest jetliner**

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<td>Fuselage width: 25'</td>
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<td>Gross weight: 400,000 lbs.</td>
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**Power**

8 Pratt and Whitney 28-cylinder R-4360s rated at 3,000 hp each (largest radial reciprocating engines ever built)

Four-bladed Hamilton standard propellers with diameters of 172".

**Designed performance**

Cruising speed: 200 mph

Maximum range: 3,000 miles

Maximum rate of climb at sea level: 1,000' per minute

**Capacities**

Payload: 130,000 lbs.

Fuel capacity: 14,000 gallons
Picture Frames, Build a batch of good-looking picture frames using our

Preserve your fondest photos of friends and loved ones by surrounding them with handsome picture frames of your own making. Here, we'll tell how to do it, from sizing, styling, and cutting to assembling and mounting.

Size your frame and select the stock

The biggest determinant in figuring how large and what shape to make your picture frame always comes down to the art package. This includes the glass, mat, photo or artwork, mounting board, and backing board. (See the Exploded View drawing on page 76.)

All of these components must fit easily into a rabbet cut into the back of the frame stock. The rabbet must be deep enough to accommodate the combined thickness of the components—at least ⅜"—with additional room to install the retaining brads or glazing points. The rabbet typically measures ¼" wide to overlap and support the glass.

The drawing below shows how to determine the overall length of a frame member. Note that the dimensions allow for a ¼" gap on all sides between the artwork package and the frame. This gap provides room for the artwork package to expand with changes in humidity and assures success during final assembly.

What you use for frame stock depends only on your imagination. Catalogs such as Constantine's (800/223-8087) carry many styles of frame moldings, some of them prefinished. Most home centers carry a variety of architectural moldings that you can adapt by adding a rabbet cut with your router table or tablesaw.

If you would like to make your own stock, check out the eight attractive molding profiles at left and far right. Then, turn to pages 77 and 78 to see how simple it is to make each one. Again, all you need are common router bits and a tablesaw. Experiment with other bits to create still more fresh looks.
Cut your miters accurately

Once you've calculated the frame size, and selected your frame stock, you're ready to cut the miters. You can cut accurate miters on your tablesaw with a simple auxiliary miter-gauge fence and a stopblock. Attach sandpaper to the face of the fence to keep your workpiece from slipping during the cutting process.

First, crosscut your four frame pieces about 1" longer than their finished sizes. Then, use a drafting triangle to adjust the miter gauge to a perfect 45° angle, as shown in photo A. Cut the right-hand miter on one end of each frame member.

Use the triangle to reset your miter gauge to make the left-hand cut. Make this cut on one workpiece, still leaving the piece about 1" too long. Hold this miter against a right-hand miter and check for square. If you see a gap between the two pieces, adjust the miter gauge as necessary. Recut the left-hand miter, removing just \( \frac{1}{16} " \) or so of material. Repeat this procedure until the miters mate perfectly.

Using a steel rule, mark one frame member for length as shown in photo B. Align the piece to make the cut, then install a stopblock on the fence. Then, cut the piece and the opposing frame member to length without changing your stopblock setting, as shown in photo C. Repeat the process to cut equal lengths of the remaining two picture frame members.

Abnormal: With the blade fully raised and the saw unplugged, use a 45° drafting triangle to set your miter gauge. Note the sandpaper attached to the face of the auxiliary fence helps hold your workpiece in place.

Above right: For accuracy, measure and mark the inside lengths of your frame pieces using a steel rule.

Right: Install a stopblock on the fence to ensure cutting opposing frame members to the same length.
Assemble the frame pieces and add the art package

In many cases, glue will hold a small frame together, provided your miters fit tightly. To glue up a frame, apply a thin layer of glue to each miter. Assemble the frame on a flat surface, check it for square, and use a miter clamp or band clamp to hold the pieces in place.

For stronger frames, reinforce the miter joints. Driving a brad into each corner makes a quick, strong solution. Glue and clamp your frame pieces in the jig in the drawing above, and check the assembly for square. To prevent the brad from splitting your frame stock, clip the head off an extra brad, chuck it in your electric drill, and use it to make a pilot hole. Drive and set two brads in each corner, then fill.

If you want even stronger joints that resist twisting, consider using splines. The drawing above shows how to cut slots for splines using a slotting cutter in a table-mounted router.

Cutting the slot larger in diameter than the spline gives you some adjustment space when lining up the mating frame surfaces. Cut the splines from ¼" hardboard using a ¾" holesaw. Apply glue to the slots and miters, then clamp.

Now, add the art package as shown below. For more on mounting, see the October 1988 issue, pages 42-47. Or, order the back issue by calling 800/572-9350.
8 EASY-TO-MAKE PROFILES
Making your own molding profiles is as easy as one-two-three. Follow the steps below to craft eye-catching picture frames. See the corresponding numbered profiles on pages 74 and 75.

Note: All frame stock shown is 3/4" thick x 1 1/2" wide.

Cut 5

V-groove router bit

Sawblade tilted 45° from vertical

Cut 2

1/8"

Cut 1

1/4"

3/8"

1 1/2"

Cut 3

3/8"

Cut 4

3/8"

Sawblade tilted 45° from vertical

Cut 3

1/4" round-nose set to cut 1/8" deep flutes

Cut 1

5/16"

1/8"

18"

Cut 2

3/8"

Cut 4

3/8"

Sawblade tilted 18° from vertical

Cut 5

1/4"

Sawblade

Cut 2

3/8"

3/8"

Cut 4

3/8"

Sawblade tilted 45° from vertical

Cut 3

3/8"

Cut 1

1 1/4"-diameter bowl cutting bit

Sawblade

Cut 3

1/8"

Cut 2

3/8"

Cut 4

3/8"

1/8"

Continued
Router Template Sets for arched panel doors

Our Arched Door Router Template sets help doormakers produce doors in four beautiful styles. Each set includes 10 rail and 10 panel templates to accommodate doors from 9-1/2" to 22" wide. The templates are precision-cut from heavy 1/4"-thick plastic, feature permanent center marks and include complete instructions. For best results use our Super Duty Flush Trim Bit to follow templates.

<table>
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<th>Item</th>
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Doormaker's Sets!

Sets include a Rail & Stile Set, Raised Panel Bit and a hardwood case!

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<th>Item</th>
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Super Duty Flush Trim Bits

Perfect for routing arched panel doors and other patterns!

Our Super Duty Flush trim bits feature massive 3/4" diameter bodies for optimum strength, 3/4" diameter bearings and down-shear cutting to eliminate frayed or chipped surfaces. These bits are designed for heavy-duty cutting, making them the perfect bit to use when routing arched panels and rails. Both bits are 1/2" shank.

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Back Cutter Bits

Fit 3/4"-thick door panels fast!

Use these bits after milling the face of your 3/4"-thick door panels.

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<th>Style</th>
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In Australia: coming soon!

Circle No. 1335
Keepsake Box
See article on page 66

FULL-SIZE
LID PATTERN

Trim to octagonal shape after applying diamonds.

Centerlines

Walnut or oak plywood, good face down

C Walnut
D Maple
E Oak
A flood isn’t the worst thing that can happen to you.

Not being insured for one is.

- A flood moves with frightening speed. In minutes, a flood can wash away everything you and your family have spent a lifetime building.
- But often the worst isn’t the flood. It’s finding out, too late, that you’re not covered for flood damage.

You’re probably not covered.

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Everyone runs the risk of being a flood victim. In fact, between 25% and 30% of flood insurance claims come from “low risk” areas. It could happen to you.

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Fortunately, now you can protect your home and property with flood insurance from the National Flood Insurance Program.

Return the coupon or call your insurance company, agent or this toll-free number: 1-888-CALL FLOOD, extension 478. Act now, since it takes 30 days before your coverage begins. Because with floods, you can never say never.

Circle No. 1982

We can’t replace your memories, but we can help you build new ones.
This tape measure finds middle without math

One of woodworking's perennial problems involves finding the center of something. I usually have to rely on mental math for this, and it's often the kind that causes a cerebral crash—dividing something like 9¾" by two.

Here's an easier way: Arm yourself with the CenterPoint 25' tape measure. Then all you have to do to find the center is look at the tape.

A separate scale along the bottom edge of the CenterPoint blade shows exactly one-half the reading on the main scale. So, to find the middle you just note the overall measurement on the regular scale (say 9¾"), then find the same measurement on the secondary scale. There's the middle.

This supremely handy tape also gives measurements in feet and inches on a scale along the middle of the blade, indicates each foot, and shows 16" centers. I extended the contractor-grade blade past 7' without it drooping. Supporting it with my hand, it made 8½'. I found it easy to engage or disengage the blade lock with my thumb. And the high-visibility yellow ABS case took drops of 4-6 without signs of damage.

If you don't think you need a 25-foot, get the 16' version. With either one of these tapes, you'll always be able to get right to the center of things.

—Tested by Bob McFarlin

Black & Decker rotary tools available with or without a cord

With a seemingly limitless array of cutting, grinding, polishing, and sanding accessories available, handheld rotary tools rank high in versatility. Now, Black & Decker's attractive new Wizard rotary tools join this handy category.

The Wizard rotary tools come in two models, the corded variable-speed RT550 and the two-speed cordless VP940. The cordless version of the Wizard runs on a single Black & Decker VersaPak 3.6-volt rechargeable battery.

Both of these new rotary tools feature a keyless chuck and easy-to-engage spindle lock. For most operations, I found finger-tightening the chuck to be adequate. For heavy tasks, such as grinding, an extra twist with pliers secured the bit more satisfactorily.

The cordless VP940 runs at 13,000 or 18,000 rpm, selectable through a top-mounted switch. I found the lower speed useful for delicate work, but the tool stalled easily at that speed. At 18,000 rpm, the VP940 seemed stronger and performed more consistently. I was able to run it 10-12 minutes on a charge; less than the 20-minute run time claimed.

The corded RT550 proved to be the real workhorse in my testing. The tool provided strong torque all across its speed range of 8,000-24,000 rpm. Even aggressive sanding with a coarse drum at the lowest speed didn't strain the RT550. At maximum speed, I found it fast and powerful.

I found both Wizard rotary tools controllable and comfortable to use. For serious work, I recommend the corded RT550. It's powerful, and its run time is unlimited—as long as you keep your electric bill paid up.

The VP940 offers convenience and portability for lighter-duty jobs. (I found it handy for sharpening my chainsaw in the field, among other things.) It would make a great addition to your VersaPak collection.

—Tested by Bob McFarlin

Continued on page 100
The Laguna Tools New 18 Bandsaw.

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Third Place: $300

HOW TO ENTER

1. RIGHT NOW: Complete and mail the preliminary entry blank on the following page, or send a photocopy, by November 2, 1998. We'll send you complete details and entry materials, along with our official entry form.

2. WHEN YOUR PROJECT IS DONE: Send us the final entry form. (Get a head start now by saving floor plans, before and after photos, and receipts that could make your project a winner.) All final entries must be postmarked by February 1, 1999.

3. THE WINNERS: Better Homes and Gardens® will select its winners on or about June 1, 1999. We will notify winners by mail and publish a selection of the top winners in upcoming issues.

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(Primarily structural home improvements. Awards for Class A — large, Class B — medium, and Class C — small projects.)

• Exterior Fix-Ups
• Outdoor Improvements
• Kitchen Shape-Ups
• Bathroom Remodeling
• Interiors
• Additions
• Whole-House
• Restorations

CATEGORY II - DECORATING

(Solely cosmetic changes to your home's interior. Awards for First, Second, and Third Place projects.)

• Special Spaces: Child's room, home office, porch, and sunroom
• Public Rooms: Living room, family room, kitchen/great-room, formal and informal dining area, and entryway
• Private Rooms: Master bedroom, master bath, guest room, and bathroom
• Whole House Redecorating: Cosmetic changes to most of the major rooms in the house

We'll judge your entry on how good it looks, how well it works, and how much value you got for the money you spent. Any home improvement/decorating project completed in 1998 is eligible, no matter how big or small it is or when it was started. It's also eligible whether you did all the work yourself or hired professional help. Entries must be U.S. residents, 18 years of age or older. Judges' decisions are final. Void where prohibited.
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*These prizes are void in Arizona, Maryland, North Dakota and Vermont.

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☐ 1. Exterior Fix-Ups
☐ 2. Outdoor Improvements
☐ 3. Kitchen Shape-Ups
☐ 4. Bathroom Remodeling
☐ 5. Interiors
☐ 6. Additions
☐ 7. Whole-House
☐ 8. Restorations

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☐ 9. Special Spaces: Child’s room, home office, porch, and sunroom
☐ 10. Public Rooms: Living room, family room, kitchen/great-room, formal and informal dining area, and entryway
☐ 11. Private Rooms: Master bedroom, master bath, guest room, and bathroom
☐ 12. Whole House Redecorating: Cosmetic changes to most of the major rooms in the house

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Allow six weeks for delivery of final entry packet. The $3.00 S&H charge is waived for residents of AZ, MD, ND, and VT.

Please do not send photos or project plans with this preliminary entry form. Send only one preliminary entry blank per family. See page 101 for complete rules.
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Finally, somebody came up with one biscuit joiner that cuts slots for every size biscuit—even the small biscuits used for narrow stock. While a 4” blade is standard on other biscuit joiners, the new Porter-Cable 557 Plate Joiner is the only one I’ve seen that comes with both 2” and 4” cutters. Using the 2” cutter and P-C’s smaller “FF” (1¼”) biscuits, I joined 1¼” stock, such as you’d use in a cabinet face frame, with no trouble.

With the rotating preset depth stops, you can quickly change the depth of the slot for sizes FF, 0, 10, and 20 biscuits. You’ll also find presets for full-depth cuts, and biscuit-size hinges and knockdown hardware.

The unusual fence design on the P-C 557 biscuit joiner makes it easy to cut biscuit slots, even on a mitered edge. The bottom scale of the unique two-level fence guide has markings from 0 to 90°, with positive stops at both extremes. For angles from 90 to 135°, just slide the fence-locking mechanism through to the top scale. With the fence in the 135° position, I captured the 45° miter in the vee of the fence and cut perfect slots as shown right. And, the fence folds flat so you don’t need to remove it to make cuts on the surface of a workpiece.

Don’t skip the safety glasses when cutting slots, though. Chips and dust can blow straight up into your eyes driven by air from the left exhaust port. Porter-Cable has promised to correct that problem.

—Tested by Dave Henderson

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Circle No. 2165

1998 Better Homes and Gardens®/NAHB Remodelers™ Council

Home Improvement Contest

OFFICIAL ENTRY RULES:

1. This contest is open to U.S. residents, 18 years of age or older, except employees and their immediate families of Meredith Corporation, co-sponsors and Home Furnishings Council, and their affiliates, subsidiaries, and advertising agencies. Preliminary entry blank must be postmarked by November 2, 1998 and received by December 1, 1998. Final entry form must be postmarked by February 1, 1999 and received by March 1, 1999. Final entry must include photo of project, written description of objectives, receipts for co-sponsor prints and floor plans (if applicable). Meredith Corporation not responsible for lost, late, misdirected or illegible entries.

2. You may enter more than one project in the contest, but not the same project in two different categories. Projects may be do-it-yourself and/or those completed by professional contractors/architects/designers. Each project may be entered by only one person. Projects must be completed in 1998.

3. Entries will be judged on appearance, function and cost-effective use of materials. In case of a tie, the entry with the highest score or appearance will be awarded the prize. Judging will be under the direction of Better Homes and Gardens® magazine. Co-sponsor awards are also judged by representatives of the co-sponsor. Decisions of judges are final. All winners except the co-sponsor winners will be selected by June 1, 1999. Co-sponsor winners will be selected by August 1999. Winners will be notified by mail. Winners will be required to sign an Affidavit of Eligibility, Assignment and Release of Liability within ten days of notification or new winners may be chosen. Travel companion of Grand Prize winner will be required to sign a release.

4. PRIZES: One Grand Prize includes $10,000 plus an all-inclusive 7-Day Vacation for Two at the Radisson Cable Beach Resort, Nassau, Bahamas and coach airfare from nearest major U.S. airport. Some restrictions may apply. 7 nights lodging, all meals/beverages, on-site activities, Accommodations subject to advance notice, space availability and blackout dates. Trip must be taken within one year from date of awarding. Approximate retail value $4,500. Two Runner-up will receive $4,000 each. Eight Class A/Four Tent Place winners will receive $1,500 each. Eight Class B/Four Second Place winners $750 each. Eight Class C/Two Third Place winners $500 each. 72 Merit winners will receive $100 each.

5. For a list of prior winners (available after August 1, 1999), send a self-addressed, stamped envelope to Better Homes and Gardens®/NAHB Remodelers™ Council Home Improvement Contest Winners' List, RFD Box 14894, Des Moines, Iowa 50306-9849.

6. Entries and entry materials become the property of Meredith Corporation and will not be returned. By acceptance of prize, winner, agree that all rights, including copyright in all entry material, are assigned to Meredith Corporation. Submission of entry constitutes permission to use winner's name, address, likeness and information regarding entrant, his/her family and property by Meredith Corporation and co-sponsors in promotion of the contest, unless prohibited by law. The project submitted cannot have been previously published or photographed by or committed to publication in any other magazine.

7. Contest is subject to all federal, state and local laws and regulations. All liability for state, federal, and local taxes is the sole responsibility of each winner. Contest is void where prohibited by law.

8. Residents of AZ, MD, ND and VT are not eligible to win the co-sponsor and Home Furnishings Council Awards. No prize transfer or substitution.

9. "Why My Home is My Haven" Contest Rules. Only eligible entries in the Better Homes and Gardens®/NAHB Remodelers™ Council Home Improvement Contest may enter. Type or legibly print a 50-100 word essay describing "Why My Home is My Haven." Place in a separate envelope labeled, "Why My Home is My Haven," and include with Home Improvement Contest entry. The essay received must be original and cannot have been previously published. Entries will be judged on originality and clarity of expression. Bowling will be under the direction of the Home Furnishings Council. Material will become the property of the Home Furnishings Council. By acceptance of prize, winner agrees that all rights, including copyright, are assigned to Home Furnishings Council. Submission of entry constitutes permission to use winner's name, address, likeness and information regarding entrant, his/her family and property by HFC, without additional compensation.

10. PLEASE DO NOT SEND PHOTOS or PROJECT PLANS WITH THE PRELIMINARY ENTRY FORM. SEND ONLY ONE PRELIMINARY ENTRY BLANK PER FAMILY.
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When snipe is a good thing

When the tool testers at WOOD magazine rate planers, much evidence of snipe—the slightly deeper knife cut at the front and back end of the board—lowers the score. If you worked as a logger in the woods, though, snipe would be a good thing.

Beveling around one end of a log with a chainsaw or ax makes it easier to pull or skid over the ground. Loggers call a log with such a helpful bevel a sniped log.

The Spruce Goose finds a new home

From the day of its flight until Howard Hughes’ death in 1976, the Spruce Goose sat in Culver City, California, hangar. Then it had a number of owners, including the Smithsonian Institution, before it was finally leased by the Walt Disney Company in 1988 from the Aero Club of Southern California/Aero Exhibits, Inc. (AEL). It joined the famed ocean liner Queen Mary at Long Beach as a major tourist attraction. But by 1990, the Walt Disney company determined that the Spruce Goose wasn’t a moneymaker and terminated the lease with its owner. The HK-1 had been evicted.

From the dozens of bids AEL received over a two-year span, the best site was determined to be the future Evergreen AirVenture Museum in McMinnville, Oregon. So in the fall of 1992, the giant aircraft was disassembled, shrink-wrapped in plastic, and moved by land and sea to its new nest 40 miles from Portland. The Spruce Goose is presently housed in a clear plastic structure awaiting its permanent shelter.

The exhibit of the Spruce Goose and its WWII-era companions is named the Captain Michael King Smith Evergreen Aviation Educational Center. Fund-raising activities to build the new center include sales of Spruce Goose souvenir merchandise, photographs, and a certificate bearing an actual piece of fabric from the aircraft’s deteriorated control surfaces.

For more information, write: Evergreen AirVenture Museum, 3850 Three Mile Lane, McMinnville, OR 97128. Call 503/472-9361. Or visit Evergreen’s website at http://www.sprucegoose.org

Aspen by another color

Michigan and other lake states have an abundance of aspen (Populus grandidentata and tremuloides). It naturally generates after logging of other species.

Normally, the whitish, lackluster hardwood ends up as construction lumber, paper pulp, crates, boxes, particleboard, and matches. All that may be changing, though.

Genetic engineers at Michigan Technological University, in Houghton, Michigan, have found a way to tamper with the species’ genes so that the wood becomes an attractive reddish color. The purpose of head researcher Chung-Jui Tsai’s experiment was to alter the lignin of the tree in order to make it easier to turn into paper pulp. However, when the bark was peeled from the experimental trees, the wood displayed a rosy, salmon hue. The distinctive color may upgrade aspen’s commercial importance sometime in the future. Its new beauty makes the wood appealing for use as furniture, exposed beams, and paneling.

Where the hardwood goes

Estimates by the U.S. Forest Service put the amount of merchantable hardwood (trees over 12” in diameter) in the United States at 700 million board feet. And, they say, our hardwood resource each year grows more than twice the amount being harvested.

Of the 12 million board feet of sawtimber (not including pulpwood for papermaking) cut annually, slightly over half is for low-grade industrial uses, such as timbers and pallets. About 10 percent of the hardwood is exported. The majority of the rest goes to the furniture industry.
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